

# Tillery K5 ALE Remodel Rogers Public Schools Rogers, Arkansas

Project No. 2422



Copyright 2024  
These Drawings and Specifications are the exclusive property of  
Hight Jackson Associates PA  
Use or reproduction is prohibited without written consent.







GENERAL CONDITIONS

SPECIFICATIONS

FOR FURNISHING LABOR AND

MATERIALS FOR:

CONSTRUCTION OF

**TILLERY K5 ALE REMODEL**

**ROGERS PUBLIC SCHOOLS**

**ROGERS, ARKANSAS**

HIGHT JACKSON ASSOCIATES PA

ARCHITECT, A.I.A.

ROGERS, ARKANSAS

PROJECT #2422

ISSUE DATE: DECEMBER 16, 2024

REVISION DATE: JANURARY 13, 2025

Copyright 2024

These Drawings and Specifications are the exclusive property of  
HIGHT JACKSON ASSOCIATES PA

Use or reproduction is prohibited without written consent.



PROJECT MANUAL FOR CONSTRUCTION OF  
**TILLERY K5 ALE REMODEL**  
**ROGERS PUBLIC SCHOOLS**  
**ROGERS, ARKANSAS**

PROJECT MANUAL TABLE OF CONTENTS

SPECIFICATIONS

**DIVISION 0 - CONDITIONS OF THE CONTRACT**

- 00 72 00      General Conditions
- 00 72 01      AIA A201 General Conditions of the Contract for Construction
- 00 72 02      EXHIBIT "B" AIA Document A133 Insurance and Bonds

**DIVISION 1 - GENERAL REQUIREMENTS**

- 01 00 00      General Requirements & Procedures
- 01 11 00      Summary of Work
- 01 22 13      Measurement and Payment
- 01 26 00      Modification Requirements
- 01 29 76      Applications for Payment
- 01 31 00      Coordination and Meetings
- 01 32 33      Construction Photographs & Documentation
- 01 32 36      Construction Progress Schedules
- 01 33 00      Submittals
- 01 35 16      Alteration Project Procedures
- 01 40 00      Quality Control
- 01 50 00      Construction Facilities and Temporary Controls
- 01 60 00      Material and Equipment
- 01 73 29      Cutting and Patching
- 01 75 00      Starting of Systems
- 01 77 00      Contract Closeout

## **DIVISION 2 – EXISTING CONDITIONS**

- 02 26 23 Asbestos Precautions and Procedures
- 02 26 26 Lead Precautions and Procedures
- 02 32 01 Site & Subsurface Investigation by Contractor
- 02 41 19 Minor Demolition

## **DIVISION 3 - CONCRETE**

- 03 11 00 Concrete Formwork
- 03 21 00 Concrete Reinforcement
- 03 30 00 Cast-In-Place Concrete
- 03 62 00 Non-Shrink Grouting
- 03 62 16 Injection Epoxy Grouting

## **DIVISION 4 - MASONRY**

- 04 05 13 Mortar
- 04 21 13 Brick Masonry
- 04 22 00 Concrete Unit Masonry

## **DIVISION 5 - METALS**

- 05 12 23 Structural Steel
- 05 21 00 Open Web Steel Joists
- 05 31 23 Metal Decking - Roof
- 05 50 00 Metal Fabrications
- 05 52 00 Handrails

## **DIVISION 6 - WOOD AND PLASTIC**

- 06 10 00 Rough Carpentry
- 06 20 23 Finish Carpentry
- 06 41 16 Cabinet Work & Shelving



## **DIVISION 7 - THERMAL AND MOISTURE PROTECTION**

07 01 50	Roof Patching
07 10 00	Waterproofing & Damp proofing
07 21 00	Insulation
07 27 26	Fluid-Applied Weather Barrier System
07 62 00	Sheet Metal Flashing & Trim
07 72 33	Roof Hatch
07 84 00	Firestopping
07 92 00	Joint Sealant

## **DIVISION 8 - OPENINGS**

08 11 13	Hollow Metal Doors & Frames
08 14 16	Wood Doors
08 31 13	Ceiling/Wall Access Panels
08 71 00	Finish Door Hardware
08 81 00	Glass & Glazing

## **DIVISION 9 – FINISHES**

09 22 16	Non-Structural Metal Framing
09 29 00	Drywall
09 51 00	Acoustical Tile Ceilings
09 65 13	Rubber Base
09 67 26	Epoxy Resinous Flooring
09 91 00	Painting & Finishing
09 96 53	Waterproof Coating

## **DIVISION 10 - SPECIALTIES**

10 11 00	Visual Display Surfaces
10 14 00	Identifying Devices
10 14 19	Aluminum Letters and Numerals
10 28 13	Toilet and Bath Accessories
10 44 00	Fire Extinguishers

## **DIVISION 11 – EQUIPMENT**

11 66 19 Wall Pads

## **DIVISION 22 - PLUMBING**

22 01 00 General Plumbing Provisions  
22 05 13 Motors for Mechanical Equipment  
22 05 53 Identification for Plumbing Piping & Equipment  
22 07 16 Equipment Insulation  
22 07 19 Piping Insulation  
22 10 05 Plumbing Piping  
22 10 06 Plumbing Specialties  
22 10 08 Plumbing Solder  
22 40 00 Plumbing Fixtures

## **DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)**

23 01 00 General HVAC Provisions  
23 05 13 Common Motor Requirements for HVAC Equipment  
23 05 53 Identification for HVAC Piping and Equipment  
23 05 93 Testing, Adjusting, And Balancing  
23 07 13 Duct Insulation  
23 09 23 Variable Refrigerant Volume (VRV) HVAC System Remote Controller  
23 09 24 VRV Advanced Multi-Zone Controller  
23 09 25 DDC Control System  
23 23 00 Refrigerant Piping and Specialties  
23 31 00 Ducts  
23 33 00 Duct Accessories  
23 33 30 Air Duct Sealants  
23 34 23 Power Ventilators  
23 37 00 Air Outlets and Inlets  
23 40 00 Air Cleaning Devices  
23 55 33 Electric Wall Heaters  
23 74 33 Packaged Dedicated Outside Air Units

- 23 75 30 VRV - Outdoor Heat Recovery
- 23 81 40 VRV - Indoor (Heat Recovery, Heat Pump)

**DIVISION 26 - ELECTRICAL**

- 26 00 10 General Electrical Provisions
- 26 05 19 Wires and Cables
- 26 05 26 Grounding
- 26 05 29 Supporting Devices
- 26 05 34 Conduit
- 26 05 37 Outlet and Pull Boxes
- 26 05 53 Identification
- 26 05 73 Overcurrent Protective Devices
- 26 09 24 Lighting Controls - Lutron Vive
- 26 21 02 Underground Distribution
- 26 24 16 Panelboards
- 26 27 26 Wall Switches, Receptacles, And Plate Covers
- 26 28 18 Motor and Circuit Disconnects
- 26 51 00 Interior Building Lighting
- 26 56 00 Exterior Lighting

**DIVISION 27 - COMMUNICATIONS**

- 27 10 05 Conduit for Telephone/Data and Tv Raceway System
- 27 10 11 Structured Telecommunications Cabling and Enclosures

**DIVISION 28 - ELECTRONIC SAFETY AND SECURITY**

- 28 31 04 Fire Detection and Voice Evacuation System

**DIVISION 31 - EARTHWORK**

- 31 31 16 Termite Control

**DIVISION 32- EXTERIOR IMPROVEMENTS**

- 32 11 16      Crushed Stone Base Course
- 32 13 13      Portland Cement Concrete Paving
- 32 31 13      Chain Link Fences & Gates

## SECTION 00 72 00

### GENERAL CONDITIONS OF THE CONTRACT

#### PART 1 GENERAL

##### 1.1 SCOPE OF WORK

- A. The work included under these Specifications consists of furnishing all items, materials, operations, or methods listed, mentioned, indicated, or scheduled on the drawings and/or in these Specifications, including all labor, materials, equipment, transportation, temporary facilities, services and incidental necessary and required for the construction and completion of the project named in the title page in accordance with contract documents.

##### 1.2 FORM OF SPECIFICATIONS

- A. General Conditions and Division 1 (General Requirements) apply to every Division (1 through 33 of these Specifications).
- B. These Specifications are of abbreviated form and contain incomplete sentences. Omissions of words or phrases such as “the Contractor shall” “shall be”, “as noted on the drawings”, “according to the drawings”, “a”, “an”, “the”, and “all” are intentional. Omitted words and phrases shall be supplied by inference in the same manner as they are when a “note” occurs on the drawings.
- C. All specification instructions are directed to the Contractor and the inclusion of any work by mention, note, or itemization, however brief, implies the Contractor shall provide same, unless specifically directed otherwise. Where a specific Contractor is named, he shall be responsible for and provide work so designated.
- D. In specifying an item by manufacturer’s name and/or catalog number, such item is to be provided complete with all the standard devices and accessories as indicated in the latest edition of the manufacturer’s catalog or brochure published at date of invitation to submit proposal, unless specifically stated otherwise.

##### 1.3 AIA GENERAL CONDITIONS

- A. AIA Document A201-2017:  
“GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION”, 2017 EDITION, 15 Articles, hereinafter referred to as the “AIA General Conditions”, is hereby made a part of this specification, a copy of which is herein attached. Contractor shall consult this document and become intimately familiar with its contents before submitting his proposal.

END OF SECTION

00 72 00-1



# AIA® Document A201® – 2017

## General Conditions of the Contract for Construction

### for the following PROJECT:

*(Name and location or address)*

Tillery K5 ALE Remodel  
Rogers, AR

### THE OWNER:

*(Name, legal status and address)*

Roger Public Schools  
Rogers, AR

### THE ARCHITECT:

*(Name, legal status and address)*

Hight Jackson Associates PA  
5201 W. Village Parkway, Suite 300  
Rogers AR 72758

### TABLE OF ARTICLES

- 1 GENERAL PROVISIONS
- 2 OWNER
- 3 CONTRACTOR
- 4 ARCHITECT
- 5 SUBCONTRACTORS
- 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
- 7 CHANGES IN THE WORK
- 8 TIME
- 9 PAYMENTS AND COMPLETION
- 10 PROTECTION OF PERSONS AND PROPERTY
- 11 INSURANCE AND BONDS
- 12 UNCOVERING AND CORRECTION OF WORK
- 13 MISCELLANEOUS PROVISIONS
- 14 TERMINATION OR SUSPENSION OF THE CONTRACT
- 15 CLAIMS AND DISPUTES

### ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

Init.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 11:33:32 ET on 12/12/2024 under Order No.2114451452 which expires on 02/28/2025, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.

User Notes:

(959735638)

## INDEX

(Topics and numbers in bold are Section headings.)

### Acceptance of Nonconforming Work

9.6.6, 9.9.3, **12.3**

Acceptance of Work

9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, **12.3**

### Access to Work

**3.16**, 6.2.1, 12.1

Accident Prevention

10

Acts and Omissions

3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5,

10.2.8, 13.3.2, 14.1, 15.1.2, 15.2

Addenda

1.1.1

Additional Costs, Claims for

3.7.4, 3.7.5, 10.3.2, 15.1.5

### Additional Inspections and Testing

9.4.2, 9.8.3, 12.2.1, **13.4**

### Additional Time, Claims for

3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, **15.1.6**

### Administration of the Contract

3.1.3, **4.2**, 9.4, 9.5

Advertisement or Invitation to Bid

1.1.1

Aesthetic Effect

4.2.13

### Allowances

**3.8**

### Applications for Payment

4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5.1, 9.5.4, 9.6.3, 9.7, 9.10

Approvals

2.1.1, 2.3.1, 2.5, 3.1.3, 3.10.2, 3.12.8, 3.12.9,

3.12.10.1, 4.2.7, 9.3.2, 13.4.1

### Arbitration

8.3.1, 15.3.2, **15.4**

## ARCHITECT

**4**

Architect, Definition of

**4.1.1**

Architect, Extent of Authority

2.5, 3.12.7, 4.1.2, 4.2, 5.2, 6.3, 7.1.2, 7.3.4, 7.4, 9.2,  
9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1,  
13.4.1, 13.4.2, 14.2.2, 14.2.4, 15.1.4, 15.2.1

Architect, Limitations of Authority and Responsibility

2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3,  
4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4, 9.4.2,  
9.5.4, 9.6.4, 15.1.4, 15.2

Architect's Additional Services and Expenses

2.5, 12.2.1, 13.4.2, 13.4.3, 14.2.4

Architect's Administration of the Contract

3.1.3, 3.7.4, 15.2, 9.4.1, 9.5

Architect's Approvals

2.5, 3.1.3, 3.5, 3.10.2, 4.2.7

Architect's Authority to Reject Work

3.5, 4.2.6, 12.1.2, 12.2.1

Architect's Copyright

1.1.7, 1.5

Architect's Decisions

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3,  
7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1,  
13.4.2, 15.2

Architect's Inspections

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.4

Architect's Instructions

3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.4.2

Architect's Interpretations

4.2.11, 4.2.12

Architect's Project Representative

4.2.10

Architect's Relationship with Contractor

1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2,  
3.5, 3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16,  
3.18, 4.1.2, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5,  
9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3, 12, 13.3.2, 13.4, 15.2

Architect's Relationship with Subcontractors

1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3

Architect's Representations

9.4.2, 9.5.1, 9.10.1

Architect's Site Visits

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4

Asbestos

10.3.1

Attorneys' Fees

3.18.1, 9.6.8, 9.10.2, 10.3.3

Award of Separate Contracts

6.1.1, 6.1.2

**Award of Subcontracts and Other Contracts for Portions of the Work**

**5.2**

### Basic Definitions

**1.1**

Bidding Requirements

1.1.1

Binding Dispute Resolution

8.3.1, 9.7, 11.5, 13.1, 15.1.2, 15.1.3, 15.2.1, 15.2.5,  
15.2.6.1, 15.3.1, 15.3.2, 15.3.3, 15.4.1

Bonds, Lien

7.3.4.4, 9.6.8, 9.10.2, 9.10.3

**Bonds, Performance, and Payment**

7.3.4.4, 9.6.7, 9.10.3, **11.1.2**, 11.1.3, **11.5**

**Building Information Models Use and Reliance**

**1.8**

Building Permit

3.7.1

### Capitalization

**1.3**

Certificate of Substantial Completion

9.8.3, 9.8.4, 9.8.5

Init.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 11:33:32 ET on 12/12/2024 under Order No.2114451452 which expires on 02/28/2025, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@alacontracts.com.

User Notes:

(959735638)



**Certificates for Payment**

4.2.1, 4.2.5, 4.2.9, 9.3.3, 9.4, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.4

**Certificates of Inspection, Testing or Approval**  
13.4.4

**Certificates of Insurance**  
9.10.2

**Change Orders**

1.1.1, 3.4.2, 3.7.4, 3.8.2.3, 3.11, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, 7.2, 7.3.2, 7.3.7, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.2, 11.5, 12.1.2

**Change Orders, Definition of**

7.2.1

**CHANGES IN THE WORK**

2.2.2, 3.11, 4.2.8, 7, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1, 11.5

**Claims, Definition of**

15.1.1

**Claims, Notice of**

1.6.2, 15.1.3

**CLAIMS AND DISPUTES**

3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, 15, 15.4

**Claims and Timely Assertion of Claims**

15.4.1

**Claims for Additional Cost**

3.2.4, 3.3.1, 3.7.4, 7.3.9, 9.5.2, 10.2.5, 10.3.2, 15.1.5

**Claims for Additional Time**

3.2.4, 3.3.1, 3.7.4, 6.1.1, 8.3.2, 9.5.2, 10.3.2, 15.1.6

**Concealed or Unknown Conditions, Claims for**  
3.7.4

**Claims for Damages**

3.2.4, 3.18, 8.3.3, 9.5.1, 9.6.7, 10.2.5, 10.3.3, 11.3, 11.3.2, 14.2.4, 15.1.7

**Claims Subject to Arbitration**

15.4.1

**Cleaning Up**

3.15, 6.3

**Commencement of the Work, Conditions Relating to**

2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.2, 15.1.5

**Commencement of the Work, Definition of**

8.1.2

**Communications**

3.9.1, 4.2.4

**Completion, Conditions Relating to**

3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 14.1.2, 15.1.2

**COMPLETION, PAYMENTS AND**

9

**Completion, Substantial**

3.10.1, 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 15.1.2

**Compliance with Laws**

2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14.1.1, 14.2.1.3, 15.2.8, 15.4.2, 15.4.3

**Concealed or Unknown Conditions**

3.7.4, 4.2.8, 8.3.1, 10.3

**Conditions of the Contract**

1.1.1, 6.1.1, 6.1.4

**Consent, Written**

3.4.2, 3.14.2, 4.1.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 13.2, 15.4.4.2

**Consolidation or Joinder**

15.4.4

**CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

1.1.4, 6

**Construction Change Directive, Definition of**

7.3.1

**Construction Change Directives**

1.1.1, 3.4.2, 3.11, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, 7.3, 9.3.1.1

**Construction Schedules, Contractor's**

3.10, 3.11, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2

**Contingent Assignment of Subcontracts**

5.4, 14.2.2.2

**Continuing Contract Performance**

15.1.4

**Contract, Definition of**

1.1.2

**CONTRACT, TERMINATION OR SUSPENSION OF THE**

5.4.1.1, 5.4.2, 11.5, 14

**Contract Administration**

3.1.3, 4, 9.4, 9.5

**Contract Award and Execution, Conditions Relating to**

3.7.1, 3.10, 5.2, 6.1

**Contract Documents, Copies Furnished and Use of**

1.5.2, 2.3.6, 5.3

**Contract Documents, Definition of**

1.1.1

**Contract Sum**

2.2.2, 2.2.4, 3.7.4, 3.7.5, 3.8, 3.10.2, 5.2.3, 7.3, 7.4, 9.1, 9.2, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.5, 12.1.2, 12.3, 14.2.4, 14.3.2, 15.1.4.2, 15.1.5, 15.2.5

**Contract Sum, Definition of**

9.1

**Contract Time**

1.1.4, 2.2.1, 2.2.2, 3.7.4, 3.7.5, 3.10.2, 5.2.3, 6.1.5, 7.2.1.3, 7.3.1, 7.3.5, 7.3.6, 7, 7, 7.3.10, 7.4, 8.1.1, 8.2.1, 8.2.3, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 12.1.2, 14.3.2, 15.1.4.2, 15.1.6.1, 15.2.5

**Contract Time, Definition of**

8.1.1

**CONTRACTOR**

3

**Contractor, Definition of**

3.1, 6.1.2

**Contractor's Construction and Submittal Schedules**

3.10, 3.12.1, 3.12.2, 4.2.3, 6.1.3, 15.1.6.2

Contractor's Employees  
2.2.4, 3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3, 11.3, 14.1, 14.2.1.1

**Contractor's Liability Insurance**  
**11.1**  
Contractor's Relationship with Separate Contractors and Owner's Forces  
3.12.5, 3.14.2, 4.2.4, 6, 11.3, 12.2.4  
Contractor's Relationship with Subcontractors  
1.2.2, 2.2.4, 3.3.2, 3.18.1, 3.18.2, 4.2.4, 5, 9.6.2, 9.6.7, 9.10.2, 11.2, 11.3, 11.4  
Contractor's Relationship with the Architect  
1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5.1, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3, 12, 13.4, 15.1.3, 15.2.1  
Contractor's Representations  
3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2  
Contractor's Responsibility for Those Performing the Work  
3.3.2, 3.18, 5.3, 6.1.3, 6.2, 9.5.1, 10.2.8  
Contractor's Review of Contract Documents  
3.2  
Contractor's Right to Stop the Work  
2.2.2, 9.7  
Contractor's Right to Terminate the Contract  
14.1  
Contractor's Submittals  
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2, 9.8.3, 9.9.1, 9.10.2, 9.10.3  
Contractor's Superintendent  
3.9, 10.2.6  
Contractor's Supervision and Construction Procedures  
1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.4, 7.3.6, 8.2, 10, 12, 14, 15.1.4  
Coordination and Correlation  
1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1  
Copies Furnished of Drawings and Specifications  
1.5, 2.3.6, 3.11  
Copyrights  
1.5, **3.17**  
Correction of Work  
2.5, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, **12.2**, 12.3, 15.1.3.1, 15.1.3.2, 15.2.1

**Correlation and Intent of the Contract Documents**  
**1.2**  
**Cost**, Definition of  
**7.3.4**  
Costs  
2.5, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3, 7.3.3.3, 7.3.4, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.2, 12.1.2, 12.2.1, 12.2.4, 13.4, 14

**Cutting and Patching**  
**3.14**, 6.2.5

Damage to Construction of Owner or Separate Contractors  
3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 12.2.4  
Damage to the Work  
3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4, 12.2.4  
Damages, Claims for  
3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.3.2, 11.3, 14.2.4, 15.1.7  
Damages for Delay  
6.2.3, 8.3.3, 9.5.1.6, 9.7, 10.3.2, 14.3.2

**Date of Commencement of the Work**, Definition of  
**8.1.2**  
**Date of Substantial Completion**, Definition of  
**8.1.3**  
**Day**, Definition of  
**8.1.4**  
Decisions of the Architect  
3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 6.3, 7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.4.2, 14.2.2, 14.2.4, 15.1, 15.2

**Decisions to Withhold Certification**  
9.4.1, **9.5**, 9.7, 14.1.1.3  
Defective or Nonconforming Work, Acceptance, Rejection and Correction of  
2.5, 3.5, 4.2.6, 6.2.3, 9.5.1, 9.5.3, 9.6.6, 9.8.2, 9.9.3, 9.10.4, 12.2.1  
Definitions  
1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 5.1, 6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1, 15.1.1

**Delays and Extensions of Time**  
**3.2**, **3.7.4**, 5.2.3, 7.2.1, 7.3.1, **7.4**, **8.3**, 9.5.1, **9.7**, 10.3.2, **10.4**, 14.3.2, **15.1.6**, 15.2.5

**Digital Data Use and Transmission**  
**1.7**  
Disputes  
6.3, 7.3.9, 15.1, 15.2

**Documents and Samples at the Site**  
**3.11**  
**Drawings**, Definition of  
**1.1.5**  
Drawings and Specifications, Use and Ownership of  
3.11  
Effective Date of Insurance  
8.2.2

**Emergencies**  
**10.4**, 14.1.1.2, **15.1.5**  
Employees, Contractor's  
3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3.3, 11.3, 14.1, 14.2.1.1  
Equipment, Labor, or Materials  
1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2  
Execution and Progress of the Work  
1.1.3, 1.2.1, 1.2.2, 2.3.4, 2.3.6, 3.1, 3.3.1, 3.4.1, 3.7.1, 3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.6, 8.2, 9.5.1, 9.9.1, 10.2, 10.3, 12.1, 12.2, 14.2, 14.3.1, 15.1.4

Int.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 11:33:32 ET on 12/12/2024 under Order No.2114451452 which expires on 02/28/2025, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@alacontracts.com.

User Notes:

(959735638)

Extensions of Time  
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2, 10.4, 14.3, 15.1.6, **15.2.5**

**Failure of Payment**  
9.5.1.3, 9.7, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2

Faulty Work  
(See Defective or Nonconforming Work)

**Final Completion and Final Payment**  
4.2.1, 4.2.9, 9.8.2, **9.10**, 12.3, 14.2.4, 14.4.3

Financial Arrangements, Owner's  
2.2.1, 13.2.2, 14.1.1.4

**GENERAL PROVISIONS**

**1**

**Governing Law**

**13.1**

Guarantees (See Warranty)

**Hazardous Materials and Substances**  
10.2.4, **10.3**

Identification of Subcontractors and Suppliers  
5.2.1

**Indemnification**  
3.1.7, **3.18**, 9.6.8, 9.10.2, 10.3.3, 11.3

**Information and Services Required of the Owner**  
2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10.1, 6.1.3, 6.1.4, 6.2.5, 9.6.1, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2, 14.1.1.4, 14.1.4, 15.1.4

**Initial Decision**  
**15.2**

**Initial Decision Maker, Definition of**  
1.1.8

Initial Decision Maker, Decisions  
14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5

Initial Decision Maker, Extent of Authority  
14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5

**Injury or Damage to Person or Property**  
**10.2.8**, 10.4

Inspections  
3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 12.2.1, 13.4

Instructions to Bidders  
1.1.1

Instructions to the Contractor  
3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.4.2

**Instruments of Service, Definition of**  
**1.1.7**

Insurance  
6.1.1, 7.3.4, 8.2.2, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 10.2.5, **11**

Insurance, Notice of Cancellation or Expiration  
11.1.4, 11.2.3

**Insurance, Contractor's Liability**  
**11.1**

Insurance, Effective Date of  
8.2.2, 14.4.2

**Insurance, Owner's Liability**  
**11.2**

**Insurance, Property**  
**10.2.5**, 11.2, 11.4, 11.5

Insurance, Stored Materials  
9.3.2

**INSURANCE AND BONDS**  
**11**

Insurance Companies, Consent to Partial Occupancy  
9.9.1

Insured loss, Adjustment and Settlement of  
11.5

Intent of the Contract Documents  
1.2.1, 4.2.7, 4.2.12, 4.2.13

**Interest**  
**13.5**

**Interpretation**  
1.1.8, 1.2.3, 1.4, 4.1.1, 5.1, 6.1.2, 15.1.1

Interpretations, Written  
4.2.11, 4.2.12

Judgment on Final Award  
15.4.2

**Labor and Materials, Equipment**  
1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2

Labor Disputes  
8.3.1

Laws and Regulations  
1.5, 2.3.2, 3.2.3, 3.2.4, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1, 10.2.2, 13.1, 13.3.1, 13.4.2, 13.5, 14, 15.2.8, 15.4

Liens  
2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8

Limitations, Statutes of  
12.2.5, 15.1.2, 15.4.1.1

Limitations of Liability  
3.2.2, 3.5, 3.12.10, 3.12.10.1, 3.17, 3.18.1, 4.2.6, 4.2.7, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 9.6.8, 10.2.5, 10.3.3, 11.3, 12.2.5, 13.3.1

Limitations of Time  
2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7, 5.2, 5.3, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15, 15.1.2, 15.1.3, 15.1.5

**Materials, Hazardous**  
**10.2.4**, **10.3**

Materials, Labor, Equipment and  
1.1.3, 1.1.6, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2

Means, Methods, Techniques, Sequences and Procedures of Construction  
3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2

Mechanic's Lien  
2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8

**Mediation**  
8.3.1, 15.1.3.2, 15.2.1, 15.2.5, 15.2.6, **15.3**, 15.4.1, 15.4.1.1

**Minor Changes in the Work**  
1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1, 7.4

Init.

/

## MISCELLANEOUS PROVISIONS

### 13

#### Modifications, Definition of

##### 1.1.1

#### Modifications to the Contract

1.1.1, 1.1.2, 2.5, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7, 10.3.2

#### Mutual Responsibility

##### 6.2

#### Nonconforming Work, Acceptance of

9.6.6, 9.9.3, 12.3

#### Nonconforming Work, Rejection and Correction of

2.4, 2.5, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4, 12.2

#### Notice

1.6, 1.6.1, 1.6.2, 2.1.2, 2.2.2., 2.2.3, 2.2.4, 2.5, 3.2.4, 3.3.1, 3.7.4, 3.7.5, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 7.4, 8.2.2, 9.6.8, 9.7, 9.10.1, 10.2.8, 10.3.2, 11.5, 12.2.2.1, 13.4.1, 13.4.2, 14.1, 14.2.2, 14.4.2, 15.1.3, 15.1.5, 15.1.6, 15.4.1

#### Notice of Cancellation or Expiration of Insurance

11.1.4, 11.2.3

#### Notice of Claims

1.6.2, 2.1.2, 3.7.4, 9.6.8, 10.2.8, 15.1.3, 15.1.5, 15.1.6, 15.2.8, 15.3.2, 15.4.1

#### Notice of Testing and Inspections

13.4.1, 13.4.2

#### Observations, Contractor's

3.2, 3.7.4

#### Occupancy

2.3.1, 9.6.6, 9.8

#### Order of Precedence

1.9, 1.9.1, 1.9.2, 1.9.3, 1.9.4

#### Orders, Written

1.1.1, 2.4, 3.9.2, 7, 8.2.2, 11.5, 12.1, 12.2.2.1, 13.4.2, 14.3.1

## OWNER

### 2

#### Owner, Definition of

##### 2.1.1

#### Owner, Evidence of Financial Arrangements

2.2, 13.2.2, 14.1.1.4

#### Owner, Information and Services Required of the

2.1.2, 2.2, 2.3, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2, 14.1.1.4, 14.1.4, 15.1.4

#### Owner's Authority

1.5, 2.1.1, 2.3.32.4, 2.5, 3.4.2, 3.8.1, 3.12.10, 3.14.2, 4.1.2, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2.1, 7.3.1, 8.2.2, 8.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2, 10.3.2, 11.4, 11.5, 12.2.2, 12.3, 13.2.2, 14.3, 14.4, 15.2.7

#### Owner's Insurance

##### 11.2

#### Owner's Relationship with Subcontractors

1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2

#### Owner's Right to Carry Out the Work

2.5, 14.2.2

#### Owner's Right to Clean Up

##### 6.3

#### Owner's Right to Perform Construction and to Award Separate Contracts

##### 6.1

#### Owner's Right to Stop the Work

##### 2.4

#### Owner's Right to Suspend the Work

14.3

#### Owner's Right to Terminate the Contract

14.2, 14.4

#### Ownership and Use of Drawings, Specifications and Other Instruments of Service

1.1.1, 1.1.6, 1.1.7, 1.5, 2.3.6, 3.2.2, 3.11, 3.17, 4.2.12, 5.3

#### Partial Occupancy or Use

9.6.6, 9.9

#### Patching, Cutting and

3.14, 6.2.5

#### Patents

3.17

#### Payment, Applications for

4.2.5, 7.3.9, 9.2, 9.3, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1, 14.2.3, 14.2.4, 14.4.3

#### Payment, Certificates for

4.2.5, 4.2.9, 9.3.3, 9.4, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4

#### Payment, Failure of

9.5.1.3, 9.7, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2

#### Payment, Final

4.2.1, 4.2.9, 9.10, 12.3, 14.2.4, 14.4.3

#### Payment Bond, Performance Bond and

7.3.4.4, 9.6.7, 9.10.3, 11.1.2

#### Payments, Progress

9.3, 9.6, 9.8.5, 9.10.3, 14.2.3, 15.1.4

## PAYMENTS AND COMPLETION

### 9

#### Payments to Subcontractors

5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2

#### PCB

10.3.1

#### Performance Bond and Payment Bond

7.3.4.4, 9.6.7, 9.10.3, 11.1.2

#### Permits, Fees, Notices and Compliance with Laws

2.3.1, 3.7, 3.13, 7.3.4.4, 10.2.2

## PERSONS AND PROPERTY, PROTECTION OF

### 10

#### Polychlorinated Biphenyl

10.3.1

#### Product Data, Definition of

##### 3.12.2

#### Product Data and Samples, Shop Drawings

3.11, 3.12, 4.2.7

#### Progress and Completion

4.2.2, 8.2, 9.8, 9.9.1, 14.1.4, 15.1.4

Init.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 11:33:32 ET on 12/12/2024 under Order No.2114451452 which expires on 02/28/2025, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.

User Notes:

(959735638)

**Progress Payments**  
9.3, 9.6, 9.8.5, 9.10.3, 14.2.3, 15.1.4

**Project, Definition of**  
1.1.4

**Project Representatives**  
4.2.10

**Property Insurance**  
10.2.5, 11.2

**Proposal Requirements**  
1.1.1

**PROTECTION OF PERSONS AND PROPERTY**  
10

**Regulations and Laws**  
1.5, 2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1, 10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14, 15.2.8, 15.4

**Rejection of Work**  
4.2.6, 12.2.1

**Releases and Waivers of Liens**  
9.3.1, 9.10.2

**Representations**  
3.2.1, 3.5, 3.12.6, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.10.1

**Representatives**  
2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.10, 13.2.1

**Responsibility for Those Performing the Work**  
3.3.2, 3.18, 4.2.2, 4.2.3, 5.3, 6.1.3, 6.2, 6.3, 9.5.1, 10

**Retainage**  
9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3

**Review of Contract Documents and Field Conditions by Contractor**  
3.2, 3.12.7, 6.1.3

**Review of Contractor's Submittals by Owner and Architect**  
3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2

**Review of Shop Drawings, Product Data and Samples by Contractor**  
3.12

**Rights and Remedies**  
1.1.2, 2.4, 2.5, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1, 6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.1, 12.2.2, 12.2.4, 13.3, 14, 15.4

**Royalties, Patents and Copyrights**  
3.17

**Rules and Notices for Arbitration**  
15.4.1

**Safety of Persons and Property**  
10.2, 10.4

**Safety Precautions and Programs**  
3.3.1, 4.2.2, 4.2.7, 5.3, 10.1, 10.2, 10.4

**Samples, Definition of**  
3.12.3

**Samples, Shop Drawings, Product Data and**  
3.11, 3.12, 4.2.7

**Samples at the Site, Documents and**  
3.11

**Schedule of Values**  
9.2, 9.3.1

**Schedules, Construction**  
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2

**Separate Contracts and Contractors**  
1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2

**Separate Contractors, Definition of**  
6.1.1

**Shop Drawings, Definition of**  
3.12.1

**Shop Drawings, Product Data and Samples**  
3.11, 3.12, 4.2.7

**Site, Use of**  
3.13, 6.1.1, 6.2.1

**Site Inspections**  
3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.9.2, 9.4.2, 9.10.1, 13.4

**Site Visits, Architect's**  
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4

**Special Inspections and Testing**  
4.2.6, 12.2.1, 13.4

**Specifications, Definition of**  
1.1.6

**Specifications**  
1.1.1, 1.1.6, 1.2.2, 1.5, 3.12.10, 3.17, 4.2.14

**Statute of Limitations**  
15.1.2, 15.4.1.1

**Stopping the Work**  
2.2.2, 2.4, 9.7, 10.3, 14.1

**Stored Materials**  
6.2.1, 9.3.2, 10.2.1.2, 10.2.4

**Subcontractor, Definition of**  
5.1.1

**SUBCONTRACTORS**  
5

**Subcontractors, Work by**  
1.2.2, 3.3.2, 3.12.1, 3.18, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2, 9.6.7

**Subcontractual Relations**  
5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1

**Submittals**  
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.4, 9.2, 9.3, 9.8, 9.9.1, 9.10.2, 9.10.3

**Submittal Schedule**  
3.10.2, 3.12.5, 4.2.7

**Subrogation, Waivers of**  
6.1.1, 11.3

**Substances, Hazardous**  
10.3

**Substantial Completion**  
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 15.1.2

**Substantial Completion, Definition of**  
9.8.1

**Substitution of Subcontractors**  
5.2.3, 5.2.4

**Substitution of Architect**  
2.3.3

**Substitutions of Materials**  
3.4.2, 3.5, 7.3.8

Init.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 11:33:32 ET on 12/12/2024 under Order No.2114451452 which expires on 02/28/2025, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aicontracts.com.

User Notes:

(959735638)

**Sub-subcontractor, Definition of**  
**5.1.2**  
 Subsurface Conditions  
 3.7.4  
**Successors and Assigns**  
**13.2**  
**Superintendent**  
**3.9, 10.2.6**  
**Supervision and Construction Procedures**  
 1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3,  
 7.3.4, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.4  
 Suppliers  
 1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.5.4, 9.6,  
 9.10.5, 14.2.1  
 Surety  
 5.4.1.2, 9.6.8, 9.8.5, 9.10.2, 9.10.3, 11.1.2, 14.2.2,  
 15.2.7  
 Surety, Consent of  
 9.8.5, 9.10.2, 9.10.3  
 Surveys  
 1.1.7, 2.3.4  
**Suspension by the Owner for Convenience**  
**14.3**  
 Suspension of the Work  
 3.7.5, 5.4.2, 14.3  
 Suspension or Termination of the Contract  
 5.4.1.1, 14  
**Taxes**  
 3.6, 3.8.2.1, 7.3.4.4  
**Termination by the Contractor**  
**14.1, 15.1.7**  
**Termination by the Owner for Cause**  
 5.4.1.1, 14.2, 15.1.7  
**Termination by the Owner for Convenience**  
**14.4**  
 Termination of the Architect  
 2.3.3  
 Termination of the Contractor Employment  
 14.2.2

**TERMINATION OR SUSPENSION OF THE CONTRACT**  
**14**  
**Tests and Inspections**  
 3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3,  
 9.9.2, 9.10.1, 10.3.2, 12.2.1, 13.4  
**TIME**  
**8**  
**Time, Delays and Extensions of**  
 3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, 8.3, 9.5.1, 9.7,  
 10.3.2, 10.4, 14.3.2, 15.1.6, 15.2.5

Time Limits  
 2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2,  
 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1,  
 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15.1.2,  
 15.1.3, 15.4  
**Time Limits on Claims**  
 3.7.4, 10.2.8, 15.1.2, 15.1.3  
 Title to Work  
 9.3.2, 9.3.3  
**UNCOVERING AND CORRECTION OF WORK**  
**12**  
**Uncovering of Work**  
**12.1**  
 Unforeseen Conditions, Concealed or Unknown  
 3.7.4, 8.3.1, 10.3  
 Unit Prices  
 7.3.3.2, 9.1.2  
 Use of Documents  
 1.1.1, 1.5, 2.3.6, 3.12.6, 5.3  
**Use of Site**  
**3.13, 6.1.1, 6.2.1**  
**Values, Schedule of**  
**9.2, 9.3.1**  
 Waiver of Claims by the Architect  
 13.3.2  
 Waiver of Claims by the Contractor  
 9.10.5, 13.3.2, 15.1.7  
 Waiver of Claims by the Owner  
 9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.3.2, 14.2.4, 15.1.7  
 Waiver of Consequential Damages  
 14.2.4, 15.1.7  
 Waiver of Liens  
 9.3, 9.10.2, 9.10.4  
**Waivers of Subrogation**  
 6.1.1, 11.3  
**Warranty**  
**3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.2, 9.10.4, 12.2.2,**  
 15.1.2  
 Weather Delays  
 8.3, 15.1.6.2  
**Work, Definition of**  
**1.1.3**  
 Written Consent  
 1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.10.3,  
 13.2, 13.3.2, 15.4.4.2  
 Written Interpretations  
 4.2.11, 4.2.12  
 Written Orders  
 1.1.1, 2.4, 3.9, 7, 8.2.2, 12.1, 12.2, 13.4.2, 14.3.1

## **ARTICLE 1 GENERAL PROVISIONS**

### **§ 1.1 Basic Definitions**

#### **§ 1.1.1 The Contract Documents**

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

#### **§ 1.1.2 The Contract**

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

#### **§ 1.1.3 The Work**

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

#### **§ 1.1.4 The Project**

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

#### **§ 1.1.5 The Drawings**

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

#### **§ 1.1.6 The Specifications**

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

#### **§ 1.1.7 Instruments of Service**

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

#### **§ 1.1.8 Initial Decision Maker**

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

#### **1.1.9 Contractor / Construction Manager**

The term Contractor is interchangeable with the term Construction Manager

### **§ 1.2 Correlation and Intent of the Contract Documents**

**§ 1.2.1** The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as

Init.

binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

1.2.4 Should a discrepancy be found among the contract documents, request interpretation from the Architect, before proceeding with the work. Should an error, inconsistency or omission later be found in the drawings or specifications, or between drawings and specifications, or between drawing divisions, Contractor is deemed to have estimated on the more stringent requirement or more expensive way of doing work, unless he shall have asked for and obtained a written decision before submission of proposal as to which method of materials will be required. Contractor shall notify Architect if any of these situations occur, and gain approval before proceeding. Reference used in these specifications to the Architect shall mean Hight-Jackson Associates PA.

1.2.5 Before submitting their proposal, each bidder shall check their set(s) of Specifications and Drawings and advise the Architect if any sheets are missing.

1.2.6 Do not scale drawings for dimensions. Accurately lay out such work from dimensions indicated on drawings unless such is found in error. Consult Architect for any interpretations concerning locations of equipment.

1.2.7 Any terms that have commonly known technical or trade meanings, unless otherwise specifically defined in the Contract Documents, shall be interpreted in accordance with the commonly known meanings.

### § 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

### § 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement. When a word, such as "approved", "proper", "satisfactory", "alternate", and "as directed" is used, it implies such reference is to the architect's specific approval and directions. "Provide" means furnish and install

### § 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the

Init.



specific written consent of the Owner, Architect, and the Architect's consultants. The Construction Manager shall be responsible for drawing and specification distribution to subcontractors, sub-subcontractors, vendors and suppliers.

#### **§ 1.6 Notice**

**§ 1.6.1** Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

**§ 1.6.2** Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

#### **§ 1.7 Digital Data Use and Transmission**

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document C106-2013, Digital Data Licensing Agreement, to establish the protocols for the development, use, transmission, and exchange of digital data. DWG drawing files can be made available to the construction manager, contractor, sub-contractors or vendor after award of contract with an executed electronic drawing release form obtained from Hight Jackson Associates PA.

*(Paragraphs deleted)*

### **ARTICLE 2 OWNER**

#### **§ 2.1 General**

**§ 2.1.1** The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

**§ 2.1.2** The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

#### **§ 2.2 Evidence of the Owner's Financial Arrangements**

**§ 2.2.1** Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

**§ 2.2.2** Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

**§ 2.2.3** After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

Init.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

**§ 2.3 Information and Services Required of the Owner**

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one electronic copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

**§ 2.4 Owner's Right to Stop the Work**

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

**§ 2.5 Owner's Right to Carry Out the Work**

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

init.

## ARTICLE 3 CONTRACTOR

### § 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor, Construction Manager or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

### § 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

### § 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

3.3.4 The Contractor shall notify the Subcontractors, Owner, and all Contractors, Subcontractors and Vendors under the Owner when the Contractor is ready for them to install their portions of the work and see that they comply with any reasonable period of time. Neither enclose nor cover any piping, wiring ducts, equipment or other items until proper tests and inspection have been made by Architect and/or proper authorities.

3.3.5 The Contractor shall notify the Architect to observe any work when placing of subsequent work would prevent observation of previous work.

3.3.6 The Contractor shall take charge of and assume general responsibility for proper protection of building during construction. The Contractor shall further provide substantial enclosures at all openings as necessary for protection, including doors with locks.

3.3.7 The Contractor, Subcontractors, sub-subcontractors, and vendors assume responsibility for their materials stored on the premises.

#### § 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. Place material orders immediately following materials submittal approval. Furnish evidence of orders to Architect upon request.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive. Proposals for substitutions of material, equipment, or methods shall be submitted no later than thirty days from date of written Notice to Proceed, authorizing performance of the Contract. Include a list of all materials proposed for substitution of materials specified. Proposals for substitution shall be accompanied by technical data, as the Architect may need in order to compare the proposed material with the material that was specified. No substitutions shall be made until written permission is given by the Architect at the direction of the Owner.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

3.4.4 Where a material is mentioned in the Specifications by trade name or manufacturer's name, the same is not preference for said material, but the intention of using said name is to establish a type of quality of material. Material of other trade names or of other manufacturers which is in the opinion of the architect, equivalent or better in type or quality will be accepted by the Architect on behalf of the Owner only as provided in Section 01 60 00

3.4.5 Before submitting proposal, Contractor, Subcontractors, Vendors and Material Suppliers shall observe Drawings and Specifications, and should Contractor discover that any material and/or its installation be indicated or specified in a manner not approved by the Material Manufacturer, or specified item has been discontinued, notify Architect and receive their instructions. The Contractor shall provide other equivalent materials suitable for the installation as selected by Architect. Contractor shall replace materials with such other equivalent suitable and selected materials and shall be entitled to an equitable adjustment in the contract price as needed.

Init.

### § 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. Warranty all work to be free from defects in materials and workmanship for a period of one year from the date of Substantial Completion, except where a different time period is specifically prescribed. Contractor will promptly correct such defects to the state of condition originally required by the contract documents at contractor's expense. Warranty period for all equipment and material shall not begin until the date of Substantial Completion. Contractor will promptly correct such defects to the state of condition originally required by the contract documents at contractor's expense during the warranty period.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

3.5.3 When, at any time during the warranty period, work is considered defective as described by the contract documents by either Owner or Architect, the Contractor shall immediately place such defective work into satisfactory condition, free from faults and defects and in conformance with contract requirements. Make good all damage to work, including contents thereof and grounds, developing within warranty period when such damage is due to use of materials and labor not conforming to contract requirements. Make good all work disturbed in fulfillment of contract obligations during warranty period. If work of other contractors is disturbed in the process of fulfilling contract, restore such work to its original condition and warranty such restored work.

3.5.4 Upon failure by contractor to proceed promptly to comply with terms of any warranty under the contract, Owner shall have such work performed as necessary to fulfill warranties, and contractor shall pay Owner such sums as expended to fulfill such warranty.

3.5.5 Work required for fulfillment of warranties embraced under the contract shall be performed at no additional expense to Owner.

3.5.6 Unless other specifically prescribed in warranty, normal wear and tear and results of accidents not chargeable to contractor are excluded from the requirements of this Article.

3.5.7 Prior to expiration of the one-year warranty period, the Architect will conduct an inspection of the project and create a punch list for items found to be deficient. Contractor will be required to be present. The Architect will set a date by which the deficient items are to be corrected. Contractor will return punch list to Architect, initialing completed each completed item. Note that contractor will remain responsible for repair and or replacement of items with warranties extending beyond one year as called for in individual specification sections or on drawings.

### § 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded. Materials and equipment incorporated into this project will be required to follow the Guidelines of the State the project is within Sales Tax and such taxes shall be included in bidder's proposals unless project qualifies for tax exemption. Contractors shall include Social Security Taxes, State Unemployment compensation Insurance and all other items of like nature.

### § 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction. Should applicable laws, ordinances, statutes, treaties, executive orders, tariffs, standards, rules and/or regulations change between the date of the Guaranteed Maximum Price proposal and commencement of the Work, and should such change require the Contractor to perform either more or less work or cause the Cost of the Work to change, the Contract Sum and Contract Time shall be equitably adjusted in compliance with the requirements of Article 7, Changes in the Work.

#### § 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor, upon having actual knowledge of such conditions, shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

#### § 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness so as not to cause delay in the progress of the Work.

#### § 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in full-time attendance at the Project site during performance of the Work. The superintendent shall have a minimum of 10 years of construction experience. Five (5) years of that experience shall have been in the capacity of a project

Init.

superintendent on similar type projects. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

**§ 3.9.2** The Contractor, prior to award of the Contract, shall notify the Owner and Architect of the name, resume and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Owner or the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Owner or Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection. The Owner retains the right to accept or reject proposed superintendent prior to signing of contract.

**§ 3.9.3** The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

**3.9.4** The superintendent assigned to the project at the beginning of construction will remain as superintendent for the entire duration of construction period. The superintendent shall provide duties per general conditions and remain on site for the entire duration of the project, including completion of all punch list items. The only circumstances that would permit replacement of the superintendent are prolonged illness, resignation of the superintendent from the company, or death. If one of the preceding circumstances should occur, the Contractor shall state in writing to the Owner the reason for replacement, send qualification statement of the proposed replacement project superintendent, and obtain approval from the Owner and Architect. The replacement superintendent shall possess the minimum requirements set forth in paragraph 3.9.1.

### **§ 3.10 Contractor's Construction and Submittal Schedules**

**§ 3.10.1** The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

**§ 3.10.2** The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be Contractor coordinated with the Contractor's construction schedule, and (2) allows the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

**§ 3.10.3** The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

### **§ 3.11 Documents and Samples at the Site**

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

### **§ 3.12 Shop Drawings, Product Data and Samples**

**§ 3.12.1** Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, vendor, or distributor to illustrate some portion of the Work.

Init.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect

Init.



have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

### § 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

### § 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

### § 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project. The Contractor shall replace broken or scratched glass, clean fixtures, remove dust, dirt, spots, marks, labels, stains, foreign paint and other blemishes from all finish work, unless more exactly specified, clean all floors and floor coverings, clean and polish hardware.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

### § 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

### § 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

### § 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, 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), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for

whose acts they 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 that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

## **ARTICLE 4 ARCHITECT**

### **§ 4.1 General**

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

### **§ 4.2 Administration of the Contract**

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

### **§ 4.2.4 Communications**

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise

such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

## ARTICLE 5 SUBCONTRACTORS

### § 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

Init.

**§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work**

**§ 5.2.1** Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection. Subcontractors shall not be released from their contract or replaced without notification -to Owner.

**§ 5.2.2** The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

**§ 5.2.3** If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

**§ 5.2.4** The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

**§ 5.3 Subcontractual Relations**

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

**§ 5.4 Contingent Assignment of Subcontracts**

**§ 5.4.1** Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

**§ 5.4.2** Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

**§ 5.4.3** Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the

Init.

Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

## **ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

### **§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts**

**§ 6.1.1** The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

**§ 6.1.2** When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

**§ 6.1.3** The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

**§ 6.1.4** Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

### **§ 6.2 Mutual Responsibility**

**§ 6.2.1** The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

**§ 6.2.2** If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of reasonably discoverable discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not reasonably discoverable.

**§ 6.2.3** The Contractor shall reimburse the Owner for reasonable costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

**§ 6.2.4** The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

**§ 6.2.5** The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

**6.2.6** Contractor shall assume general coordination and direction of the project. Each Contractor shall cooperate with other Contractors on the Work and install his work in sequence to facilitate and not delay the installation of such other contractors. The Architect is neither the coordinator nor the expeditor of the work of the various contractors.

Init.

6.2.7 The Construction Manager shall be responsible for construction schedule coordination, processing of payment applications, completion of work and closeout documentation with owner vendor contractors per agreement A151-2019.

### § 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

## ARTICLE 7 CHANGES IN THE WORK

### § 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

### § 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

### § 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- 1 By estimate and acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation computed as follows:
  - a. Net cost of materials.
  - b. State and local sales tax.
  - c. Net placing cost.
  - d. W.C. insurance premium and FICA tax.
  - e. Overhead and profit, 15% x (a + b + c + d).
  - f. Allowable bond premium.
  - g. Total Cost = a + b + c + e + f.

Credit for work omitted, which was included in original contract, shall be computed on the same basis. The value of any such extra work or change performed by a subcontractor shall be determined by the subcontractor computing his cost as outlined in subparagraph 7.3.3 (a. through e.), to which cost the Contractor shall add an overhead and profit charge of 5% plus allowable bond premium.;

- .2 Unit prices stated in the Contract Documents or subsequently agreed upon (Unit price will include contractor's profit and overhead, insurance and bond, and quantification of amount of material by third party.);
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee, to be computed according to above formula. Contractor shall be required, if called upon, to furnish original bills and payrolls and support of statement with proper affidavits. Burden of proof of costs rests upon Contractor.; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

#### § 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

### ARTICLE 8 TIME

#### § 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the written Notice to Proceed. Do not begin work prior to receipt of written Notice to Proceed authorizing performance of the contract. The official Notice to Proceed will be issued by the Owner through Architect.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

#### § 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

8.2.4 If the Contractor fails to complete the work by as noted in the Notice to Proceed, or any agreed extension thereof, he shall pay to the Owner as liquidated damages, fixed or agreed, and not as a penalty, the sum of Five Hundred Dollars (\$500.00) for each calendar day of delay of the work, which sum shall be withheld by the Owner from payments due to be made to the Contractor by the Owner under the terms of the contract.

#### § 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine; or (6) by account of rainfall, snow, or cold weather during the contract time will be subject to approval by the Architect and as provided in Section 01 29 76. Request for extension of time is to be submitted with each Request for Payment. Request for extension of time is to be submitted in writing within Thirty (30) days of the occurrence. If Contractor fails to submit request, time extension will not be approved for the pay period; or (7) If it is not possible to obtain certain materials when needed and the Contractor submits evidence that Contractor issued purchase orders and/or subcontracts immediately following execution of the Contract with the Owner and that Contractor and subcontractors have made every reasonable effort to obtain the materials when or before needed, delays in completion due to inability to obtain such materials will be acknowledged as being "beyond the Contractor's control".

Init.



**§ 8.3.2** Claims relating to time shall be made in accordance with applicable provisions of Article 15. Any claim for extension of time shall be made in writing to the Owner/Architect not more than Seven (7) days after commencement of the delay, otherwise, it shall be waived. In case of a continuing delay only one claim is necessary. In case of claims for extensions of time because of adverse weather, such extensions of time shall be granted only when such adverse weather prevented the execution of major items of Work as defined as a day where at least four (4) hours of work on a principal unit of work (critical path) underway, between the hours of 7:00 AM and 6:00 PM cannot be completed because of weather conditions beyond control of the contractor on normal working days and exceeds the number of anticipated days. The following are considered reasonable anticipated days of adverse weather on a monthly basis and shall be included in the contract time. Adverse weather days, beyond each of the monthly totals will be allowed to extend contract time, without additional cost, only if approved and authorized by the Architect, and the Owner and as provided in Section 01 29 76.

January	11 days	July	6 days
February	10 days	August	6 days
March	8 days	September	4 days
April	7 days	October	5 days
May	5 days	November	7 days
June	6 days	December	8 days

**§ 8.3.3** This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

## ARTICLE 9 PAYMENTS AND COMPLETION

### § 9.1 Contract Sum

**§ 9.1.1** The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

**§ 9.1.2** If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

### § 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

### § 9.3 Applications for Payment

**§ 9.3.1** On or before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers and shall reflect retainage if provided for in the Contract Documents. Refer to Section 01 29 76 for additional provisions.

*(Paragraph deleted)*

**§ 9.3.1.2** Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

**§ 9.3.2** Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site. Payment

Init.

claims for materials stored off site must be accompanied with an itemized list of materials establishing value, proof that the materials are insured, and a receipt of storage from a bonded warehouse. Upon payment of materials stored, title to the material shall be to the Owner. All expenses incurred in storage of materials will be paid by the Contractor.

**§ 9.3.3** The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

#### **§ 9.4 Certificates for Payment**

**§ 9.4.1** The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

**§ 9.4.2** The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

#### **§ 9.5 Decisions to Withhold Certification**

**§ 9.5.1** The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

**§ 9.5.2** When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

Init.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

*(Paragraph deleted)*

#### § 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

*(Paragraph deleted)*

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

#### § 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within fifteen days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

#### § 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete and certified by the Architect in accordance with the Contract Documents, so that the Owner can occupy or utilize the Work for its intended use without sacrificing the quality of services or having to significantly modify operations from intended usage as per design, as expressed in the Contract Documents. The contractor must obtain certificate of occupancy and any other approvals for use and occupancy from local and state agencies prior to receiving substantial completion.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. The Contractor shall proceed promptly to complete and correct items on his list. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Document and ready for Architect/Engineer's final punch. Provide submittals to Architect / Engineer that are required by any governing body or other authorities.

§ 9.8.3 Contractor shall notify Architect ten (10) days prior to the date on which the building will be ready for final inspection. Upon receipt of the Contractor's list, the Architect will perform a punch to determine by observation whether the Work or designated portion thereof is substantially complete. Failure to include an item on the final list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Significant amounts of incomplete work found during the inspection shall be grounds for ceasing the inspection. Minor adjustments and corrections to work shall not be considered cause for discontinuing final inspection. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Architect determines that Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

#### § 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

#### § 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly

Init.

issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

**§ 9.10.2** Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, (6) completion of closeout documents per specification 01 77 00 "CLOSEOUT" documents must be provided by the Contractor and reviewed by the Architect. These closeout documents are to be complete in every respect with no exclusions or exceptions. Closeout documents shall be delivered to the Architect no later than thirty (30) calendar days from Date of Substantial completion, and (7) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

**§ 9.10.3** If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

**§ 9.10.4** The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

**§ 9.10.5** Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

## **ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY**

### **§ 10.1 Safety Precautions and Programs**

The Contractor shall be responsible for initiating, maintaining, and supervising safety precautions and programs in connection with the performance of the Contract.

### **§ 10.2 Safety of Persons and Property**

**§ 10.2.1** The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is irresponsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

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

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

#### § 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

#### § 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection.

Init.

When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 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), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

#### § 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

### ARTICLE 11 INSURANCE AND BONDS

#### § 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in Document A133-2019 Exhibit B Insurance and Bonds or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 **Notice of Cancellation or Expiration of Contractor's Required Insurance.** Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

## § 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in Document A133-2019 Exhibit B Insurance and Bonds or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 **Failure to Purchase Required Property Insurance.** If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 **Notice of Cancellation or Expiration of Owner's Required Property Insurance.** Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

## § 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

## § 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The

Init.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 11:33:32 ET on 12/12/2024 under Order No.2114451452 which expires on 02/28/2025, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@alacontracts.com.

User Notes:

(959735638)



Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

#### **§11.5 Adjustment and Settlement of Insured Loss**

**§ 11.5.1** A loss insured under the property insurance required by the Agreement shall be adjusted by the Contractor as fiduciary and made payable to the Contractor as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Contractor shall pay the Architect and Owner their just shares of insurance proceeds received by the Contractor, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

**§ 11.5.2** Prior to settlement of an insured loss, the Contractor shall notify the Owner of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Owner shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Owner does not object, the Contractor shall settle the loss and the Owner shall be bound by the settlement and allocation. Upon receipt of the insurance proceeds, the Contractor shall and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Owner timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Contractor may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

### **ARTICLE 12 UNCOVERING AND CORRECTION OF WORK**

#### **§ 12.1 Uncovering of Work**

**§ 12.1.1** If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

**§ 12.1.2** If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

#### **§ 12.2 Correction of Work**

##### **§ 12.2.1 Before Substantial Completion**

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

##### **§ 12.2.2 After Substantial Completion**

**§ 12.2.2.1** In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

### § 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be affected whether or not final payment has been made.

## ARTICLE 13 MISCELLANEOUS PROVISIONS

### § 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules.

### § 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

### § 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

### § 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner and Architect, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall

give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Contractor shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect, Engineers and Owner.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

13.4.7 For soils testing and observation, contractor will be required to employ the services of the same geotechnical engineering company as that listed in Section 02 32 00, Earthwork. If no previous soils investigation has been performed, architect to approve Contractor's intended selection prior to Notice-to-Proceed.

### § 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

## ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

### § 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

#### § 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials thereon paid for by the Owner;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

#### § 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

#### § 14.4 Termination by the Owner for Convenience

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

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

Init.

- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly; executed, materials procured, fabricated, partially fabricated or otherwise purchased for the Project, whether delivered or not yet delivered to the site; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

## ARTICLE 15 CLAIMS AND DISPUTES

### § 15.1 Claims

#### § 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, modification or interpretation of the Contract Documents, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

#### § 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

#### § 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

#### § 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

#### § 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

#### § 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data accompanying each payment request substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction beyond anticipated weather days as stated in 8.3.2 of General Conditions.

#### § 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

#### § 15.2 Initial Decision

§ 15.2.1 The Owner and the Contractor shall make a good faith attempt to resolve all claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

Int.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

### § 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof. If mediation proves unsuccessful the dispute will be handled in the county and state Court of Law where the project is located.

*(Paragraphs deleted)*

# Additions and Deletions Report for AIA® Document A201® – 2017

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 11:33:32 ET on 12/12/2024.

## PAGE 1

Tillery K5 ALE Remodel  
Rogers, AR

...

Roger Public Schools  
Rogers, AR

...

Hight Jackson Associates PA  
5201 W. Village Parkway, Suite 300  
Rogers AR 72758

## PAGE 6

2.3.1, 9.6.6, 9.8

Order of Precedence

1.9.1.9.1, 1.9.2, 1.9.3, 1.9.4

## PAGE 9

### 1.1.9 Contractor / Construction Manager

The term Contractor is interchangeable with the term Construction Manager

## PAGE 10

1.2.4 Should a discrepancy be found among the contract documents, request interpretation from the Architect, before proceeding with the work. Should an error, inconsistency or omission later be found in the drawings or specifications, or between drawings and specifications, or between drawing divisions, Contractor is deemed to have estimated on the more stringent requirement or more expensive way of doing work, unless he shall have asked for and obtained a written decision before submission of proposal as to which method of materials will be required. Contractor shall notify Architect if any of these situations occur, and gain approval before proceeding. Reference used in these specifications to the Architect shall mean Hight-Jackson Associates PA.

1.2.5 Before submitting their proposal, each bidder shall check their set(s) of Specifications and Drawings and advise the Architect if any sheets are missing.

1.2.6 Do not scale drawings for dimensions. Accurately lay out such work from dimensions indicated on drawings unless such is found in error. Consult Architect for any interpretations concerning locations of equipment.

1.2.7 Any terms that have commonly known technical or trade meanings, unless otherwise specifically defined in the Contract Documents, shall be interpreted in accordance with the commonly known meanings.



...

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement. When a word, such as "approved", "proper", "satisfactory", "alternate", and "as directed" is used, it implies such reference is to the architect's specific approval and directions. "Provide" means furnish and install

...

**§ 1.5.2** The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections ~~1.7 and 1.8~~, 1.7, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants. The Construction Manager shall be responsible for drawing and specification distribution to subcontractors, sub-subcontractors, vendors and suppliers.

PAGE 11

The parties shall agree upon ~~written protocols governing the transmission and use of, and reliance on, of~~ Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document C106-2013, Digital Data Licensing Agreement, to establish the protocols for the development, use, transmission, and exchange of digital data. DWG drawing files can be made available to the construction manager, contractor, sub-contractors or vendor after award of contract with an executed electronic drawing release form obtained from Hight Jackson Associates PA.

**~~§ 1.8 Building Information Models Use and Reliance~~**

~~Any use of, or reliance on, all or a portion of a building information model without agreement to written protocols governing the use of, and reliance on, the information contained in the model shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.~~

PAGE 12

**§ 2.3.6** Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one electronic copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

PAGE 13

**§ 3.1.1** The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the ~~Contractor~~, Construction Manager or the Contractor's authorized representative.

PAGE 14

**3.3.4** The Contractor shall notify the Subcontractors, Owner, and all Contractors, Subcontractors and Vendors under the Owner when the Contractor is ready for them to install their portions of the work and see that they comply with any reasonable period of time. Neither enclose nor cover any piping, wiring ducts, equipment or other items until proper tests and inspection have been made by Architect and/or proper authorities.

**3.3.5** The Contractor shall notify the Architect to observe any work when placing of subsequent work would prevent observation of previous work.

3.3.6 The Contractor shall take charge of and assume general responsibility for proper protection of building during construction. The Contractor shall further provide substantial enclosures at all openings as necessary for protection, including doors with locks.

3.3.7 The Contractor, Subcontractors, sub-subcontractors, and vendors assume responsibility for their materials stored on the premises.

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. Place material orders immediately following materials submittal approval. Furnish evidence of orders to Architect upon request.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive. Proposals for substitutions of material, equipment, or methods shall be submitted no later than thirty days from date of written Notice to Proceed, authorizing performance of the Contract. Include a list of all materials proposed for substitution of materials specified. Proposals for substitution shall be accompanied by technical data, as the Architect may need in order to compare the proposed material with the material that was specified. No substitutions shall be made until written permission is given by the Architect at the direction of the Owner.

...

3.4.4 Where a material is mentioned in the Specifications by trade name or manufacturer's name, the same is not preference for said material, but the intention of using said name is to establish a type of quality of material. Material of other trade names or of other manufacturers which is in the opinion of the architect, equivalent or better in type or quality will be accepted by the Architect on behalf of the Owner only as provided in Section 01 60 00

3.4.5 Before submitting proposal, Contractor, Subcontractors, Vendors and Material Suppliers shall observe Drawings and Specifications, and should Contractor discover that any material and/or its installation be indicated or specified in a manner not approved by the Material Manufacturer, or specified item has been discontinued, notify Architect and receive their instructions. The Contractor shall provide other equivalent materials suitable for the installation as selected by Architect. Contractor shall replace materials with such other equivalent suitable and selected materials and shall be entitled to an equitable adjustment in the contract price as needed.

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. Warranty all work to be free from defects in materials and workmanship for a period of one year from the date of Substantial Completion, except where a different time period is specifically prescribed. Contractor will promptly correct such defects to the state of condition originally required by the contract documents at contractor's expense. Warranty period for all equipment and material shall not begin until the date of Substantial Completion. Contractor will promptly correct such defects to the state of condition originally required by the contract documents at contractor's expense during the warranty period.

PAGE 15

3.5.3 When, at any time during the warranty period, work is considered defective as described by the contract documents by either Owner or Architect, the Contractor shall immediately place such defective work into satisfactory condition, free from faults and defects and in conformance with contract requirements. Make good all damage to work, including contents thereof and grounds, developing within warranty period when such damage is due to use of materials and labor not conforming to contract requirements. Make good all work disturbed in fulfillment of contract

obligations during warranty period. If work of other contractors is disturbed in the process of fulfilling contract, restore such work to its original condition and warranty such restored work.

3.5.4 Upon failure by contractor to proceed promptly to comply with terms of any warranty under the contract, Owner shall have such work performed as necessary to fulfill warranties, and contractor shall pay Owner such sums as expended to fulfill such warranty.

3.5.5 Work required for fulfillment of warranties embraced under the contract shall be performed at no additional expense to Owner.

3.5.6 Unless other specifically prescribed in warranty, normal wear and tear and results of accidents not chargeable to contractor are excluded from the requirements of this Article.

3.5.7 Prior to expiration of the one-year warranty period, the Architect will conduct an inspection of the project and create a punch list for items found to be deficient. Contractor will be required to be present. The Architect will set a date by which the deficient items are to be corrected. Contractor will return punch list to Architect, initialing completed each completed item. Note that contractor will remain responsible for repair and or replacement of items with warranties extending beyond one year as called for in individual specification sections or on drawings.

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect-concluded. Materials and equipment incorporated into this project will be required to follow the Guidelines of the State the project is within Sales Tax and such taxes shall be included in bidder's proposals unless project qualifies for tax exemption. Contractors shall include Social Security Taxes, State Unemployment compensation Insurance and all other items of like nature.

**PAGE 16**

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction. Should applicable laws, ordinances, statutes, treaties, executive orders, tariffs, standards, rules and/or regulations change between the date of the Guaranteed Maximum Price proposal and commencement of the Work, and should such change require the Contractor to perform either more or less work or cause the Cost of the Work to change, the Contract Sum and Contract Time shall be equitably adjusted in compliance with the requirements of Article 7, Changes in the Work.

...

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the ~~Contractor~~ Contractor, upon having actual knowledge of such conditions, shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

...

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable ~~promptness~~ promptness so as not to cause delay in the progress of the Work.

...

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in full-time attendance at the Project site during performance of the Work. The superintendent shall have a minimum of 10 years of construction experience. Five (5) years of that experience shall have been in the capacity of a project

superintendent on similar type projects. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, ~~as soon as practicable after prior to~~ award of the Contract, shall notify the Owner and Architect of the ~~name~~ name, resume and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Owner or the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Owner or Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection. The Owner retains the right to accept or reject proposed superintendent prior to signing of contract.

PAGE 17

3.9.4 The superintendent assigned to the project at the beginning of construction will remain as superintendent for the entire duration of construction period. The superintendent shall provide duties per general conditions and remain on site for the entire duration of the project, including completion of all punch list items. The only circumstances that would permit replacement of the superintendent are prolonged illness, resignation of the superintendent from the company, or death. If one of the preceding circumstances should occur, the Contractor shall state in writing to the Owner the reason for replacement, send qualification statement of the proposed replacement project superintendent, and obtain approval from the Owner and Architect. The replacement superintendent shall possess the minimum requirements set forth in paragraph 3.9.1.

...

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be Contractor coordinated with the Contractor's construction schedule, and (2) ~~allow~~ allows the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

...

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, vendor, or distributor to illustrate some portion of the Work.

PAGE 19

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project. The Contractor shall replace broken or scratched glass, clean fixtures, remove dust, dirt, spots, marks, labels, stains, foreign paint and other blemishes from all finish work, unless more exactly specified, clean all floors and floor coverings, clean and polish hardware.

PAGE 22

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection. Subcontractors shall not be released from their contract or replaced without notification -to Owner.

PAGE 23

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly

notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of ~~apparent~~ apparent-reasonably discoverable discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent-reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for reasonable costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

...

6.2.6 Contractor shall assume general coordination and direction of the project. Each Contractor shall cooperate with other Contractors on the Work and install his work in sequence to facilitate and not delay the installation of such other contractors. The Architect is neither the coordinator nor the expeditor of the work of the various contractors.

6.2.7 The Construction Manager shall be responsible for construction schedule coordination, processing of payment applications, completion of work and closeout documentation with owner vendor contractors per agreement A151-2019.

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and ~~rubbish~~, the ~~rubbish~~ the Owner may clean up and the Architect will allocate the cost among those responsible.

PAGE 24

.1 Mutual ~~By estimate and~~ acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit ~~evaluation; evaluation computed as follows:~~

- a. Net cost of materials.
- b. State and local sales tax.
- c. Net placing cost.
- d. W.C. insurance premium and FICA tax.
- e. Overhead and profit, 15% x (a + b + c + d).
- f. Allowable bond premium.
- g. Total Cost = a + b + c + e + f.

Credit for work omitted, which was included in original contract, shall be computed on the same basis. The value of any such extra work or change performed by a subcontractor shall be determined by the subcontractor computing his cost as outlined in subparagraph 7.3.3 (a. through e.), to which cost the Contractor shall add an overhead and profit charge of 5% plus allowable bond premium.;

- .2 Unit prices stated in the Contract Documents or subsequently agreed upon; upon (Unit price will include contractor's profit and overhead, insurance and bond, and quantification of amount of material by third party.);
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; fee, to be computed according to above formula. Contractor shall be required, if called upon, to furnish original bills and payrolls and support of statement with proper affidavits. Burden of proof of costs rests upon Contractor.; or

PAGE 26

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement-written Notice to Proceed. Do not begin work prior to receipt of written Notice to Proceed authorizing performance of the contract. The official Notice to Proceed will be issued by the Owner through Architect.

...

8.2.4 If the Contractor fails to complete the work by as noted in the Notice to Proceed, or any agreed extension thereof, he shall pay to the Owner as liquidated damages, fixed or agreed, and not as a penalty, the sum of Five Hundred Dollars (\$500.00) for each calendar day of delay of the work, which sum shall be withheld by the Owner from payments due to be made to the Contractor by the Owner under the terms of the contract.

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor’s control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine; or (6) by account of rainfall, snow, or cold weather during the contract time will be subject to approval by the Architect and as provided in Section 01 29 76. Request for extension of time is to be submitted with each Request for Payment. Request for extension of time is to be submitted in writing within Thirty (30) days of the occurrence. If Contractor fails to submit request, time extension will not be approved for the pay period; or (7) If it is not possible to obtain certain materials when needed and the Contractor submits evidence that Contractor issued purchase orders and/or subcontracts immediately following execution of the Contract with the Owner and that Contractor and subcontractors have made every reasonable effort to obtain the materials when or before needed, delays in completion due to inability to obtain such materials will be acknowledged as being "beyond the Contractor’s control".

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15. Any claim for extension of time shall be made in writing to the Owner/Architect not more than Seven (7) days after commencement of the delay, otherwise, it shall be waived. In case of a continuing delay only one claim is necessary. In case of claims for extensions of time because of adverse weather, such extensions of time shall be granted only when such adverse weather prevented the execution of major items of Work as defined as a day where at least four (4) hours of work on a principal unit of work (critical path) underway, between the hours of 7:00 AM and 6:00 PM cannot be completed because of weather conditions beyond control of the contractor on normal working days and exceeds the number of anticipated days. The following are considered reasonable anticipated days of adverse weather on a monthly basis and shall be included in the contract time. Adverse weather days, beyond each of the monthly totals will be allowed to extend contract time, without additional cost, only if approved and authorized by the Architect, and the Owner and as provided in Section 01 29 76.

January	11 days	July	6 days
February	10 days	August	6 days
March	8 days	September	4 days
April	7 days	October	5 days
May	5 days	November	7 days
June	6 days	December	8 days

**PAGE 27**

§ 9.3.1 At least ten days On or before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, notarized and supported by all data substantiating the Contractor’s right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, suppliers and shall reflect retainage if provided for in the Contract Documents. Refer to Section 01 29 76 for additional provisions.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. ~~Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.~~ Payment claims for materials stored off site must be accompanied with an itemized list of materials establishing value, proof that the materials are insured, and a receipt of storage from a bonded warehouse. Upon payment of materials stored, title to the material shall be to the Owner. All expenses incurred in storage of materials will be paid by the Contractor.

PAGE 29

~~§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.~~

...

~~§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.~~

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

...

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven-fifteen days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

...

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete and certified by the Architect in accordance with the Contract Documents, so that the Owner can occupy or utilize the Work for its intended use use without sacrificing the quality of services or having to significantly modify operations from intended usage as per design, as expressed in the Contract Documents. The contractor must obtain certificate of occupancy and any other approvals for use and occupancy from local and state agencies prior to receiving substantial completion.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or ~~corrected prior to final payment~~ corrected. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. The Contractor shall proceed promptly to complete and correct items on his list. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract

Document and ready for Architect/Engineer's final punch. Provide submittals to Architect / Engineer that are required by any governing body or other authorities.

**§ 9.8.3** Contractor shall notify Architect ten (10) days prior to the date on which the building will be ready for final inspection. Upon receipt of the Contractor's list, the Architect will ~~make an inspection to determine~~ perform a punch to determine by observation whether the Work or designated portion thereof is substantially complete. Failure to include an item on the final list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Significant amounts of incomplete work found during the inspection shall be grounds for ceasing the inspection. Minor adjustments and corrections to work shall not be considered cause for discontinuing final inspection. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

**§ 9.8.4** When the Architect determines that Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

PAGE 31

**§ 9.10.2** Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, ~~and (6) (6) completion of closeout documents per specification 01 77 00 "CLOSEOUT" documents must be provided by the Contractor and reviewed by the Architect. These closeout documents are to be complete in every respect with no exclusions or exceptions. Closeout documents shall be delivered to the Architect no later than thirty (30) calendar days from Date of Substantial completion, and (7) if~~ required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

...

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

PAGE 33

**§ 11.1.1** The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in ~~the Agreement Document A133-2019 Exhibit B~~ Insurance and Bonds or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

PAGE 34



§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in ~~the Agreement Document A133-2019 Exhibit B Insurance and Bonds~~ or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

PAGE 35

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the ~~Owner Contractor~~ as fiduciary and made payable to the ~~Owner Contractor~~ as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The ~~Owner Contractor~~ shall pay the Architect and ~~Contractor-Owner~~ their just shares of insurance proceeds received by the ~~Owner, Contractor,~~ and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the ~~Owner Contractor~~ shall notify the ~~Contractor-Owner~~ of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The ~~Contractor-Owner~~ shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the ~~Contractor Owner~~ does not object, the ~~Owner Contractor~~ shall settle the loss and the ~~Contractor-Owner~~ shall be bound by the settlement and allocation. Upon receipt, ~~the Owner shall deposit the insurance proceeds in a separate account receipt of the insurance proceeds,~~ the Contractor shall and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the ~~Contractor-Owner~~ timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the ~~Owner Contractor~~ may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

PAGE 36

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be ~~effected~~ affected whether or not final payment has been made.

...

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. ~~If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.~~

...

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the ~~Owner, Owner and Architect,~~ or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The ~~Owner Contractor~~ shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

PAGE 37

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the ~~Architect, Architect, Engineers and Owner.~~

...

13.4.7 For soils testing and observation, contractor will be required to employ the services of the same geotechnical engineering company as that listed in Section 02 32 00, Earthwork. If no previous soils investigation has been performed, architect to approve Contractor's intended selection prior to Notice-to-Proceed.

...

.4 The Owner has failed to furnish to the Contractor reasonable evidence as required by ~~Section 2.2~~ Section 2.2

PAGE 38

.1 Exclude the Contractor from the site and take possession of all ~~materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor; materials thereon paid for by the Owner;~~

PAGE 39

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed, properly executed, materials procured, fabricated, partially fabricated or otherwise purchased for the Project, whether delivered or not yet delivered to the site; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

...

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, modification or interpretation of the Contract Documents, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

PAGE 40

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data accompanying each payment request substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction-construction beyond anticipated weather days as stated in 8.3.2 of General Conditions.

...

§ 15.2.1 Claims, The Owner and the Contractor shall make a good faith attempt to resolve all claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

PAGE 41

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties

or court order. ~~If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.~~

...

**§ 15.3.4** The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof. If mediation proves unsuccessful the dispute will be handled in the county and state Court of Law where the project is located.

#### **~~§ 15.4 Arbitration~~**

~~§ 15.4.1~~ If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

~~§ 15.4.1.1~~ A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

~~§ 15.4.2~~ The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

~~§ 15.4.3~~ The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

#### **~~§ 15.4.4 Consolidation or Joinder~~**

~~§ 15.4.4.1~~ Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

~~§ 15.4.4.2~~ Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

~~§ 15.4.4.3~~ The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

**Certification of Document's Authenticity**  
AIA® Document D401™ – 2003

I, \_\_\_\_\_, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 11:33:32 ET on 12/12/2024 under Order No. 2114451452 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ – 2017, General Conditions of the Contract for Construction, other than those additions and deletions shown in the associated Additions and Deletions Report.

\_\_\_\_\_  
*(Signed)*

\_\_\_\_\_  
*(Title)*

\_\_\_\_\_  
*(Dated)*

# AIA® Document A133® – 2019 Exhibit B

## **Insurance and Bonds**

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Construction Manager, date not known at this time.  
*(In words, indicate day, month and year.)*

for the following **PROJECT**:  
*(Name and location or address)*

Tillery K5 ALE Remodel  
Rogers, AR

**THE OWNER:**  
*(Name, legal status, and address)*

Rogers Public Schools  
Rogers, AR

**THE CONSTRUCTION MANAGER:**  
*(Name, legal status, and address)*

Crossland Construction Company, Inc.  
Rogers, AR

### **TABLE OF ARTICLES**

- B.1 GENERAL**
- B.2 OWNER'S INSURANCE**
- B.3 CONSTRUCTION MANAGER'S INSURANCE AND BONDS**
- B.4 SPECIAL TERMS AND CONDITIONS**

#### **ARTICLE B.1 GENERAL**

The Owner and Construction Manager shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201™–2017, General Conditions of the Contract for Construction.

#### **ARTICLE B.2 OWNER'S INSURANCE**

##### **§ B.2.1 General**

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article B.2 and, upon the Construction Manager's request, provide a copy of the property insurance policy or policies required by Section B.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

##### **§ B.2.2 Liability Insurance**

The Owner shall be responsible for purchasing and maintaining the Owner's usual general liability insurance.

#### **ADDITIONS AND DELETIONS:**

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Document A201™–2017, General Conditions of the Contract for Construction. Article 11 of A201™–2017 contains additional insurance provisions.

**§ B.2.3 Required Property Insurance**

**§ B.2.3.1** Unless this obligation is placed on the Construction Manager pursuant to Section B.3.3.2.1, the Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section B.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Construction Manager, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

**§ B.2.3.1.1 Causes of Loss.** The insurance required by this Section B.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials.

**§ B.2.3.1.2 Specific Required Coverages.** The insurance required by this Section B.2.3.1 shall provide coverage for loss or damage to falsework and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's and Construction Manager's services and expenses required as a result of such insured loss, including claim preparation expenses.

**§ B.2.3.1.3** Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section B.2.3.1 or, if necessary, replace the insurance policy required under Section B.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

**§ B.2.3.1.4 Deductibles and Self-Insured Retentions.** If the insurance required by this Section B.2.3 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions.

**§ B.2.3.2 Occupancy or Use Prior to Substantial Completion.** The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section B.2.3.1 have consented in writing to the continuance of coverage. The Owner and the Construction Manager shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

THE CONTRACTOR SHALL MAINTAIN BUILDERS' RISK INSURANCE AND SHALL FILE CERTIFICATES OF INSURANCE WITH THE OWNER AS REQUIRED. The limits of such insurance shall be not less than the following:

1. Property Insurance (Builders' Risk) shall be purchased and maintained by the Contractor. Furnish Owner with a copy of the policy. Contractor shall notify Owner at least Fifteen (15) days before policy is terminated. Insurance shall not exclude Owners current and continued occupancy.

**§ B.2.3.3 Insurance for Existing Structures**

If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of

Int.

the General Conditions, "all-risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section B.2.3.1, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

*(Paragraphs deleted)*

## **ARTICLE B.3 CONSTRUCTION MANAGER'S INSURANCE AND BONDS**

### **§ B.3.1 General**

**§ B.3.1.1 Certificates of Insurance.** The Construction Manager shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article B.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section B.3.2.1 and Section B.3.3.1. The certificates will show the Owner as an additional insured on the Construction Manager's Commercial General Liability and excess or umbrella liability policy or policies.

**§ B.3.1.2 Deductibles and Self-Insured Retentions.** The Construction Manager shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Construction Manager.

**§ B.3.1.3 Additional Insured Obligations.** To the fullest extent permitted by law, the Construction Manager shall cause the commercial general liability coverage to include (1) the Owner, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Construction Manager's negligent acts or omissions during the Construction Manager's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Construction Manager's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04.

**§ B.3.1.4 Waiver of Subrogation the Commercial General Liability and Automobile Liability policies shall each contain a waiver of subrogation in favor of the Owner, Architect, and their officers, directors, Board Members, employees and agents.**

**§ B.3.1.5 Subcontractors, Contractor shall cause each subcontractor to purchase and maintain insurance of the types and amounts specified as a minimum. Limits of such coverage may be reduced only upon written agreement of Owner. Contractor shall provide to the Owner copies of certificates evidencing coverage for each subcontractor. Subcontractor's commercial general liability and business automobile liability insurance shall name Owner and Architect as additional insured and have the Waiver of subrogation endorsement added in accord with Article A.3.**

**§ B.3.1.6 These certificates and the insurance policies required by this Article A.3 shall contain a provision afforded under the policies will not be canceled or allowed to expire until at least 30 days prior written notice has been given to the Owner. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness in accordance with the Contractor's information and belief.**

Init.



**§ B.3.1.7 Failure to file certificates or acceptance by the Owner or Architect of certificates of insurance which do not indicate the specified coverage shall in no way relieve the contractor of his responsibility for maintaining insurance as specified above.**

**§ B.3.2 Construction Manager's Required Insurance Coverage**

**§ B.3.2.1** The Construction Manager shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Construction Manager shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

**§ B.3.2.2 Commercial General Liability**

**§ B.3.2.2.1** Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than One Million Dollars (\$ 1,000,000 )each occurrence, Two Million Dollars (\$ 2,000,000 )general aggregate, and Two Million Dollars (\$ 2,000,000 )aggregate for products-completed operations hazard, providing coverage for claims including

- .1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- .2 personal injury and advertising injury;
- .3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- .4 bodily injury or property damage arising out of completed operations; and
- .5 the Construction Manager's indemnity obligations under Section 3.18 of the General Conditions.

**§ B.3.2.2.2** The Construction Manager's Commercial General Liability policy under this Section B.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

- .1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.
- .2 Claims for property damage to the Construction Manager's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.
- .3 Claims for bodily injury other than to employees of the insured.
- .4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.
- .5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.
- .6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.
- .7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.
- .8 Claims related to roofing, if the Work involves roofing.
- .9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.
- .10 Claims related to earth subsidence or movement, where the Work involves such hazards.
- .11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

**§ B.3.2.3** Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Construction Manager, with policy limits of not less than One Million Dollars (\$ 1,000,000 ) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

**§ B.3.2.4** The Construction Manager may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section B.3.2.2 and B.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower

Init.



coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ B.3.2.5 Workers' Compensation at statutory limits.

§ B.3.2.6 Employers' Liability with policy limits not less than One Million Dollars (\$ 1,000,000 ) each accident, One Million Dollars (\$ 1,000,000 ) each employee, and One Million Dollars (\$ 1,000,000 ) policy limit.

§ B.3.2.7 Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks

§ B.3.2.8 If the Construction Manager is required to furnish professional services as part of the Work, the Construction Manager shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than One Million Dollars (\$ 1,000,000 ) per claim and One Million Dollars (\$ 1,000,000 ) in the aggregate.

§ B.3.2.9 Construction Manager shall procure Pollution Liability insurance, with policy limits of not less than One Million Dollars (\$ 1,000,000 ) per claim and One Million Dollars (\$ 1,000,000 ) in the aggregate.

*(Paragraphs deleted)*

§ B.3.3 Construction Manager's Other Insurance Coverage

§ B.3.3.1 Insurance selected and described in this Section B.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Construction Manager shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

§ B.3.3.2 The Construction Manager shall purchase and maintain the following types and limits of insurance in accordance with Section B.3.3.1.

*(Select the types of insurance the Construction Manager is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)*

§ B.3.3.2.1 Property insurance of the same type and scope satisfying the requirements identified in Section B.2.3, which, if selected in this Section B.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section B.2.3.1.3 and Section B.2.3.3. The Construction Manager shall comply with all obligations of the Owner under Section B.2.3 except to the extent provided below. The Construction Manager shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Construction Manager shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below:

*(Where the Construction Manager's obligation to provide property insurance differs from the Owner's obligations as described under Section B.2.3, indicate such differences in the space below.*

*Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)*

§ B.3.3.2.4 Insurance for physical damage to property while it is in storage and in transit to the construction site on an "all-risks" completed value form.

§ B.3.3.2.5 Property insurance on an "all-risks" completed value form, covering property owned by the Construction Manager and used on the Project, including scaffolding and other equipment.

§ B.3.3.2.6 Other Insurance  
(List below any other insurance coverage to be provided by the Construction Manager and any applicable limits.)

Coverage	Limits
----------	--------

**§ B.3.4 Performance Bond and Payment Bond**

The Construction Manager shall provide surety bonds, from a company or companies lawfully authorized to issue  
(Paragraphs deleted)  
(Table deleted)

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

**§ B.3.4 Revised Language:**

Construction Manager shall pay premium for and furnish Two (2) copies of a Performance Bond, and a Labor and Material Payment Bond in full amount of the contract sum to cover faithful performance of the contract and payment of all obligations arising thereunder, within seven (7) calendar days after signing contract. Furnish bonds in accordance with application laws of the State of Arkansas. Labor and Material Payment Bond coverage for project shall be maintained for a period of not less than one (1) year after substantial completion. A Warranty Bond shall be furnished in full amount of the contract sum to cover faithful performance of the contract and payment of all obligations for an additional year beyond Labor and Material Payment Bond coverage.

**§ B.3.4.1** Furnish Owner, through the Architect, with two (2) copies each of required bonds.

**§ B.3.4.2** Furnish Owner, through the Architect, with two (2) copies of the signed "Contractor's and Resident Local Agents Affidavit of Qualification, attached.

**§ B.3.4.3** The Construction Manager shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy.

**ARTICLE B.4 SPECIAL TERMS AND CONDITIONS**

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

None

## SECTION 01 00 00

### GENERAL REQUIREMENTS AND PROCEDURES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. General intention.
- B. General Method of Procedure.
- C. Applicable State and Local Law
- D. Fire Protection Verification
- E. Restoration.

##### 1.2 GENERAL INTENTION

- A. Contractor shall completely prepare site for building operations, including demolition of existing items where noted, furnish labor and materials and perform work for a Remodel to Tillery Elementary School Gym Building, Rogers Public Schools, Rogers, AR, as required by drawings and specifications.
- B. Visits to the site by Bidders may be made only by appointment with the Construction Manager.
- C. In some instances, it may have been impracticable to detail all items in specifications or on drawings because of variances in manufacturer's methods or of multiple methods of achieving specified results. In such instances Contractor will be required to furnish all labor, materials, drawings, services and connections necessary to produce systems or equipment which are completely installed, functional, and ready for operation by personnel in accordance with their use. Contractor and each subcontractor is to perform work to comply with standard practices of his or her trade or profession.
- D. Offices of HIGHT/JACKSON/ASSOCIATES/P.A., as Architects, will render certain technical services during construction. Such services shall be considered as advisory to the Owner and shall not be construed as expressing or implying a contractual act of the Owner without affirmations by the Owner or his duly authorized representative.

##### 1.3 GENERAL METHOD OF PROCEDURE

- A. Working space and space available for storing materials shall be verified with the Owner prior to construction.
- B. Workmen are subject to rules of the Owner applicable to their conduct.

01 00 00-1

- C. Execute work so as to interfere as little as possible with normal functioning of Owner as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others. Use of equipment and tools that transmit vibrations and noises through the building structure, are to be limited to the time that the building is not occupied. Do not store materials and equipment in other than assigned areas.
- D. Contractor shall furnish Architect with a schedule of approximate phasing dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof.
- E. If work is scheduled to be performed on Saturdays, Sundays or holidays the Contractor shall provide written notification to the Architect indicating dates on which work will be performed. Notification shall be a minimum of 48 hours before the work date commences.
- F. Building and adjacent buildings will be occupied during performance of work, but areas of alterations will be vacated as required. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in Owner operations will not be hindered. Contractor shall permit access to Owner personnel through construction areas. Contractor to provide temporary means of protected access to all occupied areas of alteration during the construction period.
- G. When an area of the building is turned over to Contractor, Contractor shall accept entire responsibility thereof.
- H. Contractor shall maintain in operating condition existing fire protection and alarm equipment. In connection with fire alarm equipment Contractor shall make arrangements for pre-inspection of site with Fire Department.
- I. Existing Utilities: Before construction can begin, contractor shall have all existing underground utility line locations in affected construction area verified and located by one-call service, if this service exists. In addition consult Owner and/or utility companies. In Arkansas the one-call phone number is 1 800-482-8998. Contractor is to provide written proof that contact with utility companies and any private utilities such as telephone companies that the Owner may have contracted with. Provide a statement that contact has been made with Owner's personnel, all utility companies, and that all utility lines have been located to the best of their knowledge and ability. It shall be the responsibility of the contractor to relocate all existing utilities which conflict with the proposed improvements shown on the drawings.
- J. Utilities Services: Maintain existing utility services for building at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer, air pipes, or conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (except telephone), they shall be cut and capped at suitable

01 00 00-2

places where shown; or, in absence of such indication, where directed by Architect/Engineer.

1. All such work required in connection with telephone systems shall be done by Owner's Telephone Company at Contractor's expense.
2. No utilities service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of Owner.
3. Contractor shall submit a request to interrupt any such services to Owner 48 hours in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.

K. Abandoned Lines: Any service line and items such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, which are to be abandoned but are not required to be entirely removed, shall be sealed, capped or plugged. The lines shall not be capped in finished areas, but shall be removed and sealed, capped or plugged in ceiling, within furred spaces, in unfinished areas, or within walls or partitions, so that they are completely behind the finished surfaces.

L. To minimize interference of construction activities with flow of traffic comply with the following:

1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles.

M. Protection: Provide following protective measures:

1. Wherever existing roof surfaces are disturbed they shall be protected against water infiltration. In case of leaks, they shall be repaired immediately upon discovery.
2. Temporary protection against damage to all portions of existing structures and grounds where work is to be done, materials handled and equipment moved and/or relocated.
3. Protection of interior of existing structures at all times, from damage, dust and weather inclemency. Wherever work is performed, floor surfaces that are to remain in place shall be adequately protected prior to starting work, and this protection shall be maintained intact until all work in the area is completed.
4. Dampen debris to keep down dust and provide temporary dust proof barrier partitions in existing structures where necessary. Equip barrier partitions with hinged doors for access. Blank off ducts and diffusers to prevent circulation of dust into occupied areas during construction.

N. Staging and construction traffic

1. To be discussed and determined at preconstruction meeting.

#### 1.4 APPLICABLE STATE LAWS

A. Contractor and all subcontractors of all trades present on site shall comply with state and local laws and ordinances while present on public property.

01 00 00-3

**B. Absolutely no tobacco or e-cigarette use is permitted in building or on the project site.**

1.5 FIRE PROTECTION VERIFICATION

- A. Contractor to be responsible for verifying existing fire alarm system and coordinating with remodel as required by current state and local building code requirements.
- B. If any changes to the contract during construction occurs that involves work to any addition, or remodel, of this project, or work in an adjacent building, Contractor to be responsible for verifying and adding onto, altering or updating existing fire alarm system to meet state and local current code requirements and verified by representative of the local fire department having jurisdiction.

1.6 RESTORATION

- A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of Architect/Engineer. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the Architect before it is disturbed. Materials and workmanship used in restoring work shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.
- B. Upon completion of contract, deliver work complete and undamaged. Damage caused by Contractor or Contractor's workmen to existing structures, grounds, and utilities or work done by others shall be repaired by Contractor and left in as good condition as existed prior to damaging.
  - 1. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workmen to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (except telephone) which are indicated on drawings, and which are not scheduled for discontinuance or abandonment.
  - 2. Restoration work required for damage to telephone systems shall be done by Owner's Telephone Company at the Contractor's expense.
- C. Consequential damage to Owner's existing equipment or building contents in the existing building or on site because of work being performed will be replaced at Contractor's expense.
- D. Consequential damage to existing building or site components as a result of work being performed will be repaired or replaced at Contractor's expense.

01 00 00-4

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 00 00-5





## SECTION 01 11 00

### SUMMARY OF WORK

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Contract Description.
- B. Description of the work.
- C. Owner supplied Products.
- D. Contractor use of site and premises.
- E. Work sequence.
- F. Site security and encumbrances.
- G. Owner occupancy.
- H. Permits and fees

##### 1.2 CONTRACT DESCRIPTION

- A. Contract Type: Construction Management, AIA Document A133-2019, Construction Manager as Constructor.

##### 1.3 DESCRIPTION OF THE WORK

- A. The work under this contract will include all work as shown on drawings and specifications and shall include all work required to complete the project.
- B. Items noted NIC (Not in Contract), will be supplied and installed by Owner.
- C. The Owner will remove and retain possession of all items the Owner wants to retain prior to the start of construction. All remaining items to be demolished, unless noted to be removed and reinstalled on contract documents.
- D. Contractor is responsible for familiarizing himself with the entire project; for expediting and completing all phases of the project in accordance with the Contract Documents; and is solely responsible for work completed by other trades under his contract.
- E. Contractor is responsible for coordinating items furnished and installed by owner.

01 11 00-1

- F. Owner will remove and retain possession of the following items before start of work:
  - 1. Blackstone Grill
- G. Contractor will remove and deliver to the owners building at 715 W Easy St, Rogers AR:
  - 1. Interior double hollow metal doors, frame and hardware currently installed in wall between rooms Ex. Room 1 and Ex. Room 3.
- H. Other then listed above the owner has removed all items they will be retaining from space, all items left such as shelving, furniture, cabinets, storage bins, lumber etc is to be demolished by contractor.

#### 1.4 OWNER SUPPLIED PRODUCTS

- A. Owner's Responsibilities:
  - 1. Arrange for and deliver Owner reviewed Shop Drawings, Product Data, and Samples, to Contractor.
  - 2. Arrange and pay for Product delivery to site.
  - 3. On delivery, inspect Products jointly with Contractor.
  - 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
  - 5. Arrange for manufacturers' warranties, inspections, and service.
- B. Contractor's Responsibilities:
  - 1. Review Owner reviewed Shop Drawings, Product Data, and Samples. Verify owner supplied products fit where product is to be installed or placed.
  - 2. Receive and unload Products at site; inspect for completeness or damage jointly with Owner.
  - 3. Handle, store, install and finish Products.
  - 4. Repair or replace items damaged after receipt.
- C. Products supplied to site and installed by Owner's direct hire installer/contractor:
  - 1. HVAC Controls
  - 2. Video Surveillance System
  - 3. Access Control System (all specified parts in 08 43 13 and 08 71 00 to be provided and installed by contractor)
  - 4. Smart Panels
  - 5. Residential Appliances
  - 6. Furniture
- D. Items supplied by Owner for installation by Contractor:
  - 1. HVAC Equipment
  - 2. Restroom Accessories

#### 1.5 CONTRACTOR USE OF SITE AND PREMISES

- A. Limit use of site and premises to allow construction and remodeling in accordance with contract and construction documents.

01 11 00-2

## 1.6 WORK SEQUENCE

- A. Construct Work to accommodate Owner's adjacent occupancy requirements during the construction period, coordinate construction schedule and operations with Owner and Architect.
- B. Properly prepare all work to receive subsequent work or finish. Notify Architect if any work is unsatisfactory to receive such subsequent work or finish and receive his instructions before proceeding. Failure to make such notification by trade applying work over unsatisfactory materials will constitute his acceptance or responsibility for making the necessary corrections.
- C. Contractor to take photographs of Critical areas of work and other items as deemed necessary when asked to do so by Architect/Engineer. Refer to Section 01 32 33.

## 1.7 SITE SECURITY

- A. Contractor is responsible for securing the site at all times to prevent loss of property or injury to persons present at site. Such responsibility shall remain with the Contractor until all work is completed.
- B. Refer to Section 01 50 00 for temporary construction fencing requirements.

## 1.8 SITE ENCUMBRANCES

- A. Contractor will remove and/or relocate all interfering sheds, concrete slabs, driveways, curbs, walks, trees, footings, etc., prior to construction.
- B. Contractor shall maintain utilities in operation on temporary basis till near the end of construction when finished utilities shall be completed.
- C. Contractor will cut grass and weeds before starting of project and dispose of same.
- D. Provide barriers at drip line of trees to keep traffic off of root system. Trim branches to clear equipment.

## 1.9 ACCESS TO PROPERTY

- A. Provide and maintain access to property for all trades.
- B. Access for workmen and delivery of materials and equipment to immediate construction working areas within building is to be coordinated with the Owner. Provide unobstructed access to building areas required to remain in operation. Use hoist or lift wherever practical to move equipment and materials to levels above the ground floor. Hoist or lift is to be removed from premises at completion of construction.

01 11 00-3

- C. Access by Contractor and his personnel through occupied portions of buildings is not permitted within the occupied building area except along designated routes verified by the Owner.

1.10 OWNER OCCUPANCY

- A. Building will be occupied during performance of work, but areas of alterations will be vacated. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in Owner operations will not be hindered. Contractor shall permit access to Owner personnel through construction areas. Contractor to provide temporary means of protected access to all occupied areas of alteration during the construction period.

1.11 PERMITS AND FEES

- A. Contractor to be responsible for verifying and obtaining written list of all permits, fees, etc. from local, county, state, and federal (if applicable) governing bodies that will apply to this project. Contractor is responsible for paying for these permits and fees.
- B. Building Permit - Contractor secure and pay for city building permit if required by City.
- C. Special Permits/Fees – Contractor and/or subcontractors shall be responsible for securing and paying for all special permits, licenses and fees that may be required by local, state, or federal laws as may be applicable to the review, installation or certification of their systems and materials or required for installation of such materials.
- D. Connection Fees - Contractor and/or subcontractors shall be responsible for securing and paying for all fees and associated costs for review of, and connection to public utility services.

PART 2      PRODUCTS      Not Used.

PART 3      EXECUTION      Not Used.

END OF SECTION

01 11 00-4

## SECTION 01 22 13

### MEASUREMENT AND PAYMENT

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Measurement and payment criteria applicable to portions of the Work performed under a unit price payment method.
- B. Defect assessment and nonpayment for rejected work.

##### 1.2 AUTHORITY

- A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.
- B. Take all measurements and compute quantities. The Architect/Engineer will verify measurements and quantities.
- C. Assist by providing necessary equipment, workers, and survey personnel as required.

##### 1.3 UNIT QUANTITIES SPECIFIED

- A. All labor and material shall be provided as shown in construction documents, unless otherwise noted. Pricing for unit quantities referenced in the individual specification sections are for bidding and in cases of unusual conditions of change in scope of work.
- B. If the actual Work requires more or fewer quantities than those quantities indicated, provide the required quantities at the unit sum/prices contracted. Quantities and measurements supplied or placed into the work shall be verified by a third party and approved by the Architect/Engineer prior to proceeding with work. The cost for work performed by the third party to verify quantities shall be paid for by Contractor, unless noted otherwise.
- C. Each Unit Price shall include all costs incurred to the contractor for the particular item the Unit Price provides for.

##### 1.4 MEASUREMENT OF QUANTITIES

- A. Measurement Devices:
  - 1. Weigh Scales: Inspected, tested and certified by the applicable state Weights and Measures department within the past year.
  - 2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.

01 22 13-1

3. Metering Devices: Inspected, tested and certified by the applicable State department within the past year.

B. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.

C. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.

D. Measurement by Area: Measured by square dimension using mean length and width or radius.

E. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

F. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

#### 1.5 PAYMENT

A. Payment Includes: Full compensation for all required labor, Products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

B. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the Architect/Engineer multiplied by the unit sum/price for Work which is incorporated in or made necessary by the Work.

#### 1.6 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of the Architect/Engineer, it is not practical to remove and replace the Work, the Architect/Engineer will direct one of the following remedies:

1. The defective Work may remain, but the unit sum/price will be adjusted to a new sum/price at the discretion of the Architect/Engineer.

2. The defective Work will be partially repaired to the instructions of the Architect/Engineer, and the unit sum/price will be adjusted to a new sum/price at the discretion of the Architect/Engineer.

C. The individual specification sections may modify these options or may identify a specific formula or percentage sum/price reduction.

D. The authority of the Architect/Engineer to assess the defect and identify payment adjustment is final.

01 22 13-2

1.7 NONPAYMENT FOR REJECTED PRODUCTS

- A. Payment will not be made for any of the following:
1. Products wasted or disposed of in a manner that is not acceptable.
  2. Products determined as unacceptable before or after placement.
  3. Products not completely unloaded from the transporting vehicle.
  4. Products placed beyond the lines and levels of the required Work.
  5. Products remaining on hand after completion of the Work.
  6. Loading, hauling, and disposing of rejected Products.

PART 2      PRODUCTS      Not Used.

PART 3      EXECUTION      Not Used.

END OF SECTION

01 22 13-3





## SECTION 01 26 00

### MODIFICATION REQUIREMENTS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Submittals.
- B. Documentation of change in Contract Sum/Price and Contract Time.
- C. Change procedures.
- D. Construction Change Directive.
- E. Stipulated Sum change order.
- F. Unit price change order.
- G. Time and material change order.
- H. Execution of change orders.
- I. Correlation of Contractor submittals.

##### 1.2 RELATED SECTIONS

- A. Document 00 72 00 - General Conditions - AIA: Governing requirements for changes in the Work, in Contract Sum/Price, and Contract Time.
- B. AIA: Percentage allowances for Contractor's overhead and profit.
- C. Section 01 33 00 - Submittals: Schedule of values.
- D. Section 01 60 00 - Material and Equipment: Product options and substitutions.
- E. Section 01 77 00 - Contract Closeout: Project record documents.

##### 1.3 SUBMITTALS

- A. Submit the name of the individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. Change Order Forms: AIA G701. Change Order.

01 26 00-1

#### 1.4 DOCUMENTATION OF CHANGE IN CONTRACT SUM/PRICE AND CONTRACT TIME

- A. Maintain detailed records of work done on a time and material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work.
- B. Document each quotation for a change in cost or time with sufficient data to allow evaluation of the quotation.
- C. Provide additional data to support computations:
  - 1. Quantities of products, labor, and equipment.
  - 2. Taxes, insurance, and bonds.
  - 3. Overhead and profit.
  - 4. Justification for any change in Contract Time.
  - 5. Credit for deletions from Contract, similarly documented.
- D. Support each claim for additional costs, and for work done on a time and material basis, with additional information:
  - 1. Origin and date of claim.
  - 2. Dates and times work was performed, and by whom.
  - 3. Time records and wage rates paid.
  - 4. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

#### 1.5 CHANGE PROCEDURES

- A. The Architect/Engineer will advise of minor changes in the Work not involving an adjustment to Contract Sum/Price or Contract Time as authorized by AIA A201, 2017 Edition, Paragraph 7.4 by issuing a Field Order, AIA Form G708, Supplemental Instructions, AIA Form G710 or Hight Jackson Associates Architect's Supplemental Instructions.
- B. The Architect/Engineer may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications and change in Contract Time for executing the change with a stipulation of any overtime work required. Contractor will prepare and submit an estimate within 10 calendar days unless instructed otherwise.
- C. The Contractor may propose a change by submitting a request for change to the Architect/Engineer, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation. Document any requested substitutions in accordance with Section 01 60 00.

01 26 00-2

## 1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Architect/Engineer may issue a document, signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
- B. The document will describe changes in the Work and will designate method of determining any change in Contract Sum/Price or Contract Time.
- C. Promptly execute the change in Work.

## 1.7 STIPULATED SUM CHANGE ORDER

- A. Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Architect/Engineer.

## 1.8 UNIT PRICE CHANGE ORDER

- A. For predetermined unit prices and quantities, the Change Order will be executed on a fixed unit price basis.
- B. For unit costs or quantities of units of work which are not predetermined, execute Work under a Construction Change Directive.
- C. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.

## 1.9 TIME AND MATERIAL CHANGE ORDER

- A. Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
- B. Architect/Engineer will determine the change allowable in Contract Sum/Price and Contract Time as provided in the Contract Documents.
- C. Maintain detailed records of work done on a Time and Material basis.
- D. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

## 1.10 EXECUTION OF CHANGE ORDERS

- A. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

01 26 00-3

1.11 CORRELATION OF CONTRACTOR SUBMITTALS

- A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum/Price.
- B. Promptly revise progress schedules to reflect any change in Contract Time, revise sub schedules to adjust times for other items of work affected by the change and resubmit.
- C. Promptly enter changes in Project Record Documents.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 26 00-4

## SECTION 01 29 76

### APPLICATIONS FOR PAYMENT

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for payment.

##### 1.2 RELATED SECTIONS

- A. Document 00 72 00 - General Conditions - AIA: Progress payments and final payments.
- B. Section 01 31 00 - Coordination and meetings:
- C. Section 01 32 36 – Construction Progress Schedules: Submittal procedures.
- D. Section 01 77 00 - Contract Closeout: Final payment.

##### 1.3 FORMAT

- A. AIA G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet.
- B. For each item, provide a column for listing each of the following:
  - 1. Item Number.
  - 2. Description of work.
  - 3. Scheduled Values.
  - 4. Previous Applications.
  - 5. Work in Place and Stored Materials under this Application.
  - 6. Authorized Change Orders Listed separately.
  - 7. Total Completed and Stored to Date of Application.
  - 8. Percentage of Completion.
  - 9. Balance to Finish.
  - 10. Retainage.

##### 1.4 PREPARATION OF APPLICATIONS

- A. Present required information in typewritten form or on electronic media printout.
- B. Execute certification by signature of authorized officer.
- C. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.

01 29 76-1

- D. List each authorized Change Order as an extension on AIA G703 - Continuation Sheet, listing Change Order number and dollar amount as for an original item of Work.
- E. Prepare Application for Final Payment as specified in Section 01 77 00.

#### 1.5 SUBMITTAL PROCEDURES

- A. Submit three copies of each Application for Payment.
- B. Submit three copies of **updated** construction schedules with each Application for Payment.
- C. Submit three copies of Certificate of Insurance for items stored off-site with each Application for Payment.
- D. Submit delays caused as a result of adverse weather, strikes, etc. Include backup with each pay application. Provide project superintendent's weather log for project with each pay application. If no delay days occurred during the last pay period provide statement on transmittal or letter stating that no delay days occurred. Delay days for Saturday and Sunday and Holidays will not be approved unless prior notice has been given and accepted by Architect. Approved delay days will not result in an increase in completion time unless days exceed anticipated delay days as set forth under General Conditions.
  - 1. Submit as part of the pay application a monthly updated CPM work schedule as required in Section 01 32 36.
  - 2. Monthly Progress Report
    - a. Refer to Section 01 31 00, paragraph 1.7 for details.
  - 3. Updated and currently in force proof of insurance. (The proof of insurance needs to only be filed during the month of renewal, however, a lapsed Insurance Certificate will result in Pay Application being held as incomplete)
  - 4. Failure to submit any of the above required items will result in pay application being held until submissions are complete.
- E. Payment Period: Submit at intervals stipulated in the Agreement.
- F. Submit with transmittal letter as specified for Submittals in Section 01 33 00.

#### 1.6 SUBSTANTIATING DATA

- A. When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question.
- B. Provide one copy of data with a cover letter for each copy of submittal. Show application number and date, and line item by number and description.

01 29 76-2

- C. Include the following with the application when substantiating data is asked for:
  1. Current available construction photographs of item in question.
  2. Record documents for review by the Owner which will be returned to the contractor.
  3. Affidavits attesting to off-site stored products.
  4. Construction progress schedules revised and current.
  5. Other data and information as required or asked for by Architect.
  
- D. Partial Lien Waivers: If directed by Owner or Architect, the Contractor may be required to submit partial lien waivers of subcontractors and suppliers accompanying payment request applications to show proof that he has made percentage of progress payment as shown on previous payment request application. If partial lien waivers are asked for, Contractor must submit them for review and approval. If he has not submitted them, or if a subcontractor or supplier has not been paid for the previous pay periods, the current pay application will not be processed until partial lien waivers are received and approved, or until justification is accepted by Owner and Architect as to the reason payment was withheld for the subcontractor or supplier on previous payment applications.

1.7 PROOF OF INSURANCE FOR MATERIALS STORED OFF SITE.

- A. Payments will only be processed for materials stored off site that are stored in a bonded or insured warehouse. If materials are stored off site on a secure open-air site, material must be insured. Payment claims for materials stored off site must be accompanied with an itemized list of materials establishing value, proof that the materials are insured, and a receipt of storage from a bonded warehouse. Upon payment of materials stored, title to the material shall be to the Owner. All expenses incurred in storage of materials will be paid by the contractor.

1.8 RETAINAGE

- A. In making partial payments for the work, there shall be retained **Five (5%) percent** of the estimated amount for labor and materials until final completion and acceptance of all work covered in the contract. Retainage shall be paid to the Contractor in the final payment if all conditions of the contract documents have been met including completed close-out documents and as-built drawings

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 29 76-3





## SECTION 01 31 00

### COORDINATION AND MEETINGS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Coordination and project conditions.
- B. Pre-construction meeting.
- C. Field engineering
- D. Progress meetings.
- E. Pre-installation meetings.
- F. Equipment electrical characteristics and components.
- G. Examination.
- H. Preparation.
- I. Schedule and Reports

##### 1.2 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical Work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

01 31 00-1

- E. Coordinate completion and cleanup of Work of separate sections in preparation for Substantial Completion and for portions of Work if designated for Owner's partial occupancy.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

### 1.3 FIELD ENGINEERING

- A. Contractor shall locate and protect survey control and reference points.
- B. Control datum for survey is shown on Drawings.
- C. Verify setbacks and easements; confirm drawing dimensions and elevations.
- D. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

### 1.4 PRECONSTRUCTION MEETING

- A. Owner, through Architect/Engineer will schedule a meeting after the Notice of Award.
- B. **Construction Manager** shall conduct meeting.
- C. Attendance Required: Owner, Architect/Engineer, Prime Contractor, Major Subcontractors, Representatives of Governmental or other regulating Agencies.
- D. Agenda:
  - 1. Execution of Owner-Contractor Agreement.
  - 2. Submission of executed bonds and insurance certificates.
  - 3. Submission of list of Subcontractors, schedule of values, and progress schedule.
  - 4. Designation of personnel representing the parties in Contract, and the Architect/Engineer.
  - 5. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, and Change Order procedures.
  - 6. Scheduling and coordination of prime contractors.
  - 7. Inspection procedures.
  - 8. Shop drawings and Submittals, Grouping of Submittals
  - 9. Critical areas of the work
  - 10. Reports, testing and scheduling activities of a Geotechnical Engineer.
  - 11. Use of premises by Owner and Contractor.
  - 12. Owner's requirements and occupancy.
  - 13. Construction facilities and controls.
  - 14. Temporary utilities.
  - 15. Procedures for maintaining record documents (As-Builts).
  - 16. Requirements for start-up of equipment.

01 31 00-2

17. Inspection and acceptance of equipment put into service during construction period.
18. Contract closeout procedures, Substantial Completion, Final inspection, warranties, and manuals.
19. Other items as deemed necessary by the Architect or owner.

- E. Contractor to record minutes and distribute copies within two days after meeting to participants, with copies to Architect/Engineer, Owner, participants, and those affected by decisions made.

## 1.5 PROGRESS MEETINGS

- A. Contractor will schedule and administer meetings with assistance of Architect throughout progress of the Work at monthly intervals unless different interval is approved by Architect.
- B. Contractor will schedule and make arrangements for meetings, prepare agenda with copies for participants, preside at meetings. Schedule comments from Architect on agenda. Architect to approve schedule.
- C. Contractor shall provide written copies of previous items of discussion, resolution of same, and any new outstanding issues to be addressed.
- D. Attendance is required by the following people:
  1. General Contractor's Project Manager and Job Superintendent
  2. Project Manager and Field Foreman for each trade currently working on the site.
  3. Project Manager of any trade who will be mobilizing on site during the next thirty (30) days.
  4. Representative of Major Suppliers
  5. Owner/Architect/Engineer as appropriate to address agenda items.
- E. Agenda:
  1. Review minutes of previous meetings.
  2. Review of Work progress.
  3. Field observations, problems, and decisions.
  4. Identification of problems which impede planned progress.
  5. Review of submittals schedule and status of submittals.
  6. Review of off-site fabrication and delivery schedules.
  7. Maintenance of progress schedule.
  8. Corrective measures to regain projected schedules.
  9. Planned progress during succeeding work period.
  10. Coordination of projected progress.
  11. Maintenance of quality and work standards.
  12. Effect of proposed changes on progress schedule and coordination.
  13. Contractor to present outline work schedule for the next month.
  14. Other business relating to Work.

01 31 00-3

- F. Contractor to record minutes and distribute copies within two days after meeting to participants, with copies to Architect/Engineer, Owner, participants, and those affected by decisions made.

#### 1.6 PRE-INSTALLATION MEETING

- A. When required in individual specification sections, convene a pre-installation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect/Engineer four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
  - 1. Review conditions of installation, preparation and installation procedures.
  - 2. Review coordination with related work.
- E. Attendance Required: Contractor's Project Manager, Job superintendent, major Subcontractors and suppliers, Owner, Architect/Engineer, as appropriate to agenda topics for each meeting.

#### 1.7 PROGRESS REPORTS

- A. The Contractor shall submit monthly progress reports to the Architect, attached to his request for payment, showing each major item of the work, the current percentage of completion, and whether ahead or behind schedule. Any delays beyond the contractor's control, such as adverse weather conditions, strikes, etc., that delay the project completion are to be documented and submitted each month along with the progress report. Orders for all materials, except those requiring a decision by the Owner, must be placed within thirty (30) days after award of the contract and evidence of such orders furnished to the Architect. For order of materials requiring Owner decision, such as color, texture, etc; these orders will be placed as soon as possible after selection. Contractor is responsible for notifying the Architect when delaying selection will cause delays in completion. These requirements will be considered mandatory prior to any approval of monthly pay request by the Architect.
- B. Include the following items as additional requirements of the monthly report.
  - 1. Updated schedule
  - 2. All meeting minutes for month
  - 3. Updated submittal schedule
  - 4. RFI log (all logs should contain date submitted to Architect, Date returned and Status)

01 31 00-4

## 1.8 OWNER'S ACCESS TO CONSTRUCTION

- A. In addition to the Architect, the Owner shall be allowed to provide on-site representation as he deems necessary. Contractor and all subcontractors are to allow access to this (these) Individual(s) identified during the pre-construction conference, or by later correspondence from the Architect.

Note: The Architect shall remain the sole responsible party for making selections, determining colors and/or textures, and directing changes in the scope or corrections to the work covered by this contract. **NO EXCEPTIONS!**

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 31 00-5



## SECTION 01 32 33

### CONSTRUCTION PHOTOGRAPHS & DOCUMENTATION

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Photography.
- B. Electronic Photographic Digital Images
- C. Technique.
- D. Submittals.

##### 1.2 RELATED SECTIONS

- A. Section 01 11 00 - Summary of Work: Stages of the Work.
- B. Section 01 77 00 - Contract Closeout: Project record documents.

##### 1.3 PHOTOGRAPHY

- A. Have available a digital camera of sufficient quality to produce photographs of site and construction throughout progress of work when required or asked for by Architect or Owner. Contractor must have means of electronically transferring images from job site and office via e-mail to Architect/Engineer.
- B. If an Architect elects to view an observation such as footing or slab preparation via photos taken by Contractor, placement will not take place until Architect/Engineer reviews and issues observation and comment of photos.
- C. Take photographs of critical areas asked of the Architect/Engineer.  
Such areas might be:
  - 1. Excavations.
  - 2. Foundations.
  - 3. Structural framing.
  - 4. Enclosure of building.
  - 5. Other items as asked for.

##### 1.4 IMAGES

- A. Full color.
- B. Size: Appropriate to show detail required.

01 32 33-1

C. Identify each image in electronic file name. Identify name of Project, and date of view.

D. Deliver electronic images to Architect immediately for his/her review and retention in job files.

1.5 VIEWS

A. Consult with Architect/Engineer for instructions on views required.

1.6 SUBMITTALS

A. Deliver e-mail images for each requested installation.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 32 33-2



## SECTION 01 32 36

### CONSTRUCTION PROGRESS SCHEDULES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Format.
- B. Content.
- C. Revisions to schedules.
- D. Submittals.

##### 1.2 RELATED SECTIONS

- A. Section 01 11 00 - Summary of Work: Work sequence.
- B. Section 01 29 76 - Applications for Payment: Application for payment.
- C. Section 01 33 00 - Submittals: Shop drawings, product data,

##### 1.3 FORMAT

- A. Prepare schedules as a horizontal bar chart with separate bar for each major portion of Work or operation, identifying first workday of each week.
- B. Scale and Spacing: To provide space for notations and revisions.
- C. Sheet Size: Multiples of 11 x 17 inches.

##### 1.4 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification section number.
- C. Identify work of separate stages, and other logically grouped activities.
- D. Show critical path for sequencing of trades and materials.
- E. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

01 32 36-1

F. Coordinate content with schedule of values specified in Section 01 29 76.

## 1.5 REVISIONS TO SCHEDULES

- A. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
- B. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes. Show on schedule by either variation of shading or patterns so the difference is apparent.
- C. Provide narrative report to define problem areas, anticipated delays, and impact on Schedule and report corrective action taken or proposed and its effect.
- D. Provide separate schedule of submittal dates for shop drawings, product data, and samples, including dates when submittals will be required from Architect. Show decision dates for selection of finishes.

## 1.6 SUBMITTALS

- A. Submit initial schedules on or before pre-construction conference. After review, resubmit required revised data within ten (10) days.
- B. Submit revised Progress Schedules with each Application for Payment. Pay request will not be processed without revised schedule submittal. Submit one copy for each copy of the Application for payment.
- C. Submit a computer generated horizontal bar chart with separate lines for each section of Work, identifying first work day of each week.
- D. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.
- E. Indicate estimated percentage of completion for each item of Work at each submission.
- F. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and required by Allowances.
- G. Show critical path if sequence of work is dependant on certain items or trades completing their work in order for the project to be completed on time.

## 1.7 DISTRIBUTION

- A. Distribute copies of reviewed schedules to Project site file, Subcontractors, suppliers, and other concerned parties.

01 32 36-2

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 32 36-3



## SECTION 01 33 00

### SUBMITTALS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Submittal procedures.
- B. Proposed Products list.
- C. Product Data.
- D. Shop Drawings.
- E. Samples.
- F. Design data.
- G. Test reports.
- H. Certificates.
- I. Manufacturer's instructions.
- J. Manufacturer's field reports.
- K. Warranties
- L. Erection drawings.

##### 1.2 RELATED SECTIONS

- A. Section 01 40 00 - Quality Control: Manufacturers' field services and reports.
- B. Section 01 77 00 - Contract Closeout: Contract warranties, bonds, manufacturers' certificates, and closeout submittals.

##### 1.3 REFERENCES

- A. AGC (Associated General Contractors of America) publication "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".

##### 1.4 GENERAL SUBMITTAL PROCEDURES

- A. Transmit each submittal with AIA Form G810. Or Architect/Engineer accepted form.

01 33 00-1

- B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
- C. Identify Project, Contractor, Subcontractor or supplier, pertinent drawing and detail number, and specification section number, as appropriate.
- D. Apply Contractor's stamp signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents. **Contractor shall review submittal before submitting to Architect.** Architect will not review submittal until Contractor has shown proof of review.
- E. **Group submittals of like type together such as Plumbing submittals, HVAC submittals, Masonry submittals, Structural submittals, etc.** Review of single submittals of like types will be subject to delay until remaining submittals related to that being submitted are received by Architect.
- F. Architect will review submittals and if applicable, forward to consultant(s) for review. Upon review, Architect or consultant shall stamp each set of submittals indicated review status or required action, if any. This stamp in no way relieves the Contractor of meeting the requirements and/or intent of the specifications. Architect's review of shop drawings and submittals is for intent and general compliance with contract documents. All other criteria are the sole responsibility of the General Contractor and his supplier.
- G. Schedule submittals to expedite the Project and deliver to Architect/Engineer at business address. Coordinate submission of related items.
- H. Where colors and/or patterns are to be selected, or specifications include cash allowances by Architect, request such selections and materials in ample time for procurement.
- I. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor. However, Architect will make every effort to return submittals in a timely manner.
- J. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- K. Provide space for Contractor and Architect/Engineer review stamps on front of submittal, minimum space of 4" x 8" on right hand border.
- L. When revised for resubmission, identify all changes made since previous submission. Similar procedure is to be followed when resubmitting.
- M. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- N. Submittals not requested will not be recognized or processed.

01 33 00-2

## 1.5 ELECTRONIC SUBMITTAL PROCEDURE

- A. **All product data sheets, shop drawings, and miscellaneous submittal information are to be submitted electronically via email, FTP site, or other acceptable electronic submittal means. Please note that at Architect's discretion for large shop drawing submittals, a hard copy would need to be submitted along with electronic submittal. Architect will advise contractor of such submittals.**
1. Contractor shall perform initial review and have comments and review stamp included on electronic submittal or shop drawings. **Please note that this is mandatory. Submittals and shop drawings will not be reviewed by Architect until Contractor reviews them and notes any comments or corrections required.**
  2. Submit for Architect's review.
  3. After review, electronic copy will be sent back to Contractor with any comments and markups, including review stamp status. If comments require re-submittal of all or partial original submittals or shop drawings, correct and resend for final approval or for Architect's record copy.
  4. Contractor to list specification section related to each item submitted. This shall include product data and shop drawings.
- B. Items to be included in electronic submittals (As required by each product or item specification section):
1. Product data
  2. Shop drawings
  3. Design data
  4. Test reports
  5. Certificates
  6. Manufacturer's instructions
  7. Warranties
  8. Erection drawings
  9. Any other information pertinent to a product or item.

## 1.6 PRODUCT DATA

- A. Product Data for Review:
1. Submitted to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
  2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01 77 00 - CONTRACT CLOSEOUT.
- B. Product Data for Information:
1. Submitted electronically for the Architect/Engineer's knowledge as contract administrator or for the Owner.
- C. Product Data for Project Closeout:
1. Submitted for the Owner's benefit during and after project completion.

01 33 00-3

- D. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- E. Indicate Product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- F. After review distribute in accordance with the Submittal Procedures article above and provide copies of record documents described in Section 01 77 00 - CONTRACT CLOSEOUT.

## 1.7 SHOP DRAWINGS

- A. Shop Drawings for Review:
  - 1. Submitted to Architect/Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
  - 2. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01 77 00 - CONTRACT CLOSEOUT.
- B. Shop Drawings for Information:
  - 1. Submitted electronically for the Architect/Engineer's knowledge as contract administrator or for the Owner.
- C. Shop Drawings for Project Closeout:
  - 1. Submitted for the Owner's benefit during and after project completion.
- D. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

## 1.8 SAMPLES

- A. Samples for Review:
  - 1. Submit actual samples to Architect/Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- B. Samples for Information:
  - 1. Submit actual samples for the Architect/Engineer's knowledge as contract administrator or for the Owner.
- C. Samples for Selection:
  - 1. Submitted to Architect/Engineer for aesthetic, color, or finish selection.
  - 2. Submit samples of finishes from the full range of manufacturers' current standard colors, textures, and patterns for Architect/Engineer selection.

01 33 00-4



3. After review, produce duplicates and distribute them in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01 77 00 - CONTRACT CLOSEOUT.
- D. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- E. Include identification on each sample, with full Project information.
- F. Submit the number of samples specified in individual specification sections; one of which will be retained by Architect/Engineer.
- G. For each job-finished material (i.e. Masonry, Stucco, concrete, paint and other finishes), prepare a sample panel as called for in individual sections. Obtain Architect's approval before installing balance of such work. Architect may require additional panels or samples. Contractor shall follow same procedure for Architect's approval. Subsequent work shall be in accordance with the approved sample panels.
- H. Reviewed samples which may be used in the Work are indicated in individual specification sections.
- I. Samples will not be used for testing purposes unless specifically stated in the specification section.

#### 1.9 DESIGN DATA

- A. Submit electronically for the Architect/Engineer's knowledge as contract administrator or for the Owner.
- B. Submit information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

#### 1.10 TEST REPORTS

- A. Submit for the Architect/Engineer's knowledge as contract administrator or for the Owner. All test reports are to immediately be sent to Architect for his/her review.
- B. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

#### 1.11 CERTIFICATES

- A. When specified in individual specification sections, submit certification by the manufacturer, installation/application Subcontractor, or the Contractor to Architect/Engineer, in quantities specified for Product Data.

01 33 00-5

- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product but must be acceptable to Architect/Engineer.

#### 1.12 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Architect/Engineer for delivery to Owner in quantities specified for Product Data. A copy of such information will be included in the appropriate section of Close-Out Documents.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

#### 1.13 MANUFACTURER'S FIELD REPORTS

- A. Submit reports for the Architect/Engineer's benefit as contract administrator or for the Owner.
- B. Submit report within 15 days of observation to Architect/Engineer for information.
- C. Submit information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

#### 1.14 WARRANTIES

- A. Submit product or system warranty for each product submitted on. Warranties shall accompany shop drawings and submittals. The warranty must be at least to a minimum specified in individual sections, but not less than one year from date of substantial completion. Warranties will also be required as part of record documents. Refer to Section 01 77 00.

#### 1.15 ERECTION DRAWINGS

- A. Submit electronic drawings for the Architect/Engineer's benefit as contract administrator or for the Owner.
- B. Submit information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by the Architect/Engineer or Owner.

01 33 00-6

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 33 00-7



## SECTION 01 35 16

### ALTERATION PROJECT PROCEDURES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Products and installation for patching and extending Work.
- B. Transition and adjustments.
- C. Repair of damaged surfaces, finishes, and cleaning.

##### 1.2 RELATED SECTIONS

- A. Section 01 73 29 - Cutting and Patching:
- B. Section 01 50 00 - Construction Facilities and Temporary Controls: Temporary enclosures, protection of installed work, and cleaning during construction.
- C. Section 02 41 19 - Minor Demolition for Remodeling: Removal and storage of products to be reinstalled by this section.

#### PART 2 PRODUCTS

##### 2.1 PRODUCTS FOR PATCHING AND EXTENDING WORK

- A. New Materials: As specified in product sections; match existing Products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing Work as a standard.

#### PART 3 EXECUTION

##### 3.1 EXAMINATION

- A. Verify that demolition is complete and areas are ready for installation of new Work.
- B. Beginning of restoration Work means acceptance of existing conditions.

##### 3.2 PREPARATION

- A. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.

01 35 16-1

- B. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- C. Remove debris and abandoned items from area and from concealed spaces.
- D. Prepare surface and remove surface finishes to provide for proper installation of new work and finishes.
- E. Close openings in exterior surfaces to protect existing work and salvage items from weather and extremes of temperature and humidity. Insulate ductwork and piping to prevent condensation in exposed areas.

### 3.3 INSTALLATION

- A. Coordinate work of alterations and renovations to expedite completion to accommodate Owner occupancy.
- B. Remove, cut, and patch Work in a manner to minimize damage and to provide a means of restoring Products and finishes to specified condition in accordance with Section 01 73 29.
- C. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent finishes in accordance with Section 01 73 29.
- D. In addition to specified replacement of equipment and fixtures restore existing plumbing, heating, ventilation, air conditioning, and electrical systems to full operational condition.
- E. Recover and refinish Work that exposes mechanical and electrical work exposed accidentally during the work.
- F. Install Products as specified in individual sections.
- G. Any utility line serving existing mechanical or building equipment that is to remain in operation and is required to be temporarily removed because of the remodeling process or interference with new items to be installed shall be logically re-routed to provide continued utility service to the effected equipment. It will be the contractor's responsibility to obtain Architect's approval and coordinate rerouting and reconnection to equipment. There will be no extra cost involved with the removal, rerouting, and reconnection of these utility lines.

### 3.4 TRANSITIONS

- A. Where new Work abuts or aligns with existing, perform a smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.

01 35 16-2

- B. When finished surfaces are cut so that a smooth transition with new Work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect/Engineer.

### 3.5 ADJUSTMENTS

- A. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
- B. Where a change of plane of 1/4 inch or more occurs, submit recommendation for providing a smooth transition for Architect/Engineer review.
- C. Trim existing doors as necessary to clear new floor finish. Refinish trim as required.
- D. Fit work at penetrations of surfaces as specified in Section 01 73 29.

### 3.6 REPAIR OF DAMAGED SURFACES

- A. Patch or replace portions of existing surfaces that are damaged, lifted, discolored, or showing other imperfections.
- B. Repair substrate prior to patching finish.

### 3.7 FINISHES

- A. Finish surfaces as specified in individual Product sections.
- B. Finish patches to produce uniform finish and texture over entire area. When the finish cannot be matched, refinish entire surface to nearest intersections.

### 3.8 CLEANING

- A. In addition to cleaning specified in Section 01 77 00, clean Owner-occupied areas of work.

END OF SECTION

01 35 16-3





SECTION 01 40 00

QUALITY CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality assurance - control of installation.
- B. Cleaning during construction
- C. Tolerances
- D. Protection
- E. References and standards.
- F. Mockup.
- G. Inspecting and testing laboratory services.
- H. Architect/Engineer Construction Observation Notices
- I. Required Special Inspections
- J. Required Pre-Installation Meetings
- K. Manufacturers' field services.
- L. Tobacco Use

1.2 RELATED SECTIONS

- A. Section 01 33 00 - Submittals: Submission of manufacturers' instructions and certificates.
- B. Section 01 60 00 - Material and Equipment: Requirements for material and product quality.
- C. Section 01 75 00 - Starting of Systems.

1.3 CRAFTMANSHIP

- A. Each trade is to perform work and install products, following best standards of their industry. Work not in conformance with industry standards and quality will not be tolerated and will be subject to rejection.

01 40 00-1

#### 1.4 QUALITY ASSURANCE - CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Furnish, apply, install, connect, erect, clean, and condition manufactured articles, materials, and equipment per manufacturer's printed directions, unless otherwise indicated or specified. Comply with manufacturers' instructions, including each step-in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement. All attachment devices and materials shall be required to secure materials together or to other materials and to secure work of other trades.
- H. Manufacturer's printed directions must be on the job prior to and during installation of materials and equipment.
- I. Make allowance for ample expansion and contraction for all building components subject to same.
- J. Each trade shall provide sleeves, recesses and openings in their work as required to receive work from other trades.
- K. Make field check of actual building dimensions before fabricating products.
- L. Where proper fit of work depends upon close tolerances of manufactured products, furnish manufacturer with necessary templates to insure proper fit of all components.
- M. Install materials only when conditions of temperature, moisture, humidity, and condition of adjacent building components are conducive to achieving the best installation on results.

01 40 00-2

- M. Erect, install and secure building components in a structurally sound and appropriate manner. Where necessary, temporarily brace, shore, or otherwise support members until final connection or installation. Brace walls and other structural elements to prevent damage by wind and construction operations. Leave temporary bracing, shoring or other structural supports in place as long as necessary for safety and until the structure is strong enough to withstand all loads involved.
- O. Where construction consists of a series of courses of units, assemble units in best acceptable manner to provide structurally sound installation, waterproof where exposed to exterior. Accurately plumb and level all courses and verify levels of frequent courses with instruments.
- P. Handle materials in a manner to prevent scratching, abrading, distortion, chipping, breaking or other disfigurement.
- Q. Unless indicated, fabricate, and install materials true to line, plumb and level. Leave finished surfaces smooth and flat or of smooth contour where indicated, free from wrinkles, warps, scratches, dents, and other imperfections.
- R. Provide a quality of workmanship not less than the commercially accepted standards of that trade.
- S. Where obviously of best practice, furnish materials in longest practical lengths and largest practical sizes to avoid unnecessary jointing. Make all joints secure.
- T. Where fabrics, plastics and other such items join, make seams tight, secure and inconspicuous.
- U. Scribe and/or otherwise neatly fit materials to adjoining materials.
- V. Consult Architect for mounting height or position of any unit not specifically located.
- W. Mix no more materials than can be used before materials begin to “set”. Mix no partially “set” batch with another. Clean tools and appliances prior to mixing materials to avoid contamination.
- X. Conduct work in a manner to avoid injury to previously placed work.
- Y. Do not disturb materials requiring curing time until appropriate curing time has transpired.
- Z. Vertical & Horizontal Penetrations and Sleeves:
  - 1. Contractor is responsible for the layout, placement and identification of all necessary sleeves or penetrations needed to complete his work.
  - 2. All penetrations are to be fire stopped (where penetrating smoke and fire rated barriers) and sealed watertight prior to completion of contractor’s work.

01 40 00-3

3. All vertical sleeves or penetrations are to extend one and one half (1 ½”) above the floor, slab, or housekeeping pad and be sealed watertight.
- AA. Coordinate plumbing fixtures and valves with all toilet accessories to obtain proper clearances and meet ADA Guidelines at accessible locations.
- BB. Contractor to be responsible for coordinating items or equipment provided by owner so that proper space and clearances are provided in newly installed work. Notify the owner if conflicts are found.
- CC. During construction, if any material or product is damaged, it shall be repaired to the Architect’s satisfaction. If the repair is not satisfactory, the material or product will be replaced at no additional cost to owner.
- DD. Where masonry is installed, all vertical and horizontal joints align according to bond types. Where differing masonry types are installed in same wall, joints are to align between each masonry unit type unless noted otherwise.
- EE. Where electrical conduit & wire, plumbing piping, fire sprinkler piping and mechanical ductwork are exposed, each trade is to install items neatly and coordinated with work of other trades. Where multiple electrical conduits or pipes protrude through walls or space, they are to be evenly spaced apart and routed in the same plane. **Do not install below finished ceiling elevation unless shown otherwise.** At exposed structure locations conduit to exit wall at top of wall at coursing directly below roof supporting bond beam. Ductwork shall be routed logically and will be installed to provide neat, clean, and aligned appearance, both vertically and horizontally.
- FF. Schedule work so that installed weather barriers at roofs and walls are not exposed to moisture, wind, or sunlight any longer than what the weather barrier manufacturer allows. Replace any weather barrier damaged by these elements.
- GG. No items including millwork and ceiling grid are to be installed against or on walls prior to the final coat of paint being applied.

#### 1.5 CLEANING DURING CONSTRUCTION

- A. Contractor to keep building and site reasonably free of debris during construction, including mud and dirt inside building. Provide means for keeping mud and clay off floors that are to remain unfinished or clear sealed only.
- B. If a floor sweep product is used, use only a wax base product. **Oil base products are not to be used.** Verify with floor covering and adhesive suppliers and obtain approval of floor sweep product so that warranty is not jeopardized.

01 40 00-4

## 1.6 DUST CONTROL DURING CONSTRUCTION

- A. Contractor to keep dust on site to a minimum the entire duration of construction by means of regular watering. This will include dust created by grading operations, vehicular traffic, and wind.
- B. Contractor to sprinkle work with water during demolition operations to minimize dust. Provide hoses and water connections for this purpose.

## 1.7 MATERIALS STORAGE

- A. Limit site storage for construction materials in a central, secured area, within the boundaries of construction area. Assume full responsibility for protection of same.

## 1.8 APPROPRIATE MATERIALS

- A. No materials containing asbestos fibers shall be allowed in any construction materials used in this project. General Contractor shall provide written certification to this effect at the end of the project. Certification shall be included in the project close-out documents. Refer to Section 02 26 23.
- B. Should the General Contractor or any subcontractors discover materials that must be disturbed and are suspected of containing asbestos fibers or hazardous material, immediately notify the Architect. No disruption of such materials shall be attempted.

## 1.9 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerance to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

## 1.10 PROTECTION

- A. Protect installed materials to prevent damage until substantial completion and comply with individual specification sections pertaining to protection of finished products.
- B. No gypsum board, batt insulation, or materials prone to damage by moisture, mold and/or mildew will be installed prior to enclosing and drying in of building.
- C. During construction, if any material is damaged after installation because of moisture, mold and/or mildew, it shall be replaced immediately.

01 40 00-5

- D. Prior to installation and/or application of interior finishes, the building will be completely enclosed, dried in and conditioned continually to meet minimum temperature and humidity requirements for finished product installation/application.

#### 1.11 REFERENCES AND STANDARDS

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes. The contractor is to be familiar with all standards pertaining to project.
- B. Conform to reference standards at date of invitation to bidders.
- C. Obtain copies of standards when required by the Contract Documents.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from the Architect/Engineer before proceeding.
- F. Neither the contractual relationship, duties, nor responsibilities of the parties in Contract nor those of the Architect/Engineer shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

#### 1.12 REFERENCES

- A. Reference to technical society, organization or body is made in these specifications in accordance with but not limited to the following:
  - DBA ARKANSAS DEPARTMENT OF BUILDING AUTHORITY MINIMUM STANDARDS & CRITERIA
  - AIA AMERICAN INSTITUTE OF ARCHITECTS
  - ACI AMERICAN CONCRETE INSTITUTE
  - ADA THE AMERICANS WITH DISABILITIES ACT
  - AEC ARKANSAS ENERGY CODE
  - AFGG ARKANSAS FUEL GAS CODE
  - AFPC ARKANSAS FIRE PREVENTION CODE
  - AIEE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS
  - AISC AMERICAN INSTITUTE OF STEEL CONSTRUCTION
  - AMC ARKANSAS MECHANICAL CODE
  - APC ARKANSAS PLUMBING CODE
  - ASHRAE AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC.
  - ASME AMERICAN SOCIETY OF MECHANICAL ENGINEERS
  - ASTM AMERICAN SOCIETY FOR TESTING MATERIALS
  - AWSC AMERICAN WELDING SOCIETY CODE
  - AWI ARCHITECTURAL WOODWORK INSTITUTE

01 40 00-6

IBC	INTERNATIONAL BUILDING CODE
NBFU	NATIONAL BOARD OF FIRE UNDERWRITERS
NBS	NATIONAL BUREAU OF STANDARDS
NEC	NATIONAL ELECTRIC CODE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
OSHA	OCCUPATIONAL SAFETY & HEALTH ACT OF 1970
UL	UNDERWRITERS' LAB

### 1.13 MOCK-UP

- A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Accepted mock-ups shall be a comparison standard for the remaining Work.
- C. Where mock-up has been accepted by Architect/Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so.
- D. Wall Mock-Ups: Construct mock-ups of wall assemblies in “cut-away view, showing each step and material or the assembly (i.e., Stud wall, sheathing, weather barrier, thru-wall membrane flashing, cavity insulation system, and wall finish material). Also show typical weather barrier installation(s) at wall openings.

### 1.14 TESTING SERVICES

- A. Furnish materials and equipment that have been properly inspected and tested in accordance with accepted industry standards. Make field or laboratory tests where specified herein, the costs of such being paid for by the contractor, unless specifically stated otherwise. **FOR TESTING PAID FOR BY CONTRACTOR, THE PROPOSED TESTING LABORATORY/ENGINEER MUST BE APPROVED BY THE ARCHITECT NO LATER THAN 10 DAYS PRIOR TO BID OPENING.** If certain tests are to be paid for by others, the General Contractor will remain responsible for scheduling and coordinating their tests at appropriate times.
- B. Should such test or visual observation indicate failure of the materials or construction to meet requirements of the drawings and or specification, Contractor is to make additional tests as directed by the Architect, until compliance has been achieved. If such work should fail to comply, Contractor shall replace it at his expense. Charges for this additional testing will be paid for by the Contractor.
- C. Testing and source quality control may occur on or off the project site. Perform off-site testing as required by the Architect/Engineer or the Owner.
- D. Reports will be submitted by the independent firm to the Architect/Engineer and Contractor at the same time, indicating observations and results of tests and indicating compliance or noncompliance with Contract Documents.

01 40 00-7

- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
  - 1. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- F. Testing does not relieve Contractor to perform Work to contract requirements.

#### 1.15 NOTICE FOR ARCHITECT/ENGINEER OBSERVATION

- A. Whenever specifications require the contractor to have any part of the work observed and approved by the Architect, THE CONTRACTOR SHALL GIVE THE ARCHITECT A MINIMUM 24 HOUR NOTICE as to when that part of the work will be ready for observation. No part of weekends or holidays shall be counted as part of the required hours of notice. If the schedule of work has changed after notification, immediately notify Architect to inform him of change. The following is a partial list of items requiring Construction Observation. This is a general listing; your specific project may not contain some of the items listed. Refer to each individual specification section for additional observation requirements:
  - 1. **Sanitary Sewer Line:** 24 hr 10' standpipe, proper bedding, proper clearances from water lines
  - 2. **Domestic Water Line:** 24 hr city wall pressure or 75 psi air pressure test, proper bedding, proper clearance from sanitary sewer lines.
  - 3. **Cast In Place Concrete:** (retaining walls, stem walls, pedestals) water stops are in place, count rebar and size.
  - 4. **Slab on Grade:** vapor barrier, taping, extension to adjacent pours, wire mesh placement, proper supports, concrete slab depth, termite spray application (dyed)
  - 5. **Floor or Roof Deck:** structural engineer / architect is to inspect welds and side-lap fasteners.
  - 6. **Slab on Deck:** wire mesh placement, proper supports, block-outs
  - 7. **Wall and Above Ceiling:** correct insulation, mechanical and electrical engineers are to inspect conduits, ducts etc. prior to closing in walls.
  - 8. **Masonry:** Mason to prepare mock sample for review prior to starting masonry on job site
  - 9. **Gas Line:** 15psi, 24hr or as required by governing jurisdiction if more stringent.
  - 10. **Through Wall Flashing:** Inspection of surfaces, laps, termination bar installed and sealed, alignment with masonry face.

#### 1.16 REQUIRED SPECIAL INSPECTIONS

- A. When required by local or governing jurisdiction, the contractor will arrange with testing company, special inspections in accordance with Chapter 17 of the International Building Code. Contractor is to pay for special inspections.

01 40 00-8



## 1.17 REQUIRED PRE-INSTALLATION MEETINGS

- A. When noted in individual Specification Sections, on-site pre-installation meetings will be scheduled and held by the Contractor prior to installation of system, product or material. Installation of items is not to begin until meeting is held. Each specification Section should state the people that are required to attend each meeting.

## 1.18 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect/Engineer 30 days in advance of required observations.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Refer to Section 01 33 00 - SUBMITTALS, MANUFACTURERS' FIELD REPORTS article.

## 1.19 TOBACCO USE

- A. **Absolutely no tobacco or e-cigarette use is permitted inside new or existing building areas throughout construction of project.** No tobacco or e-cigarette use is permitted on entire site at anytime while present on public school property.

PART 2 PRODUCTS Not Used.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

01 40 00-9

### 3.2 PREPARATION

- A. Clean substrate surfaces prior to applying the next material or substance.
- B. Seal cracks or openings of substrate prior to applying the next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION

01 40 00-10

## SECTION 01 50 00

### CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Temporary Utilities: Electricity, lighting, heat, ventilation, telephone service, water, and sanitary facilities.
- B. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and water control.
- C. Construction Facilities: Access roads, parking, progress cleaning, project signage, and temporary buildings.
- D. Temporary Equipment

##### 1.2 RELATED SECTIONS

- A. Section 01 77 00 - Contract Closeout: Final cleaning.

##### 1.3 TEMPORARY ELECTRICITY

- A. Cost: By Owner; connect to Owner's existing power service. Do not disrupt Owner's use of service. Owner will pay cost of energy used. Exercise measures to conserve energy.
  - 1. Do not disrupt Owner's use of service.
  - 2. Complement existing power service capacity and characteristics as required.
  - 3. Contractor is to field verify adequate existing power. If project requires additional power not available on site, contractor to provide at no additional cost to Owner.
- B. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.
- C. Permanent convenience receptacles may be utilized during construction. Damage done to receptacles and cover plates during construction period shall be repaired and or replaced.
- D. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

##### 1.4 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain incandescent lighting for construction operations to achieve a minimum lighting level of 2 watt/sq ft.

01 50 00-1

- B. Provide and maintain 1 foot candle of lighting to exterior staging and storage areas after dark for security purposes.
- C. Provide and maintain 5 foot candles of lighting to interior work areas after dark for security purposes.
- D. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- E. Maintain lighting and provide routine repairs.
- F. Permanent building lighting may be utilized during construction.

#### 1.5 TEMPORARY HEATING

- A. Utilize Owner's existing heat plant, extend and supplement with temporary heat devices as needed to maintain specified conditions for construction operations. Contractor will replace filters as needed to keep system operating at optimum efficiency. Refer to Section 23 01 00 for additional requirements during construction.
  - 1. Owner will pay cost of energy used. Exercise measures to conserve energy. Enclose building prior to activating temporary heat in accordance with the Exterior Enclosures article in this section.
- B. Maintain minimum ambient temperature between 50 and 70 degrees F during working hours and 35 degrees F at other times in areas where construction is in progress, unless indicated otherwise in product sections.

#### 1.6 TEMPORARY COOLING

- A. Utilize Owner's new, cooling plant when it becomes available. Extend and supplement with temporary cooling devices as needed to maintain specified conditions for construction operations. Warranty period shall not begin until Certificate of Substantial Completion is issued.
  - 1. Owner will pay cost of energy used. Exercise measures to conserve energy. Enclose building prior to activating temporary cooling in accordance with the Exterior Enclosures article in this section.
- B. Prior to operation of permanent equipment for temporary cooling purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.
- C. Just prior to turning building or portions of building over to owner, contractor will replace all filters on equipment that was used for temporary ventilation, heat, or cooling during construction. Double-filter at return air during construction.

01 50 00-2

- D. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

#### 1.7 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Utilize existing ventilation equipment as they become available. Extend and supplement equipment with temporary fan units as required to maintain clean air for construction operations.

#### 1.8 TELEPHONE SERVICE

- A. Contractor to have cellular telephone service at time of project mobilization.
- B. Equipment to remain in operation until project substantial completion is issued.

#### 1.9 COMPUTER E-MAIL SERVICE

- A. Provide, maintain and pay for computer to contractor's office at time of project mobilization.
- A. Equipment to remain in operation until project substantial completion is issued.

#### 1.10 TEMPORARY WATER SERVICE

- A. Owner will provide water from existing water source (i.e. hose bibb) Exercise measures to conserve water. If additional water demand becomes necessary, contractor will be responsible for providing and paying for temporary service. Contractor to verify existing water source is available and adequate for his needs prior to bid date.

#### 1.11 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain the required facilities and enclosures. Existing facility use is not permitted. Provide at time of project mobilization. Maintain disposal service on a weekly basis and more often as required.

#### 1.12 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways if required per International Building Code Section 3306 and as required by governing authorities for public right-of-way and for public access to existing buildings.

01 50 00-3

- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

#### 1.13 FENCING

- A. Construction: Commercial grade chain link fence.
- B. Provide a minimum 8-foot-high fence around construction site per requirements of International Building Code Section 3306; equip with vehicular and pedestrian gates with locks. The contractor shall be responsible for compliance with this requirement.

#### 1.14 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment. Remove ice and snow as necessary for safety and proper execution of work.
- B. Protect site from puddling or running water.
- C. The contractor is to comply with the provisions of Arkansas Water and Air Pollution Control Act (Act 472 of 1949, as amended, AR Ann. 8-4-101 et seq.), and the Federal Clean Water Act [33 U.S.C. 1251 et seq.]

#### 1.15 EXTERIOR ENCLOSURES

- A. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.
- B. Provide temporary partitions to separate work areas from Owner occupied areas, to prevent penetration of dust and moisture into Owner occupied areas, and to prevent damage to existing materials and equipment.
- C. Temporary Construction: Framing with contractor's option of reinforced polyethylene, plywood, or gypsum board sheet materials unless more specifically called for on drawings, with closed joints and sealed edges at intersections with existing surfaces.

#### 1.16 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.

01 50 00-4

- C. Provide protective coverings at walls, top of cavity walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.
- G. In cold weather, protect work from damage from frost and freezing. In hot weather, protect work from rapid drying out.
- H. Protect previously placed work by suitable coverings or other protection during installation of subsequent work. Immediately clean off any foreign materials accidentally deposited on finished surfaces and where such would stain, corrode, or otherwise disfigure work.
- I. Support no runways, ramps, or construction equipment on, nor transport over any items or assemblies subject to displacement, disfigurement, or other damage to finished surfaces.
- J. Brace all construction to prevent damage or failure from wind.

#### 1.17 SECURITY

- A. Provide security and facilities to protect Work, and existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. Coordinate with Owner's security program.

#### 1.18 ACCESS ROADS

- A. Construct and maintain temporary roads accessing public thoroughfares to serve the construction area.
- B. Extend and relocate as Work progress requires. Provide detours necessary for unimpeded traffic flow.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets. Streets shall be cleaned on a regular basis of mud and gravel soiled as a result of construction activities. Local requirements shall also be followed in maintaining cleanliness of streets.

01 50 00-5

- E. Designated existing on-site roads may be used for construction traffic. Contractor will be responsible for repairing any damage to existing roads as a result of construction traffic. Road inspection shall be conducted prior to beginning of construction by Owner, Architect, and Contractor.

#### 1.19 PARKING

- A. Arrange for or provide temporary gravel surface parking areas to accommodate construction personnel. Grass areas must be returned to original condition or better.
- B. When site space is not adequate, arrange for additional off-site parking.
- C. Coordinate parking for workers with owner.

#### 1.20 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and rubbish from site weekly, or more often if needed, and dispose off-site.
- E. Open free fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

#### 1.21 PROJECT IDENTIFICATION

- A. No signs are allowed without Owner permission except those required by law.

#### 1.22 TEMPORARY EQUIPMENT

- A. Contractor is to provide temporary elevators, hoists, walks, ramps, ladders, runways, scaffolding, shoring, bracing, and other equipment required for proper progress of project work.
- B. Each subcontractor is to provide proper equipment necessary to perform and complete work associated with his trade.

01 50 00-6



1.23 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, and all other temporary items prior to Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing and permanent facilities used during construction to original or specified condition as indicated on drawings and specifications.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 50 00-7



## SECTION 01 60 00

### MATERIAL AND EQUIPMENT

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Products.
- B. Transportation and handling.
- C. Storage and protection.
- D. Product options.
- E. Substitutions.

##### 1.2 RELATED SECTIONS

- A. Section 01 40 00 - Quality Control: Product quality monitoring.

##### 1.3 PRODUCTS

- A. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- B. Provide interchangeable components of the same manufacturers for components being replaced.

##### 1.4 TRANSPORTATION AND HANDLING

- A. Transport and handle Products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.
- C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

##### 1.5 STORAGE AND PROTECTION

- A. Store and protect Products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.

01 60 00-1

- C. Store sensitive Products in weather tight, climate controlled, enclosures in an environment favorable to Product.
- D. For exterior storage of fabricated Products, place on sloped supports above ground.
- E. Provide bonded or insured off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

#### 1.6 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named in accordance with the following article.

#### 1.7 ALTERNATE SUBSTITUTIONS

- A. In general, these Specifications identify the required materials and equipment by naming one or more manufacturer's brand, model, catalog number and/or other identification; the first-named manufacturer's product used as the basis for design; other named brands considered acceptable for the application by Architect. Alternate brand manufacturers named must furnish products consistent with the specifications for the first-named product, as determined by Architect. Base Proposal shall include only those brands named, except as hereinafter provided.
  - 1. Submit product data and specifications.
  - 2. Submit color samples if color selection is required or specified.
  - 3. Provide a list of locations and contacts with telephone numbers of local installations.
  - 4. Provide qualifying comparison, comparing specifications of specified product to proposed substitution.
 If any of these items are not provided, proposed substitution will be rejected.

01 60 00-2

- B. Where materials or equipment are described but not named, provide required first-quality items, adequate in every respect for the intended use, such items subject to Architect's approval prior to procurement.
- C. Prior to receipt of proposals, should Contractor wish to incorporate in Base Proposal brands of products other than those named in Specifications, **he shall submit written request for substitution with required information to Architect not later than ten (10) days prior to date proposals are due.** Architect will consider requests and items. If proposed substitution is approved, it will be listed in an addendum issued to principal Proposers.
- D. After execution of Owner-Contractor Agreement, alternate substitution of product brands for those named in Specifications will be considered, only if (1) request is received within thirty (30) calendar days after Contract date and request includes statement showing credit due Owner, if any; if substitution product is used, (2) Owner requests consideration be given to substitute brands, (3) Proposer provides qualifying comparison, comparing specifications of specified product to proposed alternate substitution. If this is not provided, the proposed substitution will be rejected. The Architect/Engineer will notify Contractor in writing of decision to accept or reject request.
- E. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents. Materials and equipment proposed for substitution shall be acceptable by Architect to that specified in regard to construction, efficiency, utility, aesthetic design, and color. The Architect's decision shall be final and without further recourse. The physical size of substitute brand shall not be larger than the space provided for it. Requests must be accompanied by full description and technical data, in two copies, including manufacturer's name, model, catalog number, photographs or cuts, physical dimensions, operating characteristics, and any other information necessary for comparison.
- F. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.
- G. A request constitutes a representation that the Bidder: / Contractor:
1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
  2. Will provide the same warranty for the Substitution as for the specified Product.
  3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
  4. Waives claims for additional costs or time extension which may subsequently become apparent.
  5. Will reimburse Owner and Architect/Engineer for review or redesign services associated with re-approval by authorities if required.

01 60 00-3

H. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, specifications section states that no substitutions are allowed for a specific material or item, or when acceptance will require revision to the Contract Documents.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 60 00-4

## SECTION 01 73 29

### CUTTING AND PATCHING

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Requirements and limitations for cutting and patching of Work.

##### 1.2 RELATED SECTIONS

- A. Section 01 33 00 - Submittals.
- B. Section 01 11 00 - Summary of Work: Work by Owner or by separate Contractors.
- C. Section 01 35 16 - Alteration Project Procedures: Cutting and patching for alterations work.
- D. Section 01 60 00 - Material and Equipment: Product options and substitutions.
- E. Section 07 84 13 - Fire stopping.
- F. Individual Product Specification Sections:
  - 1. Cutting and patching incidental to work of the section.
  - 2. Advance notification to other sections of openings required in work of those sections.
  - 3. Limitations on cutting structural members.

##### 1.3 SUBMITTALS

- A. Submit written request in advance of cutting or alteration which affects:
  - 1. Structural integrity of any element of Project.
  - 2. Integrity of weather exposed or moisture resistant element.
  - 3. Efficiency, maintenance, or safety of any operational element.
  - 4. Visual qualities of sight exposed elements.
  - 5. Work of Owner or separate Contractor.
- B. Include in request:
  - 1. Identification of Project.
  - 2. Location and description of affected Work.
  - 3. Necessity for cutting or alteration.
  - 4. Description of proposed Work and Products to be used.
  - 5. Alternatives to cutting and patching.
  - 6. Effect on work of Owner or separate Contractor.
  - 7. Written permission of affected separate Contractor.
  - 8. Date and time work will be executed.

01 73 29-1

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Primary Products: Those required for original installation.
- B. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00.

## PART 3 EXECUTIONS

### 3.1 EXAMINATION

- A. Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
- B. After uncovering existing Work, assess conditions affecting performance of work.
- C. Beginning of cutting or patching means acceptance of existing conditions.

### 3.2 PREPARATION

- A. Provide temporary support to ensure structural integrity of the Work. Provide devices and methods to protect other portions of the Project from damage.
- B. Provide protection from elements for areas which may be exposed by uncovering work.
- C. Maintain excavations free of water.

### 3.3 CUTTING

- A. Execute cutting and fitting including excavation and fill if required, to complete the Work.
- B. Remove and replace defective or nonconforming work.
- C. Remove samples of installed work for testing when requested.
- D. Provide openings in the Work for penetration of mechanical and electrical work.
- E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

01 73 29-2



### 3.4 PATCHING

- A. Execute patching to complement adjacent Work. Match with existing finish where exposed to view unless noted otherwise.
- B. Fit Products together to integrate with other Work.
- C. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
- D. Employ skilled and experienced installer to perform patching for weather exposed and moisture resistant elements, and sight exposed surfaces.
- E. Restore work with new Products in accordance with requirements of Contract Documents.
- F. Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire resistant material in accordance with Section 07 84 00 to full thickness of the penetrated element.
- H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish the entire unit.

END OF SECTION

01 73 29-3



## SECTION 01 75 00

### STARTING OF SYSTEMS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Starting systems.
- B. Demonstration and instructions.
- C. Testing, adjusting, and balancing.

##### 1.2 RELATED SECTIONS

- A. Section 01 40 00 - Quality Control: Manufacturers field reports.
- B. Section 01 77 00 - Contract Closeout: System operation and maintenance data and extra materials.
- C. Division 23 – Heating, Ventilation, and Air Conditioning

##### 1.3 STARTING SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect/Engineer seven days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable manufacturer's representative or Contractors' personnel in accordance with manufacturers' instructions and requirements.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

01 75 00-1

- H. Submit a written report in accordance with Section 01 33 00 that equipment or system has been properly installed and is functioning correctly.

#### 1.4 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of final inspection.
- B. Demonstrate Project equipment and instruct the owner's representative by a qualified manufacturers' representative who is knowledgeable about the Project.
- C. For equipment or systems requiring seasonal operation, perform demonstrations for other season within six months.
- D. Utilize operation and maintenance manuals as the basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.
- E. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.
- F. Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instruction.
- G. The amount of time required for instruction on each item of equipment and system is specified in individual sections.
- H. Contractor to provide DVD recording of all training sessions with Owner personnel. A copy of the recorded training sessions is to be given to the Owner included in the closeout documents.

#### 1.5 TESTING, ADJUSTING, AND BALANCING

- A. The Contractor will employ services of an independent firm to perform testing, adjusting, and balancing. Contractor shall pay for services.
- B. The independent firm will perform the services specified in Division 23.
- C. Reports will be submitted by the independent firm to the Architect/Engineer indicating observations and results of tests and indicating compliance or noncompliance with the requirements of the Contract Documents.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTIONS Not Used.

END OF SECTION

01 75 00-2

## SECTION 01 77 00

### CONTRACT CLOSEOUT

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Adjusting.
- D. Project record documents.
- E. Operation and maintenance data.
- F. Spare parts and maintenance Products.
- G. Warranties and Guarantees.
- H. Maintenance service.

##### 1.2 RELATED SECTIONS

- A. Section 01 50 00 - Construction Facilities and Temporary Controls: Progress cleaning.
- B. Section 01 75 00 - Starting of Systems: System start-up, testing, adjusting, and balancing.

##### 1.3 CLOSEOUT PROCEDURES

- A. Contractor shall notify Architect ten (10) days prior to the date on which the building will be ready for final inspection and prepare his own punch list of items to complete to meet contract documents. Such notice shall not be made until completion of all items is assured, and has submitted completed punch list items to Architect. Architect will not schedule inspection for punch list until Contractor's completed punch list is received and each item is initialed by contractor as complete.
- B. Incomplete work found during the inspection shall be grounds for ceasing the inspection. Final inspection shall be resumed again only upon completion of work.
- C. Minor adjustments and corrections to work shall not be considered cause for discontinuing final inspection.

01 77 00-1

- D. Upon receipt of punch list prepared by Architect, the Contractor will immediately make necessary corrections to work as required for final completion of the project.
- E. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer's review.
- F. Provide submittals to Architect / Engineer that are required by any governing or other authorities.
- G. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due. The final application for payment will not be approved for payment by the Architect until the "COMPLETE CLOSEOUT" documents are provided to and reviewed by the Architect by the Contractor.
- H. Owner will occupy all portions of the building as specified in Section 01 11 00.

#### 1.4 FINISHING

- A. Adjust windows, doors, drawers, hardware, appliances, motors, valves, controls, and other equipment for proper operation.
- B. Seal exterior joints between materials to form a waterproofed and airtight enclosure.
- C. Clean surface using appropriate materials and methods that will thoroughly clean but not damage materials and their finishes.

#### 1.5 REPAIRS

- A. Unless Architect grants permission to repair any defective work, remove from project any work not in accordance with Contract Documents. Permission to repair any such work shall not constitute a waiver of Architect's right to require complete removal of defective work if repair operation does not restore quality and appearance of member of surface to Architect's satisfaction. If permission is granted, repair according to Architect's directions.

#### 1.6 COMPLETED WORK

- A. Completed work shall find materials structurally sound, free from scratches, abrasions, distortions, chips, breaks, blisters, holes, splits, or other disfigurement considered as imperfections for the specific material.
- B. Completed surfaces shall be thoroughly clean and free from foreign materials and stains.
- C. Contractor is to install, connect, service and operate permanent systems at earliest practical dates, unless otherwise directed by Architect.

01 77 00-2

## 1.7 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- D. Clean permanent filters or replace disposable filters of operating equipment.
- E. Clean debris from roofs, gutters, downspouts, and drainage systems.
- F. Clean site; sweep paved areas, rake clean landscaped surfaces.
- G. Remove waste and surplus materials, rubbish, and construction facilities from the site.

## 1.8 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Adjust windows, doors, drawers, hardware, appliances, motors, valves, controls, and other equipment for proper operation.

## 1.9 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed Shop Drawings, Product Data, and Samples.
  - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.

01 77 00-3

3. Changes made by Addenda and modifications. (Actual sections of addendum items may be pasted into specification in appropriate locations.)
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundations in relation to finish floor datum.
  2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent marker (i.e. new building, property line, etc.).
  3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  4. Field changes of dimension and detail.
  5. Details not on original Contract drawings.
  6. Changes made by Addenda and modifications. (Actual sections of addendum items may be pasted onto drawings in appropriate locations.)
- G. Submit to Architect in electronic media, **two (2) Flash Drives**, containing **Record Documents as described in this section** and scanned **As-Built drawings in PDF format**, properly marked to show field modifications. **These shall include both Drawings and Specifications**. For videos asked for, provide videos on separate Flash Drives. Printed media, **one set of Record Documents, one hard copy set of Record Drawings (As-Built Drawings)**, submit **one set** of three-ring binders containing **only** manufacturer **warranties and guarantees** for each product and system provided under this contract. Provide installer and manufacturer warranty department phone numbers and contact person if available for each product and system. All paper copies of closeout items to be scanned and copied to the electronic media.

#### 1.10 CLOSEOUT DOCUMENTS

- A. Prepare Flash Drive titled "CLOSEOUT DOCUMENTS", title of project, and subject matter.
- B. Submit two (2) complete Sets of closeouts and As-Built drawings in electronic format, within 60 days after final inspection.
- C. Organize closeout contents, logically organized into sections as described below.

#### GENERAL (section tab)

##### Contents:

1. A Directory, listing names, addresses, and telephone numbers of Architect / Engineer, Contractor, Subcontractors, and major equipment suppliers.
2. Executed original of occupancy permit
3. Punch Lists showing items signed off as completed by Contractor.
4. Contractor's "Asbestos Free" certification letter stating that no materials have been placed in the building containing asbestos material.

01 77 00-4



## LIEN WAIVERS (section tab)

Lien Waivers must demonstrate that the project is free of any debt or claim from any subcontractor, supplier or vendor and that the project is free and clear with the exception of monies owed the General Contractor. All subcontractors and suppliers must have been completely paid with the exception of the percentage of monies owed by the General Contractor, or payment a bond posted for each sub-contractor and supplier for whom a balance is owed. For this project, the amount is not to exceed Five Percent (5%) of their contract. Lien waiver submitted from each subcontractor and supplier is to show amount they are still owed. **These requirements are mandatory conditions to qualify for final payment.**

### Contents:

1. AIA G706A - CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIENS
2. AIA G706 - CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS
3. AIA G707 - CONSENT OF SURETY TO FINAL PAYMENT
4. Final Lien Release from each subcontractor and supplier.

## WARRANTIES / GUARANTEES / BONDS (section tab)

- A. Provide notarized copies, one original and one photocopy. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers. Submit warranties prior to final Application for Payment. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.
- B. Provider manufacturer **warranties and guarantees** for each product and system provided under this contract. Provide installer and manufacturer warranty department phone numbers and contact person if available for each product and system. This is a general listing; your specific project may not contain some of the items listed.

### Contents:

1. General Contractor's Statement of Warranty
2. All manufacturer's warranties and guaranties stipulated or implied on equipment and products (i.e., carpet wear, prefinished metal finish, etc.)
3. One-year warranty from each subcontractor
4. Termite Protection Warranty (Five-Year)
5. Fluid-applied weather barrier (Five-Year)
6. Wood interior door: Lifetime warranty
7. Glazing warranty
8. Continuous hinges warranty: (manufacturer's lifetime warranty)
9. Lockset warranty: Mortise: Three-year, Cylindrical: Ten-year
10. Exit device: Three-years.
11. Door closers: 30-years
12. Suspended ceilings: 30-year limited system performance Warranty
13. Millwork: 10-year warranty)
14. Fiber Reinforced Plastic (FRP): One-year warranty
15. Special coatings: 5-year warranty

01 77 00-5

16. Visual Display Surfaces: Life of Building
17. Hot Water Tank Warranty: (Refer to specific Specification Section and/or water heater schedule on drawings)
18. HVAC Manufacturers Warranties-(Contractor to fill out equipment warranty and registration cards and mail into manufacturer. Provide a copy of each warranty in the closeout manual.

#### 1.11 OPERATION / MAINTENANCE DOCUMENTS

- A. Submit data on Flash Drive.
- B. Organize each individual section with printed title "OPERATION / MAINTENANCE DOCUMENTS", title of project, and subject matter.
- C. Submit one set of volumes, within 10 days after final inspection.
- D. Subdivide contents, logically organized into sections as described below, with tab titling each section. Prepare a Table of Contents for each system or material description identified as follows:

##### MECHANICAL (section tab)

###### Contents:

1. Directory, listing names, addresses, and telephone numbers of Subcontractors, and major equipment suppliers.
2. Operation and maintenance instructions, arranged by system. Identify the following:
  - a. Significant design criteria.
  - b. List of equipment.
  - c. Parts list for each component.
  - d. Operating instructions.
  - e. Maintenance instructions for equipment and systems.
  - f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
  - g. Video on flash drive of each equipment and system training session.
3. Project documents and certificates, including the following:
  - a. Shop drawings and product data.
  - b. Air balance and test reports - see specifications.
  - c. Certificates.
  - d. Start up report on all major equipment items (See Division 23 of Specifications)
  - e. Copies of registration and warranty cards on major equipment initiating warranty time dated the date of substantial completion and mailed by contractor as required.

##### ELECTRICAL (section tab)

###### Contents:

1. Directory, listing names, addresses, and telephone numbers of Subcontractors, and major equipment suppliers.
2. Operation and maintenance instructions, arranged by system. Identify the following:

01 77 00-6

- a. Significant design criteria.
  - b. List of fixtures, equipment and switch gear.
  - c. Parts list for each component.
  - d. Operating instructions.
  - e. Maintenance instructions for equipment and systems.
  - f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
  - g. Video on flash drive of each equipment and system training session.
3. Project documents and certificates, including the following:
- a. Shop drawings and product data.
  - b. Electrical System Test Report - see specifications
  - c. Certificates / Warranties.
  - d. Start up report
  - e. Copies of registration cards on major equipment initiating warranty time dated the date of substantial completion and mailed by contractor as required.

#### MISCELLANEOUS EQUIPMENT & MATERIALS (section tab)

##### Contents:

- 1. Directory, listing names, addresses, and telephone numbers of Subcontractors, and major equipment or materials suppliers.
- 2. Operation and maintenance instructions for equipment arranged by system and subdivided by specification section. Identify the following:
  - a. Significant design criteria.
  - b. List of equipment.
  - c. Parts list for each component.
  - d. Operating instructions.
  - e. Maintenance instructions for equipment and systems.
  - f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
- 3. Finish material schedule including the following:
  - a. Listing of all materials
  - b. Manufacturers of each material.
  - c. Color or finish supplied on each material.
- 4. Project documents and certificates, including the following:
  - a. Shop drawings and product data.
  - b. Material Maintenance instructions and recommendations.
  - c. Wear, finish, or misc. guarantees

#### 1.12 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance, and extra products in quantities specified in individual specification sections.
- B. Deliver to project site and place in location as directed by Owner; obtain receipt prior to final payment.

01 77 00-7

### 1.13 CLOSEOUT SUBMITTAL LIST

The following is a list of submittals required by this section. It includes but is not necessarily limited to the following:

- All warranties guarantees and bonds as listed above.
- Record Drawings and Shop Drawings - Provide one set of All Shop Drawings, and two sets of Record Drawings per section 1.9.
- A Directory, listing names, addresses, and telephone numbers of Architect / Engineer, Contractor, Subcontractors, and major equipment suppliers.
- Executed original of occupancy permit
- Copy of Architect's and consultant's punch list(s) with the project manager's initials beside each item signifying that each item has been corrected.
- Contractor's "Asbestos Free" certification letter.
- Contractor's "concrete placement" drawings identifying the area placed, the time and date of the placement and weather conditions.
- AIA G706A - CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIENS
- AIA G706 - CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS
- AIA G707 - CONSENT OF SURETY TO FINAL PAYMENT
- Final Lien Release from each subcontractor and supplier.
- General Contractor's Statement of Warrantee
- Third Party Special Inspection Reports
- Copy of HVAC Manufacturers Warranties and registration (Originals filled out and sent to manufacturer.)
  
- MECHANICAL, ELECTRICAL & MISCELLANEOUS EQUIPMENT
  - a. Directory, listing names, addresses, and telephone numbers of Subcontractors, and major equipment suppliers.
  - b. Design criteria.
  - c. List of equipment.
  - d. Parts lists
  - e. Operating instructions.
  - f. Maintenance instructions
  - g. Shop drawings and product data.
  - h. test reports.
  - i. Certificates.
  - j. Startup report.
  
- Finish material schedule including the following:
  - a. Listing of all materials
  - b. Manufacturers of each material.
  - c. Color or finish supplied on each material.
- Owner receipt of spare parts and maintenance products. Contractor will provide list, naming all spare material, items and parts as specified in individual sections or on drawings. The contractor will deliver spare material, items and parts to the owner and ask him to sign list as proof that all items have been provided as listed.

01 77 00-8

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 77 00-9



## SECTION 02 26 23

### ASBESTOS PRECAUTIONS AND PROCEDURES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Contractors responsibilities concerning asbestos containing materials (ACM) in the existing building or systems where work is to occur.
- B. Contractor's responsibilities concerning asbestos in materials, products, and equipment used in the construction project.

##### 1.2 DISCOVERY OF ASBESTOS CONTAINING MATERIALS (ACM)

- A. ACM's are known to be present in the existing building or system where work is to occur and are being abated prior to the start of construction.
- B. During the construction project, the contractor shall notify the Owner and the Architect of any portion of the work which the Contractor knows or has reason to believe contains asbestos. The Contractor shall take necessary precautions to prevent damage and release of asbestos fibers to the air.
- C. Any asbestos abatement procedures shall be performed by the Owner under a separate contract.

##### 1.3 ASBESTOS CONTAINING MATERIALS AND PRODUCTS

- A. All building construction materials, products, and equipment used in the project shall be asbestos free.
- B. The Contractor shall be responsible for verifying with suppliers and manufacturers that construction materials, products, and equipment used in completion of the project are asbestos free.
- C. The Contractor shall provide certification (typewritten, signed and dated) to the Owner indicating that asbestos free materials, products, and equipment were used in completion of the work.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

02 26 23-1





## SECTION 02 26 26

### LEAD PRECAUTIONS AND PROCEDURES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Contractors responsibilities concerning lead containing materials in the existing building.

##### 1.2 EPA LEAD; RENOVATION, REPAIR, AND PAINT PROGRAM

- A. After April 22, 2010 Contractors working in any building built prior to 1978, that will be occupied by children under the age of six (6) years, must be certified, and using trained workers, under the guidelines of the Lead, Renovation, Repair, and Paint Program.
- B. Refer to Environmental Protection Agency 40 CFR Part 745 and any and all State requirements, amendments, and regulations referencing that document.

##### 1.2 DISCOVERY AND HANDLING OF LEAD CONTAINING MATERIALS

- A. Prior to any work beginning, testing for lead containing materials must be performed in one of the following manners:
  - 1. by a Certified inspector
  - 2. by a Risk Assessor
  - 3. by a Certified Renovator using an EPA recognized test kit
- B. If the test is positive and does not meet any of the EPA's conditions for exemption:
  - 1. Follow all Pre-Renovation Education Requirements including:
    - a. Distribute the Lead Pamphlet, provided by the EPA, to Owner of the building or the adult representative of the child-occupied facility per EPA guidelines.
    - b. Distribute Renovation Notices/Pre-Renovation Form to the parents/guardians of the children attending the child-occupied facility or post informational signs about the renovation per EPA guidelines.
  - 2. Follow lead-safe work practices, as outlined in EPA 40 CFR Part 745, to prevent lead contamination, including:
    - a. Contain the work area
    - b. Minimize dust
    - c. Clean up thoroughly
  - 3. Assume and follow all responsibilities of a Certified Renovator, as outlined in EPA 40 CFR Part 745.
  - 4. Verify and follow the most current guidelines.

##### 1.3 RECORDKEEPING

- A. Comply with all requirements for recordkeeping.

02 26 26-1

B. Use the Renovation Recordkeeping Checklist provided by the EPA.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

02 26 26-2

## SECTION 02 32 01

### SITE AND SUBSURFACE INVESTIGATION BY CONTRACTOR

#### PART I GENERAL

##### 1.1 SECTION INCLUDES

- A. Surface reconnaissance and evaluation of existing site conditions.
- B. Sub-surface evaluation by contractor's chosen method of investigation.

##### 1.2 RELATED SECTIONS

- A. Sections 00 72 00 - General Conditions.

#### PART 2 GENERAL

##### 2.1 EXECUTION

- A. The Contractor is responsible for having a thorough knowledge of all Drawings, Specifications, General Conditions, and other Contract Documents. Failure to acquaint himself with this knowledge does not relieve him of the responsibility for performing his work in a manner acceptable to the Owner. No additional compensation will be allowed because of conditions that occur due to the failure by the Contractor to familiarize himself and all work with this knowledge.
- B. The Contractor shall be responsible for determining the existing conditions of the site and shall thoroughly examine all factors reasonably available to him, including but not limited to the Drawings, Specifications, and site conditions, site history, local information, and seasonal weather conditions. It is the Contractor's responsibility to further investigate site conditions as he determines necessary. Any construction performed by the Contractor on the project will constitute acceptance of the site.

END OF SECTION

02 32 01-1



## SECTION 02 41 19

### MINOR DEMOLITION FOR REMODELING

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Removal of designated building equipment and fixtures.
- B. Removal of designated construction.
- C. Disposal of materials. Storage of removed materials to be re-installed.
- D. Identification of utilities.
- E. Refer to items as indicated on drawings.

##### 1.2 RELATED SECTIONS

- A. Section 01 11 00 - Summary of Work: Work sequence, Owner's continued occupancy.
- B. Section 01 35 16 - Alteration Project Procedures: Re-installation of removed and stored products.
- C. Section 01 50 00 - Construction Facilities and Temporary Controls: Temporary enclosures, dust control barricades, security at Owner occupied areas, and cleanup during construction.
- D. Section 01 77 00 - Contract Closeout: Project record documents.

##### 1.3 SUBMITTALS FOR CLOSEOUT

- A. Section 01 77 00 - Contract Closeout: Procedures for submittals.
- B. Project Record Documents: Accurately record actual locations of capped utilities, subsurface obstructions, and other items field verified as different from construction documents.

##### 1.4 REGULATORY REQUIREMENTS

- A. The Contractor shall obtain evidence in writing from the Owner prior to any work commencing that no asbestos-containing material exists in the area(s) where demolition or construction is to be performed. A copy of the Owner's asbestos survey must be available on site during any renovation or demolition activity.

02 41 19-1

- B. Conform to applicable code for demolition work, dust control, products requiring electrical disconnection and re-connection.
- C. Obtain required permits from the authorities.
- D. Do not close or obstruct egress width to any building or site exit.
- E. Do not disable or disrupt building fire or life safety systems without 2 days prior written notice to Owner.
- F. Conform to procedures applicable when hazardous or contaminated materials are discovered.

#### 1.5 SCHEDULING

- A. Section 01 33 00 - Submittals, 01 32 36 Progress Schedules: Work schedule.
- B. Schedule Work to coincide with new construction.
- C. Describe demolition removal procedures and schedule.
- D. Perform noisy work when the building is unoccupied.

#### 1.6 PROJECT CONDITIONS

- A. Conduct demolition to minimize interference with adjacent and occupied building areas.
- B. Cease operations immediately if the structure appears to be in danger and notify Architect/Engineer. Do not resume operations until directed.

#### PART 2 PRODUCTS Not Used

#### PART 3 EXECUTION

##### 3.1 PREPARATION

- A. After date of Notice to Proceed, Contractor to assume responsibility for structures and items to be demolished and removed until such work is completed to the satisfaction of the Owner's representative. After work is started on any building or structure, work shall continue without interruption until complete.
- B. Provide, erect, and maintain temporary barriers and partitions at locations as required and indicated.
- C. Erect and maintain weatherproof closures for exterior openings.

02 41 19-2

- D. Erect and maintain temporary partitions to prevent the spread of dust, odors, and noise to permit continued Owner occupancy.
- E. Protect existing materials and items which are not to be demolished.
- F. Prevent movement of structure; provide bracing and shoring.
- G. Notify affected utility companies before starting work and comply with their requirements.
- H. Mark location and termination of utilities.
- I. Provide appropriate temporary signage including signage for exit or building egress. Do not close or obstruct existing building fire exits.

### 3.2 DEMOLITION

- A. Disconnect remove and / or cap designated utilities within demolition areas.
- B. Demolish in an orderly and careful manner. Protect existing supporting structural members.
- C. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.
- D. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.
- E. Remove temporary Work.
- F. Wherever a cutting torch or other equipment that may cause a fire is used, provide, and maintain fire extinguishers nearby ready for immediate use. All possible users shall be instructed in the use of the extinguishers.
- G. Hydrants shall be accessible at all times. No debris shall be permitted to accumulate.

### 3.3 CLEAN UP

- A. On completion of work of this section and after removal of all debris, site shall be left in drainable, clean condition satisfactory to Owner's Representative. Clean-up shall include disposal of all items and materials not required to be salvaged as well as all debris and rubbish resulting from demolition operations.

### 3.4 SCHEDULES

- A. Refer to drawings for items called for to be demolished.

END OF SECTION

02 41 19-3





## SECTION 03 11 00

### CONCRETE FORM WORK

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. All concrete and related items required to complete the building, provide off-sets, bulkheads, recesses, openings, chases, etc., and install any inserts, sleeves, etc., required by other trades.

##### 1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. Concrete: Section 03 30 00
- B. Concrete Reinforcement: Section 03 21 00

##### 1.3 WORK INSTALLED BUT FURNISHED BY OTHER SECTIONS:

- A. Built-in anchors, inserts and bolts for connection of other materials.
- B. Built-in sleeves, thimbles, dovetail slots, and water-stops.

##### 1.4 DEFINITIONS:

- A. Architectural Concrete Surfaces: Formed surfaces where appearance is of major importance.
- B. Non-Architectural Concrete Surfaces: Formed surfaces where appearance is not of major importance.

##### 1.5 QUALITY ASSURANCE:

- A. Design Criteria:
  - 1. General: Conform to ACI 347-Current Edition Chapter 1, Design.
  - 2. Plywood: Conform to tables for form design in APA Form V 345- Current Edition, including strength.
- B. Requirements of Regulatory Agencies: Erect forms to meet the requirements of the Local Building Code.
- C. Allowable Tolerances:
  - 1. Non-Architectural Concrete: Conform to ACI 347- Current Edition.
- D. Contractor shall assume full responsibility for earthwork, or an existing structure used as a form and such form work must meet all requirements of this section.

03 11 00-1

## 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. On delivery to the job site, place materials in area protected from weather.
- B. Store materials above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.
- C. Handle materials to prevent damage.

## PART 2 PRODUCTS

### 2.1 MATERIALS:

- A. Conform to ACI 347- Current Edition, Chapter 3, Materials and Form Work.

### 2.2 LUMBER:

- A. Softwood framing lumber: Kiln dried, PS 20-70.
- B. Boards less than 1 1/2" thick, used for basic forms and form liners: Kiln dried.
- C. Grade marked by grading rules agency approved by American Lumber Standards Committee.
- D. Light framing or studs for plywood forms, 2 in. to 4 inches in width and thickness, construction grade.

### 2.3 PLYWOOD:

- A. Exterior type softwood plywood, PS 1-66.
- B. Each panel stamped or branded indicating veneer grades, species, type and identification.
- C. Wood faced plywood for architectural concrete surfaces. Panel veneer grades: A-C. Mill-oiled sides and mill-sealed edges of panels.

### 2.4 CORNER FORMERS:

- A. Profile type: chamfered face.
- B. Material: Wood

### 2.5 TIES:

- A. Material: Carbon Steel

03 11 00-2

- B. Type: Snap ties
- C. Depth of break back: 1 inch
- D. Maximum diameter: 1/4 inch

## 2.6 FORM COATINGS:

- A. Plywood and wood forms shall be sealed against absorption of moisture from the concrete with an approved non-staining form oil or sealer.
- B. Form sealer, lacquer or any form of release agents containing wax, oil, or other materials that would interfere with adhesion shall not be used on form work for concrete which is to receive exposed aggregate coatings.

## PART 3 EXECUTION:

### 3.1 GENERAL

- A. The design, engineering, bracing and construction of form work shall be the responsibility of the Contractor.
- B. Form work shall conform to shapes, lines and dimensions of members as shown on contract plans and shall be sufficient to prevent mortar leakage and to maintain position and shape during and after placing of concrete. Form work for exposed surfaces shall be constructed of undamaged materials that will result in an unblemished, flush surface when removed.
- C. Shoring and bracing of form work shall be adequate to resist all construction loads, wet concrete, stored and lateral loads due to earthwork. Shoring and bracing of elevated slabs shall remain in place until the concrete has reached a minimum compressive strength of 3,500 psi. (75% of the specified 28-day design strength, f'c.)
- D. Preparation of forms. Edges of exposed concrete work, exterior and interior shall be pointed up to present a good square appearance.
- E. Provide temporary openings in framework for concrete placement.
- F. Removal of forms is subject to weather conditions after concrete is poured. Remove formwork in manner to ensure complete safety of structure. Do not place building materials on slabs until they are strong enough to carry the imposed load. The contractor shall decide when to remove and accept full responsibility for their removal.

03 11 00-3

- G. Do not run reinforcement, corner protection angles, or related fixed metal items, embedded in or bonded into concrete through expansion joints. Provide filler strips for expansion joints between slabs on grade and all joints between slabs on grade and vertical surfaces. Construct joints  $\frac{1}{2}$  inch wide and full depth of slab unless noted otherwise.

END OF SECTION

03 11 00-4

## SECTION 03 21 00

### CONCRETE REINFORCEMENT

#### PART 1 GENERAL

##### 1.1 Section Includes:

- A. All steel reinforcement, mesh, dowels, and related items to comply with drawings and specifications including materials, labor, and equipment to complete the building and work shown.
- B. Observation and Required Special Inspections

##### 1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. Section 01 40 00 – Quality Control: Required Special Inspections
- B. Section 03 11 00 - Concrete Form Work: Section
- C. Section 03 30 00 - Cast-In-Place Concrete
- D. Section 04 22 00 - Concrete Unit Masonry

##### 1.3 QUALITY ASSURANCE:

- A. Acceptable Manufacturers: Regularly engaged in manufacture of steel bar and welded wire fabric reinforcing.
- B. Installer Qualifications:
  - 1. Three years experience in installation of steel bar and welded wire fabric reinforcing.
- C. Requirements of Regulatory Agencies: Conform to requirements of local Building Code.
- D. Allowable Tolerances:
  - 1. Fabrication:
    - a. Sheared length: + or - 1 inch
    - b. Stirrups, ties and spirals: + or - 1/2 inch
    - c. All other bends: + or - 1 inch
  - 2. Placement:
    - a. Concrete cover to form surfaces: + or - 1/4 inch
    - b. Minimum spacing between bars: + or - 1/4 inch
    - c. Top bars in slabs and beams:
      - (1) Members 8 inches deep or less: + or - 1/4 inch
      - (2) Members more than 8 inches, but not over 2 feet deep: + or - 1/2 inch
      - (3) Members more than 2 ft. deep: + or - 1 inch
    - d. Crosswise of members: Spaced evenly within 2 inches of stated separation.

03 21 00-1

- e. Lengthwise of members: + or - 2 inches.
- 3. Maximum bar movement to avoid interference with other reinforcing steel, conduits, or embedded items: 1 bar diameter.

#### 1.4 SHOP DRAWINGS:

- A. Comply with Section 01 33 00.
- B. Show sizes and dimensions for fabrications and placing of reinforcing steel and bar supports.
- C. Indicate bar schedule, stirrup spacing, and diagrams of bend bars.
- D. All detailing, fabrication and erection of reinforcing bars shall comply with the A.C.I. Manual of Standard Practice for Detailing Reinforced Concrete Structures. (A.C.I. 315).ACI 315R- 18 is titled "Guide to Presenting Reinforcing Steel Design Details."
- E. Manufacturer's Literature: Manufacturer's specifications and installation instructions for splice devices.

#### 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Deliver reinforcement to project site in bundles marked with durable tags indicating bar size and length.
- B. Handle and store materials to prevent contamination.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

- A. REINFORCING STEEL. Reinforcing steel for concrete shall be deformed, clean, free from rust and new. It shall conform to ASTM Standard A 615 and shall be Grade 60 for bars No. 4 and larger and Grade 40 for No. 3 bars and smaller.
- B. SMOOTH STEEL DOWEL BARS. Plain steel dowel bars for reinforcing concrete slab joints shall meet the requirements of ASTM A 615, Grade 60. These plain round dowel bars shall be free from burrs or other deformations restricting slippage in the concrete.
  - 1. Smooth Dowel bars shall be held in position parallel to the surface and centerline of the slab by a metal assembly of sufficient strength and anchorage to prevent displacement during the paving operations. Immediately prior to placement of concrete, each bar shall be field coated for a minimum distance of 2 inches greater than half the length of the bar with an approved lubricant. Lubricated ends of adjacent bars shall be on alternating sides of the slab joint.

03 21 00-2

- C. WIRE FABRIC. Wire fabric shall be electrically-welded wire fabric of cold-drawn wire (70,000 psi yield point) of the diameter and spacing required and shall conform to ASTM Standard A 185. Welded wire fabric or mesh shall be of gauge and mesh shown on plans and shall conform to "Standard Specifications for Welded Steel Wire Fabric for Concrete REINFORCEMENT: (ASTM A1064-Current Edition). Furnish mesh in flat sheets. ASTM A1064/A1064M – 17 is titled "Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete."
- D. TIE WIRE: FS-QQ-W-461, annealed steel, black, 16 gauge minimum
- E. BAR & WIRE MESH SUPPORTS: Conform to "Bar Support Specifications", CRSI Manual of Standard Practice. Metal bolsters required. No bricks or CMU allowed. Bars supports used over or against concrete surfaces which are exposed shall be plastic protected. The plastic shall have a thickness of 3/32" or greater at points of contact with the form work. The plastic shall extend upward on the wire to a point at least 1/2" above the form work. Provide following support types (CRSI Designation):
1. Woven Wire Mesh: Type "SBU", linear, longest length possible.
  2. Steel reinforcement bars: Type "SBU", length as required to fit in trench and properly support bars.
  3. Note: "SBU" type supports to have two (2) bottom runners and one (1) top runner, all continuous.
- F. DIAMOND PLATE DOWEL SYSTEM: Provide Diamond Dowel System manufactured by PNA construction technologies, "Speed Plate" System by SIKA Corp. or approved alternate. Plates are manufactured from steel certified to meet ASTM A36 (1/4" and 3/8") or ASTM A108 (3/4")
1. Install at all construction joints at building slabs-on-grade.
  2. Provide diamond plate thickness as follows, depending on slab thickness:
    - a. 1/4" (6mm) – typically used in 4"- 6" slab depths
    - b. 3/8" (10 mm) – typically used in 7"- 8" slab depths

## PART 3 EXECUTION

### 3.1 FABRICATION

- A. In accord with CRSI Manual of Standard Practice.

### 3.2 INSTALLATION:

#### A. Placements:

1. Bar Supports: CRSI Placing Reinforcing Bars (10th Edition)
2. Reinforcing Bars: CRSI Supports for Reinforcement Used in Concrete (2016). Support footing reinforcement bars with SBU type supports. Space at no more than 4'-0" on center. Support reinforcement bars at each footing corner and intersection. **Rebar chairs will not be acceptable.** For large double layer reinforcement pad footing mats, provide doubling of the SBU supports. Concrete bricks may be used as an option at large double-matted footings, **but only upon Architect's approval.**

03 21 00-3

3. Details shall be in accordance with "Building Code Requirements for Structural Concrete" (ACI 318-Current Edition)
4. **Place sufficient length supports for wire mesh concrete slab reinforcement no more than 3'-0" on center, or stagger at 2'-0" on center. Do not cut supports into small lengths.** Do not extend support through control joints.
5. Install #4 reinforcement hoops around slab penetrations 3" or larger in diameter. This would include, but not be limited to plumbing pipes, electrical conduit, floor drains, electrical floor boxes, etc.
6. Where groups of electrical conduits exceed 3" in diameter, install #4 reinforcement hoops around groups, or provide straight #4 bars around linear groups.

B. Steel Adjustment:

1. Move within allowable tolerances to avoid interference with other reinforcing steel, conduits, or embedded items.
2. Do not move bars beyond allowable tolerances without concurrence of Architect/Engineer.
3. Do not heat, bend, or cut bars without concurrence of Architect/Engineer.

C. Concrete covering over reinforcement shall be not less than the following:

1. Where concrete is deposited directly against earth: 3"
2. Where formed concrete surface will be exposed to weather or ground: 2"
3. Where formed concrete surface will not be exposed to weather or ground: for walls and slabs: 3/4"
4. For beams, girders, and columns: 1-1/2"
5. All covering: Nominal bar diameter

D. Splices:

1. Lap splices: Tie securely with wire to prevent displacement of splices during placement of concrete.
2. Splice devices: Install in accordance with manufacturer's written instructions.
3. Welding: Do not weld reinforcement.
4. Do not splice bars except at locations shown on drawings without concurrence of Architect/Engineer.

E. Wire Fabric:

1. Install in longest practicable length.
2. Lap adjoining pieces one full mesh minimum, and lace splices with 16-gauge wire.
3. Do not make end laps midway between supporting beams, or directly over beams of continuous structures.
4. Offset end laps in adjacent widths to prevent continuous laps.
5. Do not continue wire fabric through control joints

F. Diamond Plate Dowel System:

1. Install Diamond Plate Dowel System, following manufacturer's instructions.
2. Provide diamond plate dowel spacing as follows, depending on slab thickness:
  - a. 4" -6" slab thickness: 1/4" thick at 18" O.C.
  - b. 7" -8" slab thickness: 3/8" thick at 18" O.C.

03 21 00-4



3.3 CLEANING:

- A. Remove dirt, grease, oil, loose mill scale, excessive rust, and foreign matter that will reduce bond with concrete.

3.4 . PROTECTION DURING CONCRETING:

- A. Keep reinforcing steel in proper position during concrete placement.

3.5 OBSERVATION AND SPECIAL INSPECTIONS

- A. Reinforcement and placement shall be observed by the Architect/Engineer prior to placing concrete. Inspection of reinforcement for conformance to the construction documents shall be completed by the designated third-party Special Inspector.

3.6 INSTALLATION OF MISCELLANEOUS ITEMS:

- A. Contractor shall coordinate and check that all work required to be embedded in concrete is in place prior to pouring. Placement of such work is to be done without disturbing reinforcement in place.

END OF SECTION

03 21 00-5



## SECTION 03 30 00

### CAST-IN-PLACE CONCRETE

#### PART 1 GENERAL

##### 1.1 SCOPE:

- A. This Contractor shall furnish all material and labor necessary to complete execution of all concrete portions of this project, including the following items and other items of concrete or cement work which may be essential to complete that portion of the work as shown on the contract drawings and as hereinafter specified.
  - 1. Footings, foundations and structural members as shown, including piers if required.
  - 2. Concrete finish floor slabs.
  - 3. Interior trenching in existing concrete floors.
  - 4. Non-Shrink and Epoxy Grout
  - 5. Concrete Accessories
  - 6. Concrete Floor Densifier/Hardener
  - 7. Concrete Minimum Finish Tolerances & Standards
  - 8. Concrete Slab Moisture Mitigation
  - 9. Observation and Required Special Inspections
  - 10. Concrete Mix Design Submittal Form

##### 1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. Section 01 40 00 – Quality Control: Required Special Inspections
- B. Section 03 11 00 - Concrete Form Work
- C. Section 03 21 00 - Concrete Reinforcement
- D. Section 04 22 00 Concrete Unit Masonry
- E. Section 09 91 00 - Painting

##### 1.3 QUALITY ASSURANCE:

- A. Standards: Provisions of American Concrete Institute "Building Code Requirements for Structural Concrete" (ACI 318-Current Edition). American Concrete Institute "Specifications for Structural Concrete" (ACI 301-Current Edition), Concrete Reinforcing Steel Institute "Manual of Standard Practice" (Current Edition), American Concrete Institute "Guide to Presenting Reinforcing Steel Design Details" (ACI 315-Current Edition) and " Guide to Formwork for Concrete" (ACI 347-Current Edition) are

03 30 00-1

adopted except that where additional or more stringent requirements are required by these specifications.

- B. Tests: As listed in Standard Practice for Sampling Freshly Mixed Concrete ASTM C 172-Current Edition.
- C. Control Joints and Expansion Joints: Follow Provisions of American Concrete Institute concerning maximum area for placement of expansion and control joints unless shown or noted otherwise on drawings and specifications. If contractor requests adjustments to control joint placement or additional control joints and/or expansion joints, consult Architect prior to concrete placement.
- D. **Slabs must be replaced that have a crack(s) with a width of 0.05” or greater. In high visibility areas all cracks in slabs will be subject to replacement of slab sections at the discretion of the Architect.**

#### 1.4 SUBMITTALS:

- A. Test Reports: Reports of concrete compression, yield, and slump tests.
- B. Certificates:
  - 1. Manufacturer's certification that materials meet specification requirements.
  - 2. Material content per cubic yard of each class of concrete furnished:
    - a. Dry weights of cement.
    - b. Saturated surface-dried weights of fine and coarse aggregate.
    - c. Quantities, type and name of admixtures.
    - d. Weight of water.
  - 3. Ready-mix delivery tickets, ASTM C 94-Current Edition.
- C. Fully completed concrete mix design submittal form found at the end of this section for each type of concrete to be placed.

#### 1.5 PRODUCT AND ENGINEERING DATA:

- A. Submit data for design mixes, proposed admixtures, etc. per Section 01 33 00.
- B. The Contractor shall be responsible for checking quantities and dimensions in accordance with contract drawings and field conditions. Where discrepancies in dimensions are noted, the Contractor shall notify the Architect of such discrepancies and corrected dimensions noted on submittal drawings.
- C. Contract drawings receive precedence over shop drawings unless authorized in writing.

03 30 00-2

- D. Shop drawings furnished for reinforcing steel shall contain fabrication details as well as placement drawings which are to be used in conjunction with contract drawings.
- E. Detailing and fabrication of reinforcing shall conform to " Guide to Presenting Reinforcing Steel Design Details", (ACI 315-Current Edition).

#### 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Cement: Store in weather tight enclosures and protect against dampness, contamination, and warehouse set. Any cement damaged by moisture, or which fails to meet any of the specified requirements shall be rejected and removed from the work.
- B. Aggregates:
  - 1. Stockpile to prevent excessive segregation, or contamination with other materials or other sizes of aggregates.
  - 2. Use only one supply source for each aggregate stockpile.
- C. Mixing: Ready-mixed concrete shall be mixed and delivered in accordance with Standard Specifications for Ready-Mixed Concrete" (ASTM C94-Current Edition).

#### 1.7 ENVIRONMENTAL REQUIREMENTS:

- A. Allowable Concrete Temperatures
  - 1. Cold Weather: Minimum 40 degrees. With temperatures lower than 40 degrees, approval by the Architect shall be required.
  - 2. Hot Weather: Maximum 90 degrees F.
- B. Do not place concrete during rain, sleet, or snow unless protection is provided which is approved by Architect.

#### 1.8 CONCRETE SLAB MOISTURE MITIGATION:

- A. It will be the responsibility of the Contractor to obtain moisture levels at or below the required percentages as required for installation of all floor covering products by the time the products are ready to be installed. If moisture levels are not reached at the scheduled time to install floor coverings, the Contractor will pursue other means to meet floor covering moisture requirements at no additional cost to owner. This will not be a reason to delay project completion.

#### 1.9 CERTIFICATION

- A. Ready Mix concrete batch plant to be NRMCA (National Ready Mixed Concrete Association) certified. Submit proof of certification with submittals.

03 30 00-3

- B. Concrete Flatwork Finishers to be ACI certified. Submit proof of certification to the Architect for approval.

## PART 2 PRODUCTS

### 2.1 MATERIALS

#### A. Concrete:

1. Portland Cement: Type 1 Portland, meeting "Standard Specifications for Portland Cement", (ASTM C150-Current Edition) shall be used.
2. Aggregates: All aggregates shall be limestone, clean, hard strong and durable particles free of chemicals or foreign material that may affect the bonding of cement paste and shall conform to "Specifications for Concrete Aggregates" (ASTM C33-Current Edition). Coarse aggregate gradation shall be within the limits of 1 inch to No. 4 standard sieve analysis. Alternate aggregate materials must be reviewed and approved by the architect.
3. Mixing Water: Water shall be fresh, clean, and potable.
4. Slump: 5 inch maximum: plus, tolerance 0 inches, minus tolerance 2 inches.
5. Mix proportioning: To produce 28-day minimum compressive strength of moist cured laboratory samples. Provide the following minimum compressive strengths at listed locations unless noted otherwise in other specification sections or on drawings:
  - a. 3000 psi for all footing and foundation stem walls.
  - b. 3000 psi for all exterior sidewalk/stoop/patio locations.
  - c. 3500 psi for all interior slabs-on-grade.
  - d. 3000 psi for all other concrete items

- B. Curing Material: Chemical curing products: AmeriPolish PCA curing agent, manufactured by AmeriPolish Architectural Concrete Products, (800) 592-9320. 1100-CLEAR, manufactured by W.R. Meadows Inc, (800)342-5976. L&M CURE, manufactured by Laticrete (800)243-4788. The contractor is to verify with floor covering manufacturers that they will warrant their product if a curing agent is applied where the floor covering is to be installed.

- C. Below-slab vapor barrier shall be as specified in Section 07 10 00, but no less than 15 mils thick.

- D. Reinforcement: See Section 03 21 00

### 2.2 CONCRETE FLOOR DENSIFIER/HARDENER AND SEALER

#### A. Penetrating Hardener/Densifier: (Clear liquid reactive lithium-silicate based.)

1. Retroplate 99 by Advanced Floor Products.
2. Consolideck LS, by Prosoco.
3. 3D HS, by Ameripolish

03 30 00-4

4. Approved alternate by other manufacturer specified herein.

B. Clear Sealer: Refer to specification 09 91 00 Paint & Finishing

### 2.3 MIXES:

A. Proportions: Ready-mix concrete shall meet "Specifications for Ready-Mixed Concrete" (ASTM C94-94). Proportions of concrete shall produce the required strength and be workable to the extent that it can be worked into the corners and angles of forms and around reinforcement. Collection of excess free water on the surface will not be permitted nor a segregation of the materials in the mixture.

B. Free surface moisture on aggregates shall be included as part of the mixing water.

C. Water-cement ratios for project concrete mix shall be such that the relationship between the required strength and water-cement ratio of ingredients used has been previously established by reliable tests and data. Copies of previous test data, along with design mix data shall be submitted to the Architect by the Contractor for approval. Where such data is not available or is insufficient, water-cement ratios shall meet the requirements of Table 4.2.2 of ACI 318-Current Edition.

D. Admixtures shall comply with the ASTM Specifications for Chemical Admixtures. (ASTM C494-Current Edition).

1. Mid-Range Water Reducing Admixture: Mira 110, manufactured by Grace Concrete Products, 877-423-6491, Master Builders Polyheed 1720, manufactured by BASF or approved alternate product. Non-chloride, non-corrosive. Admixture to meet ASTM C494 Type A & F requirements. Comply with manufacturer's instructions for dosage. Admixture to be incorporated with mix at batch plant.

a. other admixtures may be used as a concrete mix component only with approval of the Architect.

b. Use all admixtures in accordance with recommendations of the manufacturer.

2. For concrete containing HRWR admixture (super- plasticizer) when approved by Architect: slump shall be 6"-8".

3. In no case shall the use of the admixtures produce a compressive strength less than that specified in this section.

4. Fly ash (Type C or F per ASTM C618) may NOT be used as an admixture in concrete.

5. All concrete installed at the exterior on a permanent basis shall be air entrained. Interior slabs shall not contain air entrainment. If admixture is desired, obtain approval through Architect.

03 30 00-5

6. Air-entraining admixture if used, shall meet "Specifications for Air-Entraining Admixtures" (ASTM C260-Current Edition) and shall produce air content by volume between 5 to 7%.

F. Use same Portland cement manufacturer throughout project for all interior concrete. Portland cement manufacturer may be different for exterior concrete but must be the same Portland cement manufacturer for all exterior concrete.

## 2.4 NON-SHRINK AND EPOXY GROUT

A. Non-Shrink Grout, Non-Metallic Grout: Factory premixed grout conforming to CRD-C-621-80, "Corps of Engineers Specification for Non-Shrink Grout".

1. Acceptable Manufacturers:

- a. EUCO NS, the Euclid Chemical Company
- b. SonogROUT, Sonneborn-Contech
- c. Masterflow 713, Master Builders
- d. DuragROUT, L & M Construction Chemical Co.

B. Epoxy Grout: Structural epoxy adhesive conforming to ASTM C881.

1. Acceptable Manufacturers:

- a. Sikadur 32 Hi-Mod by Sika Corporation
- b. Sonneborn Epogel by Chemrex, Inc.
- c. Epcon C6 by ITW Ramset/Redhead
- d. Hilti HY-200

## 2.5 ACCESSORIES

A. Bentonite Waterstops: Surface applied Bentonite waterstop to be Volclay RX Waterstop by American Colloid Company or approved alternate.

## PART 3 EXECUTION

### 3.1 OBSERVATIONS AND SPECIAL INSPECTIONS

A. All reinforced concrete construction shall be performed under the personal supervision of the Building Superintendent. This superintendent shall keep a record of all concrete poured on the job. The record shall show in detail the area placed, the time and date of the placement and weather conditions which existed at the time of the placement. Upon completion of the work, this record of Concrete Placement shall be included in the close out documents.

B. The Contractor shall plan his work so that adequate time is allowed for the Architect to properly observe all embedded work prior to actual placement of concrete. The

03 30 00-6



Contractor shall notify the Architect of his intent to placement at least 24 hours prior to the time that he estimates the work will be ready for observation. The Contractor shall not place any reinforced concrete without the approval of the Architect.

- C. Contractor shall plan work and coordinate with independent testing lab to be present on-site throughout concrete placement.
- D. Inspection of concrete and concrete preparation for conformance to the construction documents and IBC shall be completed by the designated third-party Special Inspector.

### 3.2 INSTALLATION:

#### A. Placing Concrete:

1. Convey concrete from mixer to final position by method which will prevent separation or loss of material.
2. Maximum time permitted before a placement of concrete after adding mixture water shall be as follows:
  - a. Air temperature above 78 degrees F. - 60 minutes.
  - b. Air temperature below 78 degrees F. - 90 minutes.
3. Concrete shall not be placed until an observation by the Architect has been made and reinforcement placement, vapor barrier, etc., is approved.
4. Excavations for footing shall be free of debris, loose dirt, mud and water just prior to placing of concrete.
5. All forms shall be clean of debris and all embedded items shall be in place and secured prior to concrete placement.
6. Wood forms shall be sprinkled with water and wet when concrete is placed, but pooling of water in forms is to be prevented.
7. Maximum height of concrete free fall, 3 feet.
8. Regulate rate of placement so concrete remains plastic and flows into position.
9. Deposit concrete in continuous operation until panel or section is completed.
10. **Concrete Placement Tolerances & Standards:**
  - a. Provide diamond plate dowels at construction joints between placements. Refer to Section 03 21 00.

03 30 00-7

- b. **Control joints:** Saw cuts are to be performed within 12 hours after finishing. Use 1/8" thick blade, cutting no less than 1/3 of the slab thickness, unless noted otherwise.
  - c. Place control joints for concrete slabs (slab-on-grade and elevated concrete slabs) no more than 8'-0" o.c. each way.
    - i. For other concrete slab thicknesses, refer to structural drawings for control joint spacing.
  - d. **Note: Other placement methods may be considered only with approval of Architect.**
11. Concrete Slab Levelness and Flatness:
- a. Levelness: FL=20 for non-polished slabs.
  - b. Flatness: FF = 25 for non-polished slabs
  - c. In areas with floor drains, maintain finished floor level elevation at walls and slope surfaces uniformly to drains.
12. Place concrete in horizontal layers, 18 inches maximum thickness.
13. For concrete on grade or fill, sub-grades shall be properly prepared and maintained as specified previously. Where concrete is placed in direct contact with the earth, the subgrade material shall be wet but not muddy at time of placement.
14. Under all slabs, provide 4" of 1/2" diameter and less crushed stone meeting ASTM C33-Current Edition, which shall be leveled and compacted. A vapor barrier, as specified in Section 07 10 00 and shown on the drawings shall be placed under all interior slabs-on-grade.
15. Removal of forms. Do not remove forms until concrete has hardened sufficiently to support its own weight and imposed construction loads. Remove forms in such manner as to ensure the complete safety of the structure and to prevent spalling or chipping of concrete. When removing forms, conform to the following:
- a. Non-Weight Supporting Forms: Form work for columns, walls, sides of beams and other parts not supporting the weight of the concrete may be removed as soon as concrete has hardened sufficiently to resist damage from removal operations, but in no case sooner than 24 hours.
  - b. Weight Supporting Forms: Do not remove form work for beam soffits, supported slabs or other parts which support the weight of concrete until concrete has reached 75% of its specified 28-day strength based on the lab cured concrete cylinder tests, but no sooner than 7 days.
16. Dish concrete floors to floor drains as shown on drawings. Provide total slope of 1/4", unless noted otherwise on drawings.

03 30 00-8

17. Follow procedures as listed below for placement and routing of pipes, sleeves, and electrical conduit:

(If any of these items are not met, pouring of concrete will not be allowed until corrected.)

- a. **Do not** route groups of conduit, pipes or sleeves above footings, unless noted to do so. If conflict occurs, consult Architect/Engineer.
- b. **Do not** route conduit, pipes, and sleeves below bearing walls when running parallel with wall.
- c. Limit width of conduit, pipes and sleeves not to exceed 3'-0" in width as it passes under wall footing. As much as possible, align the items perpendicular to the footing as it passes below footing.
- d. Provide a minimum spacing of 2'-0" between conduit or pipe groups as items pass under footings.
- e. **Do not** route conduits, pipe or sleeves under or through column footings or pad footings unless prior approval is given by Architect/Engineer.
- f. The top of all conduits, sanitary drain pipe, water supply pipe, etc. shall be installed at or below bottom of concrete slab where slab is on grade.

B. Consolidating Concrete at Steel Reinforcement:

1. Use mechanical vibrating equipment for consolidation.
2. Vertically insert and remove hand-held vibrators having minimum 1" diameter at points 18 inches to 30 inches apart.
3. Do not use vibrators to transport concrete in forms.
4. Minimum vibrator speed, 3600 rpm.
5. Vibrate concrete minimum amount required for consolidation, 3 to 5 seconds maximum.

C. Construction Joints:

1. Clean and roughen the surface of concrete and remove laitance.
2. Wet concrete surface and flush with neat cement grout before placing additional concrete.
3. Construction Joints for slabs on ground (floor joints) shall be plate dowel system. Plate dowel system sleeves shall be attached to 2 x wood members matching the depth of the slab for removal and reuse with steel stakes @ 2'-0" o.c. Form boards must have clean smooth top surface so finishing machines can pass over the top of the form.

D. Plate Dowel System: Provide Diamond Dowel System manufactured by PNA construction technologies, "Speed Plate" System by Sika. or approved alternate. Refer to Section 03 21 00.

1. Install at all slab on grade construction joints.

E. Expansion joints: Expansion joint filler, where indicated, shall meet "Specifications for pre-formed Expansion Joint Fillers for Concrete Paving and Structural Construction,

03 30 00-9

Non-extruding and Resilient, Non-bituminous. (ASTM D1752-Type 1). Provide “Zip Strip” type filler so that top ½” can be provided for sealant installation.

F. Finishing:

1. Floor Finish

- a. Edge forms and intermediate screed strips shall be placed accurately to give the desired elevations and contours. Strike-off templates or straight edges shall be used to give all floor slabs an even surface. Screeds are to be of such type not to interfere with reinforcing.
- b. Troweled finishes shall be applied to floors where concrete is the walking surface, or to have floor coverings. Troweling shall begin after all surface water has disappeared naturally and surface has wood floated to a plane smooth surface. Initial troweling shall be done after concrete has hardened sufficiently to prevent excess fines from working to surface, to produce a smooth surface free from defects and a final troweling shall be done after sufficient hardening to remove trowel marks and give a hard, dense smooth surface. Drying shall be natural. The use of "dryers" by dusting cement or sand is not permitted.
- c. Floors to receive tile or other bonded cementitious finishes shall, after wood floating to a smooth plane surface, be roughened with stiff brushes before final set.
- d. All exterior concrete slabs shall have a light broom finish of sufficient texture to prevent slipping.

2. Exposed Concrete Surfaces

- a. Areas not receiving special coatings shall be wetted and rubbed with carborundum bricks or other abrasive to give a smooth finish with a uniform color and texture. All edges shall be eased to give a good appearance.
- b. Areas receiving special coatings shall be free from imperfections such as voids and protrusions and shall be finished to a smooth and level surface.

G. Concrete Floor Slab Curing: AmeriPolish PCA curing agent, manufactured by AmeriPolish Architectural Concrete Products, (800) 592-9320. 1100-CLEAR, manufactured by W.R. Meadows Inc, (800)342-5976. L&M CURE, manufactured by Laticrete (800)243-4788. Products must be approved for concrete floor slabs receiving Polished concrete finish. Contractor to verify with floor covering manufacturers that they will warrant their product if a curing agent is applied where the floor covering is to be installed. Provide 20’x20’ test sample to confirm curing agent does not cause discoloration to the concrete slab.

H. Patching: After removal of forms, all honeycomb areas, voids, air pockets, tie holes and surface cracks shall be immediately patched.

I. Application of Floor Densifier/Hardener:

1. Apply to **unpolished** interior concrete slabs and exterior porch or patio areas scheduled to be exposed to view.

03 30 00-10

2. Apply per manufacturer's instruction to all exposed trowelled concrete floor areas and other areas as called out on finish schedule. Product to be applied as soon after curing period as manufacturer's instructions allow. Application must be smooth and even. No excess application or puddling of the product will be allowed.
  - a. Clean floors where densifier/hardener is applied with manufacturers cleaners.

### 3.3 TRENCHING OF EXISTING INTERIOR CONCRETE FLOORS

Unless noted otherwise, provide the following:

- A. Sawcut concrete where trenching is required and remove all debris.
- B. Fill trench with 4" of 1/2" or less clean washed gravel base and tamp tightly into place in no more than 8-inch lifts.
- C. Place 15 mil vapor barrier per Section 07 10 00 over gravel base. Provide 12 inches long standard no.4 rebar, drilled and friction-set 4 inches into sides of existing cut concrete slab at maximum spacing of 24 inches o.c. **Place continuous strip of bentonite along each side of trench on top of vapor barrier.**
- D. Place 6 x 6"-W1.4 x W1.4 WWF and pour minimum 4" thick, 3500 p.s.i. concrete. Finish as required for exposed finish of for floor finish scheduled to be installed.
- E. Provide sawcut control joints at no more than 8'-0" on center.

### 3.4 GRIND ONLY AT SEALED CONCRETE FLOORS

- A. At sealed concrete floors
  1. Progressively polish slab surface with 200 grit resin-bonded, phenolic diamond heads. 1 pass.
  2. Seal with DNS-400 Sprayable Acrylic Sealer by Ameripolish.

### 3.5 ACCEPTANCE OF CONCRETE:

- A. Concrete not meeting the strength requirements of these specifications shall be tested at critical locations designated by the Architect by a laboratory approved by the Architect. These tests shall be at the Contractor's expense. Such tests performed shall be in accordance with the Building Code Requirements for Structural Concrete: (ACI 318-Current Edition). If these tests still indicate below required strengths, or if inconclusive, then the Contractor shall proceed at his own expense as follows:

Remove and replace or reconstruct all under strength concrete in an approved manner or perform load tests in accordance with the "Building Code Requirements for Structural Concrete" (ACI 318-Current Edition). If load test results are not acceptable

03 30 00-11

then Contractor shall remove and replace or reconstruct all designated under strength concrete to meet requirements of these specifications.

- B. Concrete improperly placed, cured, reinforced, damaged or not meeting testing tolerances shall be considered potentially deficient and shall be tested and replaced if necessary, in accordance with Paragraph a) above.
- C. Concrete not meeting the tolerances of "Recommended Practice for Concrete Formwork: (ACI 347) and concrete not formed as shown on plans shall be considered as not acceptable and shall be removed and replaced by Contractor at his own expense unless Architect permits patching and repairing of such work. Finished repair work shall meet criteria mentioned above or shall be removed and replaced.

### 3.6 TESTING AND SAMPLING:

- A. Slump Tests: A minimum of two (2) slump tests shall be made each day concrete is placed with one (1) test being made at the time test cylinders are made. Slump tests are to be made in accordance with " Standard Test Method for Slump of Hydraulic-Cement Concrete" (ASTM C-143-Current Edition). Where slump exceeds five inches (5") or the average 28 day strength of the three (3) test specimens falls below the strength specified for the class of concrete tested, or below proportional minimum seven (7) day strengths, (80 percent of specified 28 day strength) the proportions, water content or temperature conditions shall be changed to secure the required properties, and, at the discretion of the Architect, portions of the structure containing such concrete shall be removed and replaced, or reinforced as necessary. No concrete below 3" slump shall be accepted. Follow guidelines of ASTM C94 for water added to mix on site. Do not exceed design specifications.
- B. Strength Tests. The compression strength test shall be performed in accordance with Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens" ( ASTM C39-Current Edition). Samples for concrete cylinders shall be made in accordance with "Method of Sampling Fresh Concrete" (ASTM C172-Current Edition), and test cylinders shall be prepared, and laboratory cured in accordance with "Method of Making and Curing Concrete Compression and Flexure Test in the Field" (ASTM C31-Current Edition).
- C. Cylinders. Five (5) cylinders from the same batch shall be prepared by a certified technician for each 50 cubic yards or fraction thereof placed, but not less than four (4) cylinders for each day of concrete operations shall be made. **Location of batch as to placement on the subject and supplier mix ID# shall be noted on report, and cylinders so designated. Maximum and minimum initial curing temperatures as recorded per ASTM C31 shall be included in this report.** No tests shall be required for sidewalks. One (1) cylinder shall be tested at seven (7) days and three (3) at 28 days. **If cylinder break is lower than required, the testing company to contact Contractor**

03 30 00-12

**and Architect immediately for direction. The remaining cylinder shall be maintained in proper curing conditions until specified 28-day compressive strength has been affirmed.**

- D. A minimum of nine (9) cylinders shall be tested for each class of concrete used on the project and the average of any three (3) consecutive strength tests at 28 days shall be equal to or greater than the specified strength with no test less than 500psi below the design strength.
- E. The contractor shall bear expense of all testing by a Laboratory approved by the Architect prior to award of the contract. Testing results shall be sent directly to the Architect's office, Contractor, and the Concrete Producer. Architect is to be notified of high slump concrete or low early strength (<75% of design at 7 days) immediately.

END OF SECTION

03 30 00-13

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas

# CONCRETE MIX DESIGN SUBMITTAL FORM

(Section 03 30 00 - Cast-in-Place Concrete)

**Submitted Mix Design**

Date Submitted: \_\_\_\_\_

Location and Type (pump or chute) of Placement

## Concrete Information

Supplier Mix Design #: \_\_\_\_\_

Design Strength (f'c), psi \_\_\_\_\_

Water/Cementitious Ratio \_\_\_\_\_

Total Air Content, % \_\_\_\_\_

(Entrapped or Entrained) \_\_\_\_\_

Density:

Wet, pcf \_\_\_\_\_

Dry, pcf \_\_\_\_\_

Slump:

Without WR, in. \_\_\_\_\_

With WE, in. \_\_\_\_\_

## Admixture Information

	ASTM Designation	Product & Manufacturer	Dosage (oz/cy)
Water Reducing			
Accelerating			
Retarding			

**Architect's Approval** \_\_\_\_\_

**Structural Engineer's Approval** \_\_\_\_\_

03 30 00-14



**Mix Design Proportions Per Cubic Yard**

	Identification (Type, size, source)	Weight (lbs)	Density (SSD)	Volume (cubic ft)	% Aggregate Absorption
Cement					
Fly Ash					
C.A. #1					
C.A. #2					
C.A. #3					
F.A. #1					
F.A. #2					
Water					
% Air					
	<b>Totals</b>				

03 30 00-15

**Coarse and Fine Aggregate Gradation**

Sieve	Size	% Passing Each Sieve (All sieve sizes must be entered)					Combined% Passing	Combined % Retained	
		C.A. #1	C.A. #2	C.A. #3	F.A. #1	F.A. #2		Cumulative	Individual
1-1/2"									
1"									
3/4"									
1/2"									
3/8"									
#4									
#8									
#16									
#30									
#50									
#100									
#200									
% of Vol.									

**Required Attachments and Supplemental Documentation**

\_\_\_\_\_ Portland Cement mill test  
report/certification

\_\_\_\_\_ Fly ash mill test  
report/certification

\_\_\_\_\_ Separate aggregate gradation reports including all required sieve sizes

- Note: \* All gradation reports shall be dated within 60 days of submittal  
\* Separate gradation reports required for each coarse and fine

03 30 00-16

aggregate material in the  
mix

Product data for all admixtures including, but not limited  
to:

- \* WR
- \* Set retarder
- \* Set accelerator
- \* Air entrainer

Concrete compressive strength data used for standard deviation  
calculations

**Concrete Supplier Information**

Supplier Name: \_\_\_\_\_  
Technical Contact: \_\_\_\_\_ Cell # \_\_\_\_\_  
Sales Contact: \_\_\_\_\_ Cell # \_\_\_\_\_

**Primary Plant:**

Location: \_\_\_\_\_  
Miles from Site: \_\_\_\_\_  
Travel Time to Site: \_\_\_\_\_  
NRMCA Certified (Y/N): \_\_\_\_\_  
AHTD Certified (Y/N): \_\_\_\_\_  
Batch Mixing Typer (Dry/Central Mix): \_\_\_\_\_

**Secondary Plant:**

Location: \_\_\_\_\_  
Miles from Site: \_\_\_\_\_  
Travel Time to Site: \_\_\_\_\_  
NRMCA Certified (Y/N): \_\_\_\_\_  
AHTD Certified (Y/N): \_\_\_\_\_  
Batch Mixing Typer (Dry/Central Mix): \_\_\_\_\_

03 30 00-17



## SECTION 03 62 00

### NON-SHRINK GROUTING

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Provide non shrink, rapid setting, high strength repair mortar for horizontal structural patch and repair of existing concrete substrate.
- B. Provide high strength, non-metallic, Portland cement based non shrink grout.

##### 1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation for each material and product used. Include manufacturer's Material Safety Data Sheets.

##### 1.3 REFERENCES

- A. ASTM C 109: Compressive Strength of Hydraulic Mortars
- B. ASTM C 191: Setting time of Hydraulic Cement
- C. ASTM C 882: Slant Shear Bond Strength
- D. ASTM C 928: Rapid Hardening Cementitious Materials for Concrete Repairs
- E. ASTM C 939: Flow of Grout
- F. ASTM C 1107: Hydraulic Cement Grout (Non Shrink)
- G. Region III Test Method IV: Freeze/Thaw Testing

##### 1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: The manufacturer shall be a company with at least fifteen years experience in the manufacturer and marketing of pre-packaged cementitious repair materials.
- B. Installer's Qualifications: The contractor shall be qualified to perform the work specified by reason of experience.

##### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in original packaging, labeled with product identification, manufacturer, batch number and shelf life.

03 62 00-1

- B. Store products in a dry area. Protect from direct sunlight.
- C. Handle products in accordance with manufacturer's printed recommendations.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

- A. Non Shrink rapid setting high strength, hydraulic cement based repair mortar and Non Shrink Grouts for horizontal applications. Comply with the following:
  - 1. Manufacturer: Fastset™ Non Shrink Grout (#1585-09) as manufactured by the QUIKRETE® Companies, One Securities Centre, 3490 Piedmont Road, NE, Suite 1300, Atlanta, GA 30305; telephone (404) 634-9100.
    - a. Substitutions: Comply with Section 01 11 00.
  - 2. Performance and Physical Properties at 73 degrees F and 50 percent relative humidity:
    - a. Compliance: ASTM C 928 R-3 specifications ASTM C 1107 CRD 621
    - b. Working Time, ASTM C 1107: 15-20 minutes.
    - c. Final Set Time, ASTM C 191: 20-45 minutes.
    - d. Compressive Strength, ASTM C 109 Modified:  
  
Fluid: 2000 psi (13.8 MPa) @ 3 hours, 4000 psi (27.6 MPa) @ 24 hours, 5000 psi (34.5 MPa) @ 7 days and 6500 psi (44.8 MPa) @ 28 days.  
  
Flowable: 2500 psi (19.2 MPa) @ 3 hours, 4500 psi, 4500 psi (31 MPa) @ 24 hours, 5500 psi (37.9 MPa) @ 7 days and 7500 psi (51.7 MPa) @ 28 days.  
  
Plastic: 3000 psi (20.7 MPa) @ 3 hours, 5000 psi (34.5 MPa) @ 24 hours, 6000 psi (41.3 MPa) @ 7 days and 8000 psi (55.1 MPa) @ 28 days.
  - e. Slant Shear Bond Strength, ASTM C 928: 1000 psi (6.9 MPa) @ 24 hours, 1500 psi (10.3 MPa) @ 7 days and 2500 psi (17.2 MPa) @ 28 days.
  - f. Height Change, ASTM C 1090: 0-0.2%.
  - g. Flow at Fluid Consistency, ASTM C 939: 20-30 seconds.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.
- B. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas landscaping from contact due to mixing and handling of materials.

### 3.2 SURFACE PREPARATION:

Comply with manufacturer's printed instructions and the following:

03 62 00-2

- A. Remove all spalled and unsound concrete from area to be repaired. If rusty reinforcing steel is present; it must be abrasive blasted to remove rust.
- B. Remove enough material to completely expose reinforcing steel.
- C. Large vertical or overhead patches deeper than 2" (50 mm) should contain reinforcing steel. Additional steel should be inserted using appropriate techniques if none is present.
- D. Clean surface to be repaired of all materials including dust, oil, dirt and grease.
- E. Dampen with clean water before patching and remove standing water.

### 3.3 MIXING:

Comply with manufacturer's printed instructions and the following:

- A. Material should be mechanically mixed for a minimum of three (3) minutes using a five (5) gallon (19L) bucket with a ½" (12mm) drill and paddle mixer. For large grouting applications a standard mortar mixer should be used.
- B. Add 1 ¼ gallon (4.7L) of clean water for each 60lb (27.2 kg) bag to achieve a plastic consistency. (Flowable: 1½ gallon (5.7L), fluid 1¾ gal. (6.6L)). Add the powder to the water and mix to achieve the required placing consistency. Add water sparingly to reach the desired consistency. Do not mix more material than can be placed in 15 minutes.
- C. For repair deeper than 2" (50 mm), up to 30 lbs (13.6kg) of clean, high quality ½" (12mm) gravel may be added to the mix at the plastic consistency. The water required will be reduced to 1 gallon (3.8 L) per 60-pound (27.2 kg) bag.
- D. Do not re-temper with additional water.

### 3.4 APPLICATION:

Comply with manufacturer's printed instructions and the following:

- A. Instructions for use as a Grout
  - 1. The area to be grouted should be thoroughly flushed and soaked with clean water prior to grouting. Leave no standing water.
  - 2. Place the grout quickly and continuously use light rodding or strapping is permitted to eliminate air bubbles.
  - 3. Grout temperature should be maintained from 50°F to 90°F (10°C - 32°C) to achieve specified results. Use cold water in hot weather or hot water in cold weather to achieve desired grout temperature. Do not use it if temperature is expected to go below 32°F (0°C) within a 12-hour period.

03 62 00-3

B. Instructions for use as a Repair Mortar

1. Remove all areas of spalled and unsound concrete from surface to be repaired.
2. Repair areas that are subject to heavy traffic should have a vertical edge of ½” (12 mm) or more, formed by use of a pneumatic jackhammer or sawing.
3. Dampen surface with clean water before patching. Remove standing water.
4. The repaired areas should be filled by placing material full depth, from one end to the other to eliminate partial depth lifts between batches.
5. Consolidate the material by hand tamping or chopping with a shovel or trowel. This is particularly important around the edges.
6. Screed and finish to create a surface that matches the surrounding finish.
7. Repair Mortar temperature should be maintained from 50°F to 90°F (10°C - 32°C) to achieve specified results. Use cold water in hot weather or hot water in cold weather to achieve desired grout temperature. Do not use if temperature is expected to go below 32°F (0°C) within a 12-hour period.

3.5 CURING

- A. Grouting applications must be damp cured for at least one day. No special curing procedures are required for repair applications but sealing surface with QUIKRETE® Acrylic Concrete Sealer (No. 8800) after concrete has hardened will ensure proper curing and help prevent shrinkage cracking.

3.6 CLEANING

- A. Remove excess material before material cures. If the material has cured, remove using mechanical methods that will not damage substrate.

END OF SECTION

03 62 00-4



## SECTION 03 62 16

### INJECTION EPOXY GROUTING

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Provide injection epoxy for repair of the cracks in the existing concrete wall.

##### 1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation for each material and product used. Include manufacturer's Material Safety Data Sheets.

##### 1.3 REFERENCES

- A. ASTM C 881: Epoxy-Resin-Base Bonding Systems for Concrete

##### 1.4 QUALITY ASSURANCE

- A. Installer's Qualifications: The contractor shall be qualified to perform the work specified by reason of experience.

##### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in original packaging, labeled with product identification, manufacturer, batch number and shelf life.
- B. Store products in a dry area. Protect from direct sunlight.
- C. Handle products in accordance with manufacturer's printed recommendations.

#### PART 2 – PRODUCTS

##### 2.1 MATERIALS

- A. Injection epoxy shall be ETI-GV Gel Viscosity Injection Epoxy by Simpson Strong-tie. If the crack width is less than 3/32", then use ETI-LV Low Viscosity Injection Epoxy by Simpson Strong-Tie.

#### PART 3 – EXECUTION

##### 3.1 EXAMINATION

- A. Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.

03 62 16-1

- B. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas from contact due to mixing and handling of materials.

### 3.2 CRACK PREPARATION:

- A. Clean the crack and the surface surrounding it to allow the epoxy to bond to sound concrete. Take care not to impact any debris into the crack during cleaning.
- B. Using clean, oil free compressed air, blow out the crack to remove any dust or debris. Best results will be obtained if the crack is dry at the time of injection.
- C. Remove the paint next to the existing crack. If this is not possible, route out the opening of the crack in a “V” shape using a grinder in order to get past the surface contamination.
- D. To adhere the E-Z click injection ports to the concrete wall, apply a small amount of epoxy around the bottom of the port base and place the port at one end of the crack. Repeat this step until the entire crack is ported, with injection ports placed 8” apart along the length of the crack.
- E. Using a putty knife, generously work epoxy along the entire length of the crack as recommended by the epoxy supplier. If the crack extends all the way through the wall, then seal the back of the crack.
- F. Allow the paste-over to harden before beginning injection.

### 3.3 INJECTION PROCEDURE

- A. Comply with manufacturer’s printed instructions for the cartridge preparation.
- B. Attach the E-Z click fitting to the end of the nozzle and that all ports are pushed into the open position.
- C. Attach the E-Z click injection fitting to the bottom E-Z click port until it clicks into place. Inject epoxy until it will no longer flow into the crack. Close the port and remove the injection fitting per the manufacturer’s instructions.
- D. Repeat the previous step at each port moving up the crack until the crack is completely filled.
- E. See manufacturer’s instructions for special injection tips and troubleshooting recommendations.

### 3.4 CURING AND CLEANING

- A. Once the injection epoxy has cured, remove the injection ports and past-over epoxy. The epoxy can be removed with a chisel, scraper or grinder. Continue to grind surface until all excess epoxy is removed.

END OF SECTION

03 62 16-2

## SECTION 04 05 13

### MORTAR

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Examine all Drawings, General Conditions, and General Requirements which are part of this Contract. Furnish all labor, materials, and equipment necessary for masonry mortar.

##### 1.2 RELATED SECTIONS

- A. Section 04 21 13: Brick Masonry
- B. Section 04 22 00: Concrete Unit Masonry

##### 1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM-most recent issue)
  - 1. ASTM C94, Specification for Ready-Mixed Concrete
  - 2. ASTM C109, Specification for Compressive Strength of Hydraulic Cement Mortars.
  - 3. ASTM C143, Test Method for Slump of Hydraulic Cement Concrete
  - 4. ASTM C144, Specification for Aggregate for Masonry Mortar
  - 5. ASTM C150, Specification for Portland Cement
  - 6. ASTM C207, Specification for Hydrated Lime for Masonry Purposes
  - 7. ASTM C270, Specification for Mortar for Unit Masonry
  - 8. ASTM C404, Specification for Aggregates for Masonry Grout
  - 9. ASTM C476, Specification for Grout for Masonry
  - 10. ASTM C780, Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
  - 11. ASTM C1019, Specification for Method of Sampling and Testing Grout
  - 12. ASTM C1142, Specification for Ready-Mixed Mortar for Unit Masonry
  - 13. ASTM C1329, Specification for Mortar Cement
- B. International Masonry Industry All-Weather Council (IMIAC): Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.
- C. International Masonry Industry All-Weather Council (IMIAC): Recommended Practices and Guide Specifications for Hot Weather Masonry Construction.

##### 1.4 SUBMITTALS

- A. Comply with Section 01 33 00.

04 05 13-1

- B. Submit Certification of mortar components and type for pre-blended masonry mortars such as “Spec Mix” or other approved manufacturers, dated within 12 months of contract date.

## 1.5 GENERAL REQUIREMENTS

- A. Deliver materials in unbroken bags or containers, plainly marked and labeled with Manufacturer's name, brand and mortar type.
- B. Storage of Materials
  - 1. Cement and hydrated lime: Stored in a manner to afford ready access for inspection and in suitable building to protect material from dampness. Insure protection against inclusion of foreign materials in cements and limes. MASONRY CEMENT WILL NOT BE ALLOWED IN MORTAR.
  - 2. Aggregates - use only clean, dry materials. Use no frozen materials.
- C. Build in all sheet metal work, anchors, anchor bolts, hangers, sleeves, thimbles, frames, structural members, etc. as shown and as required for other trades.
- D. Environmental Requirements: See Section 04 22 00 for temperature and laying restrictions.
  - 1. Cold Weather Requirements
    - a. Comply with IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.
    - b. When the ambient air temperature is below 40 degrees F, heat mixing water to maintain mortar temperature between 40 degrees F and 120 degrees F until placed. When the ambient air temperature is below 32 degrees F and holding, dropping, or predicted to drop below 32 degrees, no mortar is to be mixed.
  - 2. Hot Weather Requirements
    - a. Comply with IMIAC - Recommended Practices and Guide Specifications for Hot Weather Masonry Construction.
- E. Remove any materials that have partially hardened or set. DO NOT USE.
- F. Build in door frames and their anchors. Slush steel door frame jambs and heads full of mortar. Slush cells full of mortar where excessive cutting for conduit or other devices has weakened masonry.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. The mortar for all masonry, block, and brick shall meet the minimum requirements of the International Building Code.

04 05 13-2

- B. Mortar shall conform to the minimum proportion requirements given in Table II of ASTM C270, based on 28-day laboratory testing ONLY. Select mortar type based on the criteria below:
  - 1. Type “S”: For walls in contact with earth or below grade, and load-bearing interior and exterior walls.
  - 2. Type “S”: For load-bearing interior and exterior walls above grade.
  - 3. Type “N”: For non-load-bearing walls no higher than 20’-0”.
  - 4. Use Type ‘N’ only for masonry veneer.
- C. The mortar for all masonry shall be standard gray color.
- D. Provide only pre-mixed mortar of types specified manufactured by "Spec-Mix" or approved alternate substitution. **Mixing of any mortar on-site will not be allowed.**
- E. Use same manufacturer's products throughout project.
- F. Use of anti-freeze compound or other additives are not to be used without written approval of the Architect.
- G. Bond Beams and cells with vertical reinforcement shall be filled with 2000 psi concrete - NOT MORTAR.

## 2.2 MORTAR MATERIALS

- A. Portland Cement: ASTM C150, normal. Type I or III; gray color. Fly ash, slag, and pozzolans are NOT permitted as substitutes for Portland Cement.
- B. Hydrated Lime: ASTM C 207, Type S, and UBC 21-13 hydrated lime for masonry purposes.
  - 1. Manufactured by Chemstar of approved equal.
  - 2. For pigmented mortars, use colored Portland cement-lime mix of formulation required to produce color indicated, or if not indicated, as selected from manufacturer’s standard formulations. Pigments shall not exceed 10 percent of Portland cement by weight for mineral oxides nor 2 percent for carbon black.
- C. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4-inch (6.5 mm), use aggregate graded with 100 percent passing the No. 16 (1.18 mm) sieve.
  - 1. Colored-Mortar Aggregates: Natural-colored sand or ground marble, granite, or other sound stone, as required to match Architect’s sample.
- D. Aggregate for Grout: ASTM C404 with 100 percent passing the 3/8” (9.5mm) sieve.

04 05 13-3

- E. Admixtures: NOT permitted unless approved by the Structural Engineer of Record, prior to construction.
  - 1. Calcium Chloride is NOT permitted in mortar. Admixtures and other chemicals containing Thiocyanates, Calcium Chloride or more than 0.1 percent chloride ions are NOT permitted.
- F. Water: Potable

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions with installer present, for compliance with requirements for installation tolerances and other specific conditions, and miscellaneous conditions affecting performance of unit masonry.
- B. Examine rough-in and built-in construction to verify actual locations of piping and other penetrations prior to installation.

### 3.2 INSTALLATION

- A. Maintain an ambient temperature of the materials in contact with the mortar, of NOT less than 40 degrees F, unless otherwise recommended by the International Masonry All-Weather Council (IMIAC). Maintain this temperature limitation at every area and elevation of weather enclosures, when used.
- B. Lay solid brick-sized masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. DO NOT slush head joints.
- C. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings, piers, columns, and pilasters, and where adjacent to cells or cavities are 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.
- D. In existing construction, maintain joint widths shown, to match existing coursing, except for minor variations required to maintain bond alignment. If not shown, lay walls to match existing or 3/8" joints.
- E. Cut joints flush for masonry walls that are to be concealed or to be covered by other materials, unless otherwise indicated.
- F. Remove masonry units disturbed after lying; clean and reset in fresh mortar. DO NOT pound corners or jambs to shift adjacent stretcher units that have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

04 05 13-4

- G. Grouting: DO NOT place grout until the entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
- H. Refer to Section 04 22 00 for maximum allowable grouting heights.

### 3.3 MIXING OF MORTAR

- A. Machine mix in an approved type of mixer in which quantity can be accurately and uniformly controlled. Only small batches of mortar may be mixed at one time. Mixing time is not less than five (5) minutes and not less than three (3) minutes after water has been added. If hydrated lime is used, use dry-mixed method (optional) of first consistently mixing hydrated lime into putty.
- B. Dry Blended in Silos: Mixing shall be done using a continuous, self-cleaning mixer mounted at the apex of the silo. The water flow valve shall be set to provide desired workability.
- C. Keep all mixers and equipment clean. Do not deposit mortar on the ground.

### 3.4 WORKMANSHIP

- A. Mortar having stood for more than one hour shall not be used or re-tempered.
- B. Lay no masonry when danger of freezing conditions exists before mortar sets.

END OF SECTION

04 05 13-5





## SECTION 04 21 13

### BRICK MASONRY

#### PART 1 GENERAL

##### 1.1 SCOPE:

- A. Examine all Drawings, Specifications, General Conditions, Supplementary General Conditions, and General Requirements which are part of this Contract. Furnish all labor, material, tools, equipment, scaffolding, and other items necessary to complete all masonry work, with all inclusions, inserts and provisions for inclusion, connection, or passage by other Trades.

##### 1.2. RELATED SECTIONS

- A. Section 04 05 13: Mortar
- B. Section 05 50 00: Metal Fabrications-Loose lintels, anchor bolts, and steel bearing plates where anchored to, or bear on masonry:
- C. Section 07 10 00: Waterproofing and Damp Proofing Through-wall membrane flashing system
- D. Section 07 62 00: Flashings and Sheet Metal
- E. Section 07 92 00: Sealants
- F. Section 08 11 13: Hollow Metal Doors & Frames
- G. Section 09 96 53: Waterproof Coating

##### 1.3 REFERENCES

- A. ASTM A153 – Zinc Coating (Hot Dip)
- B. ASTM C67 – Test Methods of Sampling and testing Brick and Structural Clay Tile.
- C. ASTM E 835 / E835M – Guide for Dimensional Coordination of Structural Clay Units, Concrete Masonry Units, and Clay Flue Linings.

#### PART 2 PRODUCTS

##### 2.1 MATERIALS

- A. Brick to be ASTM C652, or ASTM C216 grade SW, Type FBS (ASTM C216 & ASTM C652).

04 21 13-1

- B. Face Brick: Match existing size and texture. Architect to approve
- C. All face brick shall be laid in accordance with the standards of Brick Institute of America.
- D. Common brick for back-up shall be of sound #1 common brick.
- E. **Erick Veneer Anchoring System to CMU Walls:**  
Provide LoxAll Adjustable Joint reinforcement in masonry wall coursing with 2X-Hook 3/16" diameter clip hook ties and 270-2X Ladder Eye-Wire horizontal reinforcing manufactured by Hohmann & Barnard, Inc., or approved alternate in CMU coursing at 16" O.C. vertically. Weld eyes at max. 16" o.c. to receive adjustable hook ties. Provide "Pencil Rod", 9 gage, continuous reinforcement at brick with Seismicclip Interlock System or approved equal attached to each hook tie. Install at 16" o.c. vertically.
- F. **Brick Anchoring System To Concrete or Existing Masonry Walls:**  
Provide 2X-Hook 3/16" diameter wire ties, with HB-5213, 14 gage adjustable anchor attached to concrete walls with 523 brass expansion bolt. Provide HB-213 washer to secure insulation in place. Manufactured by Hohmann & Barnard, Inc., or approved equal. Secure to walls at 16" o.c. vertically and 16" o.c. horizontally. Provide "Pencil Rod", 9 gage, continuous reinforcement at brick with Seismicclip Interlock System or approved equal attached to each wall tie. Install at 16" o.c. vertically.
- G. All ties to be placed so as not to exceed 16" vertically and 16" on center.
- H. Cavity Wall Flashing System: Mortar Net "Totalflash" masonry flashing system, or equivalent through wall system components by Hohmann & Barnard. See Section 07 10 00.
- I. Provide solid brick at all rowlock sills, in areas where brick voids will be exposed to view, and where shown on plans. The color must match stretcher course brick.
- J. Weep Vents:
  - a. Manufactured by Mortar Net, 1/2" thick, size as required to match brick head dimension. Refer to Section 07 10 00.
  - b. Install at 24" o.c. horizontally.
  - c. Provide ventilation vents at top of new masonry in same location and centering as weep vents.

## PART 3 EXECUTIONS

### 3.1 GENERAL REQUIREMENTS

- A. Deliver and store on the site, face brick, sufficient in quantity for the entire job, and secure approval of Architect before placing any of same in the work.

04 21 13-2

- B. Lay no units having a film of water or frost on their surfaces.
- C. Lay no masonry when temperature is below 40 degrees F. without Architect's permission. Such permission shall not relieve the Contractor of the responsibility for the work, however. If permitted to work below 40 degrees F., but above 32 degrees F., make provisions to heat and dry materials and protect work from freezing during the installation and curing period. No masonry is to be laid when temperatures are holding, dropping or are predicted to go below 32 degrees F. unless heated protection is provided during installation and curing period and has been approved by Architect.
- D. Build in bolts, ties, other metal anchors, sleeves, miscellaneous metals, and wood nailing strips as necessary to secure masonry together or to other materials. Use no continuous wood nailing strips.
- E. Build in steel lintels, bearing plates and flashings in contact with masonry. Bed flashing in mortar.
- F. Close up any recesses after pipes, ducts, conduits, and other items are in and have been inspected by Architect and/or other proper authorities and do all patching after other trades have completed their work.
- G. Cut exposed masonry with masonry saw to produce clean-cut edges.
- H. At end of each workday or shut down period cover walls with strong waterproof membrane overlapping walls 12" minimum on each side and securely anchor in place.
- I. Use a full height story pole at all corners. Level first and frequent courses with instrument.
- J. Carefully ship and stack upon delivery to avoid chipping. Do not stack directly on ground.
- K. Cutting and Patching: Consult other trades in advance and make provisions for installation of their work to avoid unnecessary cutting and patching. Do all cutting with a power saw designed for the purpose.
- L. Fully butter head and bed joints prior to laying.

### 3.2 WORKMANSHIP

- A. Lay all masonry in full bed of mortar, plumb and true to line with accurately spaced course and reveals. Keep bond plumb throughout, with head points of alternate courses in straight vertical lines.
- B. Provide tooled, concave joints where brick will be left exposed as a finished product, unless specifically called out to be otherwise. Verify and match existing joint strike if brick is adjoining existing brick.

04 21 13-3

- C. Where fresh masonry adjoins previously set masonry, clean, roughen, and lightly wet the set masonry before joining with the new.
- D. Where stop-offs are necessary in horizontal runs, rake back the unfinished work for joining the new work. Tothing is not permitted unless approved by the Architect.
- E. Initial rate of absorption (IRA) of the units is determined by the laboratory method described in Section 9 of Test Methods C67. IRA in the field depends on the moisture content of the masonry unit and is determined in accordance with Section 14 of Test Methods C67. Units having an average field IRA exceeding 30 g/min -30 sq. in. (30 g/min-194 cm squared) should have their IRA reduced below 30 g/min-30 sq.in. prior to laying. It is preferable to wet masonry units thoroughly 3 to 24 hrs prior to their use so as to allow time for moisture to become distributed throughout the unit except when in judgment of Architect the temperature is too low. No freshly wet masonry units or those having film of water or frost on surface shall be laid.
- F. Horizontal & Vertical Face Joints: Use tooled joints, approximately 1/4" deep and 3/8" wide.
- G. Construction/Control Joints: Construction/Control joints shall be spaced as shown on the drawings, but space no more than 24'-0" o.c. and no more than 12'-0' from corners. Provide backer rod and caulk joints in accordance with Section 07 92 00.
- H. Bond Pattern: Face Brick to be laid in running bond pattern, verify to match existing.
- I. If brick sills are to be installed, slope minimum 15 percent unless shown otherwise.
- J. Where masonry is installed, all vertical and horizontal joints to align according to bond types. Where differing masonry types are installed in same wall, joints are to align between each masonry unit type unless noted otherwise.

### 3.3 MASONRY WEEPS & CAVITY-WALL FLASHING MEMBRANE TERMINATION

- A. It will be the responsibility of the Contractor and the Mason to coordinate installation elevation of all weeps and cavity wall flashing membrane termination in masonry walls at specified locations. Adjust as needed to terminate above concrete walks. Where masonry cavity walls occur at slab-on grade conditions, locate weeps one brick course below finished floor elevation unless items such as a sidewalk, etc, interferes, in which case the weeps would be located at finished floor elevation. If finish grade elevation extends beyond 16 inches below finished floor elevation, locate weeps approximately 2-4" above finish grade unless noted otherwise. Continue through-wall flashing between weep elevation changes, keeping waterproofing integrity. Finish grade to be a minimum 2" below weeps. **WEEPS ARE TO REMAIN EXPOSED. DO NOT COVER WEEPS WITH SOIL, FLASHING, CONCRETE, OR ROOFING MATERIAL.**

04 21 13-4

### 3.4 CLEANING

- A. Remove excess materials, mortar droppings. Remove mortar droppings on connecting or adjoining work before its final set.
- B. Exposed Masonry: At completion of work, point holes in joints of exposed exterior masonry surfaces, completely fill with mortar, tool properly. After pointing has set, hardened, wet exposed masonry surfaces. Clean soiled surfaces with a solution which will not harm masonry or adjacent materials equal to Sure Klean 600 manufactured by ProSoCo, Inc. Cleaner must be approved by brick manufacturer. Apply with stiff fiber brush, leave masonry clean, free of mortar daubs, with tight mortar joints throughout. Immediately after cleaning, rinse masonry surfaces with clear water. **DO NOT USE PRESSURE SPRAY WASHER TO CLEAN OR RINSE OFF MASONRY.**
- C. Protect all other trade's work and other items set into wall.
- D. Remove, replace defective materials, correct defective workmanship, and leave masonry clean.
- E. Replace defective mortar. Match adjacent work.
- F. Remove excess mortar and smears.
- G. Use non-metallic tools in cleaning operations.

### 3.5 WATER REPELLANT COATING:

- A. At completion of cleaning, apply elastomeric waterproof coating. Refer to Section 09 96 53 Waterproof Coating.
- B. Application is to be done only with approval of the Architect and may be delayed for an extended period due to time of year or weather conditions.

### 3.6 REMOVAL OF DAMAGED EXISTING BRICK:

- A. On areas where new construction adjoins existing, removal and/or replacement of damaged brick may be necessary. Should such conditions be present, work shall be accomplished by chiseling out, and replacement of the damaged unit.
- B. After removal of the damaged unit(s), placement of new brick to match existing units shall be accomplished using wedges of wet wood, positioned to allow sufficient mortar to match existing mortar on all sides of the unit, and of sufficient depth to provide 1 1/2" minimum of mortar over the face of the wood wedges.
- C. Replacement units shall be properly aligned with mortar joints matching the depth, width, and profile of the surrounding units.

04 21 13-5

- D. After placement and proper pointing, the repaired area shall be scrubbed clean with a brush and water to remove any excess mortar.

END OF SECTION

04 21 13-6

## SECTION 04 22 00

### CONCRETE UNIT MASONRY

#### PART 1 GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Concrete masonry units.
2. Injected Masonry Fill Insulation.
3. Reinforcement, anchorages, and accessories.
4. Observation and Required Special Inspections
5. Mockup panel

###### B. Products Installed but not Furnished Under this Section:

1. Section 03 21 00 - Concrete Reinforcement
2. Section 05 50 00 - Metal Fabrications: Loose steel lintels.
3. Section 07 62 00 - Sheet Metal Flashings and Trim.

###### C. Related Sections:

1. Section 01 40 00 – Quality Control: Required Special Inspections
2. Section 03 30 00- Cast-In-Place Concrete: grout.
3. Section 04 05 13 – Mortar
4. Section 07 27 26 – Fluid-Applied Weather Barrier System
5. Section 07 21 00 – Insulation
6. Section 07 92 00 - Joint Sealers: Rod and sealant at control joints.
7. Section 09 91 00- Painting and Finishing.

##### 1.2 REFERENCES

- A. ASTM C90 - Hollow Load-Bearing Concrete Masonry Units.
- B. ASTM C145 - Solid Load-Bearing Concrete Masonry Units.
- C. Hot and Cold Weather Masonry Construction Guide - Recommended Practices and Guide Specifications for Hot & Cold Weather Masonry Construction.
- D. ASTM A153 – Zinc Coating (Hot Dip)

##### 1.3 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops the following installed compressive strengths (fm) at 28 days.
  1. For Concrete Unit Masonry: As follows, based on net area:
    - a.  $F'm = 2000 \text{ psi (13.1 Mpa)}$ .

04 22 00-1

#### 1.4 SUBMITTAL

- A. Submit samples of actual units to be used for Architect's approval.
- B. Submit to Architect the insulation type proposed.
- C. Submit mix design for concrete grout

#### 1.5 MOCK-UP SAMPLE PANEL

- A. Before commencing any work, Contractor shall erect a 4' x 4' panel of each type of CMU specified with correct mortar color. Lay in pattern to simulate wall pattern. The panel is NOT PART OF THE BUILDING and is to remain in place until removal is authorized by the Architect. The contractor shall have sufficient brick on site to erect two panels if necessary.
- B. Panel face shall show mortar, bond, widths, and tooling of joints.
- C. Approval of Architect is required before proceeding with any part of the building.
- D. Panel is to remain in place until completion of the work.
- E. Construct mock-up panel in "cut-away" view, exposing all wall assembly components. Refer to Section 01 40 00 Quality Control-Mock-Ups.

#### 1.6 ENVIRONMENTAL REQUIREMENTS

- A. Cold Weather Requirements: Hot and Cold Weather Masonry Construction Guide - Recommended Practices and Specifications for Cold Weather Masonry Construction.
- B. Lay no masonry when the temperature is below 40 degrees F. without Architect's permission. Such permission shall not relieve the Contractor of responsibility for the work, however. If permitted to work below 40 degrees F., but above 32 degrees F., make provisions to heat and dry materials and protect work from freezing during the installation and curing period. No masonry is to be laid when temperatures are holding, dropping or are predicted to go below 32 degrees F. unless heated protection is provided during installation and curing period and has been approved by the Architect.
- C. External exposed CMU: Provide units with integral water repellent

#### 1.7 PRE-INSTALLATION MEETING

- A. The Contractor will schedule and conduct a pre-installation meeting **prior to construction of cmu walls**. Those attending are to include Contractor, Architect, Owner, Structural Engineer, mason, cmu grout-mix representative and 3<sup>rd</sup> party special inspector. Items to be discussed are as follows but are not limited to these:
  - 1. Schedule

04 22 00-2



2. Installation of rebar
3. Required grout mix design strength.
4. Frequency of testing and inspections
5. Placement of grout
6. Construction height of CMU walls
7. Control joints and corners
8. Other items associated with cmu wall construction.

## PART 2 PRODUCTS

### 2.1 CONCRETE MASONRY UNITS

- A. Hollow Load Bearing Units: ASTM C90, Grade N, Type 1:
  1. Common CMU: Light weight (ASTM C331) above grade; normal weight (ASTM C331) below grade.
- B. Solid Load-Bearing Units: ASTM C145, Grade N, Type 1:
  1. Common CMU: Light weight (ASTM C331) above grade; normal weight (ASTM C331) below grade.
- C. Masonry Units: Modular units sized as required to achieve details shown; provide special units for bond beams, control and expansion joints, and lintels.
  1. Common CMU: Where indicated on drawings.
- D. Quality Control: All standard masonry units shall be manufactured by one manufacturer and shipped from the same plant. All units are subject to inspection and rejection by the Architect for defects such as excessive porous surface, chipped corners, irregular faces or sizes, etc. Sample units submitted shall be retained and shall set the standard for quality expected. Meeting ASTM C90 minimum requirements is not considered to be adequate in the areas mentioned.
- E. All outside CMU corners at interior wall is to have  $\frac{3}{4}$ " radius bullnose.
- F. Fire Resistance Classification: CMU walls and partitions shall have fire resistance ratios as indicated on the drawings. Units shall be of minimum equivalent thickness (ASTM C140) specified for the fire rating and corresponding aggregate type.

### 2.2 REINFORCEMENT AND ANCHORAGES

- A. **CMU Horizontal Joint Reinforcement:** Install horizontal joint reinforcement 16 inches on center, except space at 8 inches in parapet walls and below finished floor, or where otherwise indicated on Drawings. 120 Truss or 220 Ladder-Mesh LoxAll design, manufactured by Hohmann & Barnard, Inc., or approved alternate. Minimum 9-gauge welded steel wire; hot-dip galvanized after fabrication to 1.5 oz. Per ASTM A153 Class B-2 for use in exterior walls, mill galvanized wire for interior walls. Reinforcement width to be 1 1/2 to 2 inches less than wall thickness.

04 22 00-3

- B. Provide reinforcement with receiver eyes for brick veneer. See Section 04 21 13.
- C. Miscellaneous Masonry Anchors: Fabricated from 16 gage steel sheet or 3/8 inch steel rod, 1.5 oz. hot-dip galvanized after fabrication.
- D. Construction/Control Joints: Construction/Control joints shall be spaced as shown on the drawings. Caulk joints in accordance with Section 07 92 00. Unless shown otherwise less than 24'-0" on center, space joints for CMU veneer no more than 24'-0" on center along same plane. Provide control joints at corners no more than 12'-0" from corner or closer if shown on drawings.. Coordinate locations with Architect and Structural Engineer.

### 2.3 ACCESSORIES

- A. Joint Filler: Closed cell foam, oversized 50 percent; self-expanding joints.
- B. Preformed Control Joint Filler:
  1. VS Series by Hohmann & Barnard, Inc.
  2. No. 2901 by Wire Bond.
- C. Cavity Wall Flashing System: Mortar Net "Totalflash" masonry flashing system or equivalent thru wall system components by Hohmann & Barnard, See Section 07 10 00.
- D. Reinforcing Bar Positioners:
  1. D/A 811; Dur-O-Wal, Inc.
  2. D/A 816; Dur-O-Wal, Inc.
  3. No. 376 Rebar Positioner; Heckman Building Products, Inc.
  4. #RB Rebar Positioner; Hohmann & Barnard, Inc
  5. #RB-Twin Rebar Positioner; Hohmann & Barnard, Inc.
  6. Double O-Ring Rebar Positioner; Masonry Reinforcing Corporation of America
  7. O-Ring rebar Positioner; Masonry Reinforcing Corporation of America.
  8. Hot-dip galvanized after fabrication.

### 2.4 INJECTED MASONRY FILL INSULATION

- A. Injected Masonry Fill Insulation: CfiFOAM Aminoplast Foam Insulation by CfiFOAM, Inc., P.O. Box 10393, Knoxville, TN 37939. Phone: (865) 588-4465, Core-Fill-500 by Tailored Chemical Products, Inc., 3719 First Ave., SW, Hickory, North Carolina. STM E-119, H.U.D. 6.2.9., or approved alternate. Product must be premixed from factory.

### 2.5 CONCRETE GROUT OR SPEC MIX GROUT

- A. Concrete grout to be produced at a ready-mix batch plant, capable of producing specified concrete grout or spec mix grout, each as listed below.

04 22 00-4

B. Concrete Grout:

1. Portland Cement: Type I Portland, meeting "Standard Specifications for Portland Cement", (ASTM C150-Current Edition) shall be used.
2. Aggregates: All aggregates shall be clean, hard strong and durable particles free of chemicals or foreign material that may affect the bonding of cement paste and shall conform to "Specifications for Concrete Aggregates" (ASTM C33). Nominal maximum aggregate size for concrete grout shall be 3/8" diameter.
3. Mixing Water: Water shall be fresh, clean and potable.
4. Slump: 9 inch maximum: plus tolerance 1 inch, minus tolerance 1 inch.
5. Mix proportioning: To produce 28 day minimum compressive strength of moist cured laboratory samples, 2,000 psi at all locations.

C. Spec Mix Grout:

1. Spec Mix Core Fill Grout, Coarse (CF-02), preblended product containing cementitious materials and dried aggregates to meet ASTM C 476 and CSA A179.
2. Packaging: 80lb packages or 3,000lb bulk bags for use in Spec Mix silo system.
3. Mixing Water: Water shall be fresh, clean and potable.
4. Slump: 9 inch maximum: plus tolerance 1 inch, minus tolerance 1 inch.
5. Mix proportioning: To produce 28 day minimum compressive strength of moist cured laboratory samples, 2,000 psi at all locations.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Verify items provided by other sections of work are properly sized and located.
- B. Establish lines, levels, and coursing. Protect from disturbance.
- C. Provide temporary bracing during erection of masonry work. Maintain in place until building structure provides permanent bracing.

### 3.2 COORDINATION WITH OTHER TRADES

- A. It will be a requirement of this section to verify and coordinate work with other trades and specification sections. Do not begin work on concrete slabs on grade or elevated concrete slabs until minimum strength and cure time has been reached.

### 3.3 COURSING

- A. Place masonry to lines and levels indicated.
- B. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.

04 22 00-5

- C. Lay concrete masonry units in running bond unless adjoining work is involved, or called out on drawings otherwise. Course one block unit and one mortar joint to equal 8 inches vertically. Form flush mortar joints where joint will be covered by other construction. **Mortar joints on concealed areas where fluid applied cavity wall weather barrier is to be applied must be fully filled with no voids, holes, or cracks, struck flush with the face of CMU.** **Provide tooled, concave joints** where wall will be left exposed and painted, or is a finished product, unless specifically called out to be otherwise.

### 3.4 PLACING AND BONDING

- A. Lay solid concrete masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints. Remove excess mortar.
- B. 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 foundation walls 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 courses on footings where cells are not grouted, spread out full mortar bed, including areas under cells.
- C. Fully bond intersections, and external and internal corners.
- D. Do not shift or tap masonry units after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.
- E. Perform job site cutting with proper tools to provide straight unchipped edges. Take care to prevent breaking masonry unit corners or edges.
- F. Isolate masonry partitions from vertical structural framing members with a control joint.
- G. Where masonry is installed, all vertical and horizontal joints to align according to bond types. Where differing masonry types are installed in same wall, joints are to align between each masonry unit type unless noted otherwise.

### 3.5 TOLERANCES

- A. Alignment of Pilasters: Maximum 1/4 inch from true line.
- B. Variation from Unit to Adjacent Unit: 1/32 inch.
- C. Variation from Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet.
- D. Variation from Plumb: 1/4 inch per story non-cumulative.
- E. Variation from Level Coursing: 1/8 inch in 3 feet; 1/4 inch in 10 feet; 1/2 inch maximum.
- F. Variation of Joint Thickness: 1/8 inch in 3 feet.

04 22 00-6

### 3.6 REINFORCEMENT AND ANCHORAGES

- A. Install horizontal joint reinforcement 16 inches on center, except space at 8 inches in parapet walls and below finished floor, or where otherwise indicated on Drawings.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend 24 inches minimum each side of opening. Place joint reinforcement continuous in first and second joint below top of wall.
- C. Lap joint reinforcement ends minimum 6 inches. Discontinue at control joints. Extend 24 inches minimum each side of openings. Place reinforcing bars supported and secured against displacement. Maintain position within 1/2 inch of true dimension.
- D. Cells that contain vertical reinforcing are to be grouted full. Lap vertical reinforcing a minimum of 48 bar diameters and ensure bar is positioned in the cell as indicated on the structural plans. **Fill cells in 5'-4" lifts maximum.** Power vibrate grout in each cell full height of each lift. Maximum diameter of power vibrator for grout consolidation is 3/4". Maximum allowable CMU height for installing grout in cells is **5'-4"** or to course immediately below bond beam, whichever is lower. Contractor's option to grout to course immediately below bond beams and provide 4" tall block outs at interior walls and standard size block outs on exterior side of CMU for visual confirmation by 3<sup>rd</sup> party special inspector that cells are grouted.
- E. Bar Positioners: As vertical reinforcing is being placed, the use of reinforcing bar positioners for correct bar positioning in the wall is required. Install at each bar, locating at maximum 8'-0" o.c vertical, and/or at each bar splice point.
- F. Verify that anchorages embedded in concrete or attached to structural steel members are properly placed.
- G. Reinforce joint corners and intersections with strap anchors 16 inches on center.

### 3.7 INJECTED MASONRY FILL INSULATION

- A. Masonry fill insulation contractor shall be licensed, approved and certified by Foam Manufacturer with a minimum of 5 years experience.
- B. **Masonry fill insulation is not to be placed in wall until exterior finish on wall is installed and interior side of wall is permanently protected from adverse weather and moisture.**
- C. Place in cured masonry wall, through holes placed in mortar joints at each masonry cell. Fill voids in wall full with masonry fill insulation under pressure.
- D. Pump insulation into wall in vertical layers 3 to 5 feet high, repeat process in sections with no section greater than 10 feet higher than other sections until full height of wall is reached.

04 22 00-7

- E. Remove all excess foam from walls. Patch mortar joints with matching mortar, brush and tool joints as required to blend into place.

### 3.8 LINTELS

- A. Install loose steel lintels as scheduled.
- B. Install reinforced unit masonry lintels over openings where steel or pre-cast concrete lintels are not scheduled. Construct lintels using concrete fill and reinforcing. Maintain minimum 8 inch bearing on each side of opening.
- C. Use reinforcing bars of one piece lengths only.
- D. Place and consolidate grout fill without disturbing reinforcing. Allow lintels to reach strength before removing temporary supports as affirmed by laboratory compressive strength testing of field-cast grout prisms.

### 3.9 CONTROL JOINTS

- A. Do not continue horizontal joint reinforcing thru control joints. Continue bond beams across control joints by use of "Slip Joints" as detailed on plans. Ensure use of asphalt paper wrap to create bond break. 3/4" diameter x 24" dowels with expansion cap at each bond beam at each control joint.
- B. Install preformed control joint filler at locations indicated on Drawings. Space no further than 24'-0" o.c. or less if shown on drawings. Provide control joints at corners no more than 12'-0" or closer if shown on drawings. Use proper size material to create sealant joint space; See Section 07 92 00 for sealant performance.

### 3.10 BUILT-IN WORK

- A. As work progresses, build in metal door frames, fabricated metal frames, window frames, wood nailing strips, anchor bolts, plates, and other items to be built in the work supplied by other Sections.
- B. Build in items plumb and level.
- A. Bed anchors of metal door and glazed frames in mortar joints. Fill masonry cores with grout minimum 12 inches horizontally from framed openings.
- B. Build in door and window frames and their anchors. Slush steel door frame jambs and heads full of mortar. Slush cells full of mortar where excessive cutting for conduit or other devices has weakened masonry
- E. Do not build-in organic materials subject to deterioration.

04 22 00-8

### 3.11 CUTTING AND FITTING

- A. Cut and fit for chases, pipes, conduit, sleeves, and grounds. Cooperate with other Sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.
- C. **Do not** thin CMU walls to accommodate plumbing piping, electrical conduit or other items routed in CMU walls. Consult Architect if conditions are found that do not allow proper installation of CMU.

### 3.12 TESTING CMU CONCRETE GROUT OR SPEC MIX GROUT

- A. Strength Tests:
  - 1. Testing per ASTM C 1019.
  - 2. Three (3) test specimens shall constitute one (1) sample. A strength test shall be the average of the strengths of the specimen tested at the age specified.
  - 3. Slump to be 9 inches, plus or minus one inch.
  - 4. Specimens shall be tested at 7 and 28 days.
  - 5. The compression strength will be considered satisfactory if the average of three consecutive tests of the grout is equal to or greater than the specified strength and no individual strength test falls below the specified strength by more than 500 psi..
- B. Frequency: Minimum of Two (2) times a week from start of production.
- C. Testing Laboratory: The testing laboratory, in addition to meeting requirements of ASTM E-329, and must be an approved laboratory competent to perform cement physical testing. All tests must be performed in strict accordance with the applicable ASTM standard.
- D. Distribution of Results of Tests: Within 24 hours of results of tests, copies of the results shall be submitted to the Architect, Contractor, masonry contractor, and the grout supplier if applicable.
- E. Test mix design prior to beginning construction of CMU walls. The compressive strength test of the laboratory mix design must meet or exceed the specified 28 day design compressive strength of **2,000** psi grout unless noted otherwise.
- F. Contractor shall bear costs for all masonry testing.

### 3.13 CLEANING

- A. Remove excess materials, mortar droppings. Remove mortar droppings on connecting or adjoining work before its final set.

04 22 00-9

- B. Exposed Masonry: At completion of work, point holes in joints of exposed masonry surfaces, completely fill with mortar, tool properly. After pointing has set, hardened, wet exposed masonry surfaces. Clean soiled surfaces with a non-acidic solution which will not harm masonry or adjacent materials equal to Sure Klean 600 manufactured by ProSoCo, Inc. Cleaner must be approved by CMU manufacturer. Apply with stiff fiber brush, leave masonry clean, free of mortar daubs, with tight mortar joints throughout. Immediately after cleaning, rinse masonry surfaces with clear water. **DO NOT USE PRESSURE SPRAY WASHER TO CLEAN OR RINSE OFF MASONRY.**
- C. Protect all other trade's work and other items set into wall.
- D. Remove, replace defective materials, correct defective workmanship, and leave masonry clean.
- E. Replace defective mortar. Match adjacent work.
- F. Remove excess mortar and smears.
- G. Use non-metallic tools in cleaning operations.

#### 3.14 AIR / MOISTURE BARRIERS

- A. Prior to installation of veneer at cavity wall construction with CMU backup, or metal panel system with CMU backup, apply Liquid-Applied Cavity Wall Moisture/ Air Barrier on all CMU walls where concealed in cavity wall. Refer to Section 07 27 26, Fluid Applied Weather Barrier System.

#### 3.15 PROTECTION

- A. Maintain protective boards at exposed external corners which may be damaged by construction activities.
- B. Provide protection without damaging completed work.
- C. At day's end, cover unfinished walls to prevent moisture infiltration. Secure cover down to prevent blow-off and maintain protection for fresh masonry work.

#### 3.16 OBSERVATION AND SPECIAL INSPECTIONS

- A. CMU placement and CMU reinforcement and placement shall be periodically observed by the Architect/Engineer during laying of CMU units. Inspection of CMU placement and CMU reinforcement and placement for conformance to the construction documents shall be completed by the designated third party Special Inspector at a minimum frequency of two (2) times per week from start of production.

04 22 00-10



- B. Special Inspector Qualifications: Latest Edition of Arkansas Fire Prevention Code/ IBC. Allowable certifications include: Arkansas Licensed PE, Arkansas EIT working under a PE, ICC masonry certified technician, or NCMA (National Concrete Masonry Association) certified technician.

END OF SECTION

04 22 00-11



## SECTION 05 12 23

### STRUCTURAL STEEL

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. This section shall cover the furnishing, fabrication, erection and connection of all structural steel complete.

##### 1.2 WORK INCLUDED & FURNISHED

- A. All labor, tools, materials, scaffolding, bracing, cranes, hoist, and other construction equipment required for the completion of the structure.
- B. Preparation of shop drawings.
- C. Furnishing and fabrication of all structural steel and miscellaneous metal work including beams, columns base plates, cap plates, bearing plates, angles, struts, bracing, girts, girders, connection material, fasteners, anchor bolts, shims, loose lintels, stiffeners, hangers, brackets, rods, and welding material.
- D. Shop and field painting.
- E. Shop and field connections including temporary bracing.
- F. Section 01 40 00 – Quality Control: Required Special Inspections

##### 1.3 QUALITY ASSURANCE

- A. Fabricator's Qualifications: **A qualified fabricator that is AISC Certified for conventional steel building structures. If fabricator is not an AISC certified plant, then the fabricator must meet the protocol for special inspection requirements of IBC, Section 1704, paragraphs 1704.2.5 and 1704.2.5.1.** Documentation that one of the above requirements is met must be submitted to the Architect before starting shop drawings.

##### 1.4 RELATED SECTIONS

- A. Section 01 40 00 – Required Special Inspections
- B. Section 03 30 00- Cast-in-Place Concrete
- C. Section 05 50 00 - Metal Fabrications

05 12 23-1

## 1.5 FURNISHED BUT INSTALLED ELSEWHERE

- A. Anchor Bolts, Loose Bearing Plates: Refer to Sections 2 and 7d of AISC Code of Standard Practice.
- B. Loose Lintels: Refer to Section 7f of AISC Code of Standard Practice.

## 1.6 STANDARDS

- A. Structural Steel fabrication, connections, detailing and erection shall be in accordance with the specifications for the "Design Fabrication and Erection of the AISC Manual of Steel Construction, unless indicated otherwise in these specifications or on plans.
- B. All structural steel shall conform to standard specifications for structural steel, ASTM A36, except:
  - 1. Wide Flanges and WT Tees - ASTM A992,  $F_y=50$  ksi
  - 2. Structural steel tubing - ASTM A500,  $F_y=50$  ksi.
  - 3. Structural Steel Pipe - ASTM A501,  $F_y=35$  ksi.
  - 4. Anchor Rods – ASTM F1554, Grade 36
  - 5. Headed Stud Anchors - ASTM A108,  $F_y=50$  ksi.
  - 6. High Strength Bolts – ASTM A325

## 1.7 SHOP DRAWINGS

- A. Comply with Section 01 33 00. When corrections are required, reproducibles will be returned noting such. Drawings will then be corrected and resubmitted until final approval is received. Items not noted as requiring corrections may be fabricated after return of a previous submittal even though drawings shall be such that corrections noted on one sheet that affect another drawing will be transmitted and made on all sheets and also resubmitted.
- B. The Contractor will be responsible for checking quantities and dimensions in accordance with contract drawings. Where discrepancies in dimensions are noted, the Contractor shall notify the Architect of such discrepancies and corrected dimensions then will be furnished by the Architect. Contractor shall coordinate any dimension changes or additions with fabricator.
- C. Contract drawings receive precedence over shop drawings unless authorized in writing. Approval of shop drawings does not grant authorization of change to contract.
- D. Standard AWS symbols shall be used and shown for all welded connection details for both shop and field welds. Joint reference numbers as noted in part 4 of 7th Edition of AISC "Manual of Steel Construction" shall be shown where full strength welds are required.
- E. All splices and connections, both shop and field, shall be detailed on shop drawings.

05 12 23-2

## 1.8 PRODUCT HANDLING

- A. Delivery of materials to be installed under other sections:
  - 1. Anchor bolts and other anchorage devices which are embedded in cast-in-place concrete or masonry construction shall be delivered to the project site in time to be installed before the start of cast-in-place concrete operations or masonry work.
  - 2. Provide setting drawings, templates, and directions for the installation of the anchor bolts.
- B. Storage of Materials
  - 1. Structural steel members which are stored at the project site shall be above ground on platforms, skids or other supports.
  - 2. Steel shall be protected from corrosion.
  - 3. Other materials shall be stored in a weather-tight and dry place, until ready for use in the work.
  - 4. Packaged materials shall be stored in their original unbroken package or container.

## 1.9 COOPERATION WITH OTHER WORK

- A. Fabricator shall punch all necessary holes and provide the connection material required for the attachment of miscellaneous items, such as nailers, hangers and mechanical equipment framing. Contractor shall coordinate such work with all plans.

## 1.10 WORKMANSHIP

- A. All welding, both shop and field welding, shall be made by welders qualified by tests as prescribed in the "Code for Welding in Building Construction" (AWS D1.1-Current Edition).
- B. All fabrication and erection work shall be performed by skilled workmen, working under experienced supervision.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. All structural steel shall meet the specifications for "Structural Steel" (ASTM A36). Except wide flanges and tees shall conform to ASTM A992,  $F_y=50$  ksi, steel tubes shall conform to ASTM A500, Grade C,  $F_y=50$  KSI, and steel pipe shall conform to ASTM A501.
- B. Filler Metal for Welding shall conform to one of the following:
  - 1. Manual Shielded Metal Arc Welding - E70 Series of the "Specifications for Mild Steel covered Welding Electrodes" (AWS A51-Current Edition).
  - 2. Submerged Arc Welding - F70 AWS-flux Series of the "Specifications for Bare Mild Steel Electrodes and Fluxes for Submerged Arc Welding" AWS 5.17-96.

05 12 23-3

### C. Bolts

1. High Strength Bolts shall be A325 bolts meeting the requirements of "Specification for Structural Joints Using ASTM A325 or A490 Bolts", including suitable nuts and plain hardened washers.
2. Other bolts shall conform to "Specification for Low-Carbon Steel Externally and Internally Threaded Standard Fasteners" (ASTM A307).

## 2.2 CONNECTIONS

### A. Type

1. Unless indicated and detailed otherwise on plans, all connections shall be detailed and designed by the fabricator as unrestrained flexible connections described as Type 2 construction in Section A2.2 of the most current edition of the AISC manual of Steel Construction, but provisions must be made for excessive eccentric connections. All connections shall be in accordance with Part 4 and Part 5 of the above cited AISC Manual.
2. Bolted Connections
  - a. All bolted connections, unless noted otherwise, shall be A325 high strength steel bolts, nuts and harden washers, conforming to the "Specification for Structural Joints Using ASTM A325 or A490 Bolts".
  - b. All bolted connections, unless noted otherwise, shall be of bearing type with threads included in the shear planes. These bolts shall be snug tightened. The snug-tight condition is defined as the tightness attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench.
  - c. Bolts, nuts and washers shall conform to Tables 1 and 5 of Specifications and Commentary for "Structural Joints, Using ASTM A325 or A490 Bolts" of Current Edition of AISC Manual of Steel Construction.
  - d. Bolted parts shall be fitted tightly together before bolt installation.
  - e. All bolts shall have one nut and a hardened washer under the turning element.
  - f. When surface of bolted part in contact with nut or bolt head exceeds a slope of 1:20 with respect to a plane normal to the bolt axis, smooth beveled washers shall be used.
  - g. Bolt assembly and contact surfaces shall be free from scale, burrs, dirt and other foreign matter which might prevent solid seating.
  - h. Minimum bolt size, unless noted otherwise, shall be 5/8" in diameter. Adequate "stick through" for bolts must be provided in accordance with section C2 and Table 6, pages 5-201 and 5-202 of reference cited in part c) of the section.
  - i. All bolts at the column cap plates shall be installed with the bolt on top and the nut below the cap plate.
3. Welded
  - a. Minimum size of fillet weld permitted shall be 3/16", unless noted otherwise.
  - b. All surfaces to be welded shall be free from loose scale, slag, rust, grease, paint and other foreign materials.
  - c. All welding shall be in accordance with AWS "Structural Welding Code" (AWS D1.1-Current Edition) and as illustrates and described in "Welded Joints" in Part 4 of the 7th edition of the AISC Manual of Steel Construction.

05 12 23-4

- d. Shop welding and field welding shall be performed by a certified welder in accordance with AWS D1.1-2000, licensed in the State of Arkansas.

## PART 3 EXECUTIONS

### 3.1 FABRICATION

#### A. Connections and Splices

1. Shop connections and splices may be bolted or welded.
2. All holes for bolts shall be punched or drilled without ragged or torn edges. Finished holes for bolts shall be 1/16 inch larger than nominal diameter of the bolt.

#### B. Metal Preparation

1. All metal shall be properly prepared before shop connections are made in accordance with welding and bolting requirements of these specifications, AISC and AWS standards.
2. All completed members shall be straight, without kinks, twists, bulges, bends and open joints.
3. Shearing, punching and cutting of materials shall be without torn or ragged edges.
4. Holes too small to meet above requirements shall be enlarged without distortion to the metal by reaming.
5. Bolted parts, when assembled, shall be fabricated so that the bolts will enter without distortion.
6. Compression members shall have milled or sawed shop ends and joints.
7. Open holes necessary for connection of other work shall be provided at time of fabrication. Contractor shall coordinate work with that of other trades.
8. Grind all factory or field welds where exposed to achieve smooth consistent surface. Field-apply primer (or galvanized paint if metal is galvanized) immediately following grinding.

#### C. Painting

1. All steel work except that encased in concrete or otherwise noted, shall receive one shop coat of a rust inhibitive paint meeting Federal Specification TT-P-636 with a minimum dry paint film thickness of 2.0 mils.
2. All metal shall be free of dirt, grease, rust, mill scale, oil and other foreign material, and shall be wire brushed before painting.

#### D. Tolerances

1. Fabrication tolerances shall be in accordance with AISC Manual of Steel Construction- Current Edition.

### 3.2 ERECTION

#### A. Precautions

1. The Contractor shall take necessary precautions to secure all steel against movement during erection and that bracing as noted in the remainder of this section of the specifications is installed.

05 12 23-5

B. Field Connections

1. Field connections may be either welded or bolted.
2. As erection work progresses, all steel work shall be secured and fastened with either temporary or permanent connections.
3. Bolts exposed to weathering or to earth shall be dipped in a rust inhibitive paint prior to installation.
4. Gas cutting: Field correcting of fabrication by gas cutting shall not be permitted on any major member in the structural framing without prior approval of the Architect.
5. All beams with or without bearing plates shall be set in 1 to 1 mix of sand and Portland cement so as to ensure full contact bearing.

C. Bracing - All structural steel shall be braced, guyed and stayed to prevent lateral or vertical movement against construction loads, dead loads, wind forces and erection forces. Such bracing shall remain in place until secured and all exterior walls are in place.

D. Field Painting

1. Damage of shop paint or exposed rusted metal spots shall be cleaned and painted before erection. Paint shall be same as applied by fabricator.
2. After erection, all steel exposed to earth or weather shall be painted with a 2nd coat of rust inhibitive paint.
3. After erection, all abrasions or damaged paint marks, including bolts, nuts and welds, shall be touched up with shop paint by the erector.
4. See Section 09 91 00 for finish coats required.

E. Tolerances - Erection tolerances shall conform to part b) of section 7 of AISC "Code of Standard Practice for Steel Buildings and Bridges", as stated in the 7th Edition of AISC Manual of Steel Construction or most current edition.

### 3.3 IMPROPER FIT OF STEEL WORK

A. All framing or connections that do not properly fit, or are not located according to plans, shall be modified or replaced at contractor's expense. Contractor shall submit to the Architect drawings and proposals for modifications and replacement, for approval. No work shall proceed until approval is received, but temporary shoring and bracing shall be placed until approved corrections are made.

### 3.4 SPECIAL INSPECTIONS

A. Inspection of Steel structure placement and connections for conformance to the construction documents and the IBC shall be completed by the designated third party Special Inspector.

END OF SECTION

05 12 23-6



## SECTION 05 21 00

### OPEN WEB STEEL JOISTS

#### PART 1 GENERAL

##### 1.1 SCOPE

- A. This section shall cover the furnishing, fabrication, erection and connection of all steel joists complete.
- B. Work Included and Furnished
  - 1. All labor, tools, materials, scaffolding, bracing cranes, hoists and other construction equipment required for the completion of the roof and floor structures in accordance with drawings and these specifications.
  - 2. Preparation of shop drawings.
  - 3. Furnishing of all steel joists including bridging, bearing plates, bracing, anchors, headers, joist extensions, shims, welding material and bolting material.
  - 4. Shop and field painting.

##### 1.2 RELATED SECTIONS

- A. Section 01 40 00 – Required Special Inspections

##### 1.3 STANDARDS

- A. Open web steel joist materials and fabrication, connections, anchorage, detailing and erection shall be in accordance with the latest Edition of "Standard Specifications and Load Tables" as published by the Steel Joist Institute, except where additional or more stringent requirements are noted here in these specifications. Fabricator must have SJI certification.

##### 1.4 SHOP DRAWINGS

- A. Shop drawings shall be submitted to the Architect via the Construction Manager and approval received prior to fabrication. Submit as per Section 01 33 00. When corrections are required, copies shall be returned noting such corrections. Fabrication may be done on items not requiring correction even though drawings must be returned.
- B. Steel joist fabricator shall submit a certificate of compliance with the IBC, Sec, 1704, (copy to be included in the close out documents as part of the shop drawing submittal.
- C. Shop drawings must be signed and stamped by a registered structural engineer licensed in the state project is being constructed.
- D. The Contractor shall be responsible for checking of quantities and dimensions before submittals.

05 21 00-1

- E. Contract drawings receive precedence over shop drawings unless authorized otherwise in writing.
- F. All connections, including those made in the field, shall be shown and detailed. Welds shall be indicated with American Welding Society symbols.
- G. All materials incorporated into fabrication shall be noted as to grade.

## 1.5 WORKMANSHIP

- A. All fabrication and erection work shall be performed by skilled workmen working under experienced supervision.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Provide joists as shown on drawings, manufactured by Vulcraft or approved alternate.

## PART 3 EXECUTIONS

### 3.1 FABRICATION

- A. All joists shall be manufactured in accordance with requirements of Steel Joist Institute or requirements of American Institute of Steel Construction. Manufacturing companies who are not members of these Institutes shall submit certification that steel joists furnished meet requirements of Steel Joist Institute previously noted in these specifications prior to fabrication.
- B. All joists shall be painted with one shop coat of red or gray primer of type specified in Steel Joist Institute "Standard Specification and Load Tables".
- C. Joists shall be cambered in accordance with recommended camber as noted in Section 4.7 of Steel Joist Institute "Standard Specification and Load Tables" unless noted otherwise on plans.

### 3.2 ERECTION

- A. Spacing
  - 1. Joists shall be spaced and located according to contract plans.
- B. Bearing and Anchorage
  - 1. Joists shall have a minimum bearing of 4 inches on concrete or masonry and shall be anchored thereto by bolting or welding.
  - 2. Joists bearing on steel shall have a minimum bearing length of 2 1/2 inches and shall be bolted or welded thereto.

05 21 00-2

3. Joists parallel to walls shall be anchored directly to the wall at lines of bridging. Both top and bottom chords shall be anchored.
4. Joists with welded connections shall be welded on each side with 1/8" x 2-1/2" fillet welds. *Or as shown on the structural plans.* Roof joists shall be welded with 2-1/2 inch long fillet welds each side of joist.

C. Bridging

1. Bridging shall be of size and type indicated on the shop drawings. Bridging shall be installed as soon as joists have been erected and before application of any construction load or service loads.
2. Bridging shall be welded at top and bottom chords, unless noted otherwise.
3. Bridging shall be connected to wall, column or beams at end of bridging lines.
4. In certain locations special bridging conditions may exist to coordinate with ductwork, specialty items, etc. Indicate these bridging conditions on shop drawings.

D. Extensions and Strut Bracing

1. Strut bracing to beam flanges shall be provided where noted on plans.

E. Framing for Openings

1. See details on structural drawings.

3.3 FIELD PAINTING

- A. Damage of shop coat or rusted or exposed metal shall be cleaned, wire brushed and painted before erection with same paint applied by fabricator.
- B. All abrasion or damaged paint marks, including weld areas, shall be touched up with shop paint after erection.

3.4 SPECIAL INSPECTIONS

- A. Inspection of steel joist placement and connections for conformance to the construction documents and the IBC shall be completed by the designated third party Special Inspector.

END OF SECTION

05 21 00-3



## SECTION 05 31 23

### METAL DECKING - ROOF

#### PART 1 GENERAL

##### 1.1 SCOPE

- A. This section shall cover all furnishing, fabrication, connection and erection of steel roof deck complete.

##### 1.2 WORK INCLUDED AND FURNISHED

- A. All labor, tools, materials, scaffolding, bracing hoists and other construction equipment required for the complete erection and installation of roof deck.
- B. Shop drawings showing complete erection details shall be submitted in quadruplicate to the Architect for approval before fabrication is begun.
- C. Furnishing of steel deck, accessories and clips necessary for the completed deck, including rubber type and closures.
- D. Shop and field painting.

##### 1.3 RELATED SECTIONS

- A. Section 01 40 00 – Quality Control: Required Special Inspections
- B. Section 05 12 23: Structural Steel
- C. Section 05 21 00: Open Web Steel Joists
- D. Section 05 50 00: Metal Fabrications

##### 1.4 STANDARDS

- A. Design properties shall be computed in strict accordance with the latest edition of "Specifications for the Design of Light Gage Structural Members" of the AISI. Steel decking shall meet SDI Specifications and Certification.

#### PART 2 PRODUCTS

##### 2.1 MATERIALS

- A. Roof deck shall be manufactured from steel conforming to A-1008 having a minimum yield value of 33,000 P.S.I.

05 31 23-1

- B. Steel roof deck as installed shall be capable of supporting a total load of 50 P.S.F. with a maximum bending stress of 20,000 P.S.I. with a maximum deflection of L/240 of the span for a live load of 30 P.S.F., but in no case shall properties of the deck be less than that indicated on plans or herein these specifications.
- C. Deck shall be steel sheets with a shop coat of primer.
- D. Steel Deck Types
  - 1. **1 ½" Steel Deck:** Deck shall have continuous integral ribs 1 1/2" deep, spaced no more than 6 1/4" on center. Ribs at bearing points shall be commonly referred to as "wide rib". Gauge of material shall be as noted on contract plans, but in no case shall be less than 22 gauge, 'B' deck.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. General: Install roof deck units and accessories in accordance with manufacturer's recommendations and shop drawings.
- B. Placing Roof Deck Units.
  - 1. Position roof deck units on supporting steel framework and adjust to final position with ends bearing on supporting members and accurately aligned end to end before being permanently fastened.
  - 2. Lap ends not less than 2 1/2 inches. Laps shall occur at a support.
  - 3. Do not stretch or compress the side lap interlocks.
  - 4. Place deck units flat and square, and secure to adjacent framing without warp or deflection.
- C. Fastening Deck Units
  - 1. Secure roof deck units to supporting members with 5/8" diameter puddle welds at spacing as noted in structural notes on structural drawings.
  - 2. Welding to conform to AWS D1.1-Current Edition.
  - 3. Side laps shall have 2 #10 screw fasteners between each support, or welded according to structural notes on structural drawing.
- D. Cutting and Fitting
  - 1. Cut and fit roof deck units and accessories around projections through roof decking.
  - 2. Make cuts neat, square, and trim.
  - 3. Cut openings in roof deck true to dimensions using metal saws, drills or cutting torches.
  - 4. Do not use cutting torches where a finished appearance is required.
- E. Closure Strips: Install closure strips at all open uncovered ends and edges of roof decking, and in voids between decking and other construction.

05 31 23-2

- F. All erection work shall be coordinated with other trades to provide the necessary vents, hangers, openings, etc. required.
- G. After installation, deck shall be a continuous, clean, dry surface ready for roofing materials.
- H. Architect and structural engineer shall observe the finished roof deck prior to placing of covering materials.

### 3.2 JOINT SEALING

- A. Remove dust, dirt, and moisture from joint surfaces.
- B. Apply sealant in accordance with manufacturer's instructions.

### 3.3 TOUCH-UP PAINTING

- A. Wire brush, clean and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members.
- B. Touch-up shop painted surfaces with same paint used in shop, and apply as recommended by manufacturer.
- C. Touch-up paint shall match existing paint in exposed areas.

### 3.4 SPECIAL INSPECTIONS

- A. Inspection of steel deck placement and connections for conformance to the construction documents and the IBC shall be completed by the designated third party Special Inspector.

END OF SECTION

05 31 23-3





## SECTION 05 50 00

### METAL FABRICATIONS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Furnish labor and materials for installation of miscellaneous metal products as indicated on plans and/or specified herein.
- B. Roof hatch ladder

##### 1.2 INTEGRATION WITH OTHER TRADES

- A. Each Trade shall provide all items necessary to be built into masonry, concrete, tile, etc., prior to when needed. Construction Manager is to be responsible for coordination and scheduling of such items and coordinate installation with other trades.

##### 1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01 40 00 – Quality Control: Required Special Inspections
- B. Section 03 30 00: Cast-in-Place Concrete:
- C. Section 09 91 00: Painting and Finishing

##### 1.4 QUALITY

- A. Welders: Use only certified welders in accordance with AWS D1.1-Current Edition., licensed in the State of Arkansas.
- B. Codes and Standards
  - 1. "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings", A.I.S.C.
  - 2. "Code for Welding in Building Construction", American Welding Society.
  - 3. Applicable codes and ordinances.

##### 1.5 SHOP DRAWINGS

- A. Comply with requirements of Section 01 33 00.

05 50 00-1

## PART 2 PRODUCTS

### 2.1 METALS

- A. Metals shall conform to applicable ASTM specifications, including but not limited to:
  - 1. Steel wide flanges and tees ASTM A992 with 50 KSI yield strength
  - 2. Standard steel pipe ASTM A501
  - 3. Steel tubing ASTM A500, Grade C
  - 4. Steel plate ASTM A36
  - 5. Other Structural Steel ASTM A36
  - 6. Bolts ASTM A307
  - 7. Anchor Rods – ASTM F1554, Grade 36
  - 8. Exterior steel angle lintels and exposed steel plates and bent plates – Galvanized finish, hot dipped, ASTM 385/385M-15, grade 65.

### 2.2 PAINT

- A. Primer paint: Manufacturer's standard, compatible with finish coat paint specified in Section 09 91 00.
- B. Dissimilar metals shall be protected from galvanic action by coating with one coat of zinc chromate primer prior to assembly.

### 2.3 MISCELLANEOUS ANCHORS:

- A. Furnish anchor rods and miscellaneous anchors as required except where such items are specified in other sections of these specifications, or where customarily furnished with the items to be attached.

### 2.4 MISCELLANEOUS ITEMS

- A. Furnish and install where shown in accordance with drawings and details other items of miscellaneous metals except where same are specified in other sections of these specifications. These items to include, but not be limited to:
  - 1. Slip angles, stiffener channels, equipment frames, legs, supports, etc.
  - 2. All other materials, not specifically described, but required for a complete and proper installation.

### 2.5 ROOF HATCH ACCESS LADDER

- A. Steel Wall Ladder:
  - 1. Side Rails: 3/8 x 2-1/2” steel bar at 20 inches apart.
  - 2. Rungs: 3/4 inch square textured solid steel rods (steel texture on steel) at 12 inches on center. Rungs to be “SlipNOT round rungs, grade 2, manufactured by W. S. Molnar Company, **800-754-7668**. Alternate Rung: Model M6LRST2448 steel “Traction Tread” ladder rung, 11 gauge, Manufactured by McNichols.
    - a. Weld each rung to stringers.

05 50 00-2

3. Space rungs seven inches from wall.
4. Attach with steel mounting brackets welded to side rails.
5. Finish: Prime paint, field painted finish
6. Each step or rung shall be capable of supporting a single concentrated load of at least 250 pounds.
7. If ladder extends 24'0" in height or higher, a personal fall arrest system or ladder safety system is to be provided, per OSHA requirements.
8. Shop fabricate, welded construction.

## PART 3 EXECUTION

### 3.1 QUALITY CONTROL

- A. All material shall be new, of the best quality, and subject to the approval of the Architect.
- B. Weld or rivet permanent connections; do not use screws or bolts where they can be avoided.
- C. Fastenings shall be concealed where practical, and heads countersunk where required. Use lock washers to prevent loosening.
- D. Provide holes and connections for the work of other trades.
- E. Welds in flat surfaces, where exposed in finished rooms, or where noted shall be ground smooth and exposed corners or edges shall be rounded where practicable.
- F. All items shall be properly located, set level, plumb, square and in alignment, and shall be securely attached.
- G. Grind all factory or field welds where exposed to achieve smooth consistent surface. Field-apply primer (or galvanized paint if metal is galvanized) immediately following grinding. Paint all exposed steel per section 09 91 00.
- H. Provide galvanized finish on exterior, exposed angle lintels, exposed steel plates and steel bent plates unless noted otherwise, Provide galvanized finish on other items where specified and called for.

### 3.2 TOUCH-UP PAINTING

- A. Wire brush, clean and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members.
- B. Touch-up shop painted surfaces with same paint used in shop, and apply as recommended by manufacturer.
- C. Touch-up galvanized welded areas with Galvilite By ZRC Products Company, or approved equal.

05 50 00-3

### 3.3 SPECIAL INSPECTIONS

- A. Inspection of miscellaneous metal placement and connections for conformance to the construction documents and the IBC shall be completed by the designated third party Special Inspector.

END OF SECTION

05 50 00-4

## SECTION 05 52 00

### HANDRAILS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Furnish and install steel handrails as shown on the contract drawings. Railings shall be complete with all connections, end caps, and components to make the system complete in every respect.

##### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03 30 00: Cast-in-Place Concrete
- B. Section 09 91 00: Painting and Finishing

##### 1.3 QUALITY

- A. Welders: Use only certified welders in accordance with AWS D1.1-Current Edition., licensed in the State of Arkansas.
- B. Galvanized finish, hot dipped, ASTM 385/385M-15, grade 65.

##### 1.4 SHOP DRAWINGS

- A. Comply with Section 01 33 00.
- B. Shop drawings shall be prepared by railing manufacturer showing all railings and components in detail, along with anchorage methods, splices, and attachments and Architect's approval obtained prior to fabrication.
- C. Fabricator shall design handrails for maximum loading per governing code requirements. Unless shown otherwise on drawings, anchoring locations shall be as designed by fabricator and approved by Architect.

##### 1.5 REFERENCES

- A. Comply with State of Arkansas Adopted ADA Accessible Guidelines in regard to accessible or handicapped features.

##### 1.6 RAIL DESIGN REQUIREMENTS

- A. Fabricate and install railing system so that system is able to resist a load of 50 pounds per lineal foot and a concentrated force of 200 pounds at any point, applied in any direction along top of the rail, without damage of permanent set.

05 52 00-1

- B. Furnish certification by an engineer, registered in the state where project is located stating that handrails meet specified structural loading requirements.

## PART 2 PRODUCTS

### 2.1 MATERIALS:

- A. Pipe Handrails
  1. Fabricate and install steel pipe handrails as shown on drawings.
  2. Pipe to be 1-1/2" outside diameter. All welds to be ground flush. Furnish complete with wall returns, end caps, and mounting brackets made especially for the purpose.
  3. Caulk with a paintable butyl caulking made for long life, all joints and seams that are not welded prior to painting.
  4. All pipe handrail components are to be galvanized and painted at exterior conditions unless noted otherwise.

### 2.2 FINISH:

- A. Grind all factory or field welds where exposed to achieve smooth consistent surface. Field-apply touch up primer (or galvanized touch-up paint if metal is galvanized) immediately following grinding. Paint all exposed galvanized exterior steel per section 09 91 00.
- B. Provide galvanized finish on exterior items where specified and called for.

## PART 3 EXECUTION

### 3.1 WORKMANSHIP:

- A. All cuts shall be square and accurate for minimum joint gap.
- B. All holes shall be drilled and countersunk for proper size to receive fasteners.
- C. All fasteners shall be of compatible materials and of size and type recommended by the manufacturer.
- D. Railings and components shall be installed in a straight and plumb manner, with all bends and curves performed to fit the contour required. Provide return bends to wall where shown.
- E. All welds shall be ground smooth and consistent and joints blended to the finish of the tubular or pipe material. Field-apply primer (or galvanized paint if metal is galvanized) immediately following grinding.
- F. There shall be no projections, burrs, or blemishes to present the user a hazard of any type upon completion of the installation.

05 52 00-2

- G. Where handrails are attached to walls, ends will return to wall. Provide attachments to wall at 4'-0" on center, maximum, unless noted otherwise on drawings.
- H. Provide posts spaced evenly, but at no more than 4'-0" o.c. unless shown or noted otherwise.

END OF SECTION

05 52 00-3





## SECTION 06 10 00

### ROUGH CARPENTRY

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Furnish and install all wood framing members, stripping, blocking, grounds, pressure treated wood, fire treated wood, equipment curbs and cants, and other miscellaneous.

##### 1.2 PRODUCT HANDLING

###### A. Protection:

1. Store all materials in such a manner as to ensure proper ventilation and drainage, and to protect against damage and the weather. Store in a well-ventilated building where not exposed to extreme changes of temperature and humidity.
2. Keep all materials clearly identified with all grade marks legible. Keep all damaged material clearly identified as damages, and store separately to prevent its inadvertent use.
3. Do not allow installation of damaged or otherwise non-complying material.
4. Use all means necessary to protect the installed work and materials of all other trades.
5. Protect all metal products with adequate waterproof outer wrappings.
6. Use extreme care in off-loading of lumber to prevent damage, splitting, and breaking of materials.

##### 1.3 ECOLOGICAL PRESERVATION

- A. Contractor will not use old growth Western Red Cedar, Sitka Spruce, Western Hemlock, Pacific Fir, or Coastal Redwood unless it is recycled. Only upon written request, under unusual circumstances, will use of any of these species be considered by Architect.

#### PART 2 PRODUCTS

##### 2.1 MATERIALS

- A. All materials herein specified: The best of their respective grades, conforming to grading rules of lumber association under which they are produced, thoroughly seasoned or kiln dried. Protect and cover in shipment and on job site.
- B. Framing lumber and miscellaneous blocking - No. 2 Grade Douglas Fir, or Southern Pine, S4S in conformance with ASTM 245- 69 grading, or as otherwise specified on plans.
- C. Pressure treated wood:
  1. Use arsenic-free pressure treated lumber, Copper Azole Type-B (CA-B), Alkaline Copper Quat (ACQ), or approved equivalent product conforming to American Wood Preservers Association standards for use above ground in all places where lumber is used in contact with masonry work and concrete. Where used with roofing, at roof curbs, parapet caps,

06 10 00-1

- roof edge member or roof cant strips, whether noted on plans or not, type MCA treatment is acceptable.
2. Use minimum 0.40 Lbs./Cu. Ft. retention for ground contact lumber, and 0.25 for above ground applications.
  3. Pressure treated wood shall leave no apparent odor or stain in the completed work.
  4. Fasteners shall be stainless steel or hot-dipped, galvanized conforming to ASTM A-153.
- D. Fire treated wood: All concealed lumber, wood products and wood materials used in construction that are to remain as part of the finished work, shall be fire retardant treated, Pyro-Guard manufactured by Hoover Treated Wood Products, PO Box 7807, Pine Bluff, AR 71611 (501)247-3511, or approved alternate. Flameproof treatment shall be tested to produce a flame spread of 25 or less as determined by Underwriters Laboratories in the extended 30 minute duration of ASTM E-84, "Standard Test Method for Surface Burning Characteristics of Building Materials.". Provide with 20 year manufacturer's warranty.
1. For IBC type I and type II construction, concealed lumber used for blocking in attachment of handrails, toilet accessories, markerboards, etc. is not required to be fire treated.
  2. Isolate metal materials coming in contact with Fire treated wood with 30# felt.
- E. Plywood and Lumber:
1. Plywood to meet performance standards for its type as described in Product Standard PS 1 for Douglas Fir plywood. Provide exterior type plywood for permanently exposed plywood in outdoor applications.
  2. Provide lumber for structural carpentry using the following species provided grade for each is not lower than minimum shown:  
Fir, Douglas – WCLIB, Standard  
Pine, Southern Yellow - SPIB Rules, No. 2 Common
  3. Pressure treat concealed wood including lumber, grounds, nailers, blocking, backing, rough framing, and lumber in contact with the ground, in contact with concrete or masonry within 24" of the ground, installed on or above roof deck, and as required, complying with published standards or the American Wood Preserver's Association.
  4. Plywood not otherwise specified or not on the drawings: Douglas Fir or Southern Yellow Pine panels, C-D grade for concealed applications and A-C grade for exposed applications, meeting US product standard PS1.
  5. Interior Plywood: Thickness & type indicated on drawings;  
APA A-D INT, where exposed one side (ie. shelving, panel boards, etc.)

## PART 3 EXECUTION

### 3.1 WORKMANSHIP

- A. Framing: Frame, fit closely, set framing according to required lines, levels and secure rigidly in place.

06 10 00-2

- B. Grounds and Blocking: Provide wood grounds and blocking of size and shape required to secure other work or equipment in place. **NO METAL STRAPPING WILL BE ACCEPTED AS A SUBSTITUTE FOR WOOD BLOCKING.** Set grounds true to line, level or plumb and well secured in place. Wood blocking or nailer on steel framing shall be bolted thereto. Provide solid grounds blocking in walls for wall hung or attached items and equipment (i.e. cabinets, countertop brackets and supports, wall mounted hardware, coat hooks, toilet accessories, etc.) Also provide wood blocking in walls and/or ceilings for all owner-provided items. Verify and coordinate with owner actual locations.
- C. Nails, spikes, screws and other anchoring items shall be of the approved size and type to secure the member in place if not called out on drawings.
- D. If approved by Architect, fir dimensional lumber and fir plywood may be used in lieu of pressure treated wood in concealed areas unless pressure treated wood is required by code. If pressure treated wood is used, secure with 304 or 316 stainless steel fasteners or other corrosive-resistant fasteners approved for use with pressure treated wood and approved by manufacturer. Install 30# felt paper over metal substrates or coat with bituminous material prior to installation of pressure treated wood products.
- E. Metal products in contact with pressure-treated wood must be corrosion resistant. Examples include flashing, termite shields, fasteners (e.g. nails, screws, and bolts), and all connecting hardware (e.g. joist hangers, straps, hinges, post anchors, and truss plates). Provide non corrosive separation material between such as felt paper, bituminous material, etc.
- F. Defective materials shall be removed from the job site and replaced with acceptable materials at no additional cost to the Owner.

### 3.2 PROTECTION OF INSTALLED PRODUCT

- A. Any exposed exterior or interior plywood sheathing to be covered with temporary or permanent weather barrier within 24 hours following sheathing installation to prevent exposure to moisture or sunlight. Gypsum sheathing to be covered with temporary or permanent weather barrier within minimum time allowed by sheathing manufacturer.
- B. No plywood roof decking will be left exposed to moisture and sunlight. Weather barriers are to be installed immediately following installation of roof deck.
- C. Schedule work so that wood framing for roof and exterior walls are covered with decking or sheathing as soon as possible to prevent weathering and warpage of framing materials.

### 3.3 GRADE STAMPS

- A. Framing lumber: Identify all framing lumber by the grade stamp of the Southern Pine Inspection Bureau.
- B. Plywood: Identify all plywood as to species, grade, and glue type by the stamp of the American Plywood Association.

06 10 00-3

- C. Other: Identify all other materials of this Section by the appropriate stamp of the agency listed in the reference standards.

#### 3.4 CLEAN UP

- A. Keep the premises in a neat, safe, and orderly condition at all times during execution of this portion of the work. Clean up and remove from site the debris, cut ends, and sawdust.

END OF SECTION

06 10 00-4

## SECTION 06 20 23

### FINISH CARPENTRY

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Furnish and install items of finish carpentry and miscellaneous millwork, including all finish trim; fitting and installing all wood doors and frames; installing all finish hardware, and construction of job-built shelving.

##### 1.2 RELATED WORK

- A. Section 06 10 00 - Rough Carpentry
- B. Section 08 14 16 - Wood Doors
- C. Section 08 71 00 - Finish Hardware
- D. Section 08 81 00 - Glass and Glazing
- E. Section 09 91 00 – Finishes

##### 1.3 SHOP DRAWINGS

- A. Submit complete shop drawings for Architect's approval prior to fabrication of any millwork or trim.

##### 1.4 REFERENCES

- A. Comply with State of Arkansas Adopted ADA Accessible Guidelines in regard to accessible or handicapped features.

##### 1.5 FIELD DIMENSIONS & COORDINATION

- A. The millwork manufacturer is responsible for details and dimensions set in accordance with field measurements. The Contractor and the Millwork Supplier shall coordinate and correct any discrepancies prior to fabrication or placement of any work.
- B. Coordinate clearances of door hardware items with lites and lite frames.

##### 1.6 PRODUCT HANDLING AND DELIVERY

- A. Contractor and Millwork Supplier are to coordinate all phases of the work provided in under this section to insure timely delivery and setting after building is sufficiently dry and climate controlled to protect the work.

06 20 23-1

## PART 2 PRODUCTS

### 2.1 FINISH WOOD MATERIALS:

- A. All interior trim and railings which are to be stained shall be oak, birch unless otherwise shown on drawings.
- B. When painted, material shall be close grained, smooth surface, suitable for painting. Species to be Poplar or other similar closed grain species with Architect's approval.
- C. All materials shall be of select material, with no splits, knots, or other defects.

### 2.2 LAMINATED PLASTICS

- A. Furnish laminated plastic as detailed on drawings in strict accordance with manufacturer's recommendations. Joints shall not be located in random fashion and entire, one piece application shall be used wherever possible. Provide plastic edges where shown. Laminated plastic: "Formica", "Pionite", "Nevamar", "Wilson Art", or alternate approved by Architect. Color, pattern and finish shall be as selected by Architect.

## PART 3 EXECUTION

### 3.1 WORKMANSHIP

- A. Frame, fit closely, and set accurately to required lines, levels, and secure rigidly in place.
- B. All interior trim is to be sanded smooth at job so that no sand marks, scratches, blemishes, etc., are noticeable after finish is applied.
- C. All interior trim against concrete or masonry or solid backings is to have hollow backs.
- D. Joints are to be mitered or angled to conceal shrinkage. Butt joints are not acceptable.
- E. Trim and moldings are to be set with finish nails, screws or glue, where required. All fastening devices are to be set and holes filled with similar material not noticeable after finish.

### 3.2 FINISH HARDWARE: See Section 08 71 00.

- A. Installation only by this section. Cut, fit, and install without marring or injuring work. Examine hardware at completion of work; test, oil, grease, adjust, and perform all necessary work to insure correct operation.
- B. Doorknobs, pulls, kick plates, push plates, etc., are to be fitted and installed before finishing, then removed and re- installed after finish work is completed.

06 20 23-2

3.3 WOOD DOORS: See Section 08 14 16

A. Installation only under this section. Fit, hang, trim as required.

B. Provide the following clearances:

Sides	1/16"
Top	1/16"
Base (with threshold)	3/16"
Base (without threshold)	3/8 "

C. Install hardware as specified. Locksets and latches to have centers at 38" above finish floor unless otherwise stated. Coordinate location of locks with approved Hardware Schedule.

END OF SECTION

06 20 23-3





## SECTION 06 41 16

### CABINET WORK AND SHELVING

#### PART 1 GENERAL

##### 1.1 SCOPE:

- A. Furnish labor and materials for fabrication and installation of high-pressure laminate and/or thermally fused laminate (melamine) covered cabinetwork indicated and specified, including cabinet hardware.
- B. Thermoset Solid Polymer (solid surface) (countertops, backsplashes)

##### 1.2 RELATED SECTIONS

- A. Section 06 10 00 - Rough-in Carpentry - Blocking
- B. Section 09 65 13 – Rubber Base

##### 1.3. QUALITY ASSURANCE

- A. All cabinets and millwork to conform to the **Architectural Woodwork Institute (AWI)** quality standards, **Custom Grade** in addition to requirements as specified this section.
- B. Manufactured casework is approved, but must meet requirements as shown on drawings and as specified in this section.
- C. Manufacturers, suppliers and fabricators to have minimum 5 years in the manufacturing and installation of cabinets and millwork.
- D. Subcontractor / supplier providing work under this section will fabricate and install work specified in this section with their company's own installers and fabrication department, employed by the company. **Subcontracting of fabrication and installation will not be allowed unless approved by Architect prior to bid.**
- E. ADA-Americans with Disabilities Act requirements: The special requirements of ADA shall be a requirement of this section and where specifically indicated on drawings in detail or notation. Comply with Federal Register published September 15, 2010, Title II (28 CFR Part 35) and Title III (28 CFR, Part 36), rules and regulations.
- F. Comply with State of Arkansas Adopted ADA Accessible Guidelines in regard to accessible or handicapped features.
- G. Provide balanced construction for all high pressure laminated panels.

06 41 16-1

#### 1.4 WARRANTY

- A. Provide manufacturer's warranty against defects in materials, fabrication and installation, excluding damages caused by physical or chemical abuse or excessive heat. Warranty shall provide for replacement or repair of material and labor for a period of one (1) year ten (10) years beginning at Date of Substantial Completion.
- B. Maintain surfaces in accordance with manufacturer's care and maintenance instructions.
- C. Fabrications shall not have been moved from original place of installation.
- D. Warranty shall be transferable to subsequent owner.

#### 1.5 SHOP DRAWINGS

- A. Submit accurately detailed shop drawings to Architect for approval prior to fabrication. Comply with Section 01 33 00 for submittal.
- B. Submit two copies of shop drawings and one reproducible set to Architect.
- C. Samples: Submit thermally fused laminate (melamine), and PVC edging, full color for Architect's selection.

#### 1.6 COORDINATION & FIELD VERIFICATION

- A. Cabinet/millwork contractor to be responsible for coordination of installed equipment and fixtures specified in other sections and shown on drawings. Contractor to provide required specifications to cabinet/millwork contractor so he may make provisions for installation and attachment of equipment and fixtures, which are to be installed in cabinets. Contractor is responsible for field verifying accurate field measurements prior to fabrication and placement.

#### 1.7 PRODUCT HANDLING & DELIVERY

- A. No delivery or installation shall be allowed until building is sufficiently dry; and climate controlled to receive such materials without risk or damage to same.

### PART 2 PRODUCTS

#### 2.1 EXPOSED PRE-ASSEMBLED CABINETS: Where indicated on drawings.

- A. Ends and Exposed Partitions: 3/4" thick 47 lb. density particle board with thermally fused laminate (melamine), Selected TFL may be applied on ends and partitions not exposed to view. Ends are attached to top and bottom by AWI Premium dowelling or with special concealed 1/4" x 3-1/2" knife threaded hex headed screw connectors by Hafele or alternate.

06 41 16-2

- B. Exposed Edges: Ends, partitions, finished backs, tops, bottoms, sub-tops, shelves, drawer fronts and doors are protected with 3mm P.V.C. banding or when called for on plans, banding to be machine or clamp applied. Architect to select from manufacturer's entire PVC banding color range. The bottom edge of the base and tall cabinets finished ends must have 3mm flat PVC banding.
- C. Tops and Bottoms: Minimum 3/4" thick, 47 lb. density particle board with thermally fused laminate (melamine), will be applied when called for on plans. Tops shall be prepped to receive sink clamps. Coordinate with plumbing contractor. Exposed bottoms of wall cabinets to have same material and color as door faces.
- D. Sub-tops: At all base cabinets top frame shall be minimum 3/4" thick solid particle board.
- E. Bases: 3/4" thick x 4" wide exterior Pine or Fir plywood applied separately to the bottom of base and tall storage cabinets. 4" coved Rubber base to be installed. Refer to Section 09 65 13 Rubber Base.
- F. Concealed Shelves: Shelves 1" thick, 47 lb. density particleboard thermally fused laminate (melamine).
- G. Concealed Cabinet Interior Finish: unless called for otherwise, provide thermally fused laminate (melamine). Color to match exterior TFL.
- H. Backs:
  - 1. Exposed backs: will be same materials as ends.
  - 2. Unexposed backs: 1/2" thick 47 lb density particleboard with .028 thick high pressure laminate, balanced construction. Back to be fully captured on all four sides and attached with glue. Provide 1/2" nailer strip.
- I. Drawers: (Provide AWI premium grade construction as minimum requirement)
  - 1. Fronts: 3/4" 47 lb. density particleboard with thermally fused laminate (melamine), both sides.
  - 2. Drawer body: Sides, fronts and backs shall be 1/2" thermally fused laminate (melamine), laminate both sides (1/2" hardwood solid core plywood finger jointed or Dovetail jointed on all four corners, glued and cross pinned will be considered equal construction). (Dovetail joint will be considered equal construction). 1/2" plywood drawer bottoms shall be laminated with minimum .028 high pressure plastic laminate.
  - 3. Drawer bottom: Minimum 1/4" plywood or hardboard, grooved in on all four sides, or 1/2" 47 lb. density particle board with thermally fused laminate (melamine). Provide minimum 1/2" 47 lb. density particle board with thermally fused laminate (melamine) for drawers 30 inches or wider.
  - 4. Drawer slides:
    - a. Standard: Accuride #7432 or approved alternate, min. 75 pound capacity, ball bearing slide. All file drawer slides to be full extension.
    - b. Heavy duty full extension (equipment shelves and drawers over 24" deep and 8" in height): Accuride #3832 or approved alternate.
  - 5. Index followers: (file drawers) K.V. #476F.

06 41 16-3

6. Hanging File Rails: Blum Metafile for letter size hanging files to be provided at file size drawers. Refer to drawings for standard or lateral file hanging orientation.
  7. Additional support to be provided for drawers 30" wide or more.
- J. Doors:
1. Standards: 3/4" 47 lb. density particleboard with thermally fused laminate (melamine), both sides.
- K. Filler Panels: 3/4" thick 47 lb. density particleboard core with thermally fused laminate (melamine). Fillers to be used as required, in colors to match other vertical laminate surfaces. **No filler panels more than 3" wide are to be used unless shown otherwise.**
- L. Open Shelving Units: 1" thick 47 lb. density particleboard with .050 thick high pressure laminate. Exposed edges will be 3mm PVC or oak (refer to item No. "B" exposed edges). All shelves to be adjustable with holes at 32 mm on center.
- M. Shelf Supports:
1. Adjustable shelves: Provide holes @ 32 mm o.c. vertical, provide minimum 4 polymer twin pin-locking shelf clips per shelf capable of receiving 3/4" or 1" thick shelving. Clips to withstand 500 lb. Static load per shelf.
  2. Fixed shelves: Dowels and glue, AWI premium grade construction.
- N. Hardware:
1. Pulls: Stanley Hardware No. 4483-1/2, US26D finish, or equivalent pull.
  2. Hinges: Weber-Knapp 2 1/2" butt hinge, brushed chrome, five knuckle closed pin type, hospital tips, BHMA 156.9, Grade 1, full overlay with 270 degree swing.
  3. Catches: Roller type Amerock #9823 w/strike or magnetic catches. Doors over 36" in height shall have catches at top and bottom.
  4. Door Bumpers: Provide clear bumpers similar to 3M Bumpon at every door leaf as req., minimum 2 per leaf.
  5. Locks: to be keyed together. Locations as identified on drawings.
    - a. Drawers and single leaf doors: CompX National #C8053 series, cylinder type, 5 disk tumbler mechanism.
    - b. Double leaf locking:
 

Lock - CompX National #C8053 series, cylinder type, 5 disk tumbler mechanism.  
 Latch: CompX Timberline DL series double door latching system with the DL-200 and DL300 activator and catch. Provide black color. Provide 1 latch system (bottom) for doors up to 48" in height and two latch systems (top & bottom) for doors over 48" in height.
    - c. Push Latch: Where called for on drawings. Submit data with shop drawings for approval.
    - d. Provide Chain-type door stop installed on inside of cabinet where unit butts up against sidewall to prevent door from opening into wall or possible other device mounted on wall.
- O. Additional Material: Furnish all fillers, scribes, etc., as shown on the drawings and/or as part of the cabinets but which may not be shown.

06 41 16-4

## 2.2 LAMINATED PLASTICS

- A. Furnish laminated plastic as detailed in plans on countertops and cabinetry in strict accordance with manufacturer's recommendations. Joints shall not be located in random fashion and entire, one piece application shall be used wherever possible. Provide plastic edges where shown. Laminated plastic. Color, pattern and finish shall be as listed on drawings and verified by Architect.
- B. Thermally Fused Laminate Melamine Board: Furnish thermally fused laminate as detailed in plans on cabinetry in strict accordance with manufacturer's recommendations. Color, pattern and finish shall be as listed on drawings and verified by Architect.
  - 1. When wood-grain designs of plastic laminate are selected, Direction of wood grain to be vertical on door, end panels, fascia panels, and exposed backs, horizontal on drawer faces, aprons, and top rails unless noted otherwise.
  - 2. As an alternate product to the particle board and plywood specified, "Woodstark" Fiberboard MR, manufactured by Dow may be used upon approval by Architect in thicknesses as called for in this specification.

## 2.3 THERMOSET SOLID POLYMER (SOILD SURFACE)

- A. Furnish thermoset solid polymer (solid surface) as detailed in plans in strict accordance with manufacturer's recommendations. Color, pattern, and finish shall be as listed on drawings and verified by the Architect.
- B. Material shall be cast, filled, acrylic; not coated, laminated or of composite construction, meeting ANSI Z124 1980, type 6, and FS WW-P541E/GEN dated August 1, 1980. Superficial damage to a depth of 1/32 inch shall be repairable by sanding or polishing. Thickness of material shall be minimum 1/2" for countertops and horizontal surfaces (WITH UNDERMOUNT SINKS PROVIDE 3/4" COUNTERTOP OR DETAIL TREATED PLYWOOD UNDER 1/2" COUNTERTOP FOR ATTACHMENT OF SINK.) Provide 1/4" thickness for vertical surfaces with exception of backsplashes, which shall be 1/2" thickness. Total thickness of countertop including plywood sub top and solid polymer top is not to be less than 1 1/2" thick. Exposed edges of countertops shall be solid polymer material full thickness of edges. Finish shall be matte.
- C. Joint Adhesive: Manufacturer's standard two-part adhesive kit to create inconspicuous, non porous joints by chemical bond.
- D. Installation:
  - 1. Install fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.
  - 2. Form joints between components using manufacturer's standard joint adhesive; without conspicuous joints. Reinforce with strip of solid polymer material, 2" wide.
  - 3. Provide cutouts for plumbing, mechanical, and electrical as indicated on the drawings.
  - 4. Rout and finish component edges with clean, sharp returns. Rout cutouts, radii and contours to template. Smooth edges. Repair or reject defective and inaccurate work.

06 41 16-5

5. All components shall fit tight, level and smooth. Deliver no components to site until ready for immediate installation. Store all material indoors in clinic controlled environment.
6. All perimeters of surfaces are to be sealed to adjacent surface.

E. Warranty:

1. Provide manufacturer's warranty against defects in materials, fabrication and installation, excluding damages caused by physical or chemical abuse or excessive heat. Warranty shall provide for replacement or repair of material and labor for a period of ten years, beginning at Date of Substantial Completion.
2. Maintain surfaces in accordance with manufacturer's care and maintenance instructions.
3. Fabrications shall not have been moved from original place of installation.
4. Warranty shall be transferable to subsequent owner.

## 2.4 SEALANTS

A. Sealant Applications

1. Plastic laminate to plastic laminate (i.e. counter top to backsplash)
  - a. "Color Matched Acrylic Latex (Match countertop color)
2. Solid surface to solid surface (i.e. counter top to backsplash)
  - a. Color Matched Acrylic Latex (Match countertop color)
3. Case work to walls
  - a. Acrylic Latex, clear, tinted with paint provided by the painters to create a color match sealant to match wall color.

## 2.5 CONSTRUCTION

- A. As a minimum requirement, conform to construction standards of AWI, premium grade and as specified this section.
- B. Millwork fabricator/supplier is responsible for proper construction of each item of millwork, including support of each unit and countertops. If fabricator/supplier finds conditions on millwork drawings that might affect proper operation or require additional support from that shown, notify Architect and provide recommendation so that proper operation or support is provided.
- C. ADA- Americans with Disabilities Act Requirements: The following special requirements shall be met, where specifically indicated on architectural plans as "ADA", or by General Note. To be in compliance with Federal Register Volume 56, No. 144, Rules and Regulations:
  1. Countertop height: with or without cabinet below, not exceed a height of 34 inches A.F.F., (Above Finished Floor), at a surface depth of 25 inches unless noted otherwise.
  2. Knee space clearance: to be minimum 27 inches A.F.F., and 30 inches clear span width.
  3. 12 inch deep shelving, adjustable or fixed: not to exceed a range from 9 inches A.F.F. to 54 inches A.F.F. unless noted otherwise.

06 41 16-6

4. Wardrobe cabinets: to be furnished with rod/shelf adjustable to 48 inches A.F.F. at a maximum 21 inch shelf depth.
5. Sink cabinet clearances: Upper knee space frontal depth to be no less than 8 inches, and lower toe frontal depth to be no less than 8 inches, and lower toe frontal depth to be no lower than 11 inches, at a point 9 inches A.F.F., and as further described in Volume 56. Section 4.19 unless noted otherwise.
  - a. Catches to have a maximum resistance of 5 pounds.

#### D. Countertops

1. Underside to be properly balanced with backing sheet. Furnish counter tops with edge treatment and profile as shown on the shop drawings. Whenever possible, provide continuous lengths. Provide field joints as required using adhesive and tite-joint fasteners. No joints within 24" of a sink cut-out.
2. Provide proper support for all types of countertops at no more than 3'-0" on center unless noted otherwise.

#### E. Workmanship

1. Laminate surface/balancing liner to core under controlled conditions, by approved and regulated lamination. Natural-setting hybrid P.V.A. Type III water resistant adhesives that cure through chemical reaction, containing no health or environmentally hazardous ingredients, are required. Methods requiring heat are not allowed.
2. Cabinet parts shall be accurately machined and bored for premium grade quality joinery construction utilizing automatic machinery to insure consistent sizing of modular components. End panels shall be doweled to receive bottom and top.
3. Back panels shall be fully housed into, and recessed 7/8 inch from the back of cabinet sides, top, and bottom to insure rigidity and a fully closed cabinet. Cabinet back shall be shimmed from rear of body for tight interior fit.
4. 3/4 inch thick hang rails shall be mechanically fastened to end panels of wall, base, and tall cabinets for extra rigidity and to facilitate installation.
5. All cases shall be square, plumb, and true.
6. Provide removable back panels and closure panels for plumbing access where shown on drawings and required by code. Coordinate with plumbing, mechanical, and electrical trades.
7. Cutouts for plumbing piping in concealed rear, sides or bottom cabinet panels shall be no larger than 1/4" larger than the pipe diameter. Install sealant around all penetrations.

### PART 3 EXECUTION

#### 3.1 COORDINATION

- A. Coordinate work of this section with related work of other sections and drawings as necessary to obtain proper installation of all items.
- B. Field verify site dimensions of cabinet locations in building prior to fabrication.

06 41 16-7

- C. Coordinate all plumbing/mechanical item locations and openings with plumbing/mechanical contractor where items are related to millwork prior to routing and installation of plumbing/mechanical items.
- D. Coordinate all owner furnished items, which are to be installed in or adjacent to millwork.
- E. Coordinate locations of wood grounds and blocking concealed in walls with cabinet anchoring requirements prior to installation of wall covering.

### 3.2 INSTALLATION

- A. Storage and Protection: Cabinets and millwork shall be protected in transit. Store under cover in a ventilated building not exposed to extreme temperature and humidity changes. Do not store or install cabinets in building until concrete, masonry, and drywall/plaster work and painting is dry and building temperature and humidity are stabilized. Exterior doors, windows and glass shall be installed prior to millwork storage and installation in building. If project calls for polished concrete floors, final polishing of floor shall be complete in areas where millwork is being installed.
- B. Workmen: Install under the supervision of manufacturer's or supplier's representative if manufactured casework is provided, factory-trained mechanics certified by manufacturer will be required.
- C. Workmanship:
  - 1. Erect cabinets and millwork straight, level and plumb and securely anchor in place. Scribe and closely fit adjacent work. Cut and fit work around pipes, ducts, etc.
  - 2. Install all items complete and adjust all moving parts to operate properly.
  - 3. Leave surface clean and free from defects at time of final acceptance.
- D. Maximum width of any filler to be 3" inches wide. Filler width dimension to be balanced on each side of cabinet length.
- E. Coordinate equipment and plumbing fixture locations, scheduled to be installed in cabinets.
- G. Install sealant between countertop and backsplash, and between backsplash and wall, and other locations where cabinet butts to walls or ceilings.
- H. Anchors for cabinets to be countersunk and plugged with vinyl inserts to match back panel colors. **STICKERS ARE NOT ALLOWED.** Arrange anchors in uniform manner, anchoring to wood ground and/or masonry wall.

### 3.3 CABINET FINISH

- A. Provide finishes as selected on Finish Legend on drawings.

06 41 16-8



### 3.4 CLEANUP

- A. Remove all cartons, debris, sawdust, scrapes, etc. Leave cabinet surfaces and spaces clean, ready for owner's use.

END OF SECTION

06 41 16-9



## SECTION 07 01 50

### ROOF PATCHING

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes
  - 1. Patching of TPO roofing system.

##### 1.2 RELATED SECTIONS

- A. Section 01 11 00: Summary of Work
- B. Section 01 73 29: Cutting and Patching
- C. Section 01 35 16: Alteration Project Procedures
- D. Section 02 41 19: Minor Demolition
- E. Section 07 62 00: Sheet Metal Flashing & Trim

##### 1.3 QUALITY ASSURANCE

- A. Roofing Installer: Company specializing in membrane roof application approved by the roofing materials manufacturer specified and who has been installing roofs for at least 5 years.

##### 1.4 PROJECT/SITE CONDITIONS

- A. Environmental Requirements;
  - 1. Do not apply roofing membrane during inclement weather or when air temperature may fall below 40 degrees F.
  - 2. Do not apply roofing membrane to damp or frozen deck surface.
  - 3. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weather-proofed during same day.
- B. Coordinate the work with affected mechanical and electrical work associated with roof penetrations.

##### 1.5 MANUFACTURER'S GUARANTEE

- A. Roofing installer will perform patching of roof system in a manner approved by the existing roofing manufacturer so that patching will not void warranty of existing roof system.
- B. Submit proof to Architect's office prior to beginning work that current roof warranty will continue and applicator is certified by roof system manufacturer.

07 01 50-1

- C. Provide two year warranty covering all materials and workmanship for a period of two years for the areas of repair and/or modification. See sample guarantee form at end of this specification.

## PART 2 PRODUCTS

### 2.1 ROOF MEMBRANE

- A. If not specified or noted on the plans, the roofing installer is to determine existing roofing membrane and match type and finish.
- B. Use only the flexible membrane flashing materials that are recommended by the roofing manufacturer. Written documentation required before acceptance.

### 2.2 METAL ROOFING

- A. Metal roofing installer to match existing panel type, profile, gauge, finish type and color.
  - 1. At new openings for roof mounted mechanical equipment, provide prefabricated curbs as manufactured by Thycurb or Pate, matching existing panel profile, where more than one roof panel is involved. Curbs must have built-in diverter on the up-slope side.

### 2.3 INSULATION AND RECOVERY BOARD

- A. Where rigid roof insulation board is to be replaced or patched, provide faced isocyanurate insulation board of thickness as required to match existing insulation thickness. Mechanically fasten to existing roof deck. Provide tapered where shown or as required.
- B. Where recovery board is to be replaced, provide minimum 1/2" high pressure fiberboard. Mechanically attach to existing roof deck.
- C. Insulation board and recovery board to be approved by roofing membrane manufacturer and be compatible with roofing system.

### 2.4 ACCESSORIES

- A. Roofing Fasteners: Galvanized or non-ferrous type, size, and style as required to suit application.
- B. Mechanical Fasteners for Insulation: Appropriate to purpose intended and approved by Factory Mutual; length required for thickness of material; with metal washers. Type as required to fastening into existing roof deck.
- C. Bituminous Materials
  - 1. Asphalt Bitumen: ASTM D312, Type III.
  - 2. Plastic Cement: No. 885, (ASTM D2822) by Tamko

- 2.5 Architect will approve all patching materials prior to installation.

07 01 50-2

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify existing roof surface in areas to be patched or repaired is clean and smooth, free of depressions, waves, or projections.
- B. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips, nailing strips, and reglets are in place.
- C. Verify deck is in satisfactory condition, is supported and tightly secured.
- D. Verify existing roof surfaces are dry and free of snow or ice. Confirm dry surface by moisture meter with 12 percent moisture maximum. Provide documentation of moisture test.

### 3.2 PREPARATION

- A. Protect building surfaces against damage from roofing work.
- B. Temporary Protection: Sheet polyethylene, fiber reinforced. Provide weights to retain sheeting in position.
- C. Remove flashings, membrane and insulation if needed in preparation for new protected membrane roof patching system.
- D. Repair any damaged or rotting deck in area of patch or repair prior to patching.

### 3.3 INSTALLATION

- A. Roofing membrane system, insulation, and recovery board to be installed per manufacturer's instruction and be compatible with existing roofing. Install flashings as shown on drawings and per manufacturer's instructions.
- B. Prefinished metal roofing system, curbs, flashings, and sealant to be installed per manufacturer's instructions.

### 3.4 WEATHERTIGHTNESS

- A. All patching work on existing roof systems to be performed to provide weathertight seal in patched areas.

### 3.5 ROOF SPLICES

- A. All splices shall be made with materials supplied for this purpose by the manufacturer.

07 01 50-3

### 3.6 CLEANING

- A. Replace defaced or disfigured finishes caused by Work of this Section.

### 3.7 SCHEDULE

- A. Patch all areas disturbed during re-flashing, mechanical or electrical work, or other areas needing repair as shown on drawings. Match surface conditions (ie: gravel or smooth surface). Architect to inspect and approve all work and entire roof surface prior to acceptance.

END OF SECTION

07 01 50-4

COMPANY LETTERHEAD

CERTIFICATE OF GUARANTEE FROM INSTALLER

We, \_\_\_\_\_

(Name of Company or Contractor)

agree to maintain the roofing and flashing on the below mentioned building for the period indicated. This agreement is to render the roof and the flashing waterproof subject to the conditions outlined below.

OWNER OF BUILDING \_\_\_\_\_

Location of Building \_\_\_\_\_

City \_\_\_\_\_ Roof Area \_\_\_\_\_ square feet \_\_\_\_\_

This Guarantee effective this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, for the term of two (2) years from this date, provided any defects result from defective material or workmanship and are not caused by other mechanics, fire, accidents, or by nature over which we have no control.

It is understood and agreed that we will not be responsible for leaks in the roofing or flashing due to excessive winds, distortion of the foundation on which the roofing rests, excessive hail storms, or any other conditions over which we have no control.

Signed \_\_\_\_\_  
Name of Company

By \_\_\_\_\_

Position \_\_\_\_\_

Company is a \_\_\_\_\_  
Corp./Partnership/Individual

NOTARY PUBLIC \_\_\_\_\_

Registered in the State of \_\_\_\_\_

SEAL

**NOTE:** Standard Twenty (20) year unlimited dollar coverage warranty from the manufacturer is to be submitted in addition to the guarantee from the installer found on this form. Manufacturer's Warranty is mandatory - **NO EXCEPTIONS.**

07 01 50-5





## SECTION 07 10 00

### WATERPROOFING AND DAMPPROOFING

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Furnish labor and materials to complete waterproofing and dampproofing shown and specified.
- B. Section Includes:
  - 1. Horizontal joint waterproofing
  - 2. Expansion joint fillers
  - 3. Cavity wall flashing system
  - 4. Below-slab vapor barrier
  - 5. Expandable waterproofing

##### 1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete
- B. Section 04 22 00 – Concrete Unit Masonry
- C. Section 07 62 00 – Flashing and Sheet Metal

##### 1.3 SUBMITTALS

- A. Comply with Section 01 33 00.

##### 1.4 WARRANTY

- A. The Contractor must guarantee all materials and workmanship for a minimum period of two (2) years from the date of Substantial Completion of the building unless longer warranty periods are specified for individual specified products.
- B. The Contractor will, at any time within the two (2) year period, remedy all leaks of any nature in any part of the building due to the use of faulty materials and/or workmanship, without additional cost to the Owner. The Contractor shall further reimburse the Owner for any damage occasioned by such leaks.
- C. The Contractor is cautioned to supplement the work, described in this section of the specifications, by any means necessary to permit the above guarantee, which he will be called upon to make as an obligation of the Contract.

07 10 00-1

## 1.5 PRE-INSTALLATION MEETING

- A. The Contractor will schedule and conduct a pre-installation meeting for the following items:
  - 1. Cavity wall flashing system
  - 2. Under slab moisture barrier
- B. The following shall be in attendance:
  - 1. Contractor
  - 2. Architect
  - 3. Product supplier and or manufacturer's representative
  - 4. Installer

## PART 2 PRODUCTS

### 2.1 MATERIALS:

- A. Horizontal expansion joint waterproofing of exterior slabs or slabs on grade: Tremco Vulkem #45 SSL Sealant as manufactured by Tremco, W.R. Meadows, Inc., or approved alternate. Color to be coordinated with Architect.
- B. Horizontal expansion Joint Filler: Asphalt impregnated expansion joint material. Provide "Zip Strip" type filler so that top ½" can be removed for sealant installation.
- C. Cavity wall flashing system:
  - 1. Cavity Wall Flashing System:
    - a. Through-Wall Flashing: Flex-Flash flashing polyester scrim reinforced, minimum 40-mils thick, self-adhering, pressure sensitive clear no drool adhesive membrane formulated with Dupont "Evaloy" Kee, manufactured by Holmann & Barnard, Inc.. Provide with all available preformed shapes (i.e. corners, level changes, end dams, stop ends, etc.) as needed to fit job conditions. Apply Primer-SA by HB where installed on exterior sheathing and/or CMU.
    - b. Drainage & Vents: Mortar Net Drainage & Vent System or Mortar Trap & Weep Vent by HB.
    - c. Termination Bar: Provide continuous aluminum or stainless-steel termination bar where membrane terminates on wall sheathing or substrate. Secure to substrate with screws meeting manufacturer detailing.
    - d. Drip Edge: Not required. Terminate membrane flashing at front masonry edge. Flex-flash should be extended beyond the wall face and cut flush with the brick.
    - e. Sealant: Provide sealant at termination bar and where thru wall flashing ends overlap, inside and outside corners and any other type of soft joints. Verify compatibility of sealant with any adjacent materials. HB Sealant, Dow Corning 790 & 791 with 1200 prime coat. Silaflex-1A with #260-205 primer or Sonolastic NPI with #733 primer.
  - 2. Alternate manufacturers with equal or better product may submit product data to Architect for approval, following requirements of Section 01 60 00.
    - a. "TotalFlash" system by Mortar Net USA Ltd, is an approved alternate system, Drainage and weep vents must be provided in addition to the built-in drainage mat.

07 10 00-2

D. Weep and Ventilation Vents:

1. QV- Quadro Vent by HB, or Weepvent by Mortar Net, ½” thick, size as required to match brick or CMU veneer head dimension.
2. Install at 24” o.c. horizontally for brick veneer, 32 o.c. horizontally for CMU veneer.
3. Provide ventilation vents at top of wall in same location and centering as weep vents.
4. Confirm Color with Architect for each masonry color used.

E. Mortar Collection Material:

1. Mortar Trap by HB, or MortarNet by Mortar Net, or approved alternate.
2. Thickness as required to fill cavity. Install just above thru-wall flashing in cavity at bottom of walls and above window and door openings per manufacturer’s instructions.

F. Underslab Moisture Barrier: 15 mil thick virgin polyethylene, Approved Products and Manufacturers:

- “Stego Wrap Class A”, vapor barrier (15-mil) by Stego Industries, LLC, 877-464-7834, [www.stegoindustries.com](http://www.stegoindustries.com)
  - Vaporguard by Reef Industries, 713-507-4250, [www.reefindustries.com](http://www.reefindustries.com)
  - Moistop Ultra 15 by Fortifiber, 800-773-4777, [www.fortifiber.com](http://www.fortifiber.com)
  - Perminator HP 15 mil by WR Meadows, 800-342-5976, [www.wrmeadows.com](http://www.wrmeadows.com)
1. Use High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 4 inches. Sealing tape shall be coated with a high tack natural rubber adhesive.
  2. Waterproofing adhesive or mastic equal to Stego Mastic shall be a high quality, long lasting, asphalt-based material and shall be applied in accordance with its manufacturer’s specification. Waterproofing adhesive shall be compatible for use with the vapor barrier and shall meet the applicable standards for the intended use. The installation contractor shall submit the product specification for Architect’s review and approval prior to using the product.
  3. References
    - a. ASTM E 1745-09 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
    - b. ASTM E 154-99 (2005) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
    - c. ASTM E 96-05 Standard Test Methods for Water Vapor Transmission of Materials.
    - d. ASTM F 1249-06 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
    - e. ASTM E 1643-09 Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
  4. American Concrete Institute (ACI):
    - a. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
  5. Vapor barrier must have all of the following qualities:
    - a. Permeance of less than 0.01 Perms [ $\text{grains}/(\text{ft}^2 \cdot \text{hr} \cdot \text{inHg})$ ] as tested in accordance with ASTM E 1745 Section 7.
    - b. Other performance criteria:
      - i. Strength: ASTM E 1745 Class A.
      - ii. Thickness: 15 mils minimum

6. Quality control/assurance (Submit the following for Architect's approval):
  - a. Summary of test results as per paragraph 8.3 of ASTM E 1745.
  - b. Manufacturer's samples, literature.
  - c. Manufacturer's installation instructions for placement, seaming and penetration repair instructions.
- G. Expandable Waterproofing: Bentonite clay products, CCW Miraclay sheet membrane, CCW Miraclay mastic, CCW Mirastop BW, manufactured by Carlisle Coatings and Waterproofing, 800-527-7092, Wylie, TX, or approved alternate product.
- H. Refer to Section 09 96 53 for brick waterproofing.
- I. Refer to Section 03 30 00 for water-stops.

## PART 3 EXECUTION

### 3.1 WORKMANSHIP:

- A. Horizontal expansion joint waterproofing:
  1. All horizontal expansion joints shall be 1/2 inch asphalt impregnated expansion joint material with "zip-strip" feature. Insulation-type material will not be acceptable. Install to provide 1/2" depth below finish surface and apply sealant as called for above.
- B. Expansion joint Filler:
  1. All vertical expansion joints shall be 1/2 inch asphalt impregnated expansion joint material. Not Insulation. The top 1/2 inch of material shall be omitted and joint filled with caulking as specified in Section 07 92 00. All caulking shall be installed flush with wall surface.
- C. Expandable Waterproofing:
  1. Follow manufacturer's instructions for installation concerning application in which waterproofing is installed.
  2. Prepare surfaces or substrate to receive waterproofing per manufacturer's instructions.
- D. Cavity Wall Flashing System:
  1. The installer shall be knowledgeable of system installation. Contractor to have product representative on site when installation begins to verify correct installation procedures are being performed.
  2. Contractor to inspect each installed section of flashing system and approve before covering with veneer.
  3. Install Flashing/Drainage System in accordance with manufacturer's installation instructions.
  4. Install cavity wall flashing system at base of exterior masonry cavity walls and above doors and window openings where located in exterior masonry cavity walls and where shown on drawings. Extend flashing flush with outside face of masonry veneer.
  5. Prior to installation of wall flashing, prime substrate where wall flashings are to be installed with product approved by manufacturer.

07 10 00-4

6. Where installed at stud walls, secure to sheathing with continuous galvanized metal or stainless steel termination bar and set in adhesive.
7. Where installed at CMU walls, secure with continuous galvanized metal or stainless steel termination bar and set in adhesive.
8. Install preformed shapes at corners, changes in elevation, etc. provide end dams and end stops where required per manufacturer's instruction. Provide preformed transitions where transitioning from grade to top of walk or drive.
9. Replace any damaged membrane prior to installation of masonry veneer.
10. Coordinate installation in veneer with weeps and drainage material.
11. At brick veneer cavity walls, grout solid below grade, turn out at bed joint at least one brick course below finished floor, or 4" (1/2 course) below finished floor for CMU veneer unless shown otherwise on drawings. Install above all window and door openings at masonry cavity walls and where shown on drawings.
12. Just prior to laying of masonry veneer, install mortar collection material.
13. Install weep joints at brick head joints, 24" o.c. (horizontally), at CMU head joints at 32" o.c. (horizontally).
14. If masonry is to receive paint, stain, or special coating, weep vents and drainage vents are not to be coated. Protect as required during coating process.

E. Below-Slab Vapor Barrier (15 mil below-slab):

1. Prepare surfaces in accordance with manufacturers instructions.
2. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643. All lap joints and areas to be sealed shall be free from dirt, dust, and moisture. Sealing tape shall be applied in temperatures ranging from 41°F to 122 °F or according to its manufacturer specification. Where inconsistencies occur between the project plans and specification and ASTM E1643, the project plans and specification shall govern.
3. Unroll vapor barrier with the longest dimension parallel with the direction of the pour.
4. Lap vapor barrier over footings and seal to foundation walls or top of footings with manufacturer approved sealant.
5. Overlap joints 6 inches and seal with manufacturer's tape.
6. Seal all penetrations (including pipes) with manufacturer's pipe boot and sealant.
7. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
8. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all four sides with tape.
9. Pipe/Conduit Boots and Penetration Sealing:
  - a) Cut a piece of vapor barrier. Width: minimum 12 inches Length: one and one-half times the pipe circumference
  - b) With scissors, cut slits half the width of the vapor barrier.
  - c) Wrap boot around pipe and tape onto pipe, completely taping the base to vapor barrier using the polyethylene tape.
  - d) Install mastic around and through groups of conduit, grade stakes or piping, which cannot be sealed by taping. Seal to vapor barrier. As an allowable alternate method of penetration sealing in lieu of taping, mastic may be used to seal around single penetrations such as pipe, conduit, floor drains, etc. Confirm that the material mastic is installed at is compatible with the mastic prior to application.

07 10 00-5

10. Seal vapor barrier to top of footings with mastic where vapor barrier terminates at perimeter or interior footings. When vapor barrier terminates at concrete or CMU walls, seal with mastic. Do not apply mastic above top of finished slab elevation.

END OF SECTION

07 10 00-6

## SECTION 07 21 00

### INSULATION

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Furnish all labor, material, equipment, and services necessary for and reasonably incidental to complete insulation as called for below.

##### 1.2 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.

##### 1.3 QUALITY CONTROL

- A. All packages and containers of foam plastic and foam plastic ingredients shall bear the label of an approved agency showing either the flame spread rating and smoke developed rating of the product at the thickness tested or the use for which the product has been listed.
- B. All foam plastics or foam plastic cores in manufactured assemblies used in building construction shall have a flame spread rating of not more than 75 and shall have a smoke developed rating of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E84.
- C. The potential heat of foam plastic in any portion of the wall or panel shall not exceed 6000 BTU/sq.ft. of projected area as described by tests conducted in accordance with NFPA 259.
- D. Foam plastic insulation, exterior coatings and facings tested separately shall have a flame spread rating of 25 or less and a smoke developed rating of 450 or less as determined in accordance with ASTM E 84.
- E. Results of diversified or full scale fire tests reflecting an end use configuration shall be submitted to the Building Official demonstrating the assembly in its final form does not propagate flame over the surface or through the core when exposed on the exterior face to a fire source.
- F. The edge or face of each piece of foam plastic insulation shall bear the label of an approved agency. The label shall contain the manufacturer's or distributor's identification, model number, serial number of definitive information describing the product or materials performance characteristics and approved agency's identification.
- G. Insulating materials, concealed as installed shall have a flame spread rating of not more than 25 and a smoke developed rating of not more than 450. Insulating materials exposed as installed shall have a flame spread rating of not more than 25 and a smoke developed rating of not more than 450.

07 21 00-1

## PART 2 PRODUCTS

### 2.1 MATERIALS:

- A. Fiberglass batt type as manufactured by Owens Corning, Certainteed, Johns Manville or approved equal of thickness as shown on drawings, un-faced, meeting smoke and flame spread rating as specified this section. All concealed and exposed insulation to meet minimum flame spread and smoke development ratings per this specification and governing code requirements. Provide above all new ceilings both acoustic ceiling tile and gypsum board ceiling.

## PART 3 EXECUTION

### 3.1 WORKMANSHIP

- A. Batt Insulation between metal studs
  - 1. Install minimum 6" thick batt insulation (additional thickness as called for on drawings) above ceilings where attic space exists, and at roof where no attic space exists. Provide complete thermal seal between exterior and conditioned space.

END OF SECTION

07 21 00-2



## SECTION 07 27 26

### FLUID-APPLIED WEATHER BARRIER SYSTEM

#### PART 1 - GENERAL

##### 1.1 SUMMARY:

- A. Work of this section includes window and door flashing, air and water-resistive barrier membrane system, and accessory materials for application to exterior building envelope substrates unless indicated otherwise on the drawings and specifications.
- B. Related work:
  - 1. 03 30 00 - Cast in Place Concrete
  - 2. 04 22 00 - Concrete Unit Masonry
  - 3. 07 62 00 - Sheet Metal flashing
  - 4. 07 92 00 - Joint Sealants
  - 5. 08 11 13 - Hollow Metal Doors & Frames

##### 1.2 PERFORMANCE REQUIREMENTS:

- A. Performance requirements: Comply with the specified performance requirements and characteristics as herein specified.
- B. Performance description:
  - 1. The building envelope shall be constructed with a continuous, air and water-resistive barrier to control water and air leakage into and out of the conditioned space.
  - 2. Joints, penetrations and paths of water and air infiltration shall be made watertight and airtight.
  - 3. System shall be capable of withstanding positive and negative combined wind, stack and HVAC pressures on the envelope without damage or displacement.
  - 4. System shall be installed in an airtight and flexible manner, allowing for the relative movement of systems due to thermal and moisture variations.

##### 1.3 SUBMITTALS:

- A. Product data: Submit manufacturer's product data including membrane and accessory material types, technical and test data, composition, descriptions and properties, installation instructions and substrate preparation requirements.
- B. Shop Drawings: Provide Installation Guideline Illustrations.

##### 1.4 QUALITY ASSURANCE:

- A. Applicable standards, as referenced herein: ASTM International (ASTM).

07 27 26-1

- B. Manufacturer's qualifications: Air and water-resistive barrier systems shall be manufactured and marketed by a firm with a minimum of five (5) years experience in the production and sales of air and water-resistive barrier system. Manufacturers proposed for use, but not named in these specifications, shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past five years.
- C. Installer's qualifications: The installer shall demonstrate qualifications to perform the work of this section by submitting the following:
  - 1. Verification that installer has been trained by and is approved to perform work as herein specified by air and water-resistive barrier system manufacturer.
  - 2. A firm experienced in applying similar materials on similar size and scoped projects.
  - 3. Evidence of proper equipment and trained field personnel to successfully complete the project.
- D. Inspection and testing: Cooperate and coordinate with the Owner's inspection and testing agency. Do not cover installed products or assemblies until they have been inspected, tested and approved.
- E. Sole source: Obtain materials from a single manufacturer.
- F. Regulations: Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOC).
- G. Pre-installation conference: Prior to beginning installation of air and water-resistive barrier system, hold a pre-installation conference to review work to be accomplished.
  - 1. Contractor, Architect, installing subcontractor, membrane system manufacturer's representative, and all subcontractors who have materials penetrating membrane system or finishes covering membrane system shall be present.
  - 2. Contractor shall notify Architect at least seven days prior to time for conference.
  - 3. Contractor shall record minutes of meeting and distribute to attending parties.
  - 4. Agenda: As a minimum discuss:
    - a. Surface preparation.
    - b. Substrate condition and pretreatment.
    - c. Minimum curing period.
    - d. Special details and sheet flashing.
    - e. Sequence of construction, responsibilities, and schedule for subsequent operations.
    - f. Installation procedures.
    - g. Inspection procedures.
    - h. Protection and repair procedures.
    - i. Review and approval of all glazing applications.
  - 5. Applicator to prepare a mockup of system at an opening, showing all aspects of the weather barrier system.

#### 1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage, weather, excessive temperatures and construction operations. Remove damaged material from site and dispose of in accordance with applicable regulations.

07 27 26-2

- B. Protect air and water-resistive barrier components from freezing and extreme heat.
- C. Sequence deliveries to avoid delays, and to minimize on-site storage.

1.6 PROJECT CONDITIONS:

- A. Weather conditions: Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials used.
  - 1. Apply at surface and ambient temperatures recommended by the manufacturer. See manufacturer's product data sheets for best practices.
  - 2. Proceed with installation only when the substrate construction and preparation work are complete and in condition to receive the membrane system.
  - 3. Exposure limitations: Schedule work to ensure that air and water-resistive barrier system is covered and protected from UV exposure within 180 days of installation. If air and water-resistive barrier membrane system cannot be covered within 180 days after installation, apply temporary UV protection as recommended by membrane manufacturer.

1.7 WARRANTY:

- A. Manufacturer's warranty requirements: Submit manufacturer's written warranty stating that installed air and water-resistive barrier materials are watertight, free from defects in material and workmanship, and agreeing to replace defective materials and components.
- B. Warranty period: Five years from Date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURER:

- A. PROSOCO, Inc, 3741 Greenway Circle, Lawrence, KS 66046. Phone (800) 255-4255; Fax: (800) 877-2700. E-mail: [CustomerCare@prosoco.com](mailto:CustomerCare@prosoco.com).
- B. Approved Alternate: AirShield LMP, manufactured by W.R. Meadows (800)-342-5976
- C. Substitutions: Comply with Section 01 60 00.

2.2 R-GUARD FASTFLASH® LIQUID-APPLIED FLASHING MEMBRANE

- A. Acceptable product: PROSOCO R-GUARD® FastFlash® or equivalent by W.R. Meadows.
- B. Description: FastFlash® is a gun-grade waterproofing, adhesive and detailing compound that combines the best of silicone and polyurethane properties. This single component, 99% solids, Silyl-Terminated-Poly-Ether (STPE) is easy to gun, spread and tool to produce a highly durable, seamless, elastomeric flashing membrane in rough openings of structural walls.

07 27 26-3

- C. Characteristics:
1. Thickness: Apply according to manufacturer's instructions.
  2. Water vapor permeability: Minimum 14 perms when tested in accordance with ASTM E96.
  3. Water penetration (cyclical static air pressure difference): No uncontrolled water penetration when tested in accordance with ASTM E547.
  4. Hardness: Shore A, 40-45 when tested in accordance with ASTM C661.
  5. Tensile strength: 180 psi when tested in accordance with ASTM D412.
  6. Elongation at break: 400% when tested in accordance with ASTM D412.
  7. Peel strength: 25 pli when tested in accordance with ASTM D1781.
  8. Form: Brick Red, Gun Grade Sealant.
  9. Specific gravity: 1.45 to 1.60
  10. pH: not applicable
  11. Weight per gallon: 12.5 pounds
  12. Active content: 99 percent
  13. Total solids: 99 percent
  14. Volatile organic content (VOC): 30 grams per Liter, maximum
  15. Flash point: no data
  16. Freeze point: no data
  17. Shelf life: 1 year in tightly sealed, unopened container

### 2.3 R-GUARD SPRAY WRAP MVP (MAXIMUM VAPOR PERMEABILITY) AIR AND WATER-RESISTIVE BARRIER

- A. Acceptable product: PROSOCO R-GUARD® MVP or AirShield LMP, manufactured by W.R. Meadows
- B. Description: SPRAY WRAP MVP is a fluid-applied air and water-resistive barrier that stops air and water leakage in cavity wall, masonry veneer construction, as well as in stucco, EIFS and most other building wall assemblies. Once on the substrate, the easily applied liquid quickly dries into a rubberized, highly durable, water-resistant, vapor-permeable membrane.
- C. Characteristics:
1. Thickness: Apply in accordance with manufacturer's instructions. See product data sheet.
  2. Air infiltration: Less than 0.004 cfm per square foot (0.02 L/s/sq m) when tested in accordance with ASTM E2178 or ASTM E283.
  3. Air Barrier Assembly: pass when tested in accordance with ASTM E2357.
  4. Water vapor permeability: Minimum 17 perms when tested in accordance with ASTM E96.
  5. Structural performance: Air and water-resistive barrier system shall withstand positive and negative wind pressure loading when tested in accordance with ASTM E330.
  6. Water penetration (static pressure): No uncontrolled water penetration when tested in accordance with ASTM E331.
  7. Tensile strength: Greater than 15 psi or exceeds strength of substrate when tested in accordance with ASTM C297.
  8. Nail Sealability: pass when tested in accordance with ASTM D1970.
  9. Flexibility: pass when tested in accordance with ASTM D522.
  10. Form: thin, milky batter-like mixture
  11. Specific gravity: greater than 1.31

07 27 26-4

12. pH: 7.5 to 10.0
13. Weight per gallon: 12.2 pounds
14. Active content: no data
15. Total solids: 68 to 72 percent by volume, ASTM-D-2369
16. Volatile organic content (VOC): less than 18 grams per Liter
17. Flash point: not applicable
18. Freeze point: 32 degrees Fahrenheit (0 degrees Celsius)
19. Shelf life: 2 years in tightly sealed, unopened container

2.4 R-GUARD AIRDAM® AIR AND WATERPROOF SEALANT FOR WINDOWS AND DOORS:

- A. Acceptable product: PROSOCO R-GUARD® AirDam®
- B. Description: AirDam® is a medium modulus sealant that combines the best silicone and polyurethane properties. This single component, 98% solids Silyl-Terminated-Poly-Ether (STPE) is easy to gun and tool in all weather conditions. AirDam® cures quickly to produce a durable, high performance, high movement elastomeric interior air sealant
- C. Characteristics:
  1. Hardness: Shore A, 20-25 when tested in accordance with ASTM C661.
  2. Tensile strength: 110 psi when tested in accordance with ASTM D412.
  3. Elongation at break: 1300% when tested in accordance with ASTM D412.
  4. Peel strength: 30 pli when tested in accordance with ASTM D1781.
  5. Type: Type S, Grade NS, Class 50 when tested in accordance with ASTM C920.
  6. Shrinkage: None.
  7. Form: heavy white paste, mild odor
  8. Specific gravity: 1.3 to 1.4
  9. pH: not applicable
  10. Weight per gallon: 11.648 pounds
  11. Active content: 98 percent
  12. Total solids: 98 percent
  13. Volatile organic content (VOC): 30 grams per Liter, maximum
  14. Flash point: greater than 200 degrees Fahrenheit (greater than 93 degrees Celsius)
  15. Freeze point: not applicable
  16. Shelf life: 1 year in tightly sealed, unopened container
- D. Backer rod: Compressible, closed cell rod stock as recommended by manufacturer for compatibility with sealant. Provide size and shape of rod to control joint depth.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Verify that surfaces and conditions are ready to accept the Work of this section. Notify design professionals in writing of any discrepancies. Commencement of the Work or any parts thereof shall mean acceptance of the prepared substrates.
- B. All surfaces must be sound, clean and free of grease, dirt, excess mortar or other contaminants. Fill or bridge damaged surfaces, voids or gaps larger than one-half (1/2) inch with mortar, wood, metal, sheathing or other suitable material, as necessary. Fill voids and gaps measuring one-half (1/2) inch or less with R-GUARD Joint & Seam Filler as necessary to ensure continuity.

07 27 26-5

1. Surfaces to receive R-GUARD MVP may be dry or damp. Do not apply to surfaces which are sufficiently wet to transfer water to the skin when touched. Surfaces must be protected from rain for 2 hours following application.
  2. Surfaces to receive FastFlash<sup>®</sup>, Joint & Seam Filler, and AirDam<sup>®</sup> may be dry, damp or wet to the touch. Brush away any standing water which may be present before application. The products will tolerate rain immediately after application
- C. Where curing materials are used they must be clear resin based without oil, wax or pigments
- D. Condition materials to room temperature prior to application to facilitate extrusion and handling.
- E. Prior to installation of veneer at cavity wall construction or metal wall panels with CMU and/or exterior gypsum board sheathing backup, apply fluid-applied moisture barrier on all walls where concealed behind masonry veneer, metal wall panels, or similar material where a cavity is created unless called out otherwise.

### 3.2 SURFACE PREPARATION:

- A. Air, water-resistive and waterproofing membrane and accessories may be applied to green concrete 16 hours after removal of forms.
- B. Refer to manufacturer's product data sheets for requirements for condition of and preparation of substrates.
1. Surfaces shall be sound and free of voids, spalled areas, loose aggregate and sharp protrusions.
  2. Remove contaminants such as grease, oil and wax from exposed surfaces.
  3. Remove dust, dirt, loose stone and debris.
  4. Use repair materials and methods that are acceptable to manufacturer of the air and water-resistive barrier system.
  5. The PROSOCO R-GUARD<sup>®</sup> product line includes several options for preparing structural walls to receive the primary air and water resistive barrier. Refer to manufacturer's product data sheets and R-GUARD Installation Guidelines for additional information.
- C. Masonry and concrete substrates:
1. Mortar joints on concealed areas where fluid applied cavity wall weather barrier is to be applied must be fully filled with no voids, holes, or cracks, struck flush with the face of CMU.
  2. Mechanically remove loose mortar fins, mortar accumulations and protrusions, and debris.

### 3.3 R-GUARD FASTFLASH<sup>®</sup> FLASHING AT WINDOWS, DOORS, OPENINGS AND PENETRATIONS (PREPARE):

- A. Apply R-GUARD FastFlash<sup>®</sup> over surfaces prepared with R-GUARD Joint & Seam Filler to seal and waterproof rough openings:
1. Apply a thick bead of R-GUARD FastFlash<sup>®</sup> over any visible gaps in the prepared rough opening.
  2. Immediately press and spread the wet product into gaps.
  3. Allow treated surface to skin.

07 27 26-6

4. Starting at the top, apply a thick bead of R-GUARD FastFlash® in a zigzag pattern to the structural wall surrounding the rough opening.
5. Spread the wet product to create an opaque, monolithic flashing membrane which surrounds the rough opening and extends 4 to 6 inches over the face of the structural wall. Apply and spread additional product as needed to create an opaque, monolithic flashing membrane free of voids and pin holes.
6. Apply additional product in a zigzag pattern over a structural framing inside the rough opening.
7. Apply R-GUARD FastFlash® within temperature and weather limitations as required by manufacturer.
8. Apply R-GUARD FastFlash® to perimeters, sills and adjacent sheathing and building face, in accordance with manufacturer's product data sheet and R-GUARD Installation Guidelines illustrations.
9. Extend flashing onto building face 4 to 6 inches.
10. Install preparation products in accordance with manufacturer's Application Guideline illustrations.

### 3.4 R-GUARD AIR & WATER-RESISTIVE BARRIER INSTALLATION (PROTECT)

- A. Apply appropriate R-GUARD air and water-resistive barrier to a clean, dry substrate within temperature and weather limitations as required by manufacturer.
  1. Apply to recommended thickness. Proper thickness is achieved when coating is opaque.
  2. Allow product to cure and dry.
  3. Inspect membrane before covering. Repair any punctures, translucent or damaged areas by applying additional material.
  4. Specifier Note: If air or surface temperature exceed 95 degrees Fahrenheit (35 degrees Celsius), apply to shaded surfaces and before daytime air and surface temperatures reach their peak.
  5. On CMU wall construction back roll as necessary to ensure there are no pinholes, voids or gaps in the membrane.

### 3.5 R-GUARD FLASHING TRANSITIONS (TRANSITION)

- A. Apply R-GUARD Joint & Seam Filler and R-GUARD FastFlash® as a liquid flashing membrane to waterproof the transitions in rough opening and between dissimilar materials.
  1. Fill any voids between the top of the flashing leg and the vertical wall with R-GUARD Joint & Seam Filler. Tool to direct water from the vertical wall to the flashing.
  2. Apply a generous bead of FastFlash® to the top edge of the flashing leg.
  3. Spread the wet products to create a monolithic "cap-flash" flashing membrane extending 2 inches up the vertical face of the structural wall and 1 inch over the flashing membrane extending. Apply additional product as needed to achieve a void and pinhole free surface. This "liquid termination bar" helps secure the flashing and ensures positive drainage from the wall surface to the flashing.
  4. Allow treated surfaces to skin before installing other wall assembly, waterproofing or air barrier components.

07 27 26-7

### 3.6 R-GUARD AIRDAM® AIR AND WEATHER BARRIER SEALANT FOR WINDOWS AND DOORS INSTALLATION

- A. Install R-GUARD AirDam® with professional grade caulking gun in continuous beads without air gaps or air pockets.
  - 1. Apply R-GUARD AirDam® to a clean, dry or damp surface
  - 2. Install Backer rod: Compressible, closed cell rod stock as recommended by manufacturer for compatibility with sealant. Provide size and shape of rod to control joint depth
  - 3. Install AirDam® to provide uniform, continuous ribbons without gaps or air pockets, with complete wetting of the joint bond surfaces.
  - 4. Tool sealant immediately to ensure complete wetting of joint bond surface and to produce a smooth, concave joint profile flush with the edges of the adjacent surfaces. Where horizontal and vertical surfaces meet, tool sealant to create a slight cove so as to not trap moisture or debris.
  - 5. Do not allow materials to overflow onto adjacent surfaces. Prevent staining of adjacent surfaces.
  - 6. Remove excess and misplaced materials as work progresses. Clean the adjoining surfaces to remove misplaced materials, without damage to adjacent surfaces or finishes.

### 3.7 CURING AND DRYING

- A. Complete drying times vary with temperature, humidity and surface conditions. Protect from rain or freezing until completely dry. At 70°F (21°C) and 50% relative humidity, R-GUARD MVP dries to touch and can be overcoated in 2-4 hours.

END OF SECTION

07 27 26-8



## SECTION 07 62 00

### SHEET METAL FLASHING AND TRIM

#### PART 1 GENERAL

##### 1.1 SCOPE:

- A. The work required under this specification includes all labor, materials, equipment and services necessary for and reasonably incidental to the completion of all metal flashing and counterflashings, wall flashings, parapet cap flashing, joint covers, crickets, and other metal work required to complete the job.

##### 1.2 RELATED SECTIONS

- A. Section 07 01 50: Roof Patching
- B. Section 07 92 00: Sealants

##### 1.3 WORKMANSHIP

- A. All workmanship shall be in accordance with plans, with the various sections uniform, and sections accurately fitted and rigidly secured. All exposed edges shall be seamed, and all work shall be neatly fitted to the framework, with necessary ribs or stiffeners and other reinforcements required to make all sections rigid and substantial. This section to comply with SMACNA Standards.
- B. Proper allowance shall be made in all cases for expansion and contraction, with the vertical joints not secured directly but constructed weather and watertight to allow members to slide freely. Joint covers shall be installed over all joints.

#### PART 2 PRODUCTS

##### 2.1 MATERIALS

- A. All sheet metal shall be pre- finished steel unless noted otherwise, not less than 24 gauge, and shall be compatible to other materials they may be in contact with. No dissimilar metals will be used together.
- B. Fasteners shall be non-rusting materials which are not subject to galvanic action. Fasteners shall be of proper length and spacing to assure secure attachment, fit and alignment. Furnish and install continuous clip at cap flashing. Provide pre-finished fasteners, matching pre-finished flashing color.
- C. In general all exposed flashing is pre-finished material, but where exposed galvanized iron flashings occurs, paint grip materials shall be used.

07 62 00-1

- D. Where flashing shown must be fabricated into watertight multi-sided slopes, use paint grip material with soldered joints.
  - 1. Solder: Half and half solder made from virgin lead and tin shall conform to the Standard Specifications of the ASTM, E-32, latest edition.
  - 2. Flux: All galvanized sheet metal shall have non- corrosive acid used as a flux.
  - 3. All exposed paint grip galvanized material shall be painted color as selected by Architect.
- E. Pre-finished flashing to be shop formed sections out of material supplied by the metal roofing manufacturer with same color selection available.
- F. Flashing and Trim: Cap Flashing and Counterflashing - 24 gauge prefinished steel. Pitchpocket - two (2") inches deep, 24 galvanized iron. All flashing and trim located in areas which are visually exposed shall be prefinished unless noted otherwise.
- G. Provide cap and parapet flashing in minimum lengths of 10 feet or more between joints.

## 2.2 FINISH:

- A. Pre-finished Trim and Flashing: Finish: Factory applied Kynar 500. Color: To be selected by Architect.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install work watertight, without waves, warps, buckles, fastening stresses or distortion, allowing for expansion or contraction.

### 3.2 FLASHING:

- A. Flash walls, etc., as detailed. Flashing shall be of material and gauge as specified on plans. All walls flashing, crickets, counterflashings, etc., shall be installed in accordance with SMACNA standards and in conformance with details shown or implied on plans.
- B. Counterflashing generally shall be in 10'-0" lengths. Counterflashing shall be free from longitudinal joints. End joints in counterflashing generally shall not be soldered. Flashing to be installed with masonry, no saw cut installations will be allowed.
- C. On counterflashings, the ends of one (1) length shall fit into a pocket on the adjacent length which has been formed by soldering a skirter lining on the back of the adjoining member. Counterflashings must be bent to the required shape before being placed.
- D. Provide splices for cap flashing as shown on drawings.
- E. Provide flexible flashing with stainless steel band clamp for pipe roof penetrations.

07 62 00-2

- F. Secure all cap flashings with continuous cleats on both sides of parapets. Lap cleat sections minimum 2 inches. Secure to wood nailers with screws at minimum 16 inches on center.

### 3.3 WORKMANSHIP

- A. Fasteners shall be concealed anchors of compatible materials.
- B. Metal surfaces shall be formed and applied in strict accordance with SMACNA sheet metal working standards.
- C. No perforations of metal surfaces shall be made except as shown on details for flashing, closures, trim, etc.
- D. All exposed edges shall be seamed and all work shall be neatly fitted to the framework, with necessary ribs or stiffeners and other reinforcement required to make all sections rigid and substantial.
- E. Install work watertight, without waves, warps, buckles, fastening stresses or distortion, allowing for expansion and contraction.

END OF SECTION

07 62 00-3



## SECTION 07 72 33

### ROOF HATCH

#### PART 1 GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Prefabricated steel roof hatch, with integral support curbs, operable hardware, and counterflashings.
2. Access Ladder
3. Safety Rail

###### B. Related Sections:

1. Section 05 50 00 – Miscellaneous Metals: Requirements for shop fabricated ferrous metal items.
2. Section 06 10 00 - Rough Carpentry: Wood blocking for curbs
3. Section 07 60 00 - Sheet Metal Flashing and Trim.
4. Section 07 01 50 – Roof Patching
5. Section 09 91 00 - Painting.

##### 1.2 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00.

B. Product Data: Submit in letter form the manufacturer and model selected.

##### 1.3 WARRANTY

A. Roof Hatch: Provide five (5) year manufacturer's warranty

B. Roof Hatch Rail: Materials shall be free of defects in material and workmanship for a minimum period of Five (5) years from substantial completion. Within this period, manufacturer shall replace defective components at no charge to the Owner.

#### PART 2 PRODUCTS

##### 2.1 ROOF HATCHES

A. Roof Hatches: Type "F", by The Bilco Co., New Haven, Connecticut, Babcock-Davis, Dur-Red, or approved equal.

B. Manufactured Units:

1. Unit: 48"x 48" inch size, single leaf type.
2. Curb: 14 gage galvanized G90 steel; 1 inch rigid insulation; integral cap flashing to receive roof flashing system; extended flange for mounting. As an option, curb may be 11 gauge aluminum.
3. Cover: 14 gage galvanized G90 steel with one inch glass fiber insulation retained by 22 gage steel inner liner. Continuous gasket to provide weatherproof seal. As an option, cover may be 11 gauge aluminum with 18 gauge liner.
4. Hardware: Manufacturer's standard manually operated type with compression spring operators, positive snap latch with turn handles inside and out and padlock hasp inside; automatic hold-open arm with vinyl covered grip handle for easy release; cadmium plated finish.
5. Keyed Cylinder Lock: Provide deadbolt cylinder lock at exterior with gasketed threaded deck plate. Provide turn knob at interior. Cylinder lock is to be keyed to school district grand master key.
6. Hinges: Heavy duty pintel type.
7. Fasteners: Corrosive resistant fasteners recommended by roof hatch manufacturer.

C. Substitutions: Subject to compliance with requirements, one of the following of equal specification may be substituted for that specified.

1. Babcock-Davis Hatchways, Inc., Arlington, MA (617)643-5344
2. Milcor, Lima, OH.
3. Naturalite, Inc., Garland, TX.
4. Precision Stair Corp.
5. Approved alternate.

2.2. ACCESSORIES:

A. Roof Hatch Rail System: Manufactured by SafePro L.P., 1355 N. Walton Walker, Dallas, TX 75211, Phone 877-723-3570, [www.safeprosafety.com](http://www.safeprosafety.com). Acceptable Alternate Roof Hatch Rail System: Bil-Guard 2.0, Manufactured by Bilco or Model BSRC, Manufactured by Babcock-Davis.

1. Steel Tubing: 1-1/2 inch cold rolled electric welded steel tubing, ASTM A500, Grade B, cold formed.
2. Size: Formed to fit roof hatch size.
3. Height: 42 inch above roof surface when mounted on standard roof hatch cap flashing.
4. Mounting System: Integrated stanchions of rail system through bolted to extend cap flashing of roof hatch using 3/8 inch bolts.
5. Gate System: Gravity self-closing, non-collapsible full wrap around steel tubing grab hold, welded construction. Heavy duty hinges with 5/8 inch hinge pin with built in pinch-less gate stop and pull up full open positioning.
6. Fasteners: Stainless steel 316 Grade Hex head bolts, 3/8 inch x 2 inch, nylon locking Hex nut and flat washers.
7. Finish: Yellow Powder Coat Finish
7. Labels: Furnish with manufacturer's standard labels containing safety warnings, fall dangers, "No Hoisting" warning and manufacturer identification.
8. Performance: Meets and exceeds OSHA Standard CFR 29 1910.23 and CFR 29 1910.27.

07 72 33-2

## 2.3 FABRICATION

- A. Fabricate free of visual distortions and defects. Weld corners and joints.
- B. Provide for removal of condensation.
- C. Provide weathertight assembly.
- D. Steel components: factory prime paint.
- E. Spot weld hasp, latch and hinges to prevent removal from interior.

## 2.4 ROOF HATCH LADDER

- A. Steel Wall Ladder:
  - 1. Side Rails: 3/8 x 2-1/2 inch steel bar at 20 inches apart.
  - 2. Rungs: 3/4 inch diameter solid steel rods at 12 inches on center.
  - 3. Space rungs seven inches from wall.
  - 4. Attach with steel mounting brackets.
  - 5. Prime paint finish.
- B. Substitutions: Aluminum wall ladder, sized to match above, by Precision Stair Corp., Morristown, TN. (800)225-7814.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions. Coordinate with installation of roofing system and related flashings. Provide weathertight installation.
- C. Apply bituminous paint on metal surfaces of units in contact with cementitious materials and dissimilar metals.
- D. Field paint steel components per section 09 91 00.
- E. If aluminum components are selected, provide mill finish.
- F+. Install safety rail system in accordance with manufacturer's instructions using bolts furnished by railing manufacturer.
  - 1. Adjust gate for smooth operation, free of binding.

END OF SECTION

07 72 33-3





## SECTION 07 84 00

### FIRESTOPPING

#### PART 1 GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

##### 1.2 DEFINITIONS

- A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in, or construction joints between, fire rated wall and floor assemblies.

##### 1.3 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

Only tested firestop systems shall be used in specific locations as follows:

- A. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
- B. Safing slot gaps between edge of floor slabs and curtain walls.
- C. Openings between structurally separate sections of wall or floors.
- D. Gaps between the top of walls and ceilings or roof assemblies.
- E. Expansion joints in walls and floors.
- F. Openings and penetrations in fire-rated partitions or walls containing fire doors.
- G. Openings around structural members which penetrate floors or walls.

##### 1.4 RELATED WORK OF OTHER SECTIONS

- A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:
  - 1. Section 03 30 00 - Cast-In-Place Concrete
  - 2. Section 07 92 00 - Joint Sealers
  - 3. Section 04 22 00 – Concrete Unit Masonry Units
  - 4. Section 09 29 00 - Gypsum Drywall Systems
  - 5. Section 22 01 00 – Plumbing

07 84 00-1

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas

6. Section 23 01 00 - Basic Mechanical Materials and Methods
7. Section 23 07 13 - Mechanical Insulation
8. Section 26 00 10 - Basic Electrical Materials and Methods

## 1.5 REFERENCES

- A. Test Requirements: ASTM E 814, "Standard Method of Fire Tests of Through Penetration Fire Stops"
- B. Test Requirements: UL 1479, "Fire Tests of Through-Penetration Firestops"
- C. Test Requirements: UL 2079, "Tests for Fire Resistance of Building Joint Systems"
- D. Underwriters Laboratories (UL) of Northbrook, IL publishes tested systems in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
  1. UL Fire Resistance Directory:
    - a. Firestop Devices (XHJI)
    - b. Fire Resistance Ratings (BXRH)
    - c. Through-Penetration Firestop Systems (XHEZ)
    - d. Fill, Voids, or Cavity Material (XHHW)
    - e. Forming Materials (XHKU)
    - f. Joint Systems (XHBN)
    - g. Perimeter Fire Containment Systems (XHDG)
  2. Alternate Systems: "Omega Point Laboratories Directory" (updated annually).
- E. Test Requirements: ASTM E 1966, "Standard Test Method for Fire Resistive Joint Systems"
- F. Test Requirements: ASTM E 2307, "Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus"
- G. Inspection Requirements: ASTM E 2174, "Standard Practice for On-site Inspection of Installed Fire Stops"
- H. ASTM E 84, "Standard Test Method for Surface Burning Characteristics of Building Materials"
- I. ASTM G 21, "Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi"
- J. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
- K. All major building codes: IBC
- L. NFPA 70 - National Electric Code

07 84 00-2

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas

## 1.6 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide through-penetration fire stop systems and fire-resistive joint systems that comply with specified requirements of tested systems.
- B. Firestop System installation must meet requirements of ASTM E 814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
- D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies or support live loads and traffic. The installer shall consult the structural engineer prior to penetrating any load bearing assembly.
- E. For those firestop applications that exist for which no qualified tested system is available through a manufacturer, an engineering judgment derived from similar qualified tested system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment documents must follow requirements set forth by the International Firestop Council.
- F. Source Limitations: Obtain firestop products and systems from a single manufacturer.

## 1.7 SUBMITTALS

- A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of qualified tested firestop systems to be used and manufacturer's installation instructions to comply with Section 01 33 00.
- B. Manufacturer's engineering judgment identification number and document details when no qualified tested system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in document.
- C. Submit material safety data sheets and certificates of compliance provided with product delivered to jobsite.

## 1.8 INSTALLER QUALIFICATIONS

- A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A supplier's willingness to sell its firestopping products to the contractor or to an Installer engaged by the contractor does not in itself confer qualification on the buyer.

07 84 00-3

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas

- B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in project to a single firestop specialty contractor.
- C. The work is to be installed by a contractor with at least one of the following qualifications:
  - Hilti Accredited Firestop Specialty Contractor
  - UL Approved Contractor
  - FM 4991 Approved Contractor
- D. Firm with not less than 3 years experience with firestop installation.
- E. Successfully completed not less than 3 comparable scale projects using similar systems.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at jobsite.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- E. Do not use damaged or expired materials.

#### 1.10 PROJECT CONDITIONS

- A. Do not use materials that contain flammable solvents.
- B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet. For non-water resistant firestop materials, protect from exposure to water -- firestop materials that are water resistant shall be protected until fully cured.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

07 84 00-4

## PART 2 PRODUCTS

### 2.1 FIRESTOPPING, GENERAL

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Firestopping Materials are either “cast-in-place” (integral with concrete placement) or “post installed.” Provide cast-in-place firestop devices prior to concrete placement.

### 2.2 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with through penetration firestop systems (XHEZ), joint systems (XHBN), and perimeter firestop systems (XHDG) listed in Volume 2 of the UL Fire Resistance Directory; provide products of the following manufacturers as identified below:
  - 1. Hilti, Inc., Tulsa, Oklahoma  
800-879-8000/www.us.hilti.com
  - 2. 3M, Inc.
  - 3. STI
  - 4. Provide products from the above acceptable manufacturers; *Refer to Section 01 60 00 for Product or Manufacturer Substitutions.*
- B. Source all firestop products from a single-source manufacturer.**

### 2.3 MATERIALS

- A. Use only firestop products that have been UL 1479, ASTM E 814 or UL 2079, ASTM E 1966, ASTM E 2307 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- B. Pre-installed firestop devices for use with noncombustible and/or combustible pipes (closed and open systems), conduit, and/or cable bundles penetrating concrete floors, the following products are acceptable:
  - 1. Hilti CP 680P or CP 680M Cast-In Place Firestop Devices:
    - a. Add Aerator adapter when used in conjunction with an Aerator (Solvent system)
    - b. Add metal deck adapter kit if utilizing CP 680P or M on corrugated metal deck.
    - c. Add height extension if utilizing CP 680P or M in concrete slabs thicker than 8”.
    - d. Add Hilti Water Module (2” up to 6”) to achieve UL W-Rating
    - e. Add Hilti TOP SEAL (1/2” up to 2”) to achieve UL W-Rating
  - 2. Hilti CP 681 Tub Box Kit for use with bathtub installations.

07 84 00-5

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas

3. Hilti Toilet Flange for use with floor outlet water closets.
  4. Hilti coupling sleeve for use with floor, shower, or general purposes drains
  5. Hilti CFS-DID Drop-in device for use with cored holes.
- C. Pre-installed firestop devices containing built-in self-sealing intumescent inserts for use with data and communication cabling which allow for cable adds or changes without the need to remove or replace any firestop materials, the following product is acceptable:
1. Hilti CP 653 Speed Sleeve
  2. Hilti CFS-CC Cable Collar for use in renovation work with existing cables.
- D. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
1. Hilti FS-ONE Intumescent Firestop Sealant
  2. Hilti CFS-SIL SL: Self Leveling Silicone
  3. Hilti CP 620 Fire Foam
  4. Hilti CP 606 Flexible Firestop Sealant
  5. Hilti CFS-SIL GG: Gun Grade Silicone
- E. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
1. Hilti CFS-SIL GG: Gun Grade Silicone
  2. Hilti CP 606 Flexible Firestop Sealant
  3. Hilti FS-ONE Intumescent Firestop Sealant
- F. Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
1. Hilti CFS-SP WB Firestop Spray
  2. Hilti CFS-SIL GG: Gun Grade Silicone
  3. Hilti CP 606 Flexible Firestop Sealant
  4. Hilti CFS-SIL SL: Self Leveling Silicone
- G. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck as a backer for spray material, the following products are acceptable:
1. Hilti CP 777 Speed Plugs
  2. Hilti CP 767 Speed Strips
- H. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
1. Hilti FS-ONE Intumescent Firestop Sealant
  2. Hilti CFS-PL Firestop Plug
- I. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti FS-ONE Intumescent Firestop Sealant

07 84 00-6

2. Hilti CP 620 Fire Foam
  3. Hilti CFS-SIL GG: Gun Grade Silicone
  4. Hilti CP 606 Flexible Firestop Sealant
- J. Non-curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti CP 618 Firestop Putty Stick
  2. Hilti-PL Firestop Plug
- K. Wall opening protective materials for use with UL listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
1. Hilti CFS-P PA Firestop Putty Pad
  2. Hilti Firestop Box Insert
  3. Hilti CFS-BL Firestop Block
- L. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
1. Hilti CP 643 N Firestop Collar
  2. Hilti CP 644 Firestop Collar
  3. Hilti CP 648E Endless Wrap Strips
  4. Hilti CP 648S Single Wrap Strips
- M. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti CP 637 Firestop Mortar
  2. Hilti CFS-BL Firestop Block
  3. Hilti CP 620 Fire Foam
  4. Hilti CP 675T Firestop Board
- N. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti CFS-BL Firestop Block
  2. Hilti CP 675T Firestop Board
- O. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:
1. Hilti CFS-SP WB Firestop Spray
  2. Hilti CFS-SIL GG: Gun Grade Silicone
  3. Hilti CP 606 Flexible Firestop Sealant
  4. Hilti CFS-SIL SL: Self Leveling Silicone
- P. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:
1. Hilti CFS-BL Firestop Block
  2. Hilti CFS-PL Firestop Plug

07 84 00-7

- Q. Draft stopping at floor or roof bypass studs:
  - 1. 4" or 6"(fill depth of stud) thick mineral wool safing cut oversize to friction fit into place between studs at slab and roof edge.
- R. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.
- S. Provide a firestop system with an Assembly Rating as determined by UL 2079 or ASTM E 1966 which is equal to the time rating of construction joint assembly.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
  - 1. Verify penetrations are properly sized and in suitable condition for application of materials.
  - 2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
  - 3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
  - 4. Comply with the firestop manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
  - 5. Do not proceed until unsatisfactory conditions have been corrected.

### 3.2 COORDINATION

- A. Coordinate construction of openings, penetrations, and construction joints to ensure that the firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration fire stop systems. Coordinate construction and sizing of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- C. Coordinate firestopping with other trades so that obstructions are not placed in the way prior to installation of the firestop systems.
- D. Do not cover up through-penetration and joint firestop system installations that will become concealed behind other construction until each installation has been examined by the building inspector, per requirements of Section 110, IBC 2012.

07 84 00-8

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas



### 3.3 INSTALLATION

- A. Regulatory Requirements: Install firestop materials in accordance with UL or Intertek approved systems.
- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.
  - 1. Seal all holes or voids made by penetrations to ensure an air and water-resistant seal.
  - 2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
  - 3. Protect materials from damage on surfaces subjected to traffic.

### 3.4 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.
- E. Manufacturer's Field Services: During initial installation, firestop manufacturer should be present to assure proper installation/application.

### 3.5 IDENTIFICATION & DOCUMENTATION

- A. The firestop contractor is to supply documentation in the form of the Hilti CFS-DM Documentation Manager  
The FTP is to include:
  - 1. Architectural details
  - 2. Firestop affidavit
  - 3. Firestop system snapshot
  - 4. Installation log
  - 5. Firestop systems
  - 6. IFC guidelines for Engineering Judgments
  - 7. Product Information of utilized products
  - 8. All other relevant documentation
  - 9. Building code excerpts
- B. Copies (electronic) of the FTP are to be provided to the general contractor, architect, inspector & owner at the completion of the project.

07 84 00-9

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas

- C. Identify through-penetration firestop systems with self-adhesive, preprinted labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
  - 1. Installer/Contractor's name, address, and phone number.
  - 2. Date of installation.
  - 3. Through-Penetration firestop system and manufacturer's name.

### 3.6 ADJUSTING AND CLEANING

- A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

END OF SECTION

07 84 00-10

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas

## SECTION 07 92 00

### JOINT SEALANTS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Preparing sealant substrate surfaces.
  - 2. Concrete slab control joint filler
  - 3. Sealant and backings
  - 4. Sill Sealer (between bottom of thresholds.)

##### 1.2 RELATED SECTIONS

- A. Section 03 30 00: Cast-In-Place Concrete
- B. Section 04 21 13: Brick Masonry
- C. Section 04 22 00: Concrete Unit Masonry
- D. Section 06 41 16: Cabinetwork & Shelving
- E. Section 07 84 00: Firestopping
- F. Section 08 11 13: Hollow Metal Doors & Frames
- G. Section 08 81 00: Glass & Glazing
- H. Section 09 29 00: Drywall
- I. Section 09 78 00: FRP Panels
- J. Section 32 13 13: Concrete Pavement

##### 1.3 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.

##### 1.4 REFERENCES

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
  - 2. ASTM C1087 - Sealant Compatibility with Glazing Materials and Accessories.
  - 3. ASTM D1565 - Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Open Cell Foam).
  - 4. ASTM C920 - Elastomeric Joint Sealants.
- B. Sealing and Waterproofer Institute(SWI):
  - 1. SWI - Sealant and Caulking Guide Specifications.

07 92 00-1

## 1.5 ENVIRONMENTAL REQUIREMENTS

- A. Do not install solvent curing sealants in enclosed building spaces.
- B. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

## 1.6 SEQUENCING AND SCHEDULING

- A. Coordinate work of this Section with all Sections referencing this Section.

## 1.7 WARRANTY

- A. The Contractor must guarantee weathertightness for a period of two (2) years from the date of Substantial Completion of the building.
- B. The Contractor will, at any time within the two (2) year period, remedy all leaks of any nature in any part of the building due to the use of faulty materials and/or workmanship under this section, without additional cost to the Owner. The Contractor shall further reimburse the Owner for any damage occasioned by such leaks.
- C. The Contractor is cautioned to supplement the work, described in this section of the specifications, by any means necessary to permit the above guarantee, which he will be called upon to make as an obligation of the Contract.
- D. All sealants to have manufacturer's minimum ten (10) year warranty provided.
- E. Butyl Rubber Sill Sealer: Provide subcontractor and manufacturers One (1) year warranty from date of substantial completion.

## PART 2 PRODUCTS

### 2.1 SEALANT MATERIALS

- A. Polymer or Polyurethane Sealants:
  - 1. **Polyurethane Sealant #1:** ASTM C920, Type M, Grade NS, Class 25.
  - 2. ASTM C719, ASTM D412, ASTM C661, ASTM C679 and ASTM C510
  - 3. Polyurethane Sealant approved manufacturers:
    - a. MasterSeal NP-150 by BASF.
    - b. **Note: A two-part sealant with custom color availability are to be provided where sealants are installed in exterior walls and interior walls with painted finishes so that color matches each finish color. Architect to approve color all sealant color matches.**
  - 2. **Polymer or Polyurethane Sealant #2:** ASTM C920, Type S, Grade P, Class 25.
    - a. MasterSeal SL1 or SL2 by BASF.
    - b. Sikaflex 1c SL or 2c SL by Sika
    - c. Approved alternate

07 92 00-2

d. Provide standard color selections. **Architect to approve color.**

B. Silicone Sealant:

1. **Silicone Sealant #2:** ASTM C920, Type S, Grade NS, Class 25, mildew resistant.
  - a. Sanitary 1702 by General Electric Silicone Products Division.
  - b. 786 by Dow Corning Corporation.

C. Concrete Slab Control Joint Filler:

1. 2-part polyurea, Versaflex SL/85, rapid curing, manufactured by Versaflex, Inc., 87 Shawnee Avenue, Kansas City, KS 66105 (913) 321-9000.
2. 2-part polyurea, PE85, manufactured by Hi-Tech Systems, 1190 N. Del Rio Place, Ontario, CA 91764 (909)945-5530
3. Approved alternate

D. Sill Sealer:

1. Butyl rubber, continuous under bottom of door thresholds.

E. Provide fire rated sealant, where installed in fire rated walls. Refer to section 07 84 00.

## 2.2 ACCESSORIES

- A. Primer: Non-staining, clear type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Filler: Polyethylene foam rod, oversized 30% to 50%
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.
- E. Backer Seal: "Greyflex" backer seal, manufactured by Emseal Joint Systems, LTD (800) 526-8365. No substitutions will be accepted.

## 2.3 SEALANT COLORS

- A. Colors to be selected from manufacturer's standard color selection for each type of sealant specified with exception of two-part polyurethane sealants and silicone sealants, which are to match finishes as stated in 2.1 A & B. Architect to approve color matches.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that surfaces and joint openings are ready to receive work and field measurements are as shown on Drawings and recommended by the manufacturer.

07 92 00-3

B. Beginning of installation means installer accepts existing substrates

### 3.2 PREPARATION

- A. Clean and prime joints in accordance with manufacturer's instructions.
- B. Remove loose materials and foreign matter which might impair adhesion of sealant.
- C. Verify that joint backing and release tapes are compatible with sealant.
- D. Protect elements surrounding work of this Section from damage or disfiguration.

### 3.3 INSTALLATION

- A. Install sealant in accordance with manufacturer's instructions.
- B. Measure joint dimensions and size materials to achieve required width/depth ratios.
- C. Install joint backing rods to achieve neck dimension no greater than 1/3 the joint width. For joints 1/2" to 7/8", install backer seal prior to installing backer rod material install backer seal and backer rods as required to keep a uniform depth along entire joint.
- D. Install bond breaker where joint backing is not used.
- E. Apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within recommended temperature ranges. In no case, allow the depth of sealant be less than 1/2".
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- G. Tool joints concave.
- H. Interior sealants are not to be installed until building is tempered by HVAC system and temperature will remain constant. **DO NOT PAINT POLYURETHANE AND SILICONE SEALANTS.** Do not install sealants in walls or floors where paint, stain, etc is scheduled to be applied until after finishes are applied unless sealants are masked off during coating process.
- I. Concrete slab control joint filler:
  - 1. Use only at concrete floors which **do not** receive any floor coverings or polished concrete finish.
  - 2. Prior to final seal coat, install joint filler flush with top of slab. Remove any excess filler.

### 3.4 SCHEDULE

- A. General Exterior Construction
  - 1. Polyurethane Sealant #1

07 92 00-4

B. Horizontal Exterior Locations:

1. Polyurethane Sealant #2

C. General Interior Construction:

1. Polyurethane Sealant #1 (All wall control joints.)

D. Plumbing Fixtures:

1. Silicone Sealant #2.

E. Horizontal Interior Locations:

1. Polyurethane Sealant #2.

F. Concrete Slab Control Joint Filler

1. All control joints for slab-on-grade slabs where no finish or floor coverings are scheduled.

G. Butyl Rubber

1. Continuous bead below metal thresholds.

END OF SECTION

07 92 00-5





## SECTION 08 11 13

### HOLLOW METAL DOORS AND FRAMES

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Furnish labor and materials to complete Hollow Metal Doors, Hollow metal frames, and related items as shown and specified.

##### 1.2 RELATED SECTIONS

- A. Section 04 22 00 - Concrete Unit Masonry
- B. Section 08 14 16 - Wood Doors.
- C. Section 08 71 00 – Finish Hardware
- D. Section 08 81 00 – Glass and Glazing
- E. Division 26 - Electrical Requirements.

##### 1.3 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.
- B. Shop Drawings: Submit prior to fabrication for approval of Architect detailed shop drawings, showing all doors, frames, other miscellaneous materials. Shop drawings to show all locations of reinforcement for door hardware in doors and frames.

##### 1.4 REFERENCES

- A. Comply with State of Arkansas Adopted ADA Accessible Guidelines in regard to accessible or handicapped features.

#### PART 2 PRODUCTS

##### 2.1 MATERIALS

- A. Hollow Metal Frames -
  1. Manufactured by Steelcraft, Ceco, Curries or Amweld, or approved alternate, constructed of cold rolled steel, commercial quality, annealed and temper passed. All frames, interior, exterior: 16 gauge all openings 3'-6" or less, and 14 gauge for all openings over 3'-6".
  2. Exterior Frames: **Fleming** or approved alternate, special galvanized, paintable. Field paint all doors and frames.
  3. Frames:

08 11 13-1

- a. All frames shall be a one piece unit type with head and jambs completely mitered and face joints continuously welded in their entirety and ground smooth. Inside corners to be caulked prior to painting. The use of tenons or bent tabs is not acceptable. Where transoms and sidelights are required, frames: shop assembled for a proper fit, then shipped in largest size units permitted by shipping restriction. Mullions: assembled by sliding two sections together with continuous welded interior guides. Screwed on mullion covers and visible seams, not acceptable. All seams ground smooth. All exposed welding tabs ground smooth.
  - b. No KD type frames shall be permitted.
4. Provide concealed reinforcements, drilled and tapped, to receive hardware. Hinge reinforcements: 10 gauge with top hinge high frequency usage hinge reinforcement, 10 gauge angle stiffener welded to both sides of the frame and hinge reinforcement. Lock reinforcement: spring type stabilizer to hold lock in place. Lock and surface applied hardware reinforcement 10 gauge. Clip angles: spot welded to bottom of each frame for anchoring to floor. Mortar 14 gauge anchors, one per each 2' of height, per jamb of a type to suit conditions and requirements. All other reinforcement for hardware to be minimum 10 gauge.
  5. Frames where Underwriter Labeled doors are used: carry Underwriter Label frame.
  6. Provide three (3) rubber silencers on strike side of all frames.
  7. All exposed screws to be countersunk using flathead screws, flush with surface.
- B. Hollow Metal Doors:
1. Non-label and label steel doors: to be completely flush design with lights, louvers, etc., as required on schedule doors as manufactured by Ceco, Amweld, Steelcraft, Curries, Mesker, Dittco, Truscon, or approved equal. Provide **type "A" series** doors with flush door light frames where lights are called for on drawings.
  2. Exterior Doors: Fleming or approved alternate, 'D' Series, special galvanized, flush design, paintable. Field paint.
  3. Construction: Doors shall be constructed of 18 gauge sheets for interior applications, and 16 gauge for exterior applications. Leveled steel formed and rigidly connected and reinforced inside with continuous vertical interlocking 24-gauge stiffeners. All doors shall be continuously arc welded vertically where the two outer sheets are joined on edges and dressed smooth.
  4. All exterior doors shall be insulated and sound deadened with super-core expanded foam or approved alternate.
  5. Provide and properly locate required reinforcement in door for all door mounted hardware.
  6. For door leaf 3'-6" to 4'-0" or wider, provide preparation for 2 pairs butt hinges or continuous hinge as specified.
- C. Doors and frames shall be prepared to receive hardware as specified in section 08 71 00 and glass of type, size, and shape as shown on drawings. Use reinforcing plates welded to inner face of frames for all hardware.

08 11 13-2

- D. All exterior doors to receive aluminum thresholds. Supply with added aluminum spacer on exterior side if required. Threshold to be type and style to match details if shown on plans, but in no case on plans, no more than 1/2" in height with transition slope not to exceed 1:2 to meet Arkansas Architectural Barriers Law and Americans with Disabilities Act Guidelines.
- E. Coordinate frame throat sizes with wall thicknesses where frames are installed in stud and drywall partitions or where frames are installed in cut openings at existing masonry walls.
- F. Provide three (3) rubber door silencers for each single leaf door frame, and two (2) door silencers for each double leaf door frame.

## PART 3 EXECUTION

### 3.1 COORDINATION

- A. Coordinate location and installation of reinforcement for all scheduled door hardware items attached to hollow metal doors and frames.

### 3.2 FRAME ANCHORING

- A. Provide proper anchors for wall type frames are to be installed in.
- B. Frames installed in existing masonry walls are to be bolted through at door jambs. Dimple set bolts and fill with metal filler and sand smooth.
- C. Hollow metal door frame jambs and heads are to be slushed full of mortar. Refer to Section 04 22 00 Concrete Masonry Units.

### 3.3 FINISHES

- A. All surfaces to be job finished shall be thoroughly cleaned, removing all rust, scales, grease, etc.
- B. All exterior hollow metal doors and frames: Given shop coat of rust resistant prime paint oven baked.

### 3.4 STORAGE AND ERECTION

- A. Carefully store frames in an upright position, not on ground, protected from moisture and weather. Frames and doors that are dented or sprung, before, during, or after installation will not be accepted.

END OF SECTION

08 11 13-3



## SECTION 08 14 16

### WOOD DOORS

#### PART 1 GENERAL

##### 1.1 SCOPE:

- A. Furnish and install wood doors as shown and as specified herein. Doors are to be of type, size, and design shown and scheduled on drawings.

##### 1.2 RELATED WORK:

- A. Section 08 71 00 – Hardware
- B. Section 08 81 00 - Glass & Glazing
- C. Section 09 91 00 - Finishes

##### 1.3 QUALITY REQUIREMENT:

- A. All wood doors shall meet N.W.W.D.A. Industry Standard 1-A and Architectural Woodwork Institute Section 1300-G-3, Type FPC-7.

##### 1.4 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.
- B. Submit shop drawings in accordance with General Requirements. Include full size molding section detail for light and louver installation. Show glazing material, louver type and thickness, and face veneer grade and species.

##### 1.5 REFERENCES

- A. Comply with State of Arkansas Adopted ADA Accessible Guidelines in regard to accessible or handicapped features.

##### 1.6 DELIVERY

- A. Package in heavy Kraft paper or polyethylene bags. Deliver and store in areas of Temperature and humidity such as will not adversely affect doors.
- B. Doors shall be packaged in individual cartons.

08 14 16-1

## 1.7 PROTECTION

- A. Protect work from damage until final acceptance.

## 1.8 WARRANTY

- A. Manufacturer to provide lifetime warranty for interior duration, and two (2) year warranty for exterior duration.
- B. Door warp tolerance shall not exceed 1/4" in any section of the door.
- C. Stile, rail and core "telegraphing" shall not exceed 1/100" in any 3" span.

## PART 2 PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Masonite
- B. Oshkosh Architectural Door Company.
- C. VT Industries

### 2.2 MATERIALS

- A. Doors shall be 1 3/4" thick, 5 or 7 ply, solid core, stain grade, Aspiro Series, Natural Birch. Top and bottom rails to be 1 1/8" min. width, stiles 1 3/8" min. Width prior to field fitting. Core shall be wood particle core meeting ANSI A208.1, Grade 1-LD-1, or 1-LD-2 with a 28-32 lb density, and type II adhesive. Veneer shall be provided on side edges and shall match species of face veneer. Where a pair of doors are called for, face veneer shall be book-matched grain. Provide mineral composition core when fire rating is required.
- B. Contractor's Option: As an option to job finishing doors as per Section 09 91 00, contractor may provide pre-finished doors from manufacturer.
- C. Provide factory-prefinished doors from manufacturer. Architect to select stain color from manufacturer's standard colors.

### 2.3 FABRICATION

- A. Fabricate premium type doors in accordance with requirements of WDMA Quality Standards (SCLC-5 or 7) unless specifically indicated otherwise.
- B. Fabricate fire rated doors in accordance with requirements of Underwriter's Laboratories (UL).

08 14 16-2

- C. Provide doors with edge strips, of wood species to match face veneers.
- D. Make cutouts and provide stops for glass.
- E. Pairs of doors shall be products of a manufacturer who can furnish such doors without astragals and meet the UL requirements.
- F. Pre-fit doors at factory with 1/8 inch tolerance on each vertical face, 1/8 inch tolerance at top, and 1/2 inch at bottom, except where undercuts are scheduled.
- G. Machine doors for hardware as required by Hardware Schedule listed in Section 08 71 00, which will be supplied together with all necessary templates for hardware requiring door preparation.
- H. Steel frame shop drawings will be furnished showing location and size of hardware preparation.
- I. Bevel strike edge of single acting doors 1/8 inch in 2 inches. Radius strike edge of double acting swing doors, 2-1/8 inches.
- J. All fire rated doors shall be factory prepped to receive hardware and glazing.
- K. Pre-finish doors at factory with clear WDMA System #6 finish.

## PART 3 EXECUTION

### 3.1 INSTALLATION AND WORKMANSHIP:

- A. Install doors plumb and true to operate without bind or drag with 1/8" clearance top and sides. Provide 3/4" undercut at bottom unless indicated otherwise.
- B. Doors damaged before or after hanging will be replaced.
- C. All edge and end surfaces will be sealed with two (2) coats of door manufacturer's standard sealer before final hanging. **This includes top and bottom ends.**
- D. All necessary refitting or adjustment shall be the Contractor's responsibility during the guarantee period.
- E. Provide moldings and glass stops of same species as face veneers.
- F. If called for, wood louvers to be factory installed into properly prepared openings.
- G. Pre-machine bevel on vertical edges of single doors or meeting stiles of pairs of doors.
- H. Coordinate door light location with door hardware to assure no conflicts occur.

08 14 16-3

- I. For door leaf 3'-6" to 4'-0" or wider, provide preparation for 2 pairs butt hinges or continuous hinge as specified.

### 3.2 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver: Protect doors at all times. Deliver doors to site after plaster and cement are dry And building has reached average prevailing relative humidity of locality.
- B. Storage: Stack flat on 2 x 4 lumber, laid 12" from ends and across center. Under bottom door and over top of stack provide plywood or corrugated cardboard to protect door surface. Store doors in area where there will be no great variation in heat, dryness and humidity.
- C. Handling: Do not drag doors across one another.

### 3.3 INSPECTION

- A. Verify that door frames are of type required for door and are installed as required for proper installation of doors. Do not install doors in frames which would hinder the operation of the doors.

**SPECIAL NOTE:**

THERE CAN BE NO GLASS OR GLASS KITS IN DOORS THAT WILL INTERFERE WITH THE MOUNTING OF ANY FINISH HARDWARE. ENOUGH STILE AND RAIL MUST EXIST SO THAT NO SHIMS ARE NEEDED.

END OF SECTION

08 14 16-4



## SECTION 08 31 13

### CEILING / WALL ACCESS PANELS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Provide all labor, materials and equipment necessary for the furnishing and installation of access panels as required in gypsum board ceilings and walls and in masonry walls for mechanical or electrical equipment access. Provide proper model for panels installed in materials other than gypsum board.

##### 1.2 SUBMITTALS

- A. Comply with Section 01 33 00.

#### PART 2 PRODUCTS

##### 2.1 MANUFACTURER/MODEL

- A. Nystrom Model NT (masonry), Model RW (Stud and gypsum board)
- B. Substitutions: Subject to compliance with requirements, one of the following may be substituted for that specified.
  - 1. Karp
  - 2. J.L. Industries
  - 3. Approved alternate.
- C. Provide fire rated models of type required where installed in fire rated ceilings and walls, or where called for on drawings.
- D. Panel size as needed for application, unless called out on drawings. Panel size and locations are to be approved by Architect prior to installation.

##### 2.2 CONSTRUCTION

- A. Galvanized bonderized 16 ga. steel door and 16 ga. frame.
- B. Continuous piano hinge.
- C. Key operated cylinder lock by access panel manufacturer, unless otherwise noted.
- D. Panel finish: White powder coat, field paint to match adjacent wall or ceiling surface.

08 31 13-1

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Verify that rough openings are correctly installed to receive panels.
- B. Make necessary preparation of surrounding materials to accept panel installation.
- C. Coordinate locations and sizes of required access panels with Architect for approval.

### 3.2 INSTALLATION

- A. Install panels in accordance with manufacturer's instructions and provide concealed framing as required to properly install access panel.
- B. Adjust panel operation and locking mechanism to insure all features of access panel operate smoothly.

### 3.3 FINISH

- A. Paint panel per Section 09 91 00.
- B. Recessed perimeter grooves of panels installed in gypsum board walls or ceilings to be clean and free of drywall mud prior to painting. Gypsum board infill and perimeter of panel to be flush with gypsum board finish surrounding panel.

END OF SECTION

08 31 13-2

## SECTION 08 71 00

### FINISH DOOR HARDWARE

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Door hardware.
  - 2. Miscellaneous finish hardware.
  - 3. Latch & lock guards
- B. Related Sections:
  - 1. Section 08 11 13 - Hollow Metal Doors and Frames.
  - 2. Section 08 14 16 - Wood Doors.

##### 1.2 SUBMITTALS

- A. Comply with Section 01 33 00.
- B. Submit through Contractor to Architect. Prior to submitting, contact Architect to discuss door hardware/keying meeting. If Architect elects, submittal will be reviewed at time of meeting. Supplier will make corrections as a result of meeting and distribute record copies to Architect and Contractor.
- C. Hardware Schedule: Submit final hardware schedule organized by "sets", to indicate specifically product to be furnished for each item required on each door.
- D. Templates: Furnish templates to each fabricator of doors and frames, as required for preparation to receive hardware.

##### 1.3 DOOR HARDWARE/KEYING MEETING

- A. Prior to ordering of hardware items, Contractor shall arrange meeting between, hardware supplier, Owner, and Architect to review and verify door hardware submittals and keying suggestions. This review meeting shall be considered as the submittal review. Any changes shall be incorporated in the hardware submittals and then resubmitted to Contractor and Architect as **record copy**. Contractor to notify all parties one (1) week prior to meeting date.

##### 1.4 PRE-INSTALLATION MEETING

- A. Prior to installation of hardware items, Contractor shall arrange meeting between hardware installer, hardware supplier, and factory representatives of locks, locksets, exit devices, closers and specialty hardware items in order to review the installation requirements and procedures.

08 71 00-1

## 1.5 REFERENCES

- A. Comply with State of Arkansas Adopted ADA Accessible Guidelines in regard to accessible or handicapped features for all door hardware items used on this project.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Product Quality: Hardware items are to be ANSI Grade 1 Certification.

### 2.2 HINGES

#### A. Manufacturers:

1. Stanley
2. Hagar
3. Approved alternate

#### B. Material:

1. Provide full mortise-type hinges with stainless steel pins, except steel pins with steel hinges; non-removable for exterior and public interior exposure, non-rising for non-security exposure, flat button with matching plugs. Provide stainless steel hinges on exterior applications.
2. Ball-bearing Function: Swaged, inner leaf beveled, square corners.

#### C. CONTINUOUS HINGES

1. Roton, model 780-224 HD series. (No substitutions accepted)
2. Warranty: Manufacturer's lifetime warranty.

### 2.3 LOCKS, LATCHES, AND BOLTS

#### A. Manufacturers:

1. Schlage "LV" Vandlgard Series – Mortise lockset with Rhodes style lever handle.  
No Substitutions at new frames and doors
2. Schlage "ND" Vandlgard Series – Cylindrical lockset with Rhodes Style lever handle.  
No Substitutions at existing frame and door.
3. Locksets: (Note: Manufacturer and style to match lockset from selection specified in Section 08 71 00.)
  - a. Sargent 8200 Series Mortise Lockset
  - b. Corbin Russwin ML 2000 Series Mortise Lockset
  - c. Schlage L9000 Series Mortise Lockset
  - d. Approved alternate
4. Special operation:
  - a. Provide mortise type privacy "OCCUPIED" indicator where called for.
  - b. Provide separate privacy "OCCUPIED" indicator at cylindrical lockset.
  - c. Provide "Intruder" classroom security function for classroom doors and where called for.

08 71 00-2

5. Warranty: L Series Mortise (3-year), ND Series cylindrical (10 year)

C. Materials:

1. Strikes: Wrought box strikes, with extended lip for latch bolts, except open strike plates may be used in wood frames. Provide dustproof strikes for foot bolts.
2. Locks: Cylindrical locksets equipped with 6-pin tumbler; with interchangeable cores and keyed alike. Sargent LA/LE. Provide 2-3/4" backset. Provide three keys for each lock.

2.4 DOOR CONTROL DEVICES

A. Panic Device:

Manufacturer and Product:

1. Von Duprin XP99 Series at exterior doors (Von Duprin XP99EL Series where retractable latch exit device and security access control is called for). Von Duprin 99 Series on interior doors. No Substitutions. Use Ives VR910 Series on exterior doors and fire rated corridor doors.
2. Warranty: Provide minimum three (3) year manufacturer's warranty.
3. Unless called for otherwise, or where a fire door occurs, all panic devices will be cylinder doggable.

B. Wall Bumper:

1. Rockwood 400 Series, Concave Style
2. Glynn-Johnson 60 Series, Concave Style
3. Approved alternate.

C. Closers:

1. Interior Doors:
  - a. LCN 1460 Series (with extra duty arm where called for on hardware schedule)
  - b. Approved alternate
  - c. Warranty: Provide minimum 30 year warranty for closer operation.
  - d. Install per 3.2.E
2. Exterior Doors:
  - a. LCN 4040XP-Spring Cush Series. (No Substitutions)
  - b. Dorma 8900 Series with spring stop
  - c. Approved alternate.
  - d. Warranty: Provide minimum 30 year warranty for closer operation.
  - e. Install per 3.2.E
3. Provide with a minimum of ten (10) year manufacturer's warranty.
4. Provide all brackets and spacers necessary for all door and frame conditions.

D. Finger Guard

1. Model 2248-A 76" anodized aluminum, clear finish with white polyethylene, (Model 2248-DKB 76" anodized aluminum, dark bronze finish with black polyethylene,) manufactured by National Guard Products, Inc.
2. Approved alternate.

08 71 00-3

E. Security Access System for security-controlled doors

Security Access System

1. Panic Device: for each access control door provide; Von Duprin XP-EL electric with retractable latch, "Request to Exit" low current function, and cylinder dogging capability where security access doors are scheduled. Provide latch guard. By Storefront Sub-contractor.
2. Power Supply: for each access control door provide; Von Duprin PS914-2RS power supply with battery backup, installed in accessible, concealed location. Power supply to be capable of powering two latches, located no more than 200 feet from the power supply. By Storefront Sub-contractor.
3. Power Transfer: for each access control door provide; Von Duprin Model EPT-10 power transfer door-to-frame transfer device or approved alternate. By Storefront Sub-contractor.
4. Reader Control Devices: Provide total for the building located in server room; (1) Avigilon Life Safety panel with dual power, (1) Avigilon Two Reader Interface Module, (1) Avigilon LP Series AC-MER-CONT-LP1502 Intelligent Controller, (3; 1 at each access control door) HID Signo iClass 13.56 MHz & 125 MHz, OSDP/Wiegand, Mobile Ready, NFC compatible Readers, Signo 20 at Mullion locations, Signo 40 at junction box locations. Cable type to be Belden 658GMS Composite. By school districts vendor contractor.
5. Security System Devices: Refer to Specification Section 28 13 05 by electrical/low voltage subcontractor.
6. Provide all low voltage control wiring (color to be yellow when concealed or to match structure when in exposed floor or roof structure) as required from access control device junction box to power supply and to panic device. Conceal all wiring in walls, ceilings, doorframes, etc. Refer to electrical drawings and door/hardware schedule for locations.

F. Materials:

1. Provide grey rubber exposed resilient parts.
2. Any floor stop other than that specified will not be accepted.
3. All closer cylinders to be cast iron.

2.5 MISCELLANEOUS HARDWARE

A. Silencers: Provide in metal door frames, unless not permitted for fire rating, or unless bumper-type weather-stripping is provided; three for each single door frame, two for double-door frame.

1. 3M
2. Hager
3. Glynn Johnson
4. Approved alternate.

B. Door Flush Bolt:

1. Rockwood #555 12"
2. H.B. Ives #458
3. Glynn-Johnson FB6

08 71 00-4

3. Approved alternate.

C. Threshold:

(Threshold height not to exceed ½” to meet ADAAG guidelines.)

1. Model 896N, 5” deep, manufactured by National Guard Products, or approved alternate, ADA compliant panic threshold
2. Extruded aluminum, mill finish, neoprene seal, for exterior doors only.
3. Provide saddle-type threshold where threshold is called for at interior locations.
4. Where “square back” type threshold is to be provided, provide ADA compliant threshold, #415 series square back with #700EN stop strip. This type is to be used where backing up to terrazzo, ceramic tile, or other similar floor materials. Provide width as needed for door frame width.

D. Weatherstripping:

1. Model 135 series, aluminum with neoprene seal, manufactured by National Guard or approved alternate.
2. Provide with dark bronze finish.
3. Provide other models as required to coordinate with special door hardware items.

E. Mullion Seal:

1. Model 5100S, gray color, manufactured by National Guard Products or approved alternate.
2. Install at all removable mullions.

F. Door Coordinator Manufacturers & Products:

1. Hager, #297D Coordinator. See drawings for size.
2. Ives CO series
3. Approved alternate.

G. Sweep

1. 198 Series by National Guard Products or approved alternate.
  - a. Neoprene sweep with natural anodized aluminum trim. Size as required to cover door undercut.

H. Door Shoe (with Rain Drip & Brush Sweep)

1. 95WH Series by National Guard Products or approved alternate.
  - a. Provide with dark bronze finish.
  - b. Provide Door Shoe assembly at each exterior door leaf.

I. Astragal Set

1. 125 Series by National Guard Products
  - a. One set aluminum with neoprene astragal seals with dark bronze finish.
  - b. Install on each pair of exterior doors, extending from head to threshold.

J. Kick Plates

1. Trimco 9” kickplates
2. Aluminum Finish

08 71 00-5

- K. Keyed Removable Mullion (Model as required to coordinate with each installation)
  - 1. \*Von Duprin (Keyed) –No Substitutions
  - 2. Corbin Russwin
  - 3. Approved alternate. (Keyed)
- L. Drip Cap
  - 1. 2 ½” wide x 1 ½” deep, dark bronze
  - 2. Model 16, manufactured by National Guard Products or approved alternate.

## 2.6 FINISH

- A. All exposed interior hardware and door control devices to be furnished with US26D Finish. Exterior hardware finish to be dark bronze.
- B. Painted hardware items to match color of door control devices.

## 2.7 FABRICATION

- A. Finish and Base Material Designations: Number indicate BHMA Code or nearest traditional U. S. commercial finish. US26D & US32D or equivalent.

## PART 3 EXECUTION

### 3.1 COORDINATION

- A. Hardware supplier to verify and coordinate door and frame preparation, including required reinforcement in hollow metal doors and frames for hardware attachment.

### 3.2 INSTALLATION

- A. Hardware Mounting Heights: Door and Hardware Institute Recommended Locations for Builders Hardware for Standard Steel Doors and Frames, except as otherwise indicated.
- B. Install each hardware item to comply with manufacturer's instructions and recommendations.
- C. Door closers, door coordinators, and frame-mounted overhead stops shall be installed to frames, using machine thread type screws. Holes shall be tapped in hollow metal frames to accept threaded screws. Screws shall be of a size as recommended by hardware manufacturer.
- D. All other hardware items mounted to door shall be required to be mounted to door with appropriate through bolts for wood doors and machine thread type screws for hollow metal doors. Holes shall be tapped in hollow metal door reinforcement to accept threaded screws. Screws shall be of a size as recommended by hardware manufacturer.

08 71 00-6



- E. Door closers, door coordinators, and frame-mounted overhead stops at all **exterior and interior doors** shall have through-bolt connections at door. Exposed head of bolt shall be of a flush, smooth type.
- F. **'TEK' TYPE SCREWS ARE NOT TO BE USED.** Use fasteners provided by hardware supplier for each corresponding hardware device for door and frame type and as specified in this specification.
- G. Install each hardware item per manufacturer's instructions. If any item fails to operate properly because of improper installation, it shall be the installer's responsibility to correct. If item continues to malfunction or if Contractor or Architect suspects any hardware item to be defective, hardware supplier shall examine item in question. If Supplier determines item is defective, he shall replace item at no extra cost to owner.
- H. Thresholds to be cut around jamb stops for snug fit to door jambs.

### 3.3 ADJUSTING

- A. Hardware Adjustment: Return to project one month after Owner's occupancy, and adjust hardware for proper operation and function.

### 3.4 KEYING

- A. Locksets and cylinders are to be master keyed to present schedule. Prepare and submit a detailed list of complete keying recommendations to the Architect, which will be discussed during keying meeting. Coordinate desired keying schedule with owner prior to submitting of keying recommendation. Furnish three (3) keys for each individual lock in addition to three (3) master keys.
- B. Each key for entire project to be stamped for identification.

### 3.5 TYPICAL DOOR HARDWARE FOR EXTERIOR AND INTERIOR DOORS

- A. Each leaf of all exterior hollow metal doors, unless noted otherwise, is to receive the following hardware items:
  1. ADA Accessible closer.
  2. Continuous hinges
  3. Weatherstripping set
  4. ADA Threshold (Set in butyl rubber sealant)
  5. Astragal set (for pair of doors)
  6. Door shoe
  7. Mullion seal (for removable mullions)
  8. Drip cap

08 71 00-7

- B. Each leaf of all interior doors, unless noted otherwise, is to receive the following hardware items:
1. Three butt hinges for doors up to 3' 4"; For door leaves 3'-6" to 3'-10", provide 2 pairs butt hinges. For leaves 4'-0" or wider provide continuous hinge as specified.
  2. Corridor to corridor doors are to have continuous hinges.
  3. Provide three silencers for single leafs, two silencers for double leafs.
  4. Classroom doors are to have finger guards.
- C. Refer to listing below for hardware sets schedule.
1. Office lockset, wall bumper, closer, seals for 20min rating
  2. Office lockset, closer with stop, seals for 20min rating
  3. Classroom security lockset, wall bumper, finger guard, closer, seals for 20min rating
  4. Classroom lockset, wall bumper, closer, seals for 20min rating
  5. Privacy lockset with indicator, kickplate, wall bumper, closer, seals for 20min rating
  6. Storeroom lockset, wall bumper, closer, seals for 20min rating
  7. Vandal resistant pull, panic device, access control system, closer, wall bumper, kickplates, continuous hinge, seals for 20 min rating
  8. Vandal resistant pull, panic device, closer with stop, kickplates, continuous hinge, seals for 20 min rating.
  9. 1 vandal resistant pull with cylinder, 1 interior lever, flush bolts at inactive leaf, door shoes, thresholds, weatherstripping, drip cap, interior kick plates, continuous hinges, astragal set, removable mullion, mullion seal
  10. New hardware at existing door and frame. Cylindrical privacy lockset, occupancy indicator device, closer, wall bumper, kickplate.

END OF SECTION

08 71 00-8

## SECTION 08 81 00

### GLASS AND GLAZING

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Furnish all labor, materials, tools, equipment, services, operations and incidentals necessary to install, complete in every respect, all glass, glazing, and related work as indicated on Drawings and specified.

##### 1.2 RELATED WORK DESCRIBED ELSEWHERE

- A. Glass and glazing, as required under various Sections of these Specifications including, but not limited to:
  - 1. Hollow Metal Work: Section 08 11 13.
  - 2. Wood Doors: Section 08 14 16.
- B. Installation materials specified in Sealants and Caulking: Section 07 92 00.

##### 1.3 REFERENCES

- A. ASTM C1048 “Standard Specification for Heat Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated Glass.”
- B. ASTM C1279 “Standard Test Method for Non-Destructive Photoelastic Measurement of Edge and Surface Stresses in Annealed, Heat-Strengthened, and Fully Tempered Glass” Requirements.

##### 1.4 SUBMITTALS

- A. General: Comply with the provision of Section 01 33 00.
- B. Product Data: Within 30 calendar days after award of the Contract, submit:
  - 1. Complete materials list showing all items proposed to be furnished and installed under this Section.
  - 2. Sufficient data to demonstrate that all such materials meet or exceed the specified requirements.
- C. Shop Drawings:
  - 1. Submit detailed shop and installation drawings of all work under this Section to Architect for approval prior to ordering materials.
  - 2. Indicate glass sizes, thickness, glazing details and where mirrors are to be installed in the building.

08 81 00-1

## 1.5 FIELD MEASUREMENTS

- A. Accurately field measure all openings to receive glass and cut glass to correspond to each measured opening. The General Contractor and Glazing Contractor shall be responsible for overall coordination and accuracy of the Field Measurements.

## 1.6 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.
- B. Replacement: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

## 1.7 GUARANTEE

- A. Contractor shall furnish a written guarantee covering all mirror silvering from defects in material and workmanship for a period of five years from date of final acceptance of the building.
- B. All glazing work performed under this Section shall be guaranteed against defects in materials and workmanship for a period of one year from date of final acceptance of the building. This guarantee, however, shall not cover accidental breakage of glass subsequent to acceptance except where breakage is due directly to defective materials and/or inferior workmanship.
- C. All sealed insulating glass shall be warranted against failure of the air seal for a period of ten (10) years from the date of substantial completion.

## PART 2 PRODUCTS

### 2.1 GLASS

- A. General: Glass is called for by "type" (i.e. Insulated, wire, etc.) on Details and Schedules in the Drawings. The "types" are defined herein.
- B. Tempered Glass: Provide Tempered Glass where called for on the Drawings or in these Specifications, and where such tempering would be required under provisions of the International Building Code, latest edition, or other applicable laws and regulations.
- C. All glass shall conform to the requirements of Federal Specification DD-G-451c, or as indicated with individual glass types.
- D. Unless noted otherwise, Glass will be manufactured by Vitro (formerly PPG), Guardian Glass or approved alternate. Each light shall bear the manufacturer's label designating the type and thickness of glass. "AFPC V2 2701.1 "Each unit of tempered glass shall be permanently identified by the manufacturer. The identification shall be etched or ceramic

08 81 00-2

fired on the glass and be visible when the unit is glazed. Tempered spandrel glass is exempted from permanent labeling. This type of glass shall be identified with a removable paper label by the manufacturer.

- E. Individual glazed areas in hazardous locations shall meet requirements CPSC 16, CFR Part 1201.
- F. Size: Sizes of glass indicated on Drawings are approximate, actual sizes of glass shall be taken from actual frames. Labels shall remain on glass until after inspection by the Architect.
  - 1. Actual design sizing shall be the responsibility of the glass manufacturer. Sizes indicated herein and on the Drawings are approximate only. Where required, the manufacturer's recommended changes shall be made. Note all such changes or revisions on the Shop Drawings submitted for approval.

## 2.2 GLASS TYPES

- A. Tempered/Safety Glazing: Shall be 1/4" thick clear Tuf-flex Tempered Safety Glass to meet the requirements of Federal Specifications DD-G-1403B, ANSI Z97, 1-1984 and the Federal Standard 15 CFR 1201.
- B. 20 Minute Fire Protective Glazing: SuperLite I manufactured by SaftiFirst, 1/4" thickness, clear, Cat I & II (CPSC 16 CFP 1201) Impact Safety Rating.

## 2.3 GLAZING COMPOUNDS AND SEALANTS

- A. General: Use glazing compounds and preformed glazing sealant approved for the particular application as described herein and shown on the Drawings or specified in the Related Work referenced in Paragraph 1 b) of the Section, unless otherwise noted.
- B. Glazing Compound shall be GE SILGLAZE, clear or neutral color, unless approved otherwise by the Architect.
- C. Setting Blocks and Gaskets shall be extruded hard neoprene, clear or neutral color unless noted otherwise.
- D. Tape shall be polyisobutylene base elastic compound with gauze reinforcement, equal to Presstite 162 Elastic Compound Tape, clear or neutral color unless noted otherwise.
- E. Sealants used for glazing shall be G.E. Silicone, Dow-Corning Silicone Structural Sealant, or as approved by the Architect. Silicone shall be clear or neutral color as approved by Architect.

08 81 00-3

## 2.4 GLAZING ACCESSORIES

- A. Provide all glazing accessories required to supplement those accessories which accompany the items to be glazed, and as needed to provide a complete installation, including glazing points, clips, shims, angles, beads, settling blocks, and spacer strips. Use ferrous metal, which will be exposed in the finished work, which has a finish that will not corrode or stain while in service.

## 2.5 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.
- B. Verify all field dimension openings prior to glass fabrication and cutting. Cut pieces to fit actual opening sizes.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. General:
  - 1. All glass shall be accurately cut or sized to fit openings and locations and shall be set by skilled glazers. Extreme care shall be exercised in sizing the insulating glass to allow recommended clearances around glass.
  - 2. Cut and install glass with any visible lines or waves running in horizontal direction.
  - 3. Fix movable and operating items securely, or in a closed, locked position until glazing compound has thoroughly set.
  - 4. Use insulating units which do not have corners or edges ground, nipped, cut, or fitted after leaving the factory. Do not subject units to springing, forcing, or twisting during setting. Handle so as not to strike the setting frames or other objects.
  - 5. Use beads or stops furnished with the items to be glazed to secure the glass in place.
  - 6. Items to be glazed shall be shop-glazed or field-glazed with glass of the quality and thickness specified.

### 3.2 GLASS SETTING

- A. Wood Doors and Wood Frames: Field glaze all wood doors and wood frames with glazing sealant and flush solid wood stops as indicated on Drawings. (Metal stops where required for fire rating)
  - 1. Use sufficient glazing sealant to insure a complete seal between glass and stop.
  - 2. After stops have been installed and pulled up tight, trim bead of sealant resulting from setting operations away from face of glass. Retouch damaged compound after glazing.

08 81 00-4

### 3.3 REPLACEMENT AND CLEANING

- A. Replacement: Glass broken or glass damaged before completion of the building operations shall be replaced with glass of the like kind and quality at no cost to the Owner.
- B. Cleaning: Upon completion of all construction work and approval of all glazing installations, remove from the glass surfaces, surrounding framing materials and mirrors all labels, sealant and caulking compound smears, spots, etc. Do not use cleaning materials or agents which will damage glass or surrounding surfaces. After cleaning, wash all glass and mirrors completely.

END OF SECTION

08 81 00-5





## SECTION 09 22 16

### NON-STRUCTURAL METAL FRAMING

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Non-load bearing metal studs and accessories for wall assemblies.
- B. Wood Blocking for wall-mounted items.

##### 1.2 RELATED SECTIONS

- A. Section 05 40 00 - Cold-Formed Metal Framing.
- B. Section 07 92 00 Joint Sealants-Sill Sealer below bottom track at exterior walls
- C. Section 09 29 00 - Drywall: Gypsum interior sheathing.

##### 1.3 REFERENCES

- A. AISI - Standard for Cold-Formed Steel Framing General Provisions.
- B. AISI - North American Specification (NASPEC) for the Design of Cold-Formed Steel Structural Members - 2001.
- C. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- D. ASTM A 780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- E. ASTM A 1003 - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
- F. ASTM C 645 - Standard Specification for Nonstructural Steel Framing Members - 2006.
- G. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- H. ASTM C 1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
- I. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- J. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

09 22 16-1

- K. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- L. ASTM E 413 - Classification for Rating Sound Insulation.
- M. GA-600 - Fire Resistance Design Manual.

#### 1.4 DESIGN REQUIREMENTS

- A. Design steel in accordance with American Iron and Steel Institute Publication "Specification for the Design of Cold-Formed Steel Structural Members" or the North American Specification for the Design of Cold-Formed Steel Structural members, except as otherwise shown or specified.
- B. Design loads: As indicated on the Architectural Drawings. 5 PSF minimum design lateral load is required for interior walls by the building code. Shaftwall framing minimum design lateral load is typically 5 - 15 PSF.
- C. Design framing systems to withstand design loads without deflections greater than the following:
  - 1. Interior Non-Load Bearing Walls: Lateral deflection of:  $L/240$ . (*for gyp. bd.*)
- D. Design framing system to accommodate deflection of primary building structure and construction tolerances.
- E. Responsibilities: 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, and displaying a classification label from, an independent testing agency acceptable to the authority having jurisdiction.
  - 1. Construct fire-resistance-rated partitions in compliance with tested assembly requirements indicated in drawings.
  - 2. Rated assemblies to be substantiated, from applicable testing using the proposed products, by Contractor.
  - 3. Both metal framing & wallboard manufacturers must submit written confirmation that they accept the other manufacturer's product as a suitable component in the assembly. Acceptance is as follows:
    - a. If installation of both products is proper, no adverse effect will result in the performance of one manufacturer's product by the other's products.
    - b. Combining products can be substantiated by required assembly tests.

#### 1.5 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Submit manufacturer's product literature and data sheets for specified products.
- C. Manufacturer's certification of product compliance with codes and standards.

09 22 16-2

## 1.6 QUALITY ASSURANCE

- A. Contractor shall provide effective, full time quality control over all fabrication and erection complying with the pertinent codes and regulations of government agencies having jurisdiction.
- B. Contractor to conduct pre-installation meeting to verify project requirements, substrate conditions, and manufacturer's installation instructions.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Notify manufacturer of damaged materials received prior to installing.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store materials protected from exposure to rain, snow or other harmful weather conditions, at temperature and humidity conditions per the recommendations of ASTM C754 section 8.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. ClarkDietrich Building Systems, 9100 Pointe Drive, Suite 210, West Chester, OH. Phone: 513-870-1100. [www.clarkdietrich.com](http://www.clarkdietrich.com), [info@clarkdietrich.com](mailto:info@clarkdietrich.com).
  - 2. Other manufacturers as referenced in this section for specific products.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.
- C. All products to be manufactured by current members of the Steel Stud Manufacturers Association (SSMA), Steel Framing Industry Associates (SFIA), or the Certified Steel Stud Association (CSSA).

### 2.2 MATERIALS

- A. Steel: Galvanized Steel meeting or exceeding the requirements of ASTM A 1003.
  - 1. Coating: Galvanized G60 (Z180) coating minimum or equivalent, complying with ASTM C 645. **Stud finish MUST be hot dipped galvanized. Galvanneal finish is not acceptable. G60 must be used at all EXTERIOR locations. G40 finish is allowed at interior locations.**

### 2.3 COMPONENTS

- A. Nonstructural Studs:
  - 1. Flange Length: 1 1/4 inch (32mm) 125 flange.
  - 2. Web Depth: As indicated on drawings.
  - 3. Minimum Material Thickness: Gauge as required by stud legend shown on drawings.

09 22 16-3

4. Punch Outs: 12 inches (305mm) from base and every 48 inches (1219mm) thereafter.
- B. Nonstructural Track: Cold-Formed galvanized steel runner tracks
1. Flange Length: 1 1/4 inch (32 mm) T125 flange.
  2. Web: Track web to match stud web size.
  3. Minimum Material Thickness: Unless noted otherwise on drawings match stud gauge.
  4. Minimum Material Thickness: Track thickness to match wall stud thickness.
- C. Deflection Track: Cold-Formed Deep Leg Runner Slotted Slip Track.
1. Leg Length: 2 inch (51 mm) T200 flange.
  2. Leg Length: 2 1/2 inch (63 mm) T250 flange.
  3. Leg Length: 3 inch (76mm) T300 flange.
  4. Leg Length: 3 1/2 inch (89 mm) T350 flange.
  5. Leg Length: As required by design.
  6. Minimum Material Thickness: As required by design.
  7. Minimum Yield Strength: 33ksi (227 MPa) (for 33mils through 118mils).
  8. Minimum Yield Strength: 50ksi (345 MPa) (optional for 54mils and up).
  9. Minimum Yield Strength: As required by design.
- D. U-Channel (CRC Cold Rolled Channel):
- E. Furring Channel: Furring existing walls and suspended ceiling applications.
1. Size: 087F125-30 7/8 inch (22mm) Furring Channel 30mils (20ga Drywall).
  2. Size: 150F125-30 1 1/2 inch (38mm) Furring Channel 30mils (20ga Drywall).
- F. Framing Accessories: Provide accessories as required in this project.
1. Flat Strapping for Backing Strip.
  2. Flat Strapping and bridging for lateral bracing.
  3. L-Angles.
  4. SwiftClip Fixed Connection Angles.
  5. Deflection Slip Connectors ClarkDietrich™ Building Systems-Deflection Clips: Fast Strut™ / Fast Top™ Clips / FastClip™ Slide Clips / QuickClip™ / Slide Clip™ (SD), or approved alternate. Provide clip as required for each situation to compensate for deflection of structure.
- G. Fire or Draft Stop Blocking: Where fire or draft stop blocking is required or called for under this section or called for on drawings, mineral wool fire safing may be provided. Refer to Section 07 84 00 Firestopping.
- H. Fasteners: Self-drilling, self-tapping screws; complying with ASTM C 1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
- I. Touch-Up Paint: Complying with ASTM A 780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

09 22 16-4

## PART 3 EXECUTION

### 3.1 INSPECTION

- A. Inspect supporting substrates and structures for compliance of proper conditions for installation and performance of the cold-formed structural framing.

### 3.2 PREPARATION

- A. Prepare attachment surfaces so that they are plumb, level, and in proper alignment for accepting the cold-formed structural framing.

### 3.3 COORDINATION WITH OTHER TRADES

- A. It will be a requirement of this section to verify and coordinate work with other trades and specification sections. Do not begin work on concrete slabs on grade or elevated concrete slabs until minimum strength and cure time has been reached.

### 3.4 FABRICATION

- A. Prior to fabrication of framing, submit product submittal sheets to the architect or engineer to obtain approval.
- B. Framing components may be preassembled into panels prior to erecting. Prefabricate panels so they are square, with components attached in a manner which prevents racking and minimizes distortion during lifting and transport.
- C. Cut all framing components square for attachment to perpendicular members or as required for an angular fit against abutting members.
- D. Plumb, align and securely attach studs to flanges of both upper and lower runners, except that in the case of interior, non-load bearing walls where studs need not be attached to upper or lower runners.
- E. Splices in members other than top and bottom runner track are not permitted.
- F. Provide temporary bracing where required, until erection is complete. Fastening of components shall be with welding or with minimum 1 #8 screw both sides of flange. Welds shall conform to the requirements of AWS D.1.1, AWS D.1.3 and AISI Manual Section 4.2. All welds shall be touched up using zinc-rich paint. Wire tying will not be permitted.
- G. Cutting of steel framing members may be accomplished with a saw or shear. Torch cutting of load bearing studs will not be permitted.
- H. Install headers in all openings in axially loaded walls that are larger than the stud spacing in the wall. Form headers as shown on drawings.
- I. Unless shown otherwise on drawings, brace top of metal stud walls to structure above at max. 4'-0" O.C. with minimum 20 gauge stud bracing.

09 22 16-5

- J. Insulation equal to that specified elsewhere shall be provided in all double jamb studs and doubled headers not accessible to insulation contractors.
- K. Care should be taken to allow for additional studs at intersections, corners, doors, windows, steel joists, diagonal bracing and as called for in the shop drawings.

### 3.5 INSTALLATION – DEFLECTION TRACKS AND DEFLECTION SLIDE CLIPS

- A. Unless noted otherwise, deflection tracks are to be installed at top of interior and exterior walls terminating directly below and/or attaching to beams joists, roof or floor deck, purlins, or other items subject to deflection.
- B. Provide deflection slip connectors attached to stud walls from structure where studs extend vertically past a structural item such as but not limited to a beam or elevated floor edge angle.

### 3.6 FIRE OR DRAFT STOP BLOCKING

- A. Install fire or draft stop blocking at bottom of roof plane where studs terminate at roofs to create rated corridor.

### 3.7 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before substantial completion of final installation.

END OF SECTION

09 22 16-6

## SECTION 09 29 00

### DRYWALL

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Furnish materials and labor to complete installation of all interior drywall and miscellaneous metal trim items as indicated on plans and specified herein.

##### 1.2 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.

##### 1.3 RELATED SECTIONS

- A. Section 09 22 16 – Non-Load Bearing Metal Stud Wall Framing
- B. Section 09 91 00 - Painting.

##### 1.4 REFERENCES

- A. ASTM C1396-Standard specification for gypsum board
- B. ASTM E90- Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements (ISO 140, Part 3)

#### PART 2 PRODUCTS

##### 2.1 MATERIALS:

- A. All gypsum board shall be type “X” fire code, manufactured by Gold Bond, USG, or CertainTeed. Thickness as indicated on drawings. Provide water-resistant in damp areas and where called for. All gyp board shall be installed in accordance with manufacturer's printed instructions and as specified herein. Use water resistant materials in shower areas.
- B. Gypsum board thickness
  - 1. Unless noted otherwise in this specification or on drawings, gypsum board thickness to be 5/8”.

#### PART 3 EXECUTION

##### 3.1 INSTALLATION:

- A. Painted Gypsum Board:

09 29 00-1

1. In areas calling for painted gypsum wallboard 5/8 thick, apply with length parallel to the studs in lengths sufficient to extend from floor to ceiling with no horizontal joints.
2. Attachment to be by screws 12 inch o.c. in the field and 8 inch o.c. along vertical abutting edges, and 7 inch o.c. on ceiling areas. Type 'X' shall be attached 7 inch o.c. edges, ends, and field.
3. All taping and texture shall be done in accordance to printed instructions as supplied by Gold Bond and approved by the Architect. All texture shall be approved by the Architect before proceeding with the work.
4. All painted gypsum board will be textured per this specification unless noted otherwise.
5. Suspended drywall framing shall be attached to structure with No. 12 gauge hanger wires spaced not more than 2'-0" on center in one direction and 2'-0" on center in the other.

**B. Stud Framing**

1. Align floor and ceiling tracks to assure plumb partition. Secure the track with suitable fasteners at 24" O.C. maximum. Stud spacing to be 16" o.c. for door and window openings up to 4'-0" wide, reinforcing shall occur through use of a 20 gauge stud screw attached to frame anchors. On openings 4'-0" wide and over, use 2-20 gauge studs back to back against frame and securely attached.

**3.2 GYPSUM BOARD SURFACE TEXTURING:**

- A. Where exposed to view, provide light "orange peel" gypsum compound texture on gypsum board surfaces and where called for on drawings unless noted otherwise.
  1. Provide two 2' x 2' mockup boards with both light orange peel finish for Architect's and Owner's review and approval.
- B. Texture to be uniform on walls throughout building.
- C. Contractor to apply orange peel texturing to sample mockup panel and be approved by Architect prior to any further application

**3.3 CONTROL JOINTS**

- A. Galvanized metal control joint, Model 093 by USG or approved alternate.
- B. Control joints are to be provided at approximately 30'-0" o.c. horizontally and vertically at wall, ceiling, light coves and furrdown installations. Joints should be located at corner of door or window heads if spacing allows and where shown or called for on drawings. These shall be considered minimum requirements.
- C. Drywall contractor will repair any cracks in drywall for the one-year warranty period.

**3.4 CLEAN-UP**

- A. The Contractor shall be responsible for complete clean up on his contract at completion of same.

END OF SECTION

09 29 00-2



## SECTION 09 51 00

### ACOUSTICAL TILE CEILINGS

#### PART 1 GENERAL

##### 1.1 DESCRIPTION

- A. Furnish labor, materials, tools, equipment, scaffolding devices and incidentals necessary or required to install all acoustical tile ceilings and suspension system where shown or scheduled on the drawings.

##### 1.2 RELATED WORK

- A. Gypsum Wallboard: Section 09 29 00
- B. Air Distribution Systems: Division 23
- C. Lighting: Division 26

##### 1.3 REFERENCES:

- A. ASTM E1264 – Classification For Acoustic Ceilings
- B. ASTM E84 – Surface Burning Characteristics
- C. ASTM C367 – Strength Properties of Prefabricated Architectural Acoustical Tile or Lay-In Ceiling Panels
- D. ASTM C423 – Sound Absorption
- E. ASTM C636 – Standard Practice for Installation of Metal Suspensions Systems for Acoustical Tile and Lay-In Panels
- F. ASTM E1414 – Sound Attenuation
- G. 2010 Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions for Indoor Sources. Using Environmental Chambers – Version 1.1 – California
- H. ASTM C518-10 – Thermal Transmission Properties

##### 1.4 SUBMITTALS:

- A. Comply with Requirements of Section 01 33 00.
- B. Submit through Contractor to Architect:

09 51 00-1

## 1.5 SAMPLES

- A. Submit one 6 inch x 6 inch piece of each type of acoustical tile to Architect for approval.
- B. Label tile with manufacturer's name, light reflection and noise reduction coefficient, flame spread rating and locations to be installed.
- C. Submit a sample of adequate size to show all component parts of the suspension assembly, including perimeter angles. .

## 1.6 ACOUSTICAL PERFORMANCE

- A. Acoustical ceiling tiles in academic and office areas to have a minimum noise reduction coefficient (NRC) rating of 0.55 and a minimum ceiling attenuation class (CAC) rating of 35.

## 1.7 GUARANTEE

- A. Acoustical ceiling boards shall have a manufacturer's limited system performance warranty against warping, shrinking or sagging, for minimum Thirty (30) years from date of final acceptance of the building. Grid system to be carry a manufacturer's Thirty (30) year guarantee.
- B. All work under this section shall be guaranteed free from defects in materials and workmanship for a period of one (1) year from date of final acceptance of the building, except where longer periods of time are specified.
- C. If during the material guarantee period, shrinkage, buckling or warping of acoustical ceiling occurs, tighten all joints, replace defective acoustical boards as required to maintain tight, neat ceiling.

## PART 2 PRODUCTS

### 2.1 MATERIAL

- A. Acoustical Tile Ceiling

#### **AC-1**

Acoustical tile ceilings as called for on plans to be exposed grid system, non-combustible, mineral fiber, white ceiling board with factory applied white vinyl washable latex paint. Class 'A', flame spread of 25. 24" x 24" x 5/8" to 7/8" non-directional pattern, Radar ClimaPlus, Item Numbers: 2215, 2207, 22421 are acceptable by USG, or Fissured HumiGuard Plus Item Numbers: 465, 1831, 1713, 1754 are acceptable by Armstrong, or approved alternate. Minimum NRC rating: 0.55 CAC rating: 35.

09 51 00-2

- B. All suspended ceilings systems shall be grid system as manufactured by USG-Donn DX-24, Armstrong or approved equal manufacturer. Provide Donn ZXLA or approved equal for areas where vinyl covered gypsum board lay-in panels are called for. Components shall be formed from cold rolled steel, electrozinc coated and prepainted white. Main tee shall be double web design, .020 gauge, 1 1/2" in height. Wall angle shall be hemmed edge .024 gauge for galvanized grids. Equals: Chicago Metallic 200 series, Prelude 15/16" exposed tee system by Armstrong World Industries, Inc, or approved alternate.
- C. Provide hold down clips on all fire rated ceilings, vestibules where ceiling tile is installed, and on other areas where called for.
- D. Drywall Suspension System: Suspended gypsum board ceilings are to DGL or DGLW drywall suspension system by USG Interiors. Components shall be manufacturer's standard components and installed in strict accordance with manufacturer's specifications.

### PART 3 EXECUTION

#### 3.1 HANDLING OF MATERIALS

- A. Deliver materials to job in manufacturer's original containers, properly store and protect before, during and after installation. Damaged or defective materials shall be removed and replaced.

#### 3.2 EXAMINATION OF EXISTING CONDITIONS

- A. Contractor shall be responsible for examination and acceptance of all surfaces and conditions affecting installation of suspension system and acoustical ceilings. Unsatisfactory conditions shall be corrected before proceeding with the work.
- B. Start no work until glazing is complete, exterior openings closed in, cement work, plastering or other wet work is completed and dried out. **HVAC SYSTEM MUST BE IN PLACE AND PROPERLY OPERATING BEFORE ANY CEILING TILE IS INSTALLED**
- C. Uniform temperature of 60 degrees F. minimum shall be maintained before, during and after acoustical material installation. Humidity level shall not be any more that what is required by manufacturer's instructions for installation.

#### 3.3 INSTALLATION OF SUSPENDED SYSTEMS

- A. Exposed grid suspension system:
  1. Wall molding shall be attached to all perimeter walls in accordance with manufacturer's recommendations.
  2. Main runners shall be attached to structure with No. 12 gauge hanger wires spaced not more than 4'-0" on center in one direction and 4'-0" on center in the other.
  3. Suspended drywall tees or framing shall be attached to structure with No. 12 gauge hanger wires spaced not more than 2'-0" on center in one direction and 2'-0" on center in the other.

09 51 00-3

4. Cross tees shall be installed at 24" on center and mechanically fastened to main runners.
5. The suspension system shall be installed to permit border units of the greatest possible size, but no less than 4" wide.
6. All members shall be aligned for true, level surface and straight lines.

### 3.4 INSTALLATION OF ACOUSTICAL TILE CEILINGS

- A. Install units to sub-surfaces from set out points and to pattern shown. Verify location of work of other trades so their items occur within a whole unit or at joints as shown. Make cutouts for recessed items provided by other trades.
- B. Provide additional hangers at two adjacent corners of 2'x 4' light fixtures. Provide two at each strip fixture or incandescent fixture.
- C. Install units in place, fitting snugly. Provide spacers or hold-down clips where required and within 12' of exterior doors.
- D. Paint all rivets exposed to view to match suspension system finish. After installation, clean any soiled surfaces. Replace any damaged units.
- E. EXTRA STOCK: At project completion, provide one additional box of each type of acoustical unit specified, for maintenance use by the owner. These tiles are not to be used to replace tiles damaged as a result of failure of other items under warranty (i.e. roofing systems, HVAC systems, etc.)

### 3.5 CLEANING

- A. Following installation, clean soiled and discolored surfaces of units.
- B. Remove and replace units which are damaged or improperly installed. Do not use owner's extra stock for replacing damaged ceiling tiles damaged during construction and damage resulting from failed building components or assemblies during the warranty period.

END OF SECTION

09 51 00-4

## SECTION 09 65 13

### RUBBER BASE

#### PART 1 PRODUCTS

##### 1.1 SUMMARY:

- A. Section includes:
  - 1. Resilient Base

##### 1.2 RELATED SECTIONS:

- A. Section 06 41 16 – Cabinet Work & Shelving

##### 1.3 SUBMITTALS:

- A. Comply with Section 01 33 00.
- B. Submit through Contractor to Architect:
  - 1. Samples: Provide properly identified, actual samples of each material for approval and color selection prior to installation.
  - 2. Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

##### 1.4 QUALITY ASSURANCE:

- A. Regulatory Requirements: Conform to applicable code for flame/fuel/smoke rating requirements in accordance with ASTM E84.

##### 1.5 ENVIRONMENTAL REQUIREMENTS:

- A. Store materials for three days prior to installation in area of installation to achieve temperature stability.
- B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during and 24 hours after installation of materials.

##### 1.6 WARRANTY:

- A. Provide manufacturer's one year warranty for material and Installer's one-year warranty.

09 65 13-1

## PART 2 PRODUCTS

### 2.1 MATERIAL

#### A. Coved Rubber Base

1. Tarkett "Traditional Duracove Thermoplastic Rubber 1/8" coved wall base, Approved Alternate
2. ASTM E84/NFPA 255, Type TP or better, group 1 (solid); 4" high, 1/8" thickness; class C fire resistance, with matching pre-molded corner units; top-set coved base; color as selected from 115 color options by Architect. Pre-molded corner units to match exactly, rubber base color selected.
3. Provide base material in continuous rolls. **"Preformed" or "Field-Made" outside corners will not be allowed. Factory made Pre-molded outside corner units must be used.**
4. Adhesive: Porous surfaces: Tarkett #960 Cove Base Adhesive; Non-porous surfaces: Tarkett #946 Premium Contact Adhesive. Provide adhesives for approved alternate products as approved by manufacturer for each substrate application.

- B. Substitutions: Alternate products may be submitted for Architect's review and approval, but must comply with Section 01 60 00.

## PART 3 EXECUTION

### 3.1 EXAMINATION:

- A. Beginning of installation means acceptance of existing substrate and site conditions.

### 3.2 PREPARATION:

- A. Cleaning: Immediately prior to installation of the work of this section, vacuum clean substrate. Thoroughly clean substrate and remove all wax, oil, grease, paint, varnish hardeners, and other items which would adversely affect the bond of the adhesive.
- B. Remove edges and bumps.

### 3.3 INSTALLATION

#### A. BASE MATERIAL:

1. Areas to receive base will be clean, fully enclosed, weather-tight and temperature maintained at 65 degrees F for a minimum of 24 hours prior to and after installation. This also includes adhesives, which will be conditioned in same manner.
2. Coiled wall base will be uncoiled and laid out flat for at least 24 hours at 65 degrees.
3. Installer to verify substrate rubber base is to be adhered to and coordinate with other trades. Do not install epoxy paint where rubber base is to be installed.
4. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints. Install continuous rolls with as few joints as possible. Use pre-molded corner units.
5. Install base on solid backing. Bond tight to wall and floor surfaces.

09 65 13-2

6. Apply adhesive with 1/8" square notched trowel to cover 80% of the back surface. Hold adhesive down 1/4" from top of base.
7. Scribe to fit door frames and other interruptions.
8. Install pre-molded corner units on all outside corners before installing wall base. Do not extend continuous base around outside corners unless approved by Architect.
9. Base will be mitered at all inside corners.
10. Pieces of base less than 8" not allowed.
11. Install at toe space at base of all cabinets unless otherwise shown.

3.4 CLEANING AND FINISHING:

- A. Allow adhesive to dry prior to mopping. Follow base manufacturer's instruction for drying time.
- B. Remove excess adhesive from base, and wall surfaces without damage.

END OF SECTION

09 65 13-3





## SECTION 09 67 26

### EPOXY RESINOUS FLOORING

#### PART 1 GENERAL

##### 1.1 QUALIFICATIONS

- A. Contractor shall be an established firm regularly engaged in manufacturing and installation of specified polymer floor systems for the past 10 years. Installer must be an approved epoxy floor finish installer of the companies specified. Contractor shall have completed at least five (5) projects of similar size and complexity.

##### 1.2 RELATED SECTIONS

- A. Section 03 30 00 - Cast-In Place Concrete: Concrete slab moisture mitigation

##### 1.3 SUBMITTALS

- A. Comply with Section 01 33 00.

##### 1.4 MOCKUP

- A. Provide a 4' x 4' mockup showing texture, color and trim edges finishes for Architect's approval. This may be displayed on min. 3/4" plywood panel or small room as designated by Architect. Adjustment of the degree of slip resistance may be required to satisfy owner's requirements. Architect to also be notified when first installation begins.

##### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Material shall be delivered to job site and checked by flooring contractor for completeness and shipping damage prior to job start.
- B. Material shall be stored in a dry, enclosed area protected from exposure to moisture. Temperature of storage area shall be maintained to meet manufacturer's recommendations.

##### 1.6 JOB CONDITIONS

- A. Concrete substrate shall have cured 30 days utilizing a curing membrane. Concrete subfloor on or below grade shall have a minimum 10 mil vapor barrier installed beneath and at the perimeter of the slab. Concrete shall have a light steel trowel finish.
- B. Applicator will test and approve substrate for acceptable moisture content prior to applying epoxy system.

09 67 26-1

- C. Job area to be free of other trades during and for a period of 24 hours after floor installation.
- D. Protection of finished floor from damage by subsequent trades shall be the responsibility of the General Contractor.

## 1.7 APPROVED INSTALLERS

- A. Desco, (installer & manufacturer) Cole Isbell, 501-786-5446
- B. Pro Inco (installer), Tnemec Epoxy Flooring (manufacturer) Dave Patterson, 913-422-8001
- C. Epoxy Coating Specialists (installer), Tennant Epoxy Flooring (manufacturer) Luke McNeil, 816-642-1892
- D. Substitutions must be approved prior to bid. Installed work in local area must be viewed by the Architect as part of substitution review.

## PART 2 MATERIALS

### 2.1 MATERIAL DESCRIPTION

- A. Epoxy Floor Type EF-1: A nominal 3/16" thick epoxy flooring with an "orange peel" SR Copolymer Top Coat surface finish, semi-gloss, Quartz 'Cremona' Series, Trowelled on application by Desco.
- B. Epoxy Floor Type EF-2: A nominal 1/8" thick epoxy flooring with an "orange peel" SR Copolymer Top Coat surface finish, semi-gloss, 'Granite' Series', Broadcast application by Desco.
- C. Zinc termination strip: Continuous zinc strip installed at top of cove base and where epoxy flooring transitions to another flooring material, furnished and installed by specified companies. Provide continuous bead of polyurethane sealant along top of cove base termination strip. Where installed in kitchens and other clean areas, termination strip must comply with local and state health department regulations.
- D. All resins and sealers are to be **non-yellowing**.

### 2.2 COLORS

- A. Colors shall be custom as selected by Architect. Architect shall submit color formula to epoxy flooring company to create minimum 12" x 12" sample boards for color approval.

09 67 26-2

## PART 3 EXECUTION

### 3.1 INSPECTION

- A. Calcium Chloride Moisture and ph Testing is required to be performed to the floor prior to epoxy installation. Perform test following industry standards. Do not proceed until satisfactory conditions have been achieved.

### 3.2 SURFACE PRIMING

- A. All properly prepared substrates shall be primed using appropriate manufacturer's penetrating primers with strict adherence to application instructions.

### 3.3 MATERIAL INSTALLATION

- A. Floor installation shall strictly adhere to manufacturer's written instructions and directions.
- B. Provide integral 4" high (as scheduled on drawings) 1 inch cove base with epoxy material as indicated on drawings. Terminate at zinc strip, installed prior to installation of epoxy base.
- C. Provide slip resistant "orange peel" with SR Copolymer top coat finish on epoxy floors. Provide smooth finish for coved base, extending out from wall 6". No silica is to be used on epoxy floors unless approved by Architect. Terminate with Schluter aluminum termination strip where epoxy meets with different flooring materials or concrete slab. A ¼" vertical maximum transition is allowed.
- D. Immediately following completion of epoxy flooring system, floor shall be covered with adequate material to protect from damage. Remove prior to final inspection.
- E. All trash and debris shall be properly disposed of and arrangement shall be made to remove all unused material from the job site.

END OF SECTION

09 67 26-3



## SECTION 09 91 00

### PAINTING AND FINISHING

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. The work to be completed under this heading includes all labor, materials, equipment, and services necessary and reasonably incidental for painting throughout the building, both exterior and interior, for all wood, metal, masonry, or other surfaces as specified, to make a thoroughly complete job in every respect.
- B. Term "exposed" used herein refers to surfaces exposed at exterior of building and surfaces visible within building unless specifically called out. Materials in pipe chases, pipe tunnels and concealed above finish ceiling shall not be considered "exposed".
- C. Items included but not limited to - Exposed concrete surfaces (as called for on the interior finish schedule. Exposed concrete masonry units, interior and exterior. Exposed ferrous metals at exterior and interior of building not specified to receive factory applied finish of baked-on enamel. Concealed ferrous metals, except for fasteners and electrical and mechanical items, shall have minimum of one coat of corrosion-resistant paint. Exposed aluminum: galvanized steel roof vents, exhaust fans, grilles and registers shall not be painted unless otherwise designated.
- D. Exposed insulated piping, ductwork and mechanical equipment shall be painted unless supplied from the factory with a finish coat in compliance with building decor and this specification.
- E. Exposed wood, hardboard and plywood surfaces unless otherwise designated shall be painted or stained. Walls requiring patching or showing defects shall be painted in their entirety.
- F. There shall be no painting of copper, prefinished aluminum, or other finished metal, except iron.
- G. **Refer to section 09 29 00 for gypsum board surface texturing.**

##### 1.2 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.

##### 1.3 ENVIRONMENTAL REQUIREMENTS

- A. Follow manufacturer's recommendations for temperature range in which coatings may be applied.

09 91 00-1

- B. Comply with National Volatile Organic Compound Emission Standards for Architectural coatings, Rule 40 CFR, Part 59, established by Environmental Protection Agency for VOC limits unless stricter local regulations are required.

#### 1.4 PAINTING AND FINISHING PRE-INSTALLATION MEETING

- A. Prior to any wall or ceiling preparation, Contractor will schedule a pre-installation meeting. Required attendance will be Contractor or CM, Architect, Painter and drywall finisher, and suspended ceiling installer Contractor to conduct meeting.
- B. Discussion items:
  - 1. Gypsum board texturing and mockups
  - 2. Paint application.
  - 3. Protection of floors and surrounding finished items and finishes.
  - 4. Progression of installation following application of finished coat of paint. (i.e. switch and receptacle covers, millwork light fixtures, etc.)
  - 5. Accent painting clarification.
  - 6. Finishing of hollow metal doors and frames. (spray finish, not brushed.)
  - 7. Transparent finishes for woodwork, wood doors, etc.
  - 8. Other discussion items

### PART 2 PRODUCTS

#### 2.1 MATERIALS

- A. All paint and stain shall be manufactured by Benjamin Moore, Pittsburg or Sherwin Williams as specified.
  - 1. Other manufacturers listed below are approved, but must meet or exceed specifications for each type of paint or stain as specified in this specification.
    - a. Glidden
    - b. Kelly-Moore
    - c. Kwal.
  - 2. Substitutions: Comply with Specification Section 01 60 00.
  - 3. All colors shall be as selected by the Architect if not called out on drawings or specifications.
- B. All paint materials shall be delivered to the job in original unbroken manufacturer's packages with the labels intact and be kept in a locked room to which the Architect shall have access at all times.
- C. All materials shall be the best of their respective kinds and thoroughly mixed in the proper proportions to secure the best results.

09 91 00-2

## 2.2 SAMPLE PANELS

- A. After painters' materials have been approved and before any painting or finishing is done, submit panels as follows:
  - 1. Panels showing color and texture of finish coat.
  - 2. Panels showing clear finishes.
- B. Panels to show color: Composition board, 4 inch by 11 inch by 1/8 inch to show each color selected.
- C. Panel to show transparent finishes: Wood of same species and grain pattern as wood approved for use, 4 inch by 11 inch face by 1/4 inch thick minimum, and where both flat and edge grain will be exposed, 11 inches long by sufficient size (two by two inch minimum or actual wood member) to show complete finish. Panels shall show each type of finish specified.
- D. Attach labels to each panel stating where material is to be used, mfg. of finish material, and color or number of finish.

## 2.3 PAINTING AND FINISHING SCHEDULE

- A. **Paint Schedule provides for minimum two-coat application in addition to primer or filler coat.** Additional coat may be required for certain items to give complete coverage and uniform appearance. Omit primer for items shop primed.

## 2.4 EXTERIOR FINISHING SCHEDULE:

- A. Ferrous Metal:
  - 1st Coat: Benjamin Moore HP Acrylic Metal Primer HP1100,  
Sherwin Williams B66W00310 – Pro Industrial Pro-Cryl Universal Acrylic Primer  
PPG/Pittsburgh Pitt-Tech Plus DTM Primer/Finish 4020-1000
  - 2nd & 3rd Coat: Benjamin Moore HP DTM Acrylic Metal Enamel HP3000, gloss,  
Sherwin Williams B66W00311 – Sher-Cryl HPA High Performance Acrylic Gloss Coating  
PPG/Pittsburg Pitt-Tech Plus EP DTM Acrylic Gloss 90-1510
- B. Galvanized Metal:
  - 1st Coat: Benjamin Moore HP Acrylic Metal Primer HP1100  
Sherwin Williams B66W00310 – Pro Industrial Pro-Cryl Universal Acrylic Primer  
PPG/Pittsburgh Pitt-Tech Plus DTM Primer/Finish 4020-1000
  - 2<sup>nd</sup> & 3<sup>rd</sup> Coat: Benjamin Moore HP DTM Acrylic Metal Enamel Gloss HP3000  
Sherwin Williams B66W00311 – Sher-Cryl HPA High Performance Acrylic Gloss Coating

09 91 00-3

PPG/Pittsburg Pitt-Tech Plus EP DTM Acrylic Gloss 90-1510

1. Paint inside galvanized surfaces of guttering.

C. Concrete & Concrete Masonry Unit:

1. Painted Finish: Refer to Section 09 96 53 – Waterproof Coatings.

2.5 INTERIOR FINISHING SCHEDULE:

A. Ferrous Metals:

- 1st Coat: Benjamin Moore HP Acrylic Metal Primer HP1100  
Sherwin Williams B66W00310 – Pro Industrial Pro-Cryl Universal Acrylic Primer
- 2<sup>nd</sup> and 3<sup>rd</sup> Coat: PPG/Pittsburgh Pitt-Tech Plus DTM Primer/Finish 4020-1000  
Benjamin Moore Command Waterborne Acrylic Urethane Satin V392  
Sherwin Williams B53W01150 – Pro Industrial Waterbased Alkyd Urethane Enamel Semi-Gloss  
PPG/Pittsburg HPC Rust Preventative Alkyd 4306-0110

B. Gypsum Board & Plaster: After application of approved texture.

- 1st Coat: Benjamin Moore 354 “Super Hide” ZERO VOC Interior Latex Primer  
Sherwin Williams B28WJ0901 – Wasatch Interior Latex Hi Hide Primer  
PPG/Pittsburg “Speedhide” 6-2 Interior Latex Sealer
- 2<sup>nd</sup> & 3<sup>rd</sup> Coat: Benjamin Moore 537 Ultra Spec 500 Interior Low Sheen Finish  
Sherwin Williams B20W02651 - ProMar® 200 Zero VOC Interior Latex Eg-Shel  
PPG/Pittsburg “Speedhide” Zero Interior Latex Eggshell 6-5310

C. Wood (Painted):

- 1st Coat: Benjamin Moore INSL-X Prime All AP1000 Multi Surface Latex Primer Sealer  
Sherwin Williams B79W00450 – Multi-Purpose Waterbased Acrylic-Alkyd Primer  
PPG/Pittsburg Seal Grip Primeline Fast Dry Latex Undercoater 17-9517
- 2nd & 3rd Coat: Benjamin Moore Command Waterborne Acrylic Urethane Satin V3921X  
Sherwin Williams B53W01151- Pro Industrial Waterbased Alkyd Urethane Enamel Semi-Gloss  
PPG/Pittsburg HPC Rust Preventative Alkyd 4306-0110

D. Wood Doors (Stained):

- 1st Coat: Sherwin Williams S64T00050-Sher-Wood® BAC Wiping Stain  
Old Masters Oil-Based Wood Wiping Stain
1. Fill wood with natural paste wood filler tinted with oil stain before final finish.
  2. Match existing stain color or Architect to select stain color.

09 91 00-4



2<sup>nd</sup> 3<sup>rd</sup> & 4<sup>th</sup> Coats:

Benjamin Moore Stays Clear ® Acrylic Polyurethane Low Lustre W423  
Sherwin Williams A68F00090 – Wood Classics® Waterborne  
Polyurethane Varnish Satin

1. Top, bottom, and edges of all doors shall be finished as above.

E. Concrete Unit Masonry/Concrete (other than epoxy coating):

1st Coat: Benjamin Moore 571 - Ultra Spec Masonry High-Build Block Filler  
Sherwin Williams B25W00025 - PrepRite® Block Filler  
PPG/Pittsburg “Speedhide” Interior/Exterior Masonry HI Fill Latex  
Block Filler 6-15XI

2<sup>nd</sup> & 3<sup>rd</sup> Coat: Benjamin Moore 537 “Ultra Spec 500” Interior Zero VOC Low Sheen  
Finish  
Sherwin Williams B20W02651 - ProMar® 200 Zero VOC Interior  
Latex Eg-Shel  
PPG/Pittsburg “Speedhide” Zero Interior Latex Eggshell 6-5310

1. 4th Coat: Will be required on accent colors for adequate coverage, same type as 3<sup>rd</sup>  
coat.
2. Back roll both filler and paint coats to ensure good coverage.

F. Epoxy Coatings for CMU and Concrete:

1st Coat: Benjamin Moore 571 - Ultra Spec Masonry High-Build Block Filler  
Sherwin Williams B25W00025 - PrepRite® Block Filler  
PPG/Pittsburg “Speedhide” Interior/Exterior Masonry HI Fill Latex  
Block Filler 6-15XI

2<sup>nd</sup>& 3<sup>rd</sup> Coat Benjamin Moore HP3410/ HP3420 HP Pre-Catalyzed Waterborne  
Epoxy Semi-Gloss/ Eggshell  
Sherwin Williams K45W00151 – Pro Industrial PreCatalyzed  
Waterbased Epoxy Eg-Shel  
PPG/Pittsburg “Pitt-Glaze” WB1 Pre-Catalyzed Waterborne Acrylic  
Epoxy 16-510, Semi-gloss Finish

Acceptable

Alternate: Benjamin Moore Ultra Spec “Scuff-X” Satin N486, Semi-gloss N487.

1. Finish coating shall have a vitreous-hard, tile-like surface with high resistance to  
impact, abrasion, stain chemical and acid corrosion and with a flame spread rating of  
not more than 15 when tested in accordance with ASTM Standard Specification E-84-  
61. Application on all surfaces shall be in solid color to be selected by the Architect  
or as listed on drawings or specifications.

G. Epoxy Coatings for Gypsum Board:

1st Coat: Benjamin Moore 354 “Super Hide” Zero VOC Interior Latex Primer  
Sherwin Williams B28WJ0901 – Wasatch Interior Latex Hi Hide  
Primer

2<sup>nd</sup>& 3<sup>rd</sup> Coat PPG/Pittsburg “Speedhide” 6-2 Interior Latex Sealer  
Benjamin Moore HP3410/ HP3420 HP Pre-Catalyzed Waterborne  
Epoxy Semi-Gloss/ Eggshell

09 91 00-5

Sherwin Williams K45W00151 – Pro Industrial PreCatalyzed  
Waterbased Epoxy Eg-Shel  
PPG/Pittsburg “Pitt-Glaze” WB1 Pre-Catalyzed Waterborne Acrylic  
Epoxy 16-510, Semi-gloss Finish

Acceptable

Alternate: Benjamin Moore Ultra Spec “Scuff-X” Satin N486, Semi-gloss N487.

1. Finish coating shall have a vitreous-hard, tile-like surface with high resistance to impact, abrasion, stain chemical and acid corrosion and with a flame spread rating of not more than 15 when tested in accordance with ASTM Standard Specification E-84-61. Application on all surfaces shall be in solid color to be selected by the Architect or as listed on drawings or specifications.

#### H. Concrete Floors (Sealer)

##### 1. Clear Sealer

- a. Two coats –MasterKure CC 250SB by BASF, semi-gloss, or approved alternate.

### PART 3 EXECUTION

#### 3.1 MATERIAL AND SPACE CONDITIONS

- A. Do not apply to wet or damp surfaces. Wait a minimum of 30 days or more as required by paint manufacturer before applying to new concrete or masonry. Follow manufacturer's procedures to apply appropriate coatings prior to 30 days to other substrate surfaces. Painter is required to test new concrete or masonry for moisture content prior to beginning of painting with a certified digital PH testing meter approved by Architect. If moisture content is above manufacturer’s minimum, surface must be allowed to dry to within levels required by paint manufacturer.
- B. Interior of building must be dried in prior to painter primer application. Do not begin painting of surface when temperature is at or below or temperature is predicted to drop below that required by paint manufacturer before required paint drying period.

#### 3.2 SURFACE PREPARATION

- A. General: Temporarily remove items interfering with surface to be painted for complete painting of such items and adjacent areas.
  1. See other sections of the specifications for requirements for surface conditions and prime coat.
  2. Surfaces to be finished shall be dry, clean, smooth and prepared as specified.
  3. Materials and methods used for cleaning shall be compatible with the substrate and specified finish. Remove any residue remaining from cleaning agents used.
  4. Method of surface preparation is optional provided results of finish painting produce solid even color and texture specified.

09 91 00-6

- B. Wood: Sand to a smooth even surface and then dust off.
1. Where transparent finish is specified, finish sanding shall be with 220 grit sandpaper. Wipe surface with a tack rag prior to applying finish.
  2. Surface to be painted with an opaque finish shall have all knots, sap and pitch streaks coated with knot sealer before applying any coat of paint. Apply two coats of knot sealer over large knots.
  3. Surfaces showing raised grain shall be sanded smooth between each coat.
  4. After application of prime or first coat of stain, fill all cracks, nail and screw holes, depressions and similar defects with patching compound. Sand to make smooth and flush with surrounding surface.
  5. Before applying finish coat, reapply patching compound if required, and lightly sand surface to remove surface blemishes.
- C. Steel and Iron:
1. Remove oil, grease, soil, drawing and cutting compounds, flux and other detrimental foreign matter by use of solvents, emulsions, cleaning compounds, or by steam cleaning.
  2. Verify that all factory or field welds where exposed have been grinded to achieve smooth consistent surface and that primer has been applied on bare steel. Apply appropriate filler material where voids occur at welds and finish to achieve smooth consistent surface.
  3. Remove loose mill scale, rust, and paint, by hand or power tool cleaning, except where high temperature aluminum paint is used, the surface shall be prepared in accordance with the manufacturer's instructions.
  4. Fill all dents, holes and similar voids and depressions in flat exposed surfaces of hollow steel doors and frames, access panels, roll-up steel doors and similar items specified to have semi-gloss or gloss finish with patching compound. Finish flush with adjacent surfaces.
  5. Spot prime all abraded and damaged areas in shop prime coat which expose the bare metal, with same type of paint used for prime coat. Feather edge of spot prime as required to produce smooth finish coat. Spot prime all abraded and damaged areas which exposed the bare metal of factory finished items with paint as recommended by the manufacturer.
- D. Zinc-coated (Galvanized, Metal, Terne-Plate, Zinc, Lead, Aluminum, Copper and Copper Alloys): Prep galvanized surfaces specified to be painted per paint manufacturer's instructions. Surfaces specified to be painted shall be cleaned of all grease, oil and other deterrents to paint adhesion, with toluene, xylene or similar solvents.
1. Spot prime all abraded and damaged areas of zinc-coating which expose the bare metal, using zinc rich paint on hot-dip zinc-coated items and zinc dust primer on all others.
  2. Spot prime, with red lead prime, all abraded and damaged areas of terne-plate which exposed the base metal.

09 91 00-7

- E. Masonry, Concrete, Cement Plaster and Stucco: Remove all dust, dirt, oil, grease efflorescence, form release agents, laitance, and other deterrents to paint adhesion.
  - 1. Use emulsion type cleaning agents to remove oil, grease, paint and similar products. The use of solvents, acid, or steam is not permitted.
  - 2. Remove all loose mortar in masonry work.
  - 3. Replace mortar and fill all open joints, holes, cracks and depressions with patching compound, finished flush with adjacent surface, with texture to match texture of adjacent surface.
  - 4. Concrete floors to be stained or sealed shall be etched and prepped per manufacturer's instructions. Allow required time to dry between applications.
  - 5. Concrete shall have all broken and spalled edged repaired with patching compound to match adjacent surfaces. Remove projections to level of adjacent surface by grinding or similar methods.
  
- F. Gypsum Plaster and Drywall: Remove efflorescence, loose and chalking plaster. Remove dust, dirt, and other deterrents to paint adhesion.
  - 1. Fill holes, cracks, and other depressions with patching compound, finished flush with adjacent surface, with texture to match texture of adjacent surface.

### 3.3 APPLICATIONS

- A. Start of surface preparation or painting will be construed as acceptance of the surface as satisfactory for the application of materials.
  
- B. Unless otherwise specified, paint shall be applied in three coats, prime, body, and finish.
  
- C. Before application of body and finish coats, surfaces shall be prepped and primed, except as otherwise specified. For primers to be used for field application, see **PRIMERS** paragraph in this specification.
  
- D. Additional field applied prime coats over shop or factory applied prime coats are not required, except for exterior steel which shall have a field applied prime coat in addition to the shop prime coat.
  
- E. Retouch damaged and abraded painted surfaces before applying succeeding coats.
  
- F. Apply each coat evenly and in full covering body.
  
- G. Not less than 48 hours shall elapse between application of succeeding coats except as allowed by the manufacturer's printed instructions, and approved by the Architect.
  
- H. Finish painted surfaces shall have solid even color, free from runs, lumps, brush marks, laps, or other defects.
  
- I. To prevent items from sticking in the shut position, operable items such as access doors and panels, window sashes rolling doors, and similar items shall not be painted when in the closed position.

09 91 00-8

- J. Painted or otherwise finished surfaces of wood doors, including top and bottom edges, which are cut for fitting or for other reasons shall be given two coats of primer.
- K. Surfaces of finishing woodwork, except shop fabricated or assembled millwork and surfaces specified to have varnish, stain or natural finish shall be given one coat of primer as soon as delivered to the site.
- L. Back prime and seal ends of exterior woodwork, and edges of exterior plywood specified to be finished. Primer shall be same kind of primer specified for exposed face surface.
- M. Prime rebates for stop and face glazing of wood, and for face glazing of steel.
- N. Paint is to be applied by brush, or roller on all surfaces except metal. **SPRAY PAINTING MUST BE USED ON METAL SURFACES AND IS SUBJECT TO THE FOLLOWING:**
  - 1. Spray painting will be allowed if occupied portion of the building completely sealed off and approved by the Architect.
  - 2. Painting materials specifically required by the manufacturer to be applied by spraying shall be so applied.
  - 3. In areas, where paint is applied by spray, all items specified in Article, Work Not To Be Painted, motors, controls, telephone, and electrical equipment, and similar items shall be masked, or enclosed with polyethylene, or similar air tight material with all edges and seams continuously sealed.

#### 3.4 PRIMERS:

- A. After surface preparation, apply prime coat to various materials as follows: **NOTE:** Prime coat is not required for acrylic emulsion and latex emulsion finish.
  - 1. Steel and iron: Red lead primer
  - 2. Zinc-Coated Steel and Iron: Zinc dust primer.
  - 3. Aluminum: Zinc chromate primer.
  - 4. Lead and Terne Metal: Red lead primer.
  - 5. Copper and Copper Alloys: Zinc chromate primer
  - 6. Exterior Wood: Oil base primer.
  - 7. Interior Wood: (except for transparent finish: Enamel undercoat, thinned as recommended by the manufacturer.
  - 8. Gypsum Plaster Block Filler: Pigmented sealer, except use latex emulsion for alkyd flat finish.
  - 9. Cement plaster, Concrete, and Masonry: Latex emulsion except use two coats of latex primer when substrate has aged less than six months.
  - 10. Drywall: Latex primer, except use pigmented sealer in shower, dressing and locker rooms.

09 91 00-9

### 3.5 EXTERIOR FINISHES:

- A. On properly prepared and primed surfaces, apply the following finish coats. Prime coat is not required for acrylic emulsion finish.
  - 1. Metal: Two coats of specified paint.
    - a. **NOTE: All metal surfaces to receive paint shall be spray applied!**
  - 2. Concrete, Concrete Masonry Units: Refer to Section 09 96 53, Waterproof Coatings.

### 3.6 INTERIOR FINISHES

- A. On properly prepared and primed surface, apply the following finish coats. Prime coat is not required on concrete for floor enamel finish.
  - 1. Metal Work: Apply two coats of specified paint on exposed surfaces, including surfaces of ferrous metal louvers and ferrous metal hardware, except as follows:
    - a. Two coats of high gloss sheen specified paint on specified surfaces, color as selected.
    - b. Omit body and finish coats on surfaces concealed after installation
    - c. **NOTE: All metal surfaces to receive paint shall be spray applied. No exceptions!**
  - 2. Plaster: One coat of latex sealer plus two coats of latex satin on exposed surfaces.
  - 3. Drywall: One coat of latex sealer plus two coats of specified paint on exposed surfaces.
  - 4. Masonry and Concrete Walls: One coat of specified paint over block filler on surfaces where scheduled.
    - a. Third coat will be required on surfaces where accent colors are scheduled for adequate coverage.

### 3.7 SPECIAL APPLICATIONS

- A. Unless noted otherwise, all exposed piping, conduit, ductwork, etc., exposed on interior of rooms shall be painted, matching color of walls or ceiling item is attached or adjacent to.
- B. Epoxy Paint
  - 1. Application of epoxy coating under this heading shall be done by trained applicators who are experienced in the use of the specific materials to be applied. Coating shall be applied in such quantity as will result in a dry film thickness of minimum 4 to 6 mils in uniform solid color or colors as selected. Floors and other adjacent surfaces which are not to be coated shall be protected during application, and special coating applicator shall clean and repair any adjacent surfaces damaged by his work.
  - 2. Coordinate termination of epoxy paint with installation of rubber base. No epoxy paint is to be applied where rubber base is to be installed.

09 91 00-10

### 3.8 TRANSPARENT FINISHES ON WOOD

#### A. General:

1. Open grained wood such as oak, walnut, ash and mahogany shall be filled with a paste wood filler, colored as required to achieve finish specified. Thin filler accordance with manufacturer's instructions as required for application. Remove excess filler, wipe as clean as possible, allow to dry and sand lightly with 220 grit sandpaper.
2. Stain shall be of type and color required to achieve finish specified. Stains may be used when transparent finishes are specified to change the color of sapwood to match heartwood, and to enhance or even the color of the wood as required to match the finish specified. Varnish or polyurethane type stains will not be allowed.
3. Sealers shall be polyurethane, same as used for top coats, thinned with thinner recommended by the manufacturer at the rate of about one part of thinner to four parts of polyurethane. Sealer may be omitted where pigmented, penetrating, or wiping stains containing resins are used.
4. Sealers and polyurethane shall be sanded between coats. Allow manufacturer's recommended drying time before sanding, but in no case less than 24 hours (36 hours in damp or muggy weather). Sanding shall be done using 220 grit sandpaper. Sand enough to scarify the surface to assure good adhesion of the subsequent coat to level roughly applied sealer and to knock off the "whiskers" of any raised grain as well as dust pinnacles. Sanding blocks shall be used for between coat sanding.
5. Finish application shall be done only in clean areas and in still air. Before finishing, the area shall be vacuumed and dusted. Immediately before applying finish, the surfaces shall be wiped down with a tack rag.

#### B. Stain Finish: Apply in successive coats as follows:

1. One coat of stain.
2. One coat of sealer.
3. Two coats of satin polyurethane finish.

#### C. Natural Finish: Apply in successive coats as follows:

1. One coat of sealer.
2. Two coats of satin polyurethane finish.

**Note:** Individual specification sections or notes on drawings may call for finishes or prefinished items different from what is specified in this section (i.e. factory finished; factory stained, etc.). Unless otherwise called for, abide by those finishes as noted or specified on drawings or specification sections.

### 3.9 REFINISHING

#### A. Existing interior and exterior work to be refinished shall include the following:

1. Interior:
  - a. Existing painted surfaces of rooms, areas and spaces in which alterations occur under this contract.
  - b. Existing surfaces of rooms, areas and spaces specified to be painted as selected.

09 91 00-11

- c. All other rooms, areas and spaces noted on the drawings to be refinished.
  - 2. Exterior: Existing painted surfaces damaged, altered or disturbed as result of work performed under this contract and surfaces specified to be painted, color as selected.
- B. Except as otherwise specified or noted on drawings, refinished rooms, areas and spaces shall be refinished as follows:
    - 1. Patched and damaged surfaces of walls shall receive prime, body and finish coats.
    - 2. Patched and damaged surfaces of ceilings, except prefabricated acoustical unit ceilings shall receive prime and finish coats.
    - 3. Undisturbed surfaces of patched and damaged walls and ceilings, except prefabricated acoustical unit ceilings shall receive body and finish coats.
    - 4. In corridors, paint refinished walls and ceilings to the nearest natural break (ie; corner, reveal, door frame, etc.)
    - 5. Painted windows (interior surfaces only), doors, door frames, convectors, railings, and all other previously painted items and trim shall receive body and finish coats.
  - C. In existing rooms and areas where new prefabricated acoustical units are required, clean any existing surfaces free of dust, dirt, grease, and other deterrents to adhesion.
  - D. In existing rooms and areas where alterations occur, clean existing stained and natural finished window, doors, door frames and trim; retouch abraded surfaces and then give entire surface one coat of varnish as required to match existing. After the varnish has fired, buff with fine (Grade 4/0) steel wool to eliminate any accumulated dust particles.
  - E. Existing exterior wood and metal work shall be painted one body coat and one finish coat as specified for similar new work.
  - F. Color and texture of paint, and color and texture of stain and varnish for clear finishes on wood shall match existing, unless otherwise selected.

### 3.10 WORKMANSHIP OF REFINISHED SURFACES:

- A. Rating work to be refinished shall have surfaces prepared and made smooth before refinishing.
- B. Surfaces shall be clean and dry before refinishing.
- C. Abraded, peeled and bare spots shall be touched-up before painting or refinishing.
- D. Refinishing of existing surfaces shall include preparation of surfaces to receive new finishes including removal of any existing finishes that may preclude application of new finishes. Remove all paint spots from hardware, signs, fixtures, and other similar items not required to be finished.
- E. Remove loose particles of dirt, dust, paint film, rust, scale, and similar deterrents to paint adhesion by scraping, brushing, sanding, vacuuming, or other suitable methods.

09 91 00-12



- F. Remove grease, soil, and other deterrents to paint adhesion with a cleaning compound, or solvent compatible with substrate and subsequent coats. The use of solvents, acid, or steam will not be permitted on concrete and masonry. Remove any traces of cleaning agents which will affect paint adhesion.
- F. Properly cut out loose or broken glazing compound on glazed doors, sash, etc., to sound material. Clean cut-outs and neatly re-putty with glazing compound.
- H. Holes, cracks, and other surface indentations shall be neatly filled with patching compound compatible with substrate and subsequent coats, appropriate for the surface texture required and finished to match adjacent surface texture.
- I. Knots, pitch streaks, etc., showing through old finish shall be coated with knot sealer before refinishing.
- J. Sand or dull glossy surfaces prior to painting. Sand existing paint to a feather edge so that transition between new and existing finish will not show in the finished work.
- K. Workmanship and material shall be equal to that specified for new work of similar character as required to match adjoining work.

### 3.11 SCAFFOLDS

- A. This Contractor shall provide all ladders, scaffolds, staging, etc., required for the proper execution of the work.

### 3.12 PROTECTION:

- A. Protect all work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.

### 3.13 EXTRA STOCK:

- A. Provide minimum one full gallon of each type and each color of paint specified and used on project. Each paint container to be properly labeled, identifying type and color.

### 3.14 CLEAN UP

- A. Upon completion, clean paint from all hardware, glass and other surfaces and items not required to be painted.
- B. Before final inspection, any work which has become damaged or discolored shall be touched-up or refinished in a manner to produce solid even color and finish texture, free from defects.

END OF SECTION

09 91 00-13



## SECTION 09 96 53

### WATERPROOF COATINGS

#### PART 1 GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Masonry Weatherproof Coating: Water based high-build elastomeric, 100% acrylic waterproof coating
2. Protection of weeps and drainage vents during coating application.

###### B. Related Sections:

1. Section 04 21 13 - Brick Masonry.

##### 1.2 REFERENCES

###### A. American Society for Testing & Materials (ASTM):

1. ASTM D968 - Abrasion Resistance of Organic Coatings by the Falling Abrasive Tester.
2. ASTM D822 - Operating Light and Water Exposure Apparatus (Carbon Arc Type) for Testing Paint, Varnish, Lacquer, and Related Products.
3. ASTM G26 - Operating Light-Exposure Apparatus (Carbon Arc Type) With and Without Water for Exposure of Nonmetallic Materials.

##### 1.3 QUALITY ASSURANCE

###### A. Applicator Qualifications: Properly trained and approved by the weatherproofing system manufacturer and have authorization to offer specified warranty. Submit installer letter of certification, signed by Technical Representative of system manufacturer.

###### B. Field Sample:

1. Apply masonry weatherproofing system to sample brick panel.
2. Reflect proposed color, texture, and workmanship.
3. Obtain acceptance of completed section from Architect before beginning work.

###### C. Pre-installation Conference:

1. Contractor shall arrange meeting no less than seven days prior to starting work.
2. Attendance:
  - a. Construction Manager
  - b. Coating Contractor
  - c. Architect/Owner's Representative
  - d. Coating Manufacturer Representative/Distributor.
3. Agenda:
  - a. Substrate condition.
  - b. Sequence and method of application of coating system.

09 96 53-1

## 1.4 SUBMITTALS

- A. Comply with Section 01 33 00.

## 1.5 PROJECT CONDITIONS

### A. Environmental Requirements:

1. Do not apply on frozen or frost-filled surfaces.
2. Do not apply if temperature is below 40 degrees F. or expected to fall below 40 degrees F within 24 hours.
3. Do not apply material if rain/ precipitation is expected within 24 hours of application.
4. Do not apply material to sloped (less than 60 degrees) or horizontal surfaces.
5. Protect material from freezing.
6. Protect surfaces from rapid drying where windy, hot, and dry conditions exist.
7. Avoid applying material during rapid and extreme changes in temperature to prevent thermal shock cracks during the curing process.

## 1.6 WARRANTY

### A. Provide five year material and labor warranty to cover:

1. Waterproofing above grade.
2. Bonding.
3. Weathering.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

#### A. Subject to compliance with requirements, provide coatings of the following manufacturers:

1. Master Builder Solutions by BASF (formerly Thoro System Products)

#### B. Substitutions: Must be submitted to the Architect for review prior to bidding.

### 2.2 HIGH BUILD, WATER-BASED, ELASTOMERIC, 100% ACRYLIC WATERPROOF COATING

#### A. Master Builder Solutions, by BASF: (formerly Thoro Systems)

1. Master Protect EL 750 Smooth (formerly Thorolastic)
  - a. Density, ASTM D1475: 11.2 to 12.2 lbs per gal (1.34 to 1.46 kg/L).
  - b. Solids Content, white, ASTM D5201:
    - i. By Weight: 64.2 percent.
    - ii. By Volume: 50 percent.
  - c. Viscosity, ASTM D562: 127 to 135 KU.
  - d. VOC Content, ASTM D3960: 0.32 to 0.42 lbs per gal (38 to 50 g/L), less water and exempt solvents.

09 96 53-2

- B. Performance Requirements: MasterProtect EL 750 (formerly Thorolastic Smooth), applied at 16 mils DFT:
1. Ultimate Elongation, ASTM D412: 344 percent.
  2. Elongation Recovery, ASTM D412:
    - a. After 10 Minutes: 96.9 percent.
    - b. After 24 Hours: 98.4 percent.
  3. Ultimate Tensile Strength, ASTM D412: 220 psi (1.5 MPa).
  4. Crack Bridging, PR EN 1062-7:
    - a. At minus 77 degrees F (minus 60 degrees C): 12 mils (0.3 mm).
    - b. At 32 degrees F (0 degrees C): 19.5 mils (0.5 mm).
    - c. At 73 degrees F (23 degrees C): 27.5 mils (0.7 mm).
  5. Flexibility, ASTM D522, at minus 30 degrees F (minus 34 degrees C): 1/8 inch (3 mm) mandrel.
  6. Pull-Off Strength Adhesion, ASTM D4541: 210 psi (1.4 MPa).
  7. Wind-Driven Rain, Federal Specification TT-C-555B: Passes.
  8. Water-Vapor Permeance, ASTM D1653: 10 perms.
  9. Carbon-Dioxide Diffusion, PR EN 1062-6:
    - a. R (equivalent air-layer thickness): 263 feet (80 m).
    - b. Sc (equivalent concrete thickness): 8 inches (20 cm).
  10. Accelerated Weathering, ASTM G23, Type D, 5,000 hours: Passes.
  11. Visual Color Change, ASTM D1729, 5,000 hours: Passes.
  12. Chalking, ASTM D4214, 5,000 hours: Passes.
  13. Freeze/Thaw Resistance, ASTM C67, 60 cycles: Passes.
  14. Salt-Spray Resistance, ASTM B117, 300 hours: Passes.
  15. Dirt Pick-Up, ASTM D3719, after 6 months exposure: 94.33 percent.
  16. Mildew Resistance, ASTM D3273 and 3274: No growth.
- C. Approximate Coverage Rate: 50 to 100 sq ft per gal (4.6 to 9.3 m<sup>2</sup>/L).
- D. Wet Film Thickness (WFT):
1. Smooth: 16 to 32 mils (406 to 813 microns).
- E. Dry Film Thickness (DFT):
1. Smooth: 8 to 16 mils (203 to 406 microns).
- F. Colors:
1. To match existing coating color.
- G. Texture:
1. To match existing coating.

09 96 53-3

## PART 3 EXECUTION

### 3.1 EXAMINATION AND PREPARATION

#### A. Examination:

1. Examine substrate to which finely textured coating is to be applied. Do not proceed if unsatisfactory conditions exist which hamper proper application.
2. Beginning of application means acceptance of substrate condition.

#### B. Preparation:

1. Surfaces to receive system shall be free of defects such as honeycombs, form marks, tie holes, concrete dropping, laitance, dirt, dust, grease, form release treatments, efflorescence, curing compounds, paint and any other foreign material.
2. Ensure that substrate is sound, clean, dry, and free of dust, dirt, oils, grease, laitance, efflorescence, mildew, fungus, biological residues, and other contaminants that could prevent proper adhesion.
3. Clean surface to achieve texture similar to medium-grit sandpaper.

#### C. Repair holes and spalled and damaged concrete with repair materials approved by coating manufacturer.

#### D. Remove protruding concrete accessories and smooth out irregularities.

#### E. When chemical cleaners are used, neutralize compounds and fully rinse surface with clean water. Allow surface to dry before proceeding.

#### F. Remove blisters or delaminated areas and sand edges to smooth rough areas and provide transition to existing paint areas.

#### G. Beginning of application means acceptance of substrate.

#### H. Concrete Surfaces:

1. Cure concrete a minimum of 28 days before application.
2. Remove laitance, bond-inhibiting contaminants, form-release agents, and sealers.
3. Remove form tie wires and repair holes, small voids, and spalls using appropriate repair product approved by coating manufacturer.
4. Abrasive-blast slick, dense concrete surfaces or use primer approved by coating manufacturer. Test surface for proper adhesion.

#### I. Brick Surfaces:

1. Ensure bricks are laid true and fully cured to full load-bearing capacity.
2. Remove mortar splatter and excess mortar.
3. Repoint or fill voids with appropriate patching product approved by coating manufacturer.
4. Ensure mortar joints are sound and free of voids and cracks.
5. Apply base coat approved by coating manufacturer to new bricks

09 96 53-4

#### J. Crack Preparation and Pretreatment:

1. Treat cracks larger than 1/32 inch (0.8 mm) and up to 1/16 inch (1.6 mm) with brush-grade acrylic crack filler approved by coating manufacturer.
2. Treat cracks larger than 1/16 by 1/16 inch (1.6 by 1.6 mm) but less than 1/4 by 1/4 inch (6 by 6 mm) with knife-grade acrylic crack filler approved by coating manufacturer.
3. Treat moving cracks larger than 1/4 by 1/4 inch (6 by 6 mm) with internally plasticized polyurethane sealant approved by coating manufacturer.
4. Apply test application of crack repair materials in inconspicuous location to ensure compatibility and aesthetic approval.

### 3.2 MASONRY WEEP VENT AND DRAINAGE VENT PROTECTION

- A. Weep vents and drainage vents are not to be coated. Protect as required during coating process.

### 3.3 MIXING

- A. Mix coating in accordance with manufacturer's instructions to ensure uniform color and aggregate disbursement and to minimize air entrapment.
- B. In multi-pail applications, mix contents of each new pail into partially used pail to ensure color consistency and smooth transitions from pail to pail.

### 3.4 APPLICATION

#### A. General:

1. Apply coating in accordance with manufacturer's instructions.
2. Apply coating as a 2-coat system.
3. Maintain proper uniform wet-film thickness during application to ensure performance characteristics desired.
4. Apply coating to achieve pinhole-free, consistent film build on coated surfaces.
  - a. Apply material by brush, roller, plaster type sprayer, or low pressure sprayer.
  - b. Back roll brushed or sprayed material; cross roll roller-applied material.
  - c. Finish material so that brush and roller strokes are on one direction

### 3.5 FIELD QUALITY CONTROL

- A. Unless noted otherwise, all exterior brick masonry and concrete surfaces shall receive complete and thorough coverage of specified masonry weatherproofing. Color to match existing and verified by Architect.
- B. Maintain schedule of application of system in field office for Owner/Architect's review.
- C. Protect applied coating from damage during construction.

09 96 53-5

### 3.6 EXTRA STOCK

- A. Provide minimum one gallon of each color of coating color used on project. Each container to be properly labeled, identifying color.

END OF SECTION

09 96 53-6



## SECTION 10 11 00

### VISUAL DISPLAY SURFACES

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes:
  - 1. Porcelain Enamel Steel Markerboards
  - 2. Tackboards

##### 1.2 RELATED SECTIONS

- A. Section 04 22 00 – Concrete Unit Masonry

##### 1.3 SHOP DRAWINGS/SUBMITTALS

- A. Complete materials list of all items proposed to be furnished under this section.
- B. Comply with Section 01 33 00.
- C. Manufacturer's recommended installation procedures.
- D. Samples: Provide Manufacturer's color charts and composition samples of face, core, backing and trim to illustrate finish, color and texture, where required.

##### 1.4 DELIVERY AND STORAGE

- A. Deliver all manufactured materials in original containers bearing manufacturer's name and brand. Store materials within building in locations directed by Owner.

##### 1.5 WARRANTY

- A. Provide a manufacturer's standard "Life-Of-Building" warranty for markerboard surface.

#### PART 2 PRODUCTS

##### 2.1 GENERAL REQUIREMENTS

- A. The Manufacturer of products used in this section must have an established reputation and experience in production similar apparatus for at least five or more years in the United States, with a history of satisfactory production acceptable to the Architect.
- B. Conforms to applicable code for flame/smoke rating in tack boards in accordance with ASTM E84.

10 11 00-1

## 2.2 PRODUCTS

- A. Markerboards and tackboards specified are to be manufactured by Claridge Products and Equipment, Inc., Peter Pepper Products, Gamco, Greensteel, or approved alternate. Items specified herein will be Claridge models.
- B. Fixed Markerboard / Tackboards
  - 1. Arrangement as shown on drawings, Series 4, 4'-0" high Length as scheduled on drawings. Frame color to be standard anodized aluminum.
    - At Marker boards - Provide with continuous flat tray and 1" map rail with cork insert at markerboard only.
  - 2. Markerboard to be LCS<sup>3</sup> #100 Low Gloss White (marker and projection surface), 24 gauge, white porcelain enamel steel.
  - 3. Tackboards will be 4'-0" high bulletin board, 1/4" cork on 1/4" hardboard, with Designer fabric covering. Length as shown on specialty plans. Fabric color to be selected from manufacturer's standard colors.
  - 4. When tackboard is scheduled and shown next to markerboard, all to be integral.
  - 5. Provide 1 flag holder per classroom at marker board map rail. Coordinate install location with Architect.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Coordinate installation of all concealed blocking in wall for attachment.

### 3.2 INSTALLATION

- A. Comply with manufacturer's instructions. Provide all accessories as required for complete installation
- B. Hang units true and plumb.
- C. All attachments are to be concealed. No exposed fastener clips.

### 3.3 PROTECTION

- A. Protect units after installation from other trades.

### 3.4 SCHEDULES

- A. Refer to drawings for sizes and locations

END OF SECTION

10 11 00-2

## SECTION 10 14 00

### IDENTIFYING DEVICES

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Provide all labor, materials, fabrications and coordination required to install complete, in place interior signage.

##### 1.2 QUALITY ASSURANCE

- A. Qualifications of Manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

##### 1.3 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.
- B. Manufacturers must submit 3 references showing products for projects completed within the last 6 years.
- C. Submit manufacturer's technical data and installation for each type of sign required.
- D. Submit shop drawings listing sign size, letterform and letter heights.
- E. Submit one full size sample sign of type, style and color specified, including method of attachment. If approved, the sample will become part of the job.
- F. The manufacturer's recommended installation procedures, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.

##### 1.4 SIGN TYPE DESCRIPTION

- A. Signage shall consist of room number and room function to meet the requirements of the Americans with Disabilities Act (ADA).

##### 1.5 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during and after installation and to protect installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

10 14 00-1

## 1.6 REFERENCES

- A. Comply with State of Arkansas Adopted ADA Accessible Guidelines in regard to accessible or handicapped features.

## PART 2 PRODUCTS

### 2.1 ROOM IDENTIFICATION:

- A. Provide products from Mohawk Sign Systems, Inc.® P.O. Box 966, Schenectady, NY 12301-0966. 518/ 370-3433 or FAX 518/ 370-3332, equivalent by Archway Graphic Designs, Little Rock, AR, Best Sign Systems, Montrose, CO, or approved alternate substitution.
- B. Substitutions: Other manufacturers must submit their signage products to the Architect 10 days prior to the bid date for approval to be considered for substitution.
- C. Colors: Architect to select colors from manufacturer's standard color selection.

### 2.2 GRAPHIC PROCESS

- A. All signs shall be manufactured using Graphic Process Series 200A - Sand Carved® using Format D.
  - 1. Tactile characters shall be raised the required 1/32" inches from sign face. Glue-on letters or etched backgrounds are not acceptable.
  - 2. All text shall be accompanied by Grade 2 braille with domed dots. Braille shall be separated 1/2" from the corresponding raised characters or symbols. Grade 2 braille translation to be provided by signage manufacturer.
  - 3. All letters, numbers and/or symbols shall contrast with their background, either light characters on a dark background or dark characters on a light background. Characters and background shall have a non-glare finish.
- B. Plaque material shall be Special Purpose SP125 decorative thermosetting high pressure laminate. Material to be 1/8" thick laminate with a melamine resin surface and a phenolic resin core which provides resistance to abrasion, stains, alcohol, solvents, boiling water, and heat. The material shall be NEMA rated and have flammability and smoke values that meet the standards for flammability of interior materials.
- C. Background color as selected by architect from manufacturer's actual color samples.
- D. Letterform shall be Gill Sans upper case letters and numbers
- E. Size of letters and numbers shall be as follows:
  - 1. Room numbers shall be 1".
  - 2. Lettering for room ID signs shall be 5/8" or as noted.
  - 3. Symbol size shall be 4".
  - 4. Standard Grade 2 braille shall be 1/2" below copy.
  - 5. Corners: 1/2" radius

10 14 00-2

F. Copy position: As indicated on drawings.

## 2.3 SIGN DESIGN

A. Refer to drawings for sign types.

## PART 3 EXECUTION

### 3.1 INSPECTION

A. Examine the areas, conditions and surfaces where work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

### 3.2 SURFACE PREPARATION

A. Cleaning: Immediately prior to installation of the work of this Section, thoroughly clean all substrata and remove all oil, grease, paint, varnish hardeners, and other items which would adversely affect the bond of adhesive.

B. Smoothing: Make all substrata level and free from irregularities.

### 3.3 INSTALLATION

A. Install all graphic materials and identifying devices in strict accordance with the approved shop drawings and the manufacturer's instructions.

B. Signs shall be mounted using vinyl tape and silastic adhesive. Mechanical for Exterior signage. Unless noted otherwise, all signs shall be mounted 60" from the floor to the top of the sign on the latch side. Center of sign is to be 9" from doorframe or room opening and edge of sign. Installer user assumes responsibility for suitable installation of the signs.

### 3.4 CLEANING UP

A. Thoroughly clean all graphics and identifying devices after installation and prior to final acceptance by the Owner. Use only those cleaning materials and methods recommended by the respective manufacturers.

### 3.5 PROTECTION

A. Provide any and all necessary protective measures or materials to insure that graphic materials and identifying devices are not damaged prior to acceptance by Owner. Replacement or repairs caused by such damage shall be corrected immediately at this Contractor's expense.

10 14 00-3

### 3.6 COORDINATION

- A. Throughout construction of substrate surfaces, use all means necessary to ensure proper and adequate provision for concealed support devices, and for finished openings, to receive the work of this Section.

END OF SECTION

10 14 00-4

## SECTION 10 14 19

### ALUMINUM LETTERS AND NUMERALS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes:
  - 1. Furnishing and mounting of aluminum letters and numerals.

##### 1.2 SUMMARY

- A. Comply with requirements of Section 01 33 00.
- B. Submit letter layout following determination of verbiage through Contractor to Architect in accordance with General Conditions.

##### 1.3 SIZE AND VERBIAGE

- A. NAME:
  - 1. Verbiage: Upper case 10” high letters as follows:
    - a. INNOVATIVE LEARING CENTER
  - 2. Verbiage: Upper Case 6” high letters as follows:
    - a. ROGERS PUBLIC SCHOOLS
  - 3. Verbiage: Upper case 10” high numerals as follows:
    - a. 109

#### PART 2 PRODUCT

##### 2.1 MATERIAL

- A. Cast aluminum letters and numerals where shown on the drawings shall be as manufactured by A.R.K. Ramos Oklahoma City, OK, The Southwell Co., San Antonio, TX, OMC Industries, Inc., Gemini Incorporated, CannonFals, Minnesota, or approved alternate.
- B. Letters and numerals shall be Helvetica Medium 521.
- C. Letters and numerals shall be cast from F-214 aluminum alloy, 1” thick.
- D. Letters and numerals shall be finished in F6D Aluminum, dark bronze 313 Duranodic.

10 14 19-1

## PART 3 INSTALLATION

### 3.1 EXECUTION

- A. Letters and numerals shall be mounted to masonry wall.
- B. Letters and numerals shall be PM-1 projected mounting, minimum ½” from mounting surface, using extended masonry anchors or threaded screws. Set anchors in epoxy cement. Holes to be thoroughly cleaned prior to setting.

END OF SECTION

10 14 19-2



## SECTION 10 28 13

### TOILET AND BATH ACCESSORIES

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. The work to be completed under this heading consists of furnishing all labor, materials, equipment and services necessary for and reasonably incidental to the furnishing and application of all miscellaneous items as shown and as specified.
- B. All items shall be delivered in sound condition, properly installed and shall be clean, undamaged, and in proper working order.

##### 1.2 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.

##### 1.3 REFERENCES

- A. Comply with State of Arkansas Adopted ADA Accessible Guidelines in regard to accessible or handicapped features.

#### PART 2 PRODUCTS

##### 2.1 OWNER FURNISHED TOILET ACCESSORIES:

- A. Owner will furnish soap dispensers, tissue dispensers, paper towel dispensers, and sanitary napkin disposals. These items are to be installed by contractor.

##### 2.2 TOILET ACCESSORIES:

- A. Mop Racks: (One for each mop or service sink shown on drawings.)
  - 1. Stainless steel, satin finish; anti-slip mop holders with spring loaded, rubber cam w/3 holders.
    - a. Bobrick Washroom Equipment, Inc., Model B-223 x 24
    - b. Bradley Corp. Model 9953.
    - c. Approved alternate.
- B. Pre-manufactured Wall Mounted Mirrors: (One at each wall-hung lavatory.)
  - 1. Standard Stainless Steel Mirrors:
    - a. Surface mounted, center over each lavatory, 304 stainless steel, satin finish frame with No. 1 quality ¼" glass, mirror warranted against silver spoilage for 15yrs. Galvanized steel back, 18"x36". Secure to concealed wall hanger with theft-resistant mounting. Mounting height as scheduled on Drawings.
    - b. Acceptable Products:

10 28 13-1

Bobrick Washroom Equipment, Inc. - Model B-290-1836  
Bradley Corporation, Model 780-1836

- C. Grab Bar-Toilet Rooms: (One set at each handicapped water closet.)
1. 18 gage stainless steel; 1 1/2" diameter, safety grip surface; concealed mounting. One at each handicapped water closet.
    - a. Model No. B6806.99 x 42, B6806.99 x 36 & B6806.99 x 18 by Bobrick.
    - b. Model No. 8122-00142, 8122-00136 & 8122-00118 by Bradley.
    - c. Or approved alternate.
- D. Baby Changing Stations: Wall mounted baby changing stations and associated accessories.
1. Frame and Hinge Mechanism: Concealed 11-gauge chassis, compromised of 1" diameter integral steel-tubing that supports the changing bed and interacts with 11-gauge steel wall mounting bracket to provide steel-on-steel hinge stop. The wall frame shall serve as wall-mounting bracket.
  2. Bed Surface: injection molded polypropylene with Microban® antimicrobial additive, and ISO 22196 tested for efficacy.
  3. Size:
    - a. Surface mounted unit: 35 15/16" by 20 3/4" by 4" deep.
  4. Mounting: Surface
    - a. Mounting height: 35" to changing surface from floor.
  5. Surface is contoured, concave and smooth. Bed surface shall be minimum 535 sq. in.
  6. Dual Cavity Dispenser: Includes integral spring tab to make dispensing bed liners and diaper disposal sacks easier. Total 50 liner capacity. Equipped with tumbler lock, keyed alike Bobrick restroom accessories.
  7. Performance: Unit has minimal deflection from 90 degrees with a 200 lbs. static load placed in the center of the changing surface. Unit exceeds ASTM Standard F2285 static load requirement of 100 lbs.
  8. Complies with requirements applicable in the jurisdiction of the project, including but not limited to ADA, ICC A1171.1, International Building Code (IBC), and state building code requirements as applicable. Also complies with ASTM Standard F2285, Standard Consumer Safety Performance Specification for Diaper Changing Stations for Commercial use and EN 12221 for changing units for domestic use.
  9. Operation: Concealed pneumatic cylinder providing controlled opening and closing of the changing station bed.
  10. Instruction Graphics: Universal instruction graphics and safety messages in multiple languages.
  11. Safety Straps: Replaceable, restraining straps.
  12. Acceptable product/manufacturer: Horizontal Surface Mounted Baby Changing Station, Model KB300, manufactured by Koala Corporation, Denver, CO, 800-985-6252, or approved alternate.
  13. Provide with five (5) year manufacturer's limited warranty.
  14. Color to be selected by Architect from minimum 3 colors.

10 28 13-2

## PART 3 EXECUTION

### 3.1 FABRICATION:

- A. Stamped names or labels on exposed faces of toilet accessory units are not permitted. Wherever locks are required for particular type of accessory, provide same keying throughout project. Furnish two keys for each lock, properly identified.
- B. Surface Mounted Accessories: Fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous piano hinge or minimum of two 1 1/2" pin hinges of same metal as unit cabinet. Provide concealed anchorage wherever possible.

### 3.2 INSTALLATION:

- A. Install toilet accessory units in accordance with manufacturer's instructions, using fasteners appropriate to substrate and recommended by manufacturer of unit.
- B. Install units at location and heights as shown on drawings. Install as to comply with all national, state, and local codes and regulations. Units shall be plumb and level, firmly anchored.
- C. If mirrors are installed on ceramic tile, coordinate tile pattern and layout to accommodate mirrors. Mirror to be installed on single plane.
- D. Molly-type anchors are not acceptable for securing accessories to walls or partitions. Secure to gypsum board partitions with screws anchored in wood blocking. Anchor accessories to masonry walls with screws set in epoxy.
- E. Where mounting grab bars to existing gypsum board walls, anchor with WingIt model 251-4 wall anchor, manufactured by WingIt Innovations, Inc. Install per manufacturer's instructions.

### 3.3 ADJUSTING AND CLEANING:

- A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly.
- B. Clean and polish all exposed surfaces after removing protective coatings.

END OF SECTION

10 28 13-3



## SECTION 10 44 00

### FIRE EXTINGUISHERS & CABINETS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Work under this heading consists of furnishing all labor, materials, equipment and services necessary to install fire extinguisher and cabinets as shown or called out on drawings.

##### 1.2 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.

#### PART 2 PRODUCTS

##### 2.1 MATERIALS

- A. Furnish where called for on drawings, semi-recessed, enameled steel case with "Larsen-Loc" door latching mechanism, solid door, with red fire handle plate, Larsen 2409-6R, J.L. Industries 1017, or approved alternate. Where fire rated cabinets are called for, provide FS-2409-6R by Larsen, J.L Industries, or approved equal. Verify semi-recessed cabinet will fit in provided wall thickness. Break-glass doors will be acceptable only if approved company has no equal to "Larsen-Loc".
- B. Furnish multi-purpose dry chemical extinguisher, Larsen MP10, J.L. Industries Cosmic 10E, or approved equal in each fire extinguisher cabinet.
- C. Provide extinguishers with wall mounted brackets where called for on drawings.

#### PART 3 EXECUTION

##### 3.1 INSTALLATION:

- A. Accurately locate all items, install level, plumb, and true. See Plans for required locations. Rigidly attach to the supporting surfaces in the manner recommended by the manufacturer. Install cabinet as required to provide 48" from finished floor to extinguisher handle.

END OF SECTION

10 44 00-1



## SECTION 11 66 19

### WALL PADS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Furnish all labor, material and services required to completely furnish:
  - 1. Wall Pads

##### 1.2 SUBMITTALS

- A. Submit product data sheets and shop drawings, complying with Section 01 33 00.

#### PART 2 PRODUCTS

##### 2.1 WALL PADS

- A. Wall Protection Pads
  - 1. Type: Fabric covered foam wall protection pads; Wall Pads as manufactured by Draper, Porter, Performance Sports, ACI, or approved equal.
  - 2. Pad size: 24 by 72 inches.
  - 3. Cushioning foam material:
    - a. 2 inches thick polyurethane or polyethylene foam
    - b. Flammability – Class A
  - 4. Backer: 7/16 inch wafer board
  - 5. Cover: Solid vinyl coated polyester fabric with embossed pattern:
    - a. Weight: 14 ounces per SY.
    - b. Tear resistance: 65 pounds.
    - c. Resistant to rot, mildew, and ultraviolet light.
    - d. Flammability: Class A.
    - e. Color: To be selected from standard colors by the Architect.
    - f. Construction: Cushioning material adhered to backer and panel fully wrapped with fabric which is stapled to backer such that backer is not exposed on front or sides.
    - g. Attachment: Provide pads with Z mounting clips top and bottom.

#### PART 3 EXECUTIONS

##### 3.1 EXAMINATION

- A. Verification of Conditions: Verify areas to receive equipment items free of impediments interfering with installation and conditions of installation substrates and structure are acceptable to begin installation.

### 3.2 INSTALLATION

- A. Install wall pads in accordance with manufacturer's installation instructions and final shop drawings. Provide accessories, anchors, fasteners, inserts and other items for installation and permanent attachment to adjoining construction.
- B. Wall padding is to be installed in alignment with adjacent wall pad to create level horizontal and vertical edges.
- C. Wall Pads: Field verify dimensions prior to fabrication.
- D. Wall Pads:
  - 1. Install in accordance with manufacturer's written instructions and shop drawings.
  - 2. Mount protection pads directly above finished floor.
  - 3. Secure to wall with fasteners along top and bottom. Type, size and spacing of fasteners as recommended by manufacturer.

### 3.3 ADJUSTMENT AND CLEANING

- A. Cleaning: Clean installed pads on both exposed and semi-exposed surfaces. Touch-up finishes to restore damaged or soiled surfaces.

### 3.4 PROTECTION

- A. General: Provide final protection and maintain conditions to ensure pads are without damage or deterioration at time of substantial completion.

### 3.5 MAINTENANCE AND OPERATION

- A. General: Transmit to Owner both operation and maintenance instructions of all wall and column padding.

END OF SECTION



## SECTION 22 01 00

### GENERAL PLUMBING PROVISIONS

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. The work covered by Division 22 sections consist of furnishing all labor, equipment, appliances and material for the heating, air conditioning, piping and plumbing systems in strict accordance with Codes, Specifications 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.
- B. General Contractor shall install all concrete pads and bases required for installing mechanical equipment. Mechanical Contractor is responsible for the exact sizes required, location of anchor bolts, etc.
- C. Some equipment may be furnished by other divisions. Mechanical Contractor is responsible to check the drawings and specifications for equipment that will be furnished by others. Furnish the supplies (hot and cold water cut-offs), traps, drains, controls, gas piping, backflow preventers, pressure reducing valves, etc., on all equipment furnished by other divisions.
- D. General Contractor shall furnish and install all ceiling access panels required to service mechanical equipment, valves and controls above gyp board or hidden spline ceilings.
- E. General Contractor shall provide all site drive, sidewalk and other surfaced areas saw cutting and repairs back to preexisting conditions for the required mechanical piping. Mechanical Contractor shall provide the trenching, bedding and backfill required for the pipe installation.

##### 1.2 RELATED SECTIONS

- A. The General Conditions and Division 1, General Requirements, as bound in the specification preamble, apply to all work under Division 22. Carefully note its contents in performance of the work.
- B. The Architectural, Fire Suppression, Mechanical, Electrical and Structural plans and Specifications, including Information to Bidders and other pertinent documents issued by the Engineer are a part of this Specifications and the accompanying mechanical

22 01 00-1

plans. Comply with them in every respect. Examine all the above carefully. Failure to comply does not relieve the Contractor of responsibility nor may it be used as a basis for additional compensation due to omission of architectural, electrical and structural details from the mechanical drawings.

- C. All electrical power wiring is specified under Division 26 of the Specifications. Mechanical Contractor shall furnish all motor starters required for the control and protection of all motors furnished for the Division 22.
- D. All concrete pads and bases required for installing mechanical equipment are specified in another section of the Specifications. Advise the General Contractor as to the exact sizes required, location of anchor bolts, etc.
- E. Paint all mechanical equipment, piping, supports and other exposed material. Do not paint indoor equipment supplied with painted finish, such as the main mechanical equipment unless damaged during handling and installation. In such cases, use touch-up paint of the same type and color as original paint. Conform to requirements in other sections of the Specifications and match wall finish to the room in which installed.

### 1.3 CODES, FEES AND LATERAL COSTS

- A. Comply with all applicable codes, specifications, local ordinances, industry standards, utility company regulations, and the applicable requirements of the following latest nationally accepted codes and standards:
  - 1. 2021 Rogers, Arkansas City Building Code.
  - 2. 2021 Arkansas State Mechanical Code.
  - 3. 2018 Arkansas State Plumbing Code.
  - 4. 2014 Arkansas Energy Code.
  - 5. 2021 IBC - International Building Code.
  - 6. IFC - International Fire Code; latest accepted edition.
  - 7. IGC - International Gas Code; latest accepted edition.
  - 8. IPC - International Plumbing Code; latest accepted edition.
  - 9. IMC - International Mechanical Code; latest accepted edition.

22 01 00-2

10. IECC - International Energy Conservation Code; latest accepted edition.
  11. AMCA - Air Moving & Conditioning Association.
  12. ASA - American Standards Association.
  13. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.
  14. ASME - American Society of Mechanical Engineers.
  15. ASTM - American Society of Testing Materials.
  16. AWWA - American Water Works Association.
  17. NBS - National Bureau of Standards.
  18. NEMA - National Electrical Manufacturers Association.
  19. NFPA - National Fire Protection Association.
  20. SMACNA - Sheet Metal & Air Conditioning Contractors' National Association.
  21. UL - Underwriters' Laboratories, Inc.
  22. AGA - American Gas Association.
  23. OSHA - Occupational Safety and Hazard Association.
  24. AABC - Associated Air Balance Councils.
  25. NEBB - National Environmental Balancing Bureau.
- B. Comply with State of Arkansas adopted ADA Accessible Guidelines in regard to accessible or handicapped features.
- C. In case of difference between building codes, Specifications, state Laws, local ordinances, industry standards and utility company regulations and the Contract Documents, the most stringent governs. Promptly notify the Engineer in writing of any such difference.
- D. Remove any work installed that does not comply with the requirements of the applicable building codes, state laws, local ordinances, industry standards, or utility company regulations, correct the deficiencies, and reinstall all work at no cost to the

22 01 00-3

Owner.

- E. The mechanical drawings show the general arrangement of all piping, equipment and appurtenances. Follow as closely as actual building construction and the work of other trades will permit. Final layout will be governed by actual field conditions with all measurements verified at the site. Conform to the requirements shown on all of the drawings. General and structural drawings take precedence over mechanical drawings. Because of the small scale of the mechanical drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. Investigate the existing and finish conditions affecting the work and arrange the work accordingly, providing such fittings, valves and accessories as may be required to meet such conditions. Contractor shall verify that all equipment, ducts, pipes and all other components will fit in the space provided before fabrication or ordering.
- F. Obtain any and all required permits in connection with this work under the Contract and pay any and all fees in connection therewith. Arrange with the serving utility companies for the connections to all utilities and pay all charges for same including inspection fees and meters if required. Refundable deposits will be paid by the Owner.

#### 1.4 GUARANTEE

- A. Furnish a written certificate guaranteeing all materials, equipment and labor furnished to be free of all defects for a period of one (1) year from and after the date of final acceptance of the work by the Owner and further guarantee to replace such work without charges if any defects appear within the stipulated guaranty period.

#### 1.5 SOIL CONDITIONS

- A. The Specifications and the drawings in no way imply the conditions of the soil to be encountered. When excavating may be required in execution of the work, this Contractor agrees that he has informed himself regarding conditions affecting the work.

#### 1.6 INSPECTION OF PREMISES

- A. Before submitting a bid, visit the site of the proposed job and determine the conditions relating to this work.

22 01 00-4

## 1.7 UTILITIES, LOCATIONS AND ELEVATIONS

- A. Locations and elevations of the various utilities included within the scope of this work have been obtained from substantially reliable sources and are offered as a general guide only, without guarantee as to accuracy. Verify the location and elevation of all utilities and their relation to the work before entering into a contract.
- B. Identify outdoor underground lines with continuous strip of plastic utility marker tape at regular intervals (maximum of 10 feet) "Caution (state utility) pipe below". Install one foot directly above pipe before backfilling to grade.

## 1.8 EXISTING BUILDING AND EXISTING MECHANICAL EQUIPMENT

- A. Visit the existing building and become thoroughly acquainted with the existing physical plant, mechanical systems and utilities in order to determine all of the work that will be necessary to carry out the intent of the plans and specifications.
- B. If it is necessary, in any way, to interfere with normal operations of the existing utilities in order to carry out the work, give notice and obtain written approval from the Owner before the work is started.
- C. The work involved in this project requires the Contractor to work inside of an existing building. Interruption of the regular routine of the building by the Contractor must be kept to a minimum.

## 1.9 EQUIPMENT NOT SPECIFIED UNDER DIVISION 22

- A. Equipment which requires plumbing and other mechanical connections may be specified in another division of this Specification. Under these conditions, provide necessary utilities including waste, water and natural gas.
- B. Rough-in work from approved shop drawings only.

## PART 2 PRODUCTS

### 2.1 EQUIPMENT AND MATERIALS

- A. Provide new materials bearing the manufacturer's name, trade name and the UL label in every case where a standard has been established for the particular material. Furnish the standard product of a manufacturer regularly engaged in the production of the required type of equipment. Provide the manufacturer's latest approved design.

22 01 00-5

- B. Deliver equipment and materials to the site and store in original containers, suitably sheltered from the elements, but readily accessible for inspection by the Engineer until installed. Store all items subject to moisture damage (such as controls) in dry, heated spaces.
- C. Provide equipment and materials of the same general type and of the same make throughout the work to provide uniform appearance, operation and maintenance.
- D. Tightly cover equipment and protect against dirt, water and chemical or mechanical injury and theft. At the completion of the work, clean fixtures, equipment and materials and polish thoroughly. Turn over to the Owner in a condition satisfactory to the Engineer. Repair damage or defects developing before acceptance of the work at no expense to the Owner.
- E. Insure that items to be furnished fit the space available. Make necessary field measurements to ascertain space requirements, including those for connections. Furnish and install such sizes and shapes of equipment that the final installation suits the true intent and meaning of the drawings and Specifications.
- F. Follow manufacturer's directions completely in the delivery, storage, protection and installation of all equipment and materials. Promptly notify the Engineer in writing of any conflicts between any requirements of the Contract Documents and the manufacturers' directions. Obtain the Engineer's written instruction before proceeding with the work. Replace any work that does not comply with the manufacturers' directions or such written instructions from the Engineer, at no cost to the Owner.
- G. Support all products by service organizations with adequate spare parts inventory and personnel located reasonably close to the site.
- H. Where multiple units of the same type or class of products are required, provide all units of the same manufacturer.

## 2.2 EQUIPMENT ACCESSORIES

- A. Furnish and install all equipment, accessories, connections and incidental items necessary to fully complete all work, ready for use, occupancy and operation by the Owner.
- B. Where equipment requiring different arrangement or connections from those shown is provided, install the equipment to operate properly and in harmony with the intent of the drawings and Specifications.

22 01 00-6

- C. Support, plumb, rigid and true to line, all work and equipment furnished. 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 provide extra steel bolts, inserts, pipe stands, brackets and accessories for proper supports whether or not shown on the drawings. When directed, submit drawings showing supports.
- D. If accessories are required to complete the work and meet the intent of the specification, it is the responsibility of the Contractor to provide such accessories.

### 2.3 MATERIAL AND EQUIPMENT SCHEDULE

- A. Submit to the Engineer as soon as practical, six (6) complete sets of the schedule of materials and equipment proposed for the installation. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data and submit under one cover with an index sheet in front.
- B. Provide written certification that shop drawings are in accordance with the specifications and are dimensionally correct with reference to available space.
- C. All submittals will be reviewed a maximum of two (2) times. The cost of additional submittal reviews beyond those two specified will be charged to the Contractor.
- D. Shop drawings for the Engineer's files are required on the following items:
  - 1. Commercial water heaters.
  - 2. Plumbing fixtures, floor and roof drains.
  - 3. Valves/Circulation pumps/flex connectors and other specialties.
  - 4. Water balance certification.
  - 5. Piping materials including valves.
  - 6. Piping insulation materials.
  - 7. Complete mechanical equipment electrical data and wiring details.

### 2.4 EQUIPMENT AND MATERIAL SUBSTITUTIONS

- A. It is the responsibility of the Contractor to investigate any desired substitutions for specified equipment prior to submission of his bid. The Mechanical Contractor shall

22 01 00-7

be responsible for any changes required in mechanical, electrical, structural or vibration isolation systems and shall bear all cost for those changes whether the substitute equipment is named by manufacturer in the specifications or is submitted to the Architect for "or equal" consideration. All changes shall be accomplished in a manner acceptable to the Architect per Section 01 60 00 at no additional cost to the Owner.

- B. In order to obtain prior approval on equipment or material not specified in Division 22 Specifications or Equipment Schedules, Mechanical Contractor MUST submit to the Engineer any proposed equipment or material ten (10) working days prior to the bid date.
- C. If ANY substitute equipment is submitted to Engineer for approval, without said equipment having been pre-approved, the entire submittal will be rejected for resubmittal.
- D. Any equipment manufacturers which are a subsidiary to the listed acceptable manufacturers are not considered equal. Therefore, it is the responsibility of the Contractor and equipment supplier to obtain prior approval as described in paragraph 2.4, this Section.

## 2.5 ELECTRICAL MOTORS

- A. Provide motors of a recognized manufacturer, wound for the voltage specified, and in conformance to latest standards of the manufacturer and performance of the National Electrical Manufacturers Association and the Institute of Electrical and Electronic Engineers. Provide motors as manufactured by General Electric, Westinghouse, Century or Siemens-Allis, Baldor or approved equal.
- B. Provide motors rated for continuous duty at 100% of rated capacity and temperature raise of 40 degrees Centigrade open type; 50 degrees Centigrade drip and splash proof; 55 degrees Centigrade explosion proof and totally enclosed above an ambient of 40 degrees Centigrade.
- C. Unless otherwise required, provide integral horsepower, polyphase motors, Class B, general purpose, squirrel cage, open type induction motors, T-frame.
- D. Provide single phase fractional horsepower motors of the open capacitor type. Generally, motors under 1/2 horsepower may be split phase type unless otherwise specified. Provide motors rated 1/2 horsepower or less with integral overcurrent protection.

22 01 00-8



- E. Insure the insulation resistance between stator conductor and frames of motors is not less than 1/2 megohm. Provide shop test of motors including temperature rise, insulation resistance, motor terminal voltage, normal operating line current, RPMs, breaker or switch size with fusing and overload relay sizes.

## PART 3 EXECUTION

### 3.1 COORDINATION OF WORK

- A. Compare the mechanical drawings and Specifications with the drawings and Specifications for other trades and report any discrepancies between them to the Engineer and obtain from him written instruction for changes necessary in the mechanical work. Install the mechanical work in cooperation with other trades installing inter-related work. Before installation, make proper provisions to avoid interferences in a manner approved by the Engineer. Make all changes required in the work caused either by neglect or existing field conditions at no cost to the Owner.
- B. It is the responsibility of the General Contractor, Mechanical Contractor, Electrical Contractor and Sprinkler Contractor to coordinate installation of all equipment. Equipment installed prior to proper coordination, which interferes with the harmony and intent of the specifications and drawings, will be removed and reinstalled at the cost of the responsible Contractor.
- C. Furnish anchor bolts, sleeves, inserts and supports required for the mechanical work. Locate anchor bolts, sleeves, inserts and supports as directed by the trade requiring them and insure that they are properly installed.
- D. Adjust locations of pipes, ducts, equipment fixtures, etc., to accommodate the work and for interferences anticipated and encountered. Determine the exact route and location of each pipe and duct prior to fabrication.
  - 1. New work and remodeled areas are to interface with existing facility services. Contractor to familiarize himself with the extent of the work prior to submitting his bid. Failure to gain familiarity will not be grounds for additional compensation.
  - 2. Provide right-of-way to lines that pitch over those that do not pitch. For example, Plumbing drains normally have right-of-way. Lines whose elevations cannot be changed have the right-of-way over lines whose elevations can be changed.

22 01 00-9

3. Make offsets, transitions and changes in direction in pipes and ducts as required to maintain proper head room and pitch.
- E. Install all mechanical work to permit removal without damage to other parts, to coils, fan shafts and wheels, filters, belt guards, sheaves and drives and all other parts requiring periodic replacement or maintenance. Arrange pipes, ducts and equipment to permit ready access to valves, cocks, traps, starters, motors, control components and to clear the openings of swinging and overhead doors and of access panels.

### 3.2 CHLORINATION OF DOMESTIC WATER LINES

- A. After the hot and cold water systems are complete, all fixtures connected, the system flushed out completely and the shut-off valve to the water main closed, fill the system with a solution containing 50 parts per million of available chlorine. Allow the solution to stand six (6) hours before flushing and returning to service.
- B. Then fill the system with a solution containing 100 parts per million of available chlorine. Allow this solution to stand two (2) hours before flushing and returning to service.
- C. Notify the Owner twenty-four hours prior to test so his representative can witness test. Obtain chemical analysis of the domestic water lines after chlorination from a Certified Chemist and submit the results of these tests to the Engineer and Owner.

### 3.3 RECORD DRAWINGS

- A. Maintain record drawings showing exact locations and sizes, as actually installed, of piping, drains, cleanouts, ductwork, controls and equipment as specified herein. Deliver to the Owner/Architect upon completion and acceptance of the work, one (1) complete set of contract drawings marked to indicate all deviations from intended installation.

### 3.4 CUTTING AND PATCHING

- A. The General Contractor shall be responsible for all required cutting, patching, etc., incidental to this work and shall make all required repairs thereafter to the satisfaction of the Engineer. Do not cut into any major structural element, beam or column without the written approval of the Engineer.
- B. Cut, patch, repair and/or replace pavements, sidewalks, roads and curbs as required to permit the installation of the work and pay all expenses incurred for this work.

22 01 00-10

### 3.5 EXCAVATION AND TRENCHING FOR PIPING

- A. Excavate to the depths indicated on the Drawings or as required to provide adequate slope and burial depth. Excavated materials not required or suitable for backfill or fill shall be removed from the site. Do such grading as is necessary to prevent surface water from flowing into trenches or other excavations. Water accumulating therein shall be removed by pumping or by other method. Sheeting and shoring shall be installed as may be necessary for protection of the work and for safety of personnel. Excavation shall be by open cut except that short sections of a trench may be tunneled if the pipe can be safely and properly installed and backfill can be properly tamped in such tunnel sections.
- B. Trench Excavation: Grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil. Where rock is encountered excavate to a minimum overdepth of 4" below trench depths indicated on the Drawings or specified. Overdepth in rock excavation and unauthorized overdepths shall be backfilled. Whenever wet or otherwise unstable soil incapable of properly supporting the pipe is encountered such soil shall be removed and the trench backfilled to proper grade as hereinafter specified.
- C. Depth of Cover: Trenches shall be of depth that will provide three feet (3') minimum cover for domestic water, fire lines, sanitary and storm sewers from existing grade or from indicated finish grade, whichever is lower, unless otherwise specifically shown.
- D. Utilities Locating: Locate existing utility lines prior to beginning any excavation
- E. Protection of Existing Utilities: Existing utility lines to be retained that are shown on the Drawings or the locations of which are made known to the Contractor prior to excavation, as well as all utility lines uncovered during excavation operations, shall be protected from damage during excavation and backfilling, and if damaged, shall be repaired by the Contractor, at his expense.
- F. Trenches shall not be backfilled until required pressure and other tests have been performed and until the utilities systems as installed conform to requirements of Drawings and Specifications.
- G. Backfill trenches with excavated materials consisting of earth, sandy clay, sand, gravel, soft shale or other approved materials, free from clods of earth or stones 2-1/2" maximum dimension, deposited in 6" layers and compacted to 95% Standard Proctor Compaction Test of the maximum laboratory density determined in accordance with

22 01 00-11

ASTM D698, Moisture-Density Relation of Soils. If fills fail to meet the specified densities, the Contractor shall remove and re-compact the fill until specified densities are achieved. Compaction test shall be performed for each fifty linear feet of trench.

- H. Provide a 4-inch thick (minimum) layer of 3/4-inch No. 4 gravel aggregate bedding beneath all buried piping. Bedding shall be compacted and leveled to provide sloping required.
- I. Tests for displacement of sewers: After the trench has been backfilled to 2 feet or more above the pipe, if the pipe shows poor alignment, displaced pipe, or any other defects, such defects shall be remedied by the Contractor at his expense.

### 3.6 EQUIPMENT START-UP AND TESTING

- A. Instruct the Owner's operating personnel during start-up and separate operating tests of each major item of equipment. During the operating tests, prove the operation of each item of equipment to the satisfaction of the Engineer. Give at least seven (7) days notice to the Engineer of equipment start-up and operating tests.

### 3.7 CATALOG DATA FOR OWNER

- A. Provide, in looseleaf binders, two (2) sets of a compilation of catalog data of each manufactured item of equipment used in the mechanical work and present this compilation to the Owner/Architect for transmittal to the Owner before final payment is made. Include descriptive data and printed installation, operating and maintenance instructions for each item of equipment. Provide a complete double index as follows:
  - 1. Listing of products alphabetically by name.
  - 2. Listing the names of manufacturers whose products have been incorporated in the work alphabetically together with their addresses and the names and addresses of the local sales representatives.
  - 3. Certificates of Final Inspections.
  - 4. Complete spare parts data with current prices and supply sources.
  - 5. Extended warranties.
- B. Deliver to the Owner all special tools, lubricants, extra materials and any other products necessary for the proper operation and maintenance of the mechanical and plumbing systems.

22 01 00-12

- C. Provide project record documents indicating all changes from contract documents made during construction.
- D. Submit all Certificates of Final Inspections from the Administrative Authorities.
- E. Submit TAB reports on approved forms. Final TAB report submittals shall include all required rebalances if any are required.

### 3.8 INSTRUCTION OF OWNER'S REPRESENTATIVE

- A. Instruct the representative of the Owner in the proper operation and maintenance of all elements of the mechanical system.

### 3.9 PROTECTIVE COATINGS

- A. Paint exterior surfaces of steel piping run in or through concrete floor fill, under tile floors or underground, and aluminum surfaces in contact with masonry, with one coat of acid resisting bituminous base paint.

### 3.10 TEST AND ACCEPTANCE

- A. Water Piping System: Test with water at 100 psi for one (1) hour or with available city water pressure for twenty-four (24) hours to prove tight and free from leaks.
- B. Plumbing and Drainage System: Test the new system humidity and drain piping with water and prove tight. Test system with 10 feet of water for 24 hour period. Air test is not permitted.

### 3.11 NOISE CONTROL

- A. It is intended that the mechanical systems as installed under this contract be free from objectionable noise when the system is operating. The system shall operate at noise levels below criteria recommended for the application by ASHRAE. Provide vibration isolation accessories and isolate equipment, pipeline, ductwork, etc., as required so as to insure an acceptable noise level in all of the mechanical systems.

### 3.12 CLEANING AND ADJUSTING

- A. Do not allow waste material and rubbish to accumulate in or above the premises. After completion of this work, remove rubbish, tools, scaffolding and surplus materials from and about the building and leave all work clean and ready for use. Clean all equipment, pipes, valves and fittings of grease, metal cuttings and sludge. Repair any stoppage, discoloration or other damage to parts of the building, its finish

22 01 00-13

or furnishings due to failure to properly clean the mechanical systems, without additional cost to the Owner. Adjust all automatic control devices for proper operation.

### 3.13 SYSTEM OPERATING TESTS

- A. After the successful completion of all equipment start-up and test requirements, perform the following tests on the complete mechanical systems:
1. First Operating Test by Contractor: Prove the operation of the mechanical systems and of each individual item in the systems. Give at least 10 days prior notice to the Engineer of such tests. Adjust and set proper quantities to all items and equipment. Should any item of the systems fail to perform in an approved manner, repeat this test until approved by the Engineer. During this test, balance circulation of heating and cooling water to balancing cocks, valves, thermostats and similar Items to insure that the mechanical systems perform as intended.
  2. Checking by Owner and Engineer: Following the successful completion of first operating tests by the Contractor, the Owner and the Engineer have the privilege of making such tests as they may desire during a period of three weeks to ascertain in detail if any corrections are to be made to the system. At the end of the testing by the Owner and the Engineer, the Engineer may direct the Contractor in writing to make such corrections to the systems as are within the scope of the contract.
  3. Contractor's Corrections to Systems: Make all required corrections to the systems and notify the Engineer in writing that the corrections outlined have been completed. Give at least seven (7) days notice of a final three-day operating test.
  4. Three-Day Operating Test: Perform an operating test to the satisfaction of the Engineer for a period of three (3) days. Should any element of the systems not perform properly, make all required corrections and repeat the test until successfully performed.
    - a. Submit the Form of Record proposed by the Contractor for the recording of all measurements to the Engineer for approval at least two weeks before the approved form will be required by the Contractor.
    - b. Measurements: Make the following measurements at two-hour intervals (5 measurements per 8-hour day) during the three-day operating test.

22 01 00-14

- 1) Electrical: Running amperes and voltage of each motor 3/4 horsepower or larger.
  - 2) Air temperatures in each heated or air conditioned space and outdoor temperatures.
- c. Instruments: Provide all instruments, materials and labor to perform the tests and to obtain and record the measurements specified herein, including the furnishing of all required record forms as approved by the Engineer. Submit for the Engineer's approval, complete shop drawings or catalog data for all instruments to be used for the three day operating test and obtain approval at least two weeks before the instruments will be required for test measurements.
- d. Report: Submit four (4) copies of a written report of the three-day operating test on the approved Form of Record to the Engineer for approval and subsequent transmittal to the Owner.

### 3.14 MOTOR CONTROL

- A. General: Provide each motor 1/8 horsepower or larger with a suitable controller and devices that will perform the functions as specified for the respective motors, together with manual reset thermal overload, protection in each undergrounded conductor. Provide the controller either integral with circuit protective device or mounted in separate enclosure. Starters shall be Allen-Bradley, G.E., Westinghouse, Square D or approved equal.
- B. Control: Automatic control devices such as thermostats, float or pressure switches may control the starting and stopping of motor directly, provided the device used is designated for that purpose and has an adequate horsepower rating. When automatic control device does not have such a rating, use a magnetic starter with the automatic control device actuating the pilot control circuit. When combination manual and automatic control is specified and the control device operates the motor directly, provide a manual motor starter and selector switch. When combination manual and automatic control is specified and the automatic control device actuates the pilot control circuit, a magnetic control device actuates the pilot control provided. Provide all magnetic starters with push buttons or selector switches in the covers. Provide connections to the selector switch such that only the normal automatic regulating control devices will be bypassed when the switch is in the manual position. Connect all safety control devices, such as low or high pressure cutouts, high temperature

22 01 00-15

cutouts and motor overload protective devices in the motor control circuit in both the manual and automatic positions of the selector switch control circuit. Make connections to any selector switch or to more than one (1) automatic regulatory control device in accordance with wiring diagrams recommended by the manufacturer and approved by the Engineer. Where required for manual control, provide push-button stations consisting of two (2) momentary contact operators, 600 volts, 10 amperes installed and wired for three wire control to provide under-voltage relays, auxiliary contacts or other devices required for a complete system.

- C. Location: Where the controller is located within sight of the motor driven equipment (fifty feet or less), the controller and circuit protective device shall be capable of being locked in the open position. Where the controller is located out of sight of the motor driven equipment (more than fifty feet) provide a non-fused safety disconnect, suitable for the service, and which opens all ungrounded conductors simultaneously, at or on the motor driven equipment.
- D. Enclosure: Enclosure to be general purpose, NEMA Type 1 unless noted otherwise (NEMA Type 1 gasketed). The circuit breaker shall be operable by hand from outside the enclosure and shall be so interlocked with the door or doors that it must be returned to the "OFF" position before the door can be opened.
- E. Push-buttons: Provide maintained contact, standard duty type in a general purpose, NEMA Type 1 enclosure for surface mounting rated for 10 amperes continuous at 600 volts or less.

### 3.15 ACCESS PANELS

- A. Provide access panels as required in all walls, ceilings and ductwork to service and have access to all valves, and other operating parts. For all ceiling and wall access doors that are required in gypsum board and plaster, provide minimum 24" x 24", Milcor type appropriate for the construction involved. Contractor shall provide all access doors as required to provide adequate access.

### 3.16 DEMOLITION

- A. There are areas in the existing building in which demolition will have to be performed due to the requirements for remodeling. The demolition work involved is not fully described herein; however, the information given on the electrical and mechanical drawings and the information set out in the specifications will substantially serve to inform the mechanical Contractor as to the full extent of the demolition required.

22 01 00-16



- B. Contractor should visit job site to verify extent of demolition required to complete project.
- C. It is the intent of this Specification that all required demolition work be fully and completely performed and all work be accomplished in a neat and workmanlike manner.
- D. Remove all existing piping, fittings, heating, cooling, ventilation equipment that is required to accomplish the remodel work. All existing utilities that are disconnected shall be capped recessed in walls and floors. Contractor shall be responsible for visiting building and determining the extent of the demolition work. Contractor shall provide any necessary temporary piping required to keep existing building utilities (water, gas and sewer) in operation until new construction is completed to the extent that the new utilities can be reconnected.
- E. All rubbish, debris and expendable items resulting from demolition work shall be removed from the premises as it accumulates and disposed of at an off-site location by the Contractor.

### 3.17 SALVAGE

- A. Except as otherwise specified herein, or noted on drawings, the Contractor shall receive title to all building materials indicated to be demolished or removed which are not specifically designated as being retained by the Owner, said title to vest in the Contractor immediately upon receipt of Work Order. All salvage materials removed shall be taken from the premises promptly, as the storage of salvage materials on the site will not be permitted. Bidders shall take into account the salvage value to them of materials removed and such value shall be reflected in the bids.
- B. All items of usable equipment shall remain the property of the Owner. All such items of equipment which are to be removed and which are not to be reused shall be stored on the premises by the Contractor as directed by the Owner.
- C. Usable items shall be determined by the Owner and shall include existing heating and cooling pumps and other equipment so designated as "usable" by the Owner.

### 3.18 ASBESTOS DISCOVERY

- A. If the execution of this work requires the disturbing of any substance which appears to be asbestos or which may contain asbestos fibers, notify the Owner before continuing work at the suspect location. Any materials testing positive will be removed by the

22 01 00-17

Owner before work continues.

### 3.19 FINALLY

- A. It is the intention that this specification shall provide a complete installation except as herein before specifically excepted. All accessory construction and apparatus necessary or advantageous in the operation and testing of the work shall be included. The omission of specific reference to any part of the work necessary for such complete installation shall not be interpreted as relieving this Contractor from furnishing and installing such parts.

END OF SECTION

22 01 00-18

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas

## SECTION 22 05 13

### MOTORS FOR MECHANICAL EQUIPMENT

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Single phase electric motors.
- B. Three phase electric motors.

##### 1.2 RELATED REQUIREMENTS

- A. Division 26 - Equipment Wiring: Electrical characteristics and wiring connections.
- B. Section 26 28 18 - Motor and Circuit Disconnects.
- C. Section 26 05 73 - Overcurrent Protective Devices.

##### 1.3 REFERENCE STANDARDS

- A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015.
- B. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators; 2017.
- C. NEMA MG 1 - Motors and Generators; 2021.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

##### 1.4 SUBMITTALS

- A. See Section 22 01 00 - General Plumbing Provisions, for submittal procedures.
- B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.
- D. Operation Data: Include instructions for safe operating procedures.

22 05 13-1

- E. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacture of electric motors for commercial use, and their accessories, with minimum five years documented product development, testing, and manufacturing experience.
- B. Conform to NFPA 70.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

## 1.7 WARRANTY

- A. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Baldor Electric.
- B. Lincoln Motors.
- C. A. O. Smith Electrical Products Company.
- D. Magnetek.
- E. Reliance Electric/Rockwell Automation.
- F. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

### 2.2 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Electrical Service: Refer to Division 26 for required electrical characteristics.
- B. Electrical Service:

22 05 13-2

1. Motors 1/2 HP and Smaller: 115 volts, single phase, 60 Hz.
  2. Motors Larger than 1/2 Horsepower: 460 volts, three phase, 60 Hz.
- C. Construction:
1. Open drip-proof type except where specifically noted otherwise.
  2. Design for continuous operation in 40 degrees C environment.
  3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
  4. Motors with frame sizes 254T and larger: Energy Efficient Type.
- D. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- E. Wiring Terminations:
1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
  2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

## 2.3 APPLICATIONS

- A. Exception: Motors less than 250 watts, for intermittent service may be the equipment manufacturer's standard and need not conform to these specifications.
- B. Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.
- C. Motors located outdoors: Totally enclosed weatherproof epoxy-sealed type.

## 2.4 SINGLE PHASE POWER - SPLIT PHASE MOTORS

- A. Starting Torque: Less than 150 percent of full load torque.
- B. Starting Current: Up to seven times full load current.

22 05 13-3

- C. Breakdown Torque: Approximately 200 percent of full load torque.
- D. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.
- E. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

## 2.5 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

- A. Starting Torque: Exceeding one fourth of full load torque.
- B. Starting Current: Up to six times full load current.
- C. Multiple Speed: Through tapped windings.
- D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

## 2.6 THREE PHASE POWER - SQUIRREL CAGE MOTORS

- A. Starting Torque: Between 1 and 1-1/2 times full load torque.
- B. Starting Current: Six times full load current.
- C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.
- D. Design, Construction, Testing, and Performance: Conform to NEMA MG 1 for Design B motors.
- E. Insulation System: NEMA Class B or better.
- F. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.
- G. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
- H. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors imbedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter.

22 05 13-4

- I. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA STD 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
- J. Sound Power Levels: To NEMA MG 1.
- K. Part Winding Start Above 254T Frame Size: Use part of winding to reduce locked rotor starting current to approximately 60 percent of full winding locked rotor current while providing approximately 50 percent of full winding locked rotor torque.
- L. Weatherproof Epoxy Sealed Motors: Epoxy coat windings with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.
- M. Nominal Efficiency: As scheduled at full load and rated voltage when tested in accordance with IEEE 112.
- N. Nominal Power Factor: As scheduled at full load and rated voltage when tested in accordance with IEEE 112.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- C. Check line voltage and phase and ensure agreement with nameplate.

### 3.2 SCHEDULES

- A. NEMA Open Motor Service Factors.
  - 1. 1/6-1/3 hp:
    - a. 3600 rpm: 1.35.
    - b. 1800 rpm: 1.35.
    - c. 1200 rpm: 1.35.

22 05 13-5

- d. 900 rpm: 1.35.
- 2. 1/2 hp:
  - a. 3600 rpm: 1.25.
  - b. 1800 rpm: 1.25.
  - c. 1200 rpm: 1.25.
  - d. 900 rpm: 1.15.
- 3. 3/4 hp:
  - a. 3600 rpm: 1.25.
  - b. 1800 rpm: 1.25.
  - c. 1200 rpm: 1.15.
  - d. 900 rpm: 1.15.

B. Three Phase - Energy Efficient, Open Drip-Proof Performance:

- 1. 1800 rpm.
  - a. 1 hp:
    - 1) NEMA Frame: 143T.
    - 2) Minimum Percent Power Factor: 84.
    - 3) Minimum Percent Efficiency: 82.
  - b. 1-1/2 hp:
    - 1) NEMA Frame: 145T.
    - 2) Minimum Percent Power Factor: 85.
    - 3) Minimum Percent Efficiency: 84.
  - c. 2 hp:
    - 1) NEMA Frame: 145T.

22 05 13-6



- 2) Minimum Percent Power Factor: 85.
- 3) Minimum Percent Efficiency: 84.
- d. 3 hp:
  - 1) NEMA Frame: 182T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 86.
- e. 5 hp:
  - 1) NEMA Frame: 184T.
  - 2) Minimum Percent Power Factor: 87.
  - 3) Minimum Percent Efficiency: 87.
- f. 7-1/2 hp:
  - 1) NEMA Frame: 213T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 88.
- g. 10 hp:
  - 1) NEMA Frame: 215T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 89.
- h. 15 hp:
  - 1) NEMA Frame: 256T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 91.
- i. 20 hp:

22 05 13-7

- 1) NEMA Frame: 256T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 91.
- j. 25 hp:
- 1) NEMA Frame: 284T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 91.
- k. 30 hp:
- 1) NEMA Frame: 286T.
  - 2) Minimum Percent Power Factor: 88.
  - 3) Minimum Percent Efficiency: 92.
- l. 40 hp:
- 1) NEMA Frame: 324T.
  - 2) Minimum Percent Power Factor: 83.
  - 3) Minimum Percent Efficiency: 92.
2. 3600 rpm.
- a. 1-1/2 hp:
- 1) NEMA Frame: 143T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 82.
- b. 2 hp:
- 1) NEMA Frame: 145T.
  - 2) Minimum Percent Power Factor: 87.

22 05 13-8

- 3) Minimum Percent Efficiency: 82.
- c. 3 hp:
  - 1) NEMA Frame: 145T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 84.
- d. 5 hp:
  - 1) NEMA Frame: 182T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 85.
- e. 7-1/2 hp:
  - 1) NEMA Frame: 184T.
  - 2) Minimum Percent Power Factor: 88.
  - 3) Minimum Percent Efficiency: 86.
- f. 10 hp:
  - 1) NEMA Frame: 213T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 87.
- g. 15 hp:
  - 1) NEMA Frame: 215T.
  - 2) Minimum Percent Power Factor: 89.
  - 3) Minimum Percent Efficiency: 89.
- h. 20 hp:
  - 1) NEMA Frame: 254T.

22 05 13-9

- 2) Minimum Percent Power Factor: 89.
  - 3) Minimum Percent Efficiency: 90.
  - i. 25 hp:
    - 1) NEMA Frame: 256T.
    - 2) Minimum Percent Power Factor: 92.
    - 3) Minimum Percent Efficiency: 90.
  - j. 30 hp:
    - 1) NEMA Frame: 284T.
    - 2) Minimum Percent Power Factor: 91.
    - 3) Minimum Percent Efficiency: 91.
  - k. 40 hp:
    - 1) NEMA Frame: 286T.
    - 2) Minimum Percent Power Factor: 92.
    - 3) Minimum Percent Efficiency: 92.
- C. Three Phase - Energy Efficient, Totally Enclosed, Fan Cooled Performance:
1. 1800 rpm.
    - a. 1 hp:
      - 1) NEMA Frame: 143T.
      - 2) Minimum Percent Power Factor: 84.
      - 3) Minimum Percent Efficiency: 82.
    - b. 1-1/2 hp:
      - 1) NEMA Frame: 145T.
      - 2) Minimum Percent Power Factor: 85.

22 05 13-10

- 3) Minimum Percent Efficiency: 84.
- c. 2 hp:
  - 1) NEMA Frame: 145T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 84.
- d. 3 hp:
  - 1) NEMA Frame: 182T.
  - 2) Minimum Percent Power Factor: 83.
  - 3) Minimum Percent Efficiency: 87.
- e. 5 hp:
  - 1) NEMA Frame: 184T.
  - 2) Minimum Percent Power Factor: 83.
  - 3) Minimum Percent Efficiency: 88.
- f. 7-1/2 hp:
  - 1) NEMA Frame: 213T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 89.
- g. 10 hp:
  - 1) NEMA Frame: 215T.
  - 2) Minimum Percent Power Factor: 84.
  - 3) Minimum Percent Efficiency: 90.
- h. 15 hp:
  - 1) NEMA Frame: 254T.

22 05 13-11

- 2) Minimum Percent Power Factor: 86.
- 3) Minimum Percent Efficiency: 91.
- i. 20 hp:
  - 1) NEMA Frame: 256T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 91.
- j. 25 hp:
  - 1) NEMA Frame: 284T.
  - 2) Minimum Percent Power Factor: 84.
  - 3) Minimum Percent Efficiency: 92.
- k. 30 hp:
  - 1) NEMA Frame: 286T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 93.
- l. 40 hp:
  - 1) NEMA Frame: 324T.
  - 2) Minimum Percent Power Factor: 83.
  - 3) Minimum Percent Efficiency: 93.
2. 3600 rpm.
  - a. 1-1/2 hp:
    - 1) NEMA Frame: 143T.
    - 2) Minimum Percent Power Factor: 85.
    - 3) Minimum Percent Efficiency: 82.

22 05 13-12

- b. 2 hp:
  - 1) NEMA Frame: 145T.
  - 2) Minimum Percent Power Factor: 87.
  - 3) Minimum Percent Efficiency: 82.
- c. 3 hp:
  - 1) NEMA Frame: 182T.
  - 2) Minimum Percent Power Factor: 87.
  - 3) Minimum Percent Efficiency: 82.
- d. 5 hp:
  - 1) NEMA Frame: 184T.
  - 2) Minimum Percent Power Factor: 88.
  - 3) Minimum Percent Efficiency: 85.
- e. 7-1/2 hp:
  - 1) NEMA Frame: 213T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 86.
- f. 10 hp:
  - 1) NEMA Frame: 215T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 87.
- g. 15 hp:
  - 1) NEMA Frame: 254T.
  - 2) Minimum Percent Power Factor: 91.

22 05 13-13

- 3) Minimum Percent Efficiency: 88.
- h. 20 hp:
  - 1) NEMA Frame: 256T.
  - 2) Minimum Percent Power Factor: 89.
  - 3) Minimum Percent Efficiency: 89.
- i. 25 hp:
  - 1) NEMA Frame: 284T.
  - 2) Minimum Percent Power Factor: 92.
  - 3) Minimum Percent Efficiency: 90.
- j. 30 hp:
  - 1) NEMA Frame: 286T.
  - 2) Minimum Percent Power Factor: 92.
  - 3) Minimum Percent Efficiency: 91.
- k. 40 hp:
  - 1) NEMA Frame: 324T.
  - 2) Minimum Percent Power Factor: 91.
  - 3) Minimum Percent Efficiency: 91.

END OF SECTION

22 05 13-14



## SECTION 22 05 53

### IDENTIFICATION FOR PLUMBING PIPING & EQUIPMENT

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe Markers.
- E. Ceiling tacks.

##### 1.2 RELATED REQUIREMENTS

- A. Section 09 91 23 - Interior Painting: Identification painting.

##### 1.3 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2001 (Reapproved 2007).

##### 1.4 SUBMITTALS

- A. See Section 22 01 00 - General Plumbing Provisions, for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Valve Schedule: Schedule of wording, symbols, letter size, and color coding for valve identification. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification (if any). Mark valves which are intended for emergency shutoff and similar special uses by special "flags" in margin of schedule. In addition to mounted copies, furnish extra copies for maintenance manuals as specified in Division 1.

22 05 53-1

- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

## PART 2 PRODUCTS

### 2.1 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

- A. Pipe Markers: 3/4 inch diameter and higher.

### 2.2 IDENTIFICATION APPLICATIONS

- A. Automatic Controls: Tags. Key to control schematic.
- B. Piping: Pipe markers.
- C. Small-sized Equipment: Tags.
- D. Valves: Tags and ceiling tacks where located above lay-in ceiling.

### 2.3 NAMEPLATES

- A. Manufacturers:
  - 1. Kolbi Pipe Marker Co.
  - 2. Seton Identification Products.
  - 3. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Description: Laminated three-layer plastic with engraved letters.
  - 1. Letter Color: White.
  - 2. Letter Height: 1/2 inch.
  - 3. Background Color: Black.
  - 4. Plastic: Conform to ASTM D709.

### 2.4 TAGS

- A. Manufacturers:

22 05 53-2

1. Advanced Graphic Engraving.
  2. Brady Corporation.
  3. Kolbi Pipe Marker Co.
  4. Seton Identification Products.
  5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

## 2.5 STENCILS

- A. Manufacturers:
1. Brady Corporation.
  2. Kolbi Pipe Marker Co.
  3. Seton Identification Products.
  4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Stencils: With clean cut symbols and letters of following size:
1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
  2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
  3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
  4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.

22 05 53-3

5. Over 10 inch Outside Diameter of Insulation or Pipe: 32 inch long color field, 3-1/2 inch high letters.

C. Stencil Paint: Semi-gloss enamel, colors conforming to ASME A13.1.

## 2.6 PIPE MARKERS

A. Manufacturers:

1. Brady Corporation.
2. Kolbi Pipe Marker Co.
3. MIFAB, Inc.
4. Seton Identification Products.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Comply with ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

F. Color code as follows:

1. Potable, Cooling, Boiler, Feed, Other Water: Green with white letters.
2. Fire Quenching Fluids: Red with white letters.
3. Toxic and Corrosive Fluids: Orange with black letters.
4. Flammable Fluids: Yellow with black letters.
5. Combustible Fluids: Brown with white letters.

22 05 53-4

## 2.7 CEILING TACKS

- A. Manufacturers:
  - 1. Craftmark.
  - 2. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Description: Steel with 3/4 inch diameter color coded head.
- C. Color code as follows:
  - 1. Green - Plumbing valves.
  - 2. Blue - Heating/cooling valves.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

### 3.2 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Use tags on piping 3/4 inch diameter and smaller.
  - 1. Identify service, flow direction, and pressure.
  - 2. Install in clear view and align with axis of piping.

22 05 53-5

3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- G. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

22 05 53-6

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas

## SECTION 22 07 16

### EQUIPMENT INSULATION

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Flexible elastomeric cellular insulation.
- B. Equipment insulation.
- C. Covering.
- D. Breeching insulation.

##### 1.2 RELATED REQUIREMENTS

- A. Section 22 05 53 - Identification for Plumbing Piping & Equipment.
- B. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

##### 1.3 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- C. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).
- D. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2019).
- E. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- F. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2023.
- G. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2022.

22 07 16-1

- H. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
- I. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2016.
- J. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).
- K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- L. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

#### 1.4 SUBMITTALS

- A. See Section 22 01 00 - General Plumbing Provisions for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for equipment scheduled.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not less than five years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum five years of documented experience.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original non-broken factory packaging, labeled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

22 07 16-2



## 1.7 FIELD CONDITIONS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.
- C. Perform work at ambient and equipment temperature as recommended by the adhesive manufacturer.

## PART 2 PRODUCTS

### 2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

- A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, UL 723, ASTM E84, NFPA 255, or UL 723.

### 2.2 GLASS FIBER, FLEXIBLE

- A. Manufacturers:
  - 1. Knauf Insulation.
  - 2. Johns Manville Corporation.
  - 3. Owens Corning Corp.
  - 4. CertainTeed Corporation.
  - 5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Insulation: ASTM C553; flexible, noncombustible.
  - 1. 'K' Value: 0.36 at 75 degrees F, when tested in accordance with ASTM C177 or ASTM C518.
  - 2. Maximum Service Temperature: 450 degrees F.
  - 3. Maximum Water Vapor Sorption: 5.0 percent by weight.
  - 4. Density: 1.5 lb/cu ft.
- C. Vapor Barrier Jacket: Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.

22 07 16-3

1. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
  2. Secure with self-sealing longitudinal laps and butt strips.
- D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- E. Vapor Barrier Lap Adhesive:
1. Compatible with insulation.
- F. Insulating Cement/Mastic:
1. ASTM C195; hydraulic setting on mineral wool.

### 2.3 GLASS FIBER, RIGID

- A. Manufacturer:
1. Knauf Insulation.
  2. Johns Manville Corporation.
  3. Owens Corning Corp.
  4. CertainTeed Corporation.
  5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Insulation: ASTM C612 or ASTM C592; rigid, noncombustible.
1. 'K' Value: 0.25 at 75 degrees F, when tested in accordance with ASTM C177 or ASTM C518.
  2. Maximum Service Temperature: 850 degrees F.
  3. Maximum Water Vapor Sorption: <5.0 percent by weight.
  4. Maximum Density:
- C. Vapor Barrier Jacket:
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.

22 07 16-4

2. Moisture Vapor Permeability: 0.029 ng/Pa s m (0.02 perm inch), when tested in accordance with ASTM E96/E96M.
  3. Moisture vapor transmission: ASTM E 96; 0.02 perm.
  4. Secure with self-sealing longitudinal laps and butt strips.
- D. Vapor Barrier Lap Adhesive:
1. Compatible with insulation.
- E. Insulating Cement/Mastic:
1. ASTM C195; hydraulic setting on mineral wool.

## 2.4 CELLULAR GLASS

- A. Manufacturer:
1. Pittsburgh Corning Corporation.
  2. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Insulation: ASTM C552, Grade 2.
1. 'K' Value: 0.41 at 100 degrees F.
  2. Service Temperature: Up to 900 degrees F.
  3. Water Vapor Permeability: 0.005 perm inch.
  4. Water Absorption: 0.2 percent by volume, maximum.
  5. Density: Minimum 6.80 lb/cu ft.

## 2.5 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer:
1. Armacell International.
  2. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534 Grade 2, in sheet form.

22 07 16-5

1. 'K' Value: 0.25 at 75 degrees F.
  2. Minimum Service Temperature: -40 degrees F.
  3. Maximum Service Temperature: 220 degrees F.
  4. Water Absorption: 1.0 percent by weight, maximum, when tested in accordance with ASTM D 1056.
  5. Water Vapor Permeability: 0.05 perm-inches, maximum, when tested in accordance with ASTM E 96.
  6. Connection: Waterproof vapor barrier adhesive.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

## 2.6 JACKETS

### A. PVC Plastic:

1. Manufacturers:
  - a. Johns Manville Corporation.
  - b. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
2. Jacket: Sheet material, off-white color.
  - a. Minimum Service Temperature: -40 degrees F.
  - b. Maximum Service Temperature: 150 degrees F.
  - c. Moisture Vapor Permeability: 0.029 ng/Pa s m (0.02 perm inch), when tested in accordance with ASTM E96/E96M.
  - d. Moisture Vapor Transmission: ASTM E 96/E 96M; 0.002 perm-inches.
  - e. Thickness: 15 mil.
  - f. Connections: Pressure sensitive color matching vinyl tape.
3. Covering Adhesive Mastic:
  - a. Compatible with insulation.

22 07 16-6

- B. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.
  - 1. Lagging Adhesive:
    - a. Compatible with insulation.
- C. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
  - 1. Thickness: 0.020 inch sheet.
  - 2. Finish: Embossed.
  - 3. Joining: Longitudinal slip joints and 2 inch laps.
  - 4. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify that equipment has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.
- C. Repair all insulation that is damaged during construction using the same materials

#### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Factory Insulated Equipment: Do not insulate.
- C. Exposed Equipment: Locate insulation and cover seams in least visible locations.
- D. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
- E. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.
- F. Insulated equipment containing fluids below ambient temperature: Insulate entire system.

22 07 16-7

- G. Fiber glass insulated equipment containing fluids below ambient temperature: Provide vapor barrier jackets, factory-applied or field-applied. Finish with glass cloth and vapor barrier adhesive.
- H. For hot equipment containing fluids 140 degrees F or less, do not insulate flanges and unions, but bevel and seal ends of insulation.
- I. Inserts and Shields:
  - 1. Application: Equipment 1-1/2 inches diameter or larger.
  - 2. Shields: Galvanized steel between hangers and inserts.
  - 3. Insert location: Between support shield and equipment and under the finish jacket.
  - 4. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
  - 5. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- J. Finish insulation at supports, protrusions, and interruptions.
- K. Equipment in Mechanical Equipment Rooms or Finished Spaces: Finish with PVC jacket and fitting covers or aluminum jacket.
- L. Exterior Applications: Provide vapor barrier jacket or finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal equipment.
- M. Cover glass fiber insulation with metal mesh and finish with heavy coat of insulating cement.
- N. Nameplates and ASME Stamps: Bevel and seal insulation around; do not insulate over.
- O. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation so it can be easily removed and replaced without damage.

### 3.3 SCHEDULES

- A. Heating Systems:

22 07 16-8

1. Air Separators: Glass Fiber, Flexible Insulation: 2 inches thick.
2. Expansion Tanks: Glass Fiber, Flexible Insulation: 2 inches thick.

B. Cooling Systems:

1. Air Separators: Glass Fiber, Flexible Insulation: 2 inches thick.
2. Expansion Tanks: Glass Fiber, Flexible Insulation: 2 inches thick.
3. Equipment Exposed to Freezing with Heat Tracing: Glass Fiber, Flexible Insulation: 2 inches thick.

END OF SECTION

22 07 16-9





## SECTION 22 07 19

### PIPING INSULATION

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

##### 1.2 RELATED REQUIREMENTS

- A. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

##### 1.3 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).
- C. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2019).
- D. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2019).
- E. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- F. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2017 (Reapproved 2023).
- G. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2023.
- H. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).

22 07 19-1

- I. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
- J. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.

#### 1.4 SUBMITTALS

- A. See Section 22 01 00 - General Plumbing Provisions, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than five years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum five years of documented experience.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.
- B. Deliver material to job site in original non-broken factory packaging, labeled with manufacturer's density and thickness.

#### 1.7 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.
- C. Perform work at ambient and equipment temperature as recommended by the adhesive manufacturer.

22 07 19-2

## PART 2 PRODUCTS

### 2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

- A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.

### 2.2 GLASS FIBER

- A. Manufacturers:
  - 1. Knauf Insulation.
  - 2. Johns Manville Corporation.
  - 3. Owens Corning Corp.
  - 4. CertainTeed Corporation.
  - 5. Armstrong World Industries, Inc.
  - 6. Rubatex Corp.
  - 7. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Insulation: ASTM C547 ; semi-rigid, noncombustible, end grain adhered to jacket.
  - 1. 'K' value: ASTM C177, 0.24 at 75 degrees F.
  - 2. Maximum service temperature: 650 degrees F.
  - 3. Maximum moisture absorption: 0.2 percent by volume.
- C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- E. Vapor Barrier Lap Adhesive:
  - 1. Compatible with insulation.
- F. Insulating Cement/Mastic:

22 07 19-3

1. ASTM C195; hydraulic setting on mineral wool.
- G. Fibrous Glass Fabric:
1. Cloth: Untreated; 9 oz/sq yd weight.
  2. Blanket: 1.0 lb/cu ft density.
  3. Weave: 5x5.
- H. Indoor Vapor Barrier Finish:
1. Cloth: Untreated; 9 oz/sq yd weight.
  2. Vinyl emulsion type acrylic, compatible with insulation, white color.
- I. Outdoor Vapor Barrier Mastic:
1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- J. Outdoor Breather Mastic:
1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- K. Insulating Cement:
1. ASTM C449/C449M.

## 2.3 CELLULAR GLASS

- A. Manufacturers:
1. Pittsburgh Corning Corporation.
  2. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Insulation: ASTM C 552.
1. 'K' value: 0.37 at 100 degrees F.
  2. Service Temperature: Up to 900 degrees F.
  3. Water Vapor Permeability: 0.005 perm inch.
  4. Water Absorption: 0.2 percent by volume, maximum.

22 07 19-4

## 2.4 HYDROUS CALCIUM SILICATE

- A. Manufacturers:
  - 1. Johns Manville Corporation.
  - 2. PABCO.
  - 3. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Insulation: ASTM C533 and ASTM C795; rigid molded, asbestos free, gold color.
  - 1. 'K' value: 2 and C518; 0.40 at 300 degrees F, when tested in accordance with 2 or 1.
- C. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- D. Insulating Cement:
  - 1. ASTM C449/C449M.

## 2.5 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer:
  - 1. Armacell International.
  - 2. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534 Grade 2; use molded tubular material wherever possible.
  - 1. 'K' value: ASTM C 177; 0.27 at 75 degrees F.
  - 2. Maximum Moisture Absorption - Pipe Insulation: 3.5 percent, by weight, when tested in accordance with ASTM D 1056.
  - 3. Maximum Moisture Absorption - Sheets: 6.0 percent, by weight, when tested in accordance with ASTM D 1056.
  - 4. Water Vapor Permeability: 0.20 perm-inches, when tested in accordance with ASTM E 96.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

22 07 19-5

1. Air dried, contact adhesive, compatible with insulation.

## 2.6 JACKETS

### A. PVC Plastic.

1. Manufacturers:
  - a. Johns Manville Corporation.
  - b. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
  - a. Minimum Service Temperature: 0 degrees F.
  - b. Maximum Service Temperature: 150 degrees F.
  - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
  - d. Thickness: 15 mil.
  - e. Connections: Pressure sensitive color matching vinyl tape.
3. Covering Adhesive Mastic:
  - a. Compatible with insulation.

### B. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.

1. Lagging Adhesive:
  - a. Compatible with insulation.

### C. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.

1. Thickness: 0.016 inch sheet.
2. Finish: Embossed.
3. Joining: Longitudinal slip joints and 2 inch laps.

22 07 19-6

4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.
- C. Repair all insulation that is damaged during construction using the same materials.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Glass fiber insulated pipes conveying fluids below ambient temperature:
  1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
  2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- G. Inserts and Shields:
  1. Application: Piping 1 inch diameter or larger.

22 07 19-7

2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
  3. Insert location: Between support shield and piping and under the finish jacket.
  4. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
  5. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
- I. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.
- J. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.

### 3.3 SCHEDULES

A. Plumbing Systems:

1. Domestic Hot Water Supply:

a. Glass Fiber Insulation:

- 1) Pipe Size Range: 2 inch and under: 1 inch thickness.
- 2) Pipe Size Range: 2-1/2 inch and larger: 1-1/2 inch thickness.
- 3) Thickness: 1/2 inch (in interior walls).

2. Domestic Cold Water Supply:

a. Glass Fiber Insulation:

- 1) Pipe Size Range: 2 inch and under: 1 inch thickness.
- 2) Pipe Size Range: 2-1/2 inch and larger: 1 inch thickness.
- 3) Thickness: 1/2 inch (in interior walls).

22 07 19-8



3. Sanitary Piping Above Ceilings:
  - a. Glass Fiber Insulation:
    - 1) Pipe Size Range: all sizes.
    - 2) Thickness: 1 inch.

B. Cooling Systems:

1. Condensate Drains from Cooling Coils: 1/2 inch thickness; flexible elastomeric cellular insulation.
2. Refrigerant Suction: 3/4 inch thickness; flexible elastomeric cellular insulation.
3. Refrigerant Hot Gas: 3/4 inch thickness; flexible elastomeric cellular insulation.

C. Other Systems:

1. Piping Exposed to Freezing with Heat Tracing: 1-1/2 inch thickness; glass fiber insulation

END OF SECTION

22 07 19-9



SECTION 22 10 05

PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe, pipe fittings, valves, and connections for piping systems.
  - 1. Sanitary sewer.
  - 2. Domestic water.
  - 3. Flanges, unions, and couplings.
  - 4. Pipe hangers and supports.
  - 5. Valves.
  - 6. Gas.

1.2 RELATED REQUIREMENTS

- A. Section 22 01 00 - General Plumbing Provisions.
- B. Section 22 05 53 - Identification for Plumbing Piping & Equipment.
- C. Section 22 07 19 - Piping Insulation.

1.3 REFERENCE STANDARDS

- A. ANSI Z21.22 - American National Standard for Relief Valves for Hot Water Supply Systems; 2015 (Reaffirmed 2020).
- B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.
- C. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250; 2021.
- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
- E. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2018.
- F. ASME B31.1 - Power Piping; 2024.

22 10 05-1

- G. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2023.
- H. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- I. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2021.
- J. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023a.
- K. ASTM B32 - Standard Specification for Solder Metal; 2020.
- L. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2020.
- M. ASTM B68/B68M - Standard Specification for Seamless Copper Tube, Bright Annealed; 2019.
- N. ASTM B75/B75M - Standard Specification for Seamless Copper Tube; 2011.
- O. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.
- P. ASTM D2680 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping; 2020.
- Q. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing; 2020.
- R. ASTM D2846/D2846M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems; 2019a.
- S. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020.
- T. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2023.
- U. ASTM D3517 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe; 2019.
- V. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2018.

22 10 05-2

- W. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. through 60 In. (100 mm through 1500 mm); 2022.
- X. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2020.
- Y. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
- Z. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends; 2018.
- AA. MSS SP-78 - Gray Iron Plug Valves, Flanged and Threaded Ends; 2011.
- BB. NFPA 54 - National Fuel Gas Code; National Fire Protection Association; 2012.

#### 1.4 SUBMITTALS

- A. See Section 22 01 00 - General Plumbing Provisions, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Project Record Documents: Record actual locations of valves.

#### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with State of Arkansas, city of Rogers, standards.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Conform to ASME (BPV IX) and applicable state labor regulations.
- D. Welder Qualifications: Certified in accordance with ASME (BPV IX).
- E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

#### 1.6 REGULATORY REQUIREMENTS

- A. Perform Work in accordance with State of Arkansas and city of Rogers plumbing code.

22 10 05-3

- B. Conform to city of Rogers, Arkansas code for installation of backflow prevention devices.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

#### 1.8 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

### PART 2 PRODUCTS

#### 2.1 SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: ASTM A74, service weight.
  - 1. Fittings: Cast iron.
  - 2. Joint Seals: ASTM C 564 neoprene gaskets.
- B. Cast Iron Pipe: CISPI 301, hubless, service weight.
  - 1. Fittings: Cast iron.
  - 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
- C. PVC Pipe: ASTM D2665.
  - 1. Fittings: PVC.
  - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

22 10 05-4

- D. In Fire-rated Walls:
  - 1. Cast iron.
    - a. Fittings: Cast iron.

- E. In Plenum-rated Areas:
  - 1. Cast iron.
    - a. Fittings: Cast iron.

## 2.2 WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
  - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
  - 2. Joints: ASTM B32, alloy Sn95 solder.

## 2.3 NATURAL GAS PIPING, BURIED BEYOND 5 FEET OF BUILDING

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
  - 1. Fittings: ASTM A234/A234M, wrought steel welding type, with AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.
  - 2. Joints: ASME B31.1, welded.
- B. Polyethylene Pipe: ASTM D2513, SDR 11.
  - 1. Fittings: ASTM D2683 or ASTM D2513 socket type.
  - 2. Joints: Fusion welded.

## 2.4 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
  - 1. Fittings: ASTM A234/A234M, wrought steel welding type.
  - 2. Fittings: ASTM A 234/A 234M, forged steel welding type.

22 10 05-5

3. Joints: ASME B31.1, welded.
4. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

## 2.5 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
  2. Fittings: ASME B16.3, malleable iron, or ASTM A 234/A 234M, forged steel welding type.
  3. Fittings: Press-connect fittings listed in accordance with ANSI LC4/CSA 6.32 and 125 psig pressure rated.
    - a. Press-connect fittings approved manufacturers:
      - 1) Viega MegaPressG.
      - 2) Pre-approved manufacturers.
  4. Joints: NFPA 54, threaded or welded to ASME B31.1.
  5. All gas piping over 2 inches in diameter shall be welded or press-connect.

## 2.6 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
1. Ferrous pipe: Class 150 malleable iron threaded unions.
  2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
- B. Flanges for Pipe Size Over 1 Inch:
1. Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
  2. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Grooved and Shouldered Pipe End Couplings:

22 10 05-6



1. Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
  2. Sealing gasket: "C" shape composition sealing gasket.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
- E. Victaulic Devices:
1. Couplings shall consist of a one or more piece ductile or malleable iron cast housing, a synthetic rubber gasket of a central cavity pressure-responsive design, with nuts, bolts, locking toggle or lugs to secure unit together.
    - a. Coupling housings shall be cast of ductile iron conforming to ASTM A-536 (Grade 65-45-12) or malleable iron conforming to ASTM A-47 (Grade 32510), hot dip galvanized to ASTM A-153, or zinc electroplated to ASTM B-633, as manufactured by Victaulic Company of America. Refer to Victaulic product specifications for other materials.
    - b. Coatings shall consist of an alkyd enamel paint, or hot-dip galvanizing to ASTM A-153, or zinc electroplating to ASTM B-633, as specified.
  2. Couplings for grooved end steel pipe shall be Victaulic couplings for grooved end steel pipe.
    - a. Line, fittings and valve joints shall be Victaulic flexible (styles 75, 77, 78, or 791) or rigid (styles 005, 07 or HP-70).
    - b. Rigid joints shall be Victaulic style 07 "Zero-Flex", style HP-70 or style 005 "FireLock" couplings.
    - c. Pin assembled joints shall be Victaulic style 791 "Vic-Boltless" couplings.
    - d. Reducing joints shall be Victaulic style 750 Reducing Couplings for pipe to pipe joints or to create reducing fittings using straight fitting configurations.
    - e. Outlets: All joints designated Outlet Couplings, or where feasible to replace reducing outlet tees, shall be Victaulic style 72 Outlet Couplings (specify grooved, female or male threaded outlet).

22 10 05-7

- f. Flanged Connections shall be Victaulic style 741 (2-24") "Vic-Flange" adapters, engaging directly into grooved pipe and bolting directly to ANSI Class 125 cast iron and Class 150 steel flanged components or style 743 (2-12") for ANSI Class 300 flanged components; installer to supply standard flange bolts.
  - g. Quick disconnects shall be Victaulic style 78 "Snap-Joint" Couplings or style 780/781 for double grooved pipe.
3. Gasket shall be molded of synthetic rubber in a central cavity, pressure-responsive configuration conforming to the pipe outside diameter and coupling housing, of elastomers having properties as designated in ASTM D-2000. Reference shall always be made to the latest published Selection Guide for Victaulic Gaskets for proper gasket selection for the intended service.
- a. Water service: Gasket supplied for water services from -30 degrees F to +230 degrees F, shall be a Grade "E" EPDM compound, with green color code, molded of materials conforming to ASTM D-2000, designation 2CA615A25B24F17Z, recommended for hot water service within the specified temperature range, plus a variety of dilute acids, oil-free air, and many chemical services. Not recommended for petroleum services.
4. Bolts and nuts shall be heat treated carbon steel, track head, conforming to physical properties of ASTM A-183 minimum tensile 110,000 psi, black, or zinc electroplated to ASTM B-633, as supplied or specified.
5. Fittings shall be Victaulic full flow cast fittings, steel fittings or segmentally welded fittings with grooves or shoulders designed to accept Victaulic grooved end couplings.
- a. Standard fittings shall be cast of ductile iron conforming to ASTM A-536 (Grade 65-45-12), or malleable iron conforming to ASTM A-47, Grade 32510, painted with alkyd enamel or hot-dip galvanized to ASTM A-153 or zinc electroplated to ASTM B-633 or cadmium plated to ASTM A-165 as required.
  - b. Standard steel fittings including large size elbows (16-24") shall be forged steel conforming to ASTM A-234 Grade WPB (0.375" wall), painted with alkyd enamel or hot-dip galvanized to ASTM A-153.
6. Branch outlets for hole cut steel pipe shall be Victaulic hole cut products.

22 10 05-8

7. Branch outlets shall be made with Victaulic style 920, 921 or 929 "Mechanical-T" branch connections with locating collar or foot engaging into hole. (Specify outlet/branch connection type - grooved, female threaded or FIT, as available.)
8. Sprinkler head connections: Branch connections, direct sprinkler head connections, drop nipples and sprigs shall be made with Victaulic style 922 "Hooker" outlet connections with locating collar engaging into hole, assembled with standard plated breakaway head bolt (specify 1/2, 3/4 or 1" female threaded outlet).
9. Gauge, meter outlets for hole cut steel pipe shall be Victaulic strapless mechanical outlet products style 923 "Vic-Let" or 924 "Vic-O-Well" and shall provide a pipe outlet without a need for a strap or lower housing to wrap around the pipe.
10. Flow indicators for hole cut steel pipe shall be Victaulic style 736 Waterflow Indicators for wet sprinkler systems, to sense water flow to 10 GPM or greater.
11. Fittings for plain end steel pipe shall be Victaulic FIT fittings (sizes 1", 1 1/4", 1 1/2" and 2") with internal pipe stop for uniform takeout dimensions, 1/4-turn positive locking lugs of heat treated carbon steel conforming to AISI C-1022, cadmium plated, with externally locked-position indicator for inspection or connection of plain end steel pipe. FIT fittings shall have self-contained, pressure responsive gaskets: for water service (-30 degrees to +230 degrees F) Grade "E"; FIT silicone Grade "L" (-30 degrees to +160 degrees F) are recommended for fire protection dry systems, all systems operating below 0 degrees F, plus dry heat, air without hydrocarbons, certain chemical services and water to +160 degrees F. FIT Nitrile gaskets Grade "T" (0 degrees to +180 degrees F) are recommended for petroleum products, hydrocarbons, air without hydrocarbons, except hot dry air over +140 degrees F, vegetable and mineral oils within the specified temperature range. Not recommended for hot water services.
12. Reducing outlet tees shall be Victaulic FIT style 96 with female threaded outlet (specify 1/2, 3/4 or 1" outlet) for direct sprinkler head, sprig or drop nipple connections.
13. 90 degree elbows shall be Victaulic FIT style 969.
14. FIT Outlet/Mechanical-T shall be Victaulic FIT style 929 with FIT locking lug branch outlet (specify 1 1/4, 1 1/2 or 2" outlet) for direct branch connections.
15. Straight tees shall be Victaulic FIT style 963.

22 10 05-9

16. Straight couplings shall be Victaulic FIT style 960.
17. Reducing elbows shall be Victaulic FIT style 966 with female threaded outlet (specify 1/2, 3/4, or 1" outlet) for direct sprinkler head, sprig or drop nipple connections.

## 2.7 MECHANICALLY FORMED TEE FITTINGS

- A. Mechanically extracted outlets shall have a height not less than three times the thickness of the branch tube wall.
- B. Branch tubes shall not restrict the flow in the main tube. Mechanical Contractor shall insure the branch tube penetration into the collar is of the correct depth.
- C. Mechanically formed tee fittings shall be cleaned and brazed with filler material conforming to AWS A5.8.

## 2.8 PRESS FITTINGS

- A. Fittings shall comply with NSF 61, CSA, UPC and be approved by the local jurisdiction. Wrot copper press fittings shall be made from commercially pure copper mill products per ASTM B 75 Alloy C12200. Cast copper alloy press fittings shall be made from materials with a minimum of 78% copper and a maximum of 15% zinc. The press fittings connections shall be compatible with seamless K, L or M copper tube made to ASTM B 88. Fittings shall have a maximum non-shock working pressure of 200 PSI between the temperatures of -20°F and +250°F. Elastomeric seals shall be made of EPDM material, and the fittings shall be manufactured with an inboard bead design. All fittings shall be installed in accordance with the manufacturer's installation instructions and according to local plumbing and mechanical codes. The press-to-connect joint shall be made with pressing tools and jaw sets recommended and authorized by press fitting manufacturer.

## 2.9 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
- B. Plumbing Piping - Drain, Waste, and Vent:
  1. Conform to ASME B31.9.
  2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.

22 10 05-10

3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
  4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
  6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
  7. Vertical Support: Steel riser clamp.
  8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- C. Plumbing Piping - Water:
1. Conform to ASME B31.9.
  2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.
  3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
  4. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.
  5. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron pipe roll, double hanger.
  6. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
  7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.
  8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
  9. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
  10. Vertical Support: Steel riser clamp.

22 10 05-11

11. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
12. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
13. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

## 2.10 GATE VALVES

### A. Manufacturers:

1. Conbraco Industries.
2. Nibco, Inc.
3. Milwaukee Valve Company.
4. Crane Co.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

### B. Up To and Including 2 1/2 Inches:

1. MSS SP-80, Class 125, bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, solder or threaded ends.

### C. 3 Inches and Larger:

1. MSS SP-70, Class 125, iron body, bronze trim, outside screw and yoke, handwheel, solid wedge disc, flanged ends. Provide chain wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

## 2.11 GLOBE VALVES

### A. Manufacturers:

1. Conbraco Industries.
2. Nibco, Inc.
3. Milwaukee Valve Company.
4. Crane Co.

22 10 05-12

5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Up To and Including 2 1/2 Inches:

1. MSS SP-80, Class 125, bronze body, bronze trim, handwheel, bronze disc, solder or threaded ends.

C. 3 Inches and Larger:

1. MSS SP-85, Class 125, iron body, bronze trim, handwheel, outside screw and yoke, renewable bronze plug-type disc, renewable seat, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

## 2.12 BALL VALVES

A. Manufacturers:

1. Conbraco Industries.
2. Nibco, Inc.
3. Milwaukee Valve Company.
4. Crane Co.

B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, threaded ends with union.

## 2.13 PLUG VALVES

A. Manufacturers:

1. Conbraco Industries.
2. Nibco, Inc.
3. Milwaukee Valve Company.
4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Construction 2-1/2 Inches and Larger: 1, 250 psi CWP, cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged or grooved ends. Provide lever

22 10 05-13

operator with set screw.

## 2.14 BUTTERFLY VALVES

- A. Manufacturers:
  - 1. Hammond Valve.
  - 2. Crane Co.
  - 3. Milwaukee Valve Company.
  - 4. Stockham.
  - 5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Construction 1-1/2 Inches and Larger: MSS SP-67, 200 psi CWP, cast or ductile iron body, elastomer coated ductile iron disc, resilient replaceable EPDM seat, wafer ends, extended neck, 10 position lever handle.
- C. Provide gear operators for valves 6 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

## 2.15 FLOW CONTROLS

- A. Manufacturers:
  - 1. ITT Bell & Gossett.
  - 2. Griswold Controls.
  - 3. Taco, Inc.
  - 4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
- C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

## 2.16 SPRING LOADED CHECK VALVES

- A. Manufacturers:

22 10 05-14



1. Hammond Valve.
  2. Crane Co.
  3. Milwaukee Valve Company.
  4. Stockham.
  5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Class 125, iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.

## 2.17 WATER PRESSURE REDUCING VALVES

- A. Manufacturers:
1. Amtrol Inc.
  2. Cla-Val Co.
  3. Watts Regulator Company.
  4. Spence Engineering Co.
  5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Up to 2 Inches:
1. MSS SP-80, bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.
- C. Over 2 Inches:
1. MSS SP-85, cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged.

## 2.18 RELIEF VALVES

- A. Pressure Relief:
1. Manufacturers:
    - a. Cla-Val Co.

22 10 05-15

- b. Henry Technologies.
  - c. Watts Regulator Company.
  - d. Spence Engineering Co.
  - e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
2. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labelled.
- B. Temperature and Pressure Relief:
- 1. Manufacturers:
    - a. Cla-Val Co.
    - b. Henry Technologies.
    - c. Watts Regulator Company.
    - d. Spence Engineering Co.
    - e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
  - 2. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labelled.

## 2.19 STRAINERS

- A. Manufacturers:
- 1. Armstrong International, Inc.
  - 2. Green Country Filtration.
  - 3. WEAMCO.
  - 4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Size 1-1/2 inch to 4 inch:

22 10 05-16

1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.
- C. Size 5 inch and Larger:
1. Class 125, flanged iron body, basket pattern with 1/8 inch stainless steel perforated screen.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

### 3.2 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

### 3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 07 19.
- G. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.
- H. Establish elevations of buried piping outside the building to ensure not less than 3 ft of cover.

22 10 05-17

- I. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- K. Provide support for utility meters in accordance with requirements of utility companies.
- L. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
- M. Install bell and spigot pipe with bell end upstream.
- N. Install valves with stems upright or horizontal, not inverted.
- O. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
- P. Install water piping to ASME B31.9.
- Q. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- R. Sleeve pipes passing through partitions, walls and floors.
- S. Inserts:
  - 1. Provide inserts for placement in concrete formwork.
  - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
  - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
  - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
  - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.
- T. Pipe Hangers and Supports:
  - 1. Install in accordance with ASME B31.9.

22 10 05-18

2. Support horizontal piping as scheduled.
  3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
  4. Place hangers within 12 inches of each horizontal elbow.
  5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
  6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
  7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  8. Provide copper plated hangers and supports for copper piping.
  9. Provide hangers adjacent to motor driven equipment with vibration isolation.
  10. Support cast iron drainage piping at every joint.
- U. Where water pressure within the building exceeds 75 psi static, install an approved water-pressure reducing valve conforming to ASSE 1003 with strainer to reduce the building pressure to 75 psi static or less.

### 3.4 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- D. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Install globe valves for throttling, bypass, or manual flow control services.
- F. Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.
- G. Provide spring loaded check valves on discharge of water pumps.

22 10 05-19

- H. Provide ball valves in natural gas systems for shut-off service.
- I. Provide flow controls in water recirculating systems where indicated.
- J. All sanitary waste and vent pipe installed above grade in fire-rated walls, fire-rated plenum spaces or return air plenums shall be cast iron.

### 3.5 TOLERANCES

- A. Drainage Piping: Maintain invert elevations within 1/4 inch vertically of location indicated on drawings. Slope to drain at minimum of 1/4 inch per foot slope for pipes 3 inch and smaller and 1/8 inch per foot slope for pipes larger than 3 inch.
- B. Contractor must maintain inverts as indicated on the drawings. The contractor shall employ the latest precision technology available to insure the accuracy of the installation. If the contractor is unable to maintain, the contractor should notify the engineer IMMEDIATELY to obtain direction.
- C. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

### 3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect water distribution system in accordance with Arkansas state and local codes.
- B. Prior to starting work, verify system is complete, flushed and clean.
- C. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- F. Maintain disinfectant in system for 24 hours.
- G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

22 10 05-20

- I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

### 3.7 SERVICE CONNECTIONS

- A. Connection of dissimilar pipe materials shall be made with the specified adapter couplings.
- B. Sewers shall be encased or cradled in concrete where shown on the plans or as directed by the Engineer. Unless otherwise noted on the plans, concrete encasement shall encircle the pipe and shall be a minimum thickness of four inches.
- C. This Contractor shall extend the system of gas piping, to the various outlets as indicated on plans, complete with stop ball valves, drip pockets, valves and other accessories that may be required to give proper and adequate service.
- D. Provide gas ball valves in final connection to all equipment. Unions will not be permitted, except in final connections to equipment. Proper reducing fittings shall be used. Bushings will not be accepted. Gas piping in building shall be standard weight schedule 40 black steel pipe with malleable fittings or approved press-connect fittings, unless contractor wishes to weld all joints. Welded rod shall be of same material as piping. No. 22 bronze welding will be permitted.
- E. All underground gas service exterior to the building (5 psi or less) shall be a polyethylene plastic pipe manufactured in accordance with ASTM No. D-2517 or D-2513 and shall be indicated on the pipe. Gas piping shall be laid at least 36" below grade at all points. Provide a #12 THN copper wire in trench with pipe and leave both ends exposed for future accessibility.
- F. All gas piping in ground, including service, shall be checked with a "Holiday" detector to assure that the coating is free of holes, voids, contamination, cracks, etc. This test shall be performed after the completion of joint and finish coating and touch-up. This test shall be conducted in the presence of the Owner's inspector and performed by experienced personnel.
- G. For corrosion protection, all underground steel pipe and fittings must be coated and wrapped.
- H. Test all gas piping operating at 6 oz. with air pump and mercury gauge to pressure that will maintain 25 psig for 20 minutes and inspected by gas service official.

22 10 05-21

- I. All gas piping operating at more than 1 psig shall be tested at 100 psig for steel and 50 psig for plastic, for a minimum of 15 minutes and inspected by gas service official.
- J. The pressure regulator at the building shall be sized, and approved by gas service official.
- K. All above ground piping shall be rigid steel pipe designated for natural gas use. Pipe shall be painted with a rust inhibiting primer and a final coat the color of which shall be determined by governing regulations or as directed by the Engineer if no governing regulations exist regarding finish color.
- L. All gas piping systems within a building and other above ground gas piping shall be electrically continuous and bonded to a grounded electrode as defined in NFPA 70.
- M. Medium and high pressure gas regulators installed in the medium and high pressure gas lines (2 psi or greater) shall comply with the following provisions:
  - 1. Shall be suitable for the inlet and outlet gas pressure.
  - 2. Shall comply with Code and gas official requirements.
  - 3. Shall be accessible for servicing.
  - 4. Shall be vented to outdoors when located indoors.
  - 5. Shall be installed in the gas piping system so that it cannot be concealed by building construction.
- N. Provide a listed shut off valve immediately ahead of and immediately behind each medium pressure regulator.
- O. Underground gas piping shall be installed in a separate ditch.

### 3.8 SCHEDULES

- A. Pipe Hanger Spacing:
  - 1. Metal Piping:
    - a. Pipe size: 1/2 inches to 1-1/4 inches:
      - 1) Maximum hanger spacing: 8 ft.
      - 2) Hanger rod diameter: 1/4 inch.

22 10 05-22



- b. Pipe size: 1-1/2 inches to 2 inches:
    - 1) Maximum hanger spacing: 8 ft.
    - 2) Hanger rod diameter: 1/4 inch.
  - c. Pipe size: 2-1/2 inches to 3 inches:
    - 1) Maximum hanger spacing: 8 ft.
    - 2) Hanger rod diameter: 3/8 inch.
  - d. Pipe size: 4 inches to 6 inches:
    - 1) Maximum hanger spacing: 8 ft.
    - 2) Hanger rod diameter: 3/8 inch.
  - e. Pipe size: 8 inches to 12 inches:
    - 1) Maximum hanger spacing: 10 ft.
    - 2) Hanger rod diameter: 1/2 inch.
  - f. Pipe size: 14 inches and Over:
    - 1) Maximum hanger spacing: 10 ft.
    - 2) Hanger rod diameter: 7/8 inch..
2. Plastic Piping:
- a. All sizes:
    - 1) Maximum hanger spacing: 6 ft.
    - 2) Hanger rod diameter: 3/8 inch.

END OF SECTION

22 10 05-23



## SECTION 22 10 06

### PLUMBING SPECIALTIES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Floor Drain Roof and floor drains.
- B. Cleanouts.
- C. Refrigerator valve and recessed box.
- D. Backwater valves.
- E. Backflow preventers.
- F. Water hammer arrestors.
- G. Thermostatic mixing valves.

##### 1.2 RELATED REQUIREMENTS

- A. Section 22 10 05 - Plumbing Piping.
- B. Section 22 40 00 - Plumbing Fixtures.

##### 1.3 REFERENCE STANDARDS

- A. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers; 2023.

##### 1.4 SUBMITTALS

- A. See Section 22 01 00 - General Plumbing Provisions, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
- D. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.

22 10 06-1

- E. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors \_\_\_\_.
- F. Operation Data: Indicate frequency of treatment required for interceptors.
- G. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. Extra Loose Keys for Outside Hose Bibbs: Four.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than five years documented experience.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept specialties on site in original factory packaging. Inspect for damage.

## PART 2 PRODUCTS

### 2.1 DRAINS

- A. Manufacturers:
  - 1. Josam Company.
  - 2. Jay R. Smith Manufacturing Company.
  - 3. Zurn Industries, Inc.
  - 4. Wade Tyler Pipe.
  - 5. Watts.
  - 6. Substitutions: See Section 22 10 00 - General Plumbing Provisions.
- B. Floor Drain:
  - 1. ASME A112.6.3; lacquered cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable round nickel bronze strainer with removable perforated sediment bucket.

22 10 06-2

## 2.2 CLEANOUTS

### A. Manufacturers:

1. Jay R. Smith Manufacturing Company.
2. Josam Company.
3. Ward Manufacturing, Inc.
4. Zurn Industries, Inc.
5. Wade Tyler Pipe.
6. Watts.
7. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

### B. Cleanouts at Exterior Surfaced Areas:

1. Round cast nickel bronze access frame and non-skid cover.

### C. Cleanouts at Exterior Unsurfaced Areas:

1. Line type with lacquered cast iron body and round epoxy coated gasketed tractor-type cover.

### D. Cleanouts at Interior Finished Wall Areas:

1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.

### E. Cleanouts at Interior Unfinished Accessible Areas: Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

## 2.3 REFRIGERATOR VALVE AND RECESSED BOX

### A. Box Manufacturers:

1. Guy Gray Manufacturing.
2. IPS Corporation/Water-Tite.
3. Oatey.

22 10 06-3

4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Valve Manufacturers:
1. Guy Gray Manufacturing.
  2. IPS Corporation/Water-Tite.
  3. Zurn Industries, Inc.
  4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- C. Description: Painted metal preformed rough-in box with brass valves with wheel handle, slip in finishing cover.

## 2.4 BACKFLOW PREVENTERS

- A. Manufacturers:
1. Conbraco Industries.
  2. Valve Solutions, Inc.
  3. Watts Regulator Company.
  4. Zurn Industries, Inc.
  5. FEBCO.
  6. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Reduced Pressure Backflow Preventers:
1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

## 2.5 WATER HAMMER ARRESTORS

- A. Manufacturers:
1. Jay R. Smith Manufacturing Company.

22 10 06-4

2. Watts Regulator Company.
3. Zurn Industries, Inc.
4. Wade Tyler Pipe.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Water Hammer Arrestors:

1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range -100 to 300 degrees F and maximum 250 psi working pressure.

## 2.6 MIXING VALVES

A. Thermostatic Mixing Valves:

1. Manufacturers:
  - a. ESBE.
  - b. Leonard Valve Company.
  - c. Watts.
  - d. Honeywell Water Controls.
  - e. Powers Process Controls.
  - f. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
2. Valve: Chrome plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment.
3. Accessories:
  - a. Check valve on inlets.
  - b. Volume control shut-off valve on outlet.
  - c. Stem thermometer on outlet.
  - d. Strainer stop checks on inlets.

22 10 06-5

4. Cabinet: 16 gage stainless steel, for surface mounting with keyed lock.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Encase exterior cleanouts in concrete flush with grade. Refer to plans for detail.
- D. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
- E. Pipe relief from backflow preventer to nearest floor drain or floor sink.
- F. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatories, sinks, and water closets.
- G. Install city approved backwater valve on all building sewers at the exterior of the building and prior to connection to the public sewer system.

END OF SECTION

22 10 06-6



## SECTION 22 10 08

### PLUMBING SOLDER

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Lead-free plumbing solder.

##### 1.2 RELATED SECTIONS

- A. Section 22 10 05 - Plumbing Piping.
- B. Section 22 40 00 - Plumbing Fixtures.

##### 1.3 REFERENCES

- A. ASTM B 32 - Standard Specification for Solder Metal; 1996.
- B. NSF 61 - Drinking Water System Components - Health Effects; 2002 (ANSI/NSF 61).

#### PART 2 PRODUCTS

##### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Taracorp/IMACO, Inc; 1690 Lowery Street, Winston-Salem, NC 27101-5603. ASD. Tel: (910) 777-8600 or (800) 334-5266, Fax: (800) 637 6697
- B. Substitutions: See Section 22 01 00 - General Plumbing Provisions for equipment and material substitutions.
- C. Provide all plumbing solder from a single manufacturer.

##### 2.2 MATERIALS

- A. Plumbing Solder: Sterling® solder or equal, ASTM B 32, Alloy Grade TC; 95 percent tin, 4.85 percent copper, 0.15 percent selenium.
  - 1. Certified to comply with NSF 61.
  - 2. Melting Temperature: 410 degrees F.
  - 3. Tensile Strength: 7,130 psi.

22 10 08-1

4. Shear Strength: 5,979 psi.
  5. Elongation Percent: 19.1.
  6. Brinell Hardness: 15.1.
  7. Burst Strength: 5,800 psi.
  8. Pressure/Temperature Test Data on Copper Tube Assemblies comprised of 3 inch, 2 inch, 1 inch, 3/4 inch, and 1/2 inch Tubing with a Reducing Tee:
    - a. No leaks at 70 degrees F., 200 psi, held for 2 minutes.
    - b. No leaks at 180 degrees F., 200 psi, held for 2 minutes.
    - c. No leaks at 70 degrees F., 2,000 psi, held for 5 minutes.
- B. No lead in plumbing solder.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Apply plumbing solder as required by other Sections of these Specifications.

END OF SECTION

22 10 08-2

## SECTION 22 40 00

### PLUMBING FIXTURES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Water closets.
- B. Lavatories.
- C. Sinks.
- D. Electric water coolers.

##### 1.2 RELATED REQUIREMENTS

- A. Section 22 10 05 - Plumbing Piping.
- B. Section 22 10 06 - Plumbing Specialties.
- C. Division 26 - Equipment wiring, electrical characteristics and wiring connections.

##### 1.3 REFERENCE STANDARDS

- A. Comply with State of Arkansas adopted ADA Accessible Guidelines in regard to accessible or handicapped features.
- B. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008 (Reaffirmed 2013).
- C. ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).
- D. ASME A112.18.1 - Plumbing Supply Fittings; 2018, with Errata.
- E. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2024.
- F. ASSE 1014 - Performance Requirements for Backflow Prevention Devices for Hand-Held Showers; 2020.
- G. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.
- H. NSF 372 - Drinking Water System Components - Lead Content; 2022.

22 40 00-1

## 1.4 SUBMITTALS

- A. Section 22 01 00 - General Plumbing Provisions: Procedures for submittals.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Manufacturer's Instructions: Indicate installation methods and procedures.
- D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.

## 1.6 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept fixtures on site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

## 1.8 WARRANTY

- A. Provide five year manufacturer warranty for electric water cooler.
- B. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

## PART 2 PRODUCTS

### 2.1 FLUSH VALVE WATER CLOSETS

- A. Water Closets: Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action, china bolt caps.
  - 1. Flush Volume: 1.6 gallon, maximum.
  - 2. Flush Valve: Exposed (top spud).

22 40 00-2

- a. Dual-Filtered Bypass.
3. Flush Operation: Sensor operated.
4. Refer to plans for mounting height
5. Manufacturers:
  - a. American Standard Inc.
  - b. Kohler Company.
  - c. Zurn Industries, Inc.
  - d. Sloan.
  - e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Flush Valves: ASME A112.18.1, diaphragm type, dual-filtered bypass, complete with vacuum breaker stops and accessories.
  1. Sensor-Operated Type: Solenoid operator, low voltage hard-wired, infrared sensor and over-ride push button.
    - a. Valve shall be equal to Sloan Royal #111 ES-S.
  2. Manufacturers:
    - a. Sloan Valve Company.
    - b. Zurn Industries, Inc.
    - c. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
  3. Sensor-Operated:
    - a. Type: ASME A112.19.5; chloramine-resistant clog-resistant dual-seat diaphragm valve complete with vacuum breaker, stops and accessories.
    - b. Mechanism: Solenoid-operated piston or electronic motor-actuated operator with low-voltage powered infrared sensor, and mechanical override or override push button.
    - c. Supplied Volume Capacity: 1.2 gal per flush.

22 40 00-3

C. Seats:

1. Manufacturers:

- a. Beneke Magnolia.
- b. Bemis Manufacturing Company.
- c. Church Seat Company.
- d. Olsonite.
- e. \_\_\_\_\_.
- f. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

- 2. Solid white plastic, open front, extended back, stainless steel self-sustaining hinge, brass bolts, without cover.

2.2 LAVATORIES

A. Lavatory Manufacturers:

- 1. American Standard Inc.
- 2. Kohler Company.
- 3. Zurn Industries, Inc.
- 4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Vitreous China Wall Hung Basin:

- 1. ASME A112.19.2; Vitreous china wall hung lavatory with D-shaped bowl and faucet ledge. Self-draining deck area with contoured back and side splash shields.
  - a. Drilling Centers: 4 inch.
  - b. Refer to plans for mounting height.

C. Supply Faucet Manufacturers:

- 1. Zurn industries, Inc.
- 2. Sloan.

22 40 00-4

3. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- D. Sensor Operated Faucet: Cast brass, chrome plated, deck mounted with sensor located on neck of spout.
1. Faucet shall be equal to Sloan model ETF-600 sensor operated faucet.
  2. Spout Style: Standard.
  3. Power Supply: 24 VAC.
    - a. Direct wired to junction box.
    - b. For 24V applications, provide transformer.
  4. Mixing Valve: Thermostatic mixing valve.
  5. Water Supply: 1/2 inch compression connections.
  6. Aerator: Vandal resistant, 0.5 GPM, .
  7. Automatic Shut-off: 30 seconds.
  8. Sensor range: Automatically adjusts.
    - a. Accessory: Optional remote reprogrammer module to adjust pre-set factory functions.
  9. Finish: Polished chrome.
  10. Accessory: 4 inch deck plate.
  11. Sensor Operated Faucet Manufacturers:
    - a. Sloan Valve Company.
    - b. Zurn Industries, Inc.
    - c. Substitutions: Not permitted.
- E. Accessories:
1. Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon.
  2. Offset waste with plug and strainer where required.

22 40 00-5

3. Quarter-turn angle stops.
4. Flexible supplies.
5. Carrier:
  - a. Manufacturers:
    - 1) JOSAM Company.
    - 2) Zurn Industries, Inc.
    - 3) Wade.
    - 4) Watts.
    - 5) Mifab.
    - 6) Substitutions: See Section 22 01 00 - General Plumbing Provisions.
  - b. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs.

## 2.3 SINKS

- A. Sink Manufacturers:
  1. American Standard Inc.
  2. Elkay.
  3. Just.
  4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Single Compartment Bowl:
  1. ASME A112.19.3; See schedule outside dimensions, 18 gage thick, Type 304 stainless steel, self-rimming and undercoated, with ledge back drilled for trim.
    - a. Drain: 1-1/2 inch stainless steel drain.
- C. Trim: ASME A112.18.1; chrome plated brass supply with high rise rigid spout, water economy aerator with maximum 2.2 gpm flow, indexed lever handles .

22 40 00-6



1. Acceptable Faucet Manufacturers:
  - a. Just
  - b. Elkay
  - c. Zurn
  - d. Chicago Faucets.
  - e. T&S Brass.
- D. Accessories: Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon, quarter turn angle stops, flexible supplies.

## 2.4 ELECTRIC WATER COOLERS

- A. Electric Water Cooler Manufacturers:
  1. Tri Palm International/Oasis.
  2. Elkay Manufacturing Company.
  3. Haws Corporation.
  4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Water Cooler: ARI 1010; split level or single level where indicated handicapped mounted electric water cooler with stainless steel top, vinyl on steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, push button, mounting bracket, refrigerated with integral air cooled condenser and stainless steel grille.
- C. Provide integral bottle filler where indicated on the plans.
- D. Capacity: 8 gpm of 50 degree F water with inlet at 80 degree F and room temperature of 90 degree F, when tested in accordance with ASHRAE Std 18.
- E. Electrical: Maximum 1/5 hp compressor, 6 foot cord and plug for connection to electric wiring system including grounding connector.

22 40 00-7

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power is available and of the correct characteristics.
- C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

### 3.2 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

### 3.3 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid supplies to fixtures with quarter turn stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall carriers and bolts.
- E. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 92 00, color to match fixture
- F. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.
- G. Install handicap valve handles to the accessible side.
- H. Provide HandiLav or approved equal molded trap and supply insulation kit for all exposed drain and supply handicap lavatories.

### 3.4 INTERFACE WITH WORK OF OTHER SECTIONS

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

22 40 00-8

### 3.5 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

### 3.6 CLEANING

- A. Clean plumbing fixtures and equipment.

### 3.7 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.
- B. Repair or replace damaged products before Date of Substantial Completion.

### 3.8 SCHEDULES

- A. Fixture Heights: Install fixtures to heights above finished floor as indicated.
  - 1. Water Closet Flush Valves:
    - a. Standard: 11 inches min. above bowl rim.
    - b. Youth: Refer to Architectural Plans.
  - 2. Lavatory:
    - a. Standard: 31 inches to top of basin rim.
    - b. Accessible: 34 inches maximum to top of basin rim.
    - c. Youth: Refer to Architectural Plans.
- B. Minimum fixture rough-in sizes or as required for particular fixtures.
  - 1. Water Closet (Flush Valve Type):
    - a. Cold Water: 1 Inch.
    - b. Waste: 4 Inch.
    - c. Vent: 2 Inch.
  - 2. Lavatory:
    - a. Hot Water: 1/2 Inch.

22 40 00-9

- b. Cold Water: 1/2 Inch.
  - c. Waste: 1-1/2 Inch.
  - d. Vent: 1-1/4 Inch.
3. Sink:
- a. Hot Water: 1/2 Inch.
  - b. Cold Water: 1/2 Inch.
  - c. Waste: 1-1/2 Inch.
  - d. Vent: 1-1/4 Inch.
4. Drinking Fountain:
- a. Cold Water: 1/2 Inch.
  - b. Waste: 1-1/4 Inch.
  - c. Vent: 1-1/4 Inch.

END OF SECTION

22 40 00-10

## SECTION 23 01 00

### GENERAL HVAC PROVISIONS

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. The work covered by Division 23 sections consist of furnishing all labor, equipment, appliances and material for the heating, air conditioning, piping and plumbing systems in strict accordance with Codes, Specifications 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.
- B. General Contractor shall install all concrete pads and bases required for installing mechanical equipment. Mechanical Contractor is responsible for the exact sizes required, location of anchor bolts, etc.
- C. Some equipment may be furnished by other divisions. Mechanical Contractor is responsible to check the drawings and specifications for equipment that will be furnished by the Owner. Furnish the duct, insulation, controls, etc., on all equipment furnished by other divisions.
- D. General Contractor shall furnish and install all ceiling access panels required to service mechanical equipment, valves and controls above gyp board or hidden spline ceilings.
- E. NOTE: HVAC DDC Controls are included in the specification for reference only. The HVAC controls system described in the specifications and on the drawings is to be provided by the owner under separate contract. The controls system will be bid directly to the owner at a date as specified elsewhere in this specification.
- F. NOTE: The equipment described in the following sections is to be provided by Owner through a purchasing agreement. Mechanical contractor SHALL be responsible for installation of such equipment and all necessary accessories in order to provide a complete and working system.
  - 1. Section 23 09 23 - Variable Refrigerant Volume (VRV) HVAC System Remote Controller.
  - 2. Section 23 09 24 - VRV Advanced Multi-Zone Controller.

23 01 00-1

3. Section 23 55 33 - Electric Wall Heaters.
4. Section 23 74 33 - Packaged Dedicated Outdoor Air Units.
5. Section 23 09 25 - DDC Control System.
6. Section 23 75 30 - VRV - Outdoor Heat Recovery.
7. Section 23 81 40 - VRV - Indoor (Heat Recovery, Heat Pump).

## 1.2 RELATED SECTIONS

- A. The General Conditions and Division 1, General Requirements, as bound in the specification preamble, apply to all work under Division 23. Carefully note its contents in performance of the work.
- B. The Architectural, Fire Suppression, Plumbing, Electrical and Structural plans and Specifications, including Information to Bidders and other pertinent documents issued by the Engineer are a part of this Specifications and the accompanying mechanical plans. Comply with them in every respect. Examine all the above carefully. Failure to comply does not relieve the Contractor of responsibility nor may it be used as a basis for additional compensation due to omission of architectural, electrical and structural details from the mechanical drawings.
- C. All electrical power wiring is specified under Division 26 of the Specifications. Mechanical Contractor shall furnish all motor starters required for the control and protection of all motors furnished for the Division 23. Provide and install all automatic temperature and interlock wiring required for controlling mechanical equipment furnished under Division 23, in compliance with Division 26 of the Project Manual.
- D. All concrete pads and bases required for installing mechanical equipment are specified in another section of the Specifications. Advise the General Contractor as to the exact sizes required, location of anchor bolts, etc.
- E. Paint all roof top mechanical equipment, ducts, supports and other exposed material. Do not paint indoor equipment supplied with painted finish, such as the main mechanical equipment unless damaged during handling and installation. In such cases, use touch-up paint of the same type and color as original paint. Conform to requirements in other sections of the Specifications and match wall finish to the room in which installed.

23 01 00-2

### 1.3 CODES, FEES AND LATERAL COSTS

A. Comply with all applicable codes, specifications, local ordinances, industry standards, utility company regulations, and the applicable requirements of the following latest nationally accepted codes and standards:

1. 2021 Rogers , Arkansas City Building Code.
2. 2021 Arkansas State Mechanical Code.
3. 2018 Arkansas State Plumbing Code..
4. 2014 Arkansas Energy Code.
5. 2021 IBC - International Building Code.
6. IFC - International Fire Code; latest accepted edition.
7. IGC - International Gas Code; latest accepted edition.
8. IMC - International Mechanical Code; latest accepted edition.
9. IPC - International Plumbing Code; latest accepted edition.
10. IECC - International Energy Conservation Code
11. AMCA - Air Moving & Conditioning Association.
12. ASA - American Standards Association.
13. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.
14. ASME - American Society of Mechanical Engineers.
15. ASTM - American Society of Testing Materials.
16. AWWA - American Water Works Association.
17. NBS - National Bureau of Standards.
18. NEMA - National Electrical Manufacturers Association.
19. NFPA - National Fire Protection Association.

23 01 00-3

20. SMACNA - Sheet Metal & Air Conditioning Contractors' National Association.
  21. UL - Underwriters' Laboratories, Inc.
  22. AGA - American Gas Association.
  23. OSHA - Occupational Safety and Hazard Association.
  24. AABC - Associated Air Balance Councils
  25. NEBB - National Environmental Balancing Bureau
- B. Comply with State of Arkansas adopted ADA Accessible Guidelines in regard to accessible or handicapped features.
- C. In case of difference between building codes, Specifications, state Laws, local ordinances, industry standards and utility company regulations and the Contract Documents, the most stringent governs. Promptly notify the Engineer in writing of any such difference.
- D. Remove any work installed that does not comply with the requirements of the applicable building codes, state laws, local ordinances, industry standards, or utility company regulations, correct the deficiencies, and reinstall all work at no cost to the Owner.
- E. The mechanical drawings show the general arrangement of all piping, equipment and appurtenances. Follow as closely as actual building construction and the work of other trades will permit. Final layout will be governed by actual field conditions with all measurements verified at the site. Conform to the requirements shown on all of the drawings. General and structural drawings take precedence over mechanical drawings. Because of the small scale of the mechanical drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. Investigate the existing and finish conditions affecting the work and arrange the work accordingly, providing such fittings, valves and accessories as may be required to meet such conditions. Contractor shall verify that all equipment, ducts, pipes and all other components will fit in the space provided before fabrication or ordering.
- F. Obtain any and all required permits in connection with this work under the Contract and pay any and all fees in connection therewith. Arrange with the serving utility companies for the connections to all utilities and pay all charges for same including inspection fees and meters if required. Refundable deposits will be paid by the

23 01 00-4



Owner.

#### 1.4 GUARANTEE

- A. Furnish a written certificate guaranteeing all materials, equipment and labor furnished to be free of all defects for a period of one (1) year from and after the date of final acceptance of the work by the Owner and further guarantee to replace such work without charges if any defects appear within the stipulated guaranty period.

#### 1.5 SOIL CONDITIONS

- A. The Specifications and the drawings in no way imply the conditions of the soil to be encountered. When excavating may be required in execution of the work, this Contractor agrees that he has informed himself regarding conditions affecting the work.

#### 1.6 INSPECTION OF PREMISES

- A. Before submitting a bid, visit the site of the proposed job and determine the conditions relating to this work.

#### 1.7 UTILITIES, LOCATIONS AND ELEVATIONS

- A. Locations and elevations of the various utilities included within the scope of this work have been obtained from substantially reliable sources and are offered as a general guide only, without guarantee as to accuracy. Verify the location and elevation of all utilities and their relation to the work before entering into a contract.
- B. Identify outdoor underground lines with continuous strip of plastic utility marker tape at regular intervals (maximum of 10 feet) "Caution (state utility) pipe below". Install one foot directly above pipe before backfilling to grade.

#### 1.8 EXISTING BUILDING AND EXISTING MECHANICAL EQUIPMENT

- A. Visit the existing building and become thoroughly acquainted with the existing physical plant, mechanical systems and utilities in order to determine all of the work that will be necessary to carry out the intent of the plans and specifications.
- B. If it is necessary, in any way, to interfere with normal operations of the existing utilities in order to carry out the work, give notice and obtain written approval from the Owner before the work is started.

23 01 00-5

- C. The work involved in this project requires the Contractor to work inside of an existing building. Interruption of the regular routine of the building by the Contractor must be kept to a minimum.

#### 1.9 EQUIPMENT NOT SPECIFIED UNDER DIVISION 23

- A. Equipment which requires plumbing and other mechanical connections may be specified in another division of this Specification. Under these conditions, provide necessary utilities including waste, water, natural gas, duct, insulation and controls.
- B. Rough-in work from approved shop drawings only.

### PART 2 PRODUCTS

#### 2.1 EQUIPMENT AND MATERIALS

- A. Provide new materials bearing the manufacturer's name, trade name and the UL label in every case where a standard has been established for the particular material.  
Furnish the standard product of a manufacturer regularly engaged in the production of the required type of equipment. Provide the manufacturer's latest approved design.
- B. Deliver equipment and materials to the site and store in original containers, suitably sheltered from the elements, but readily accessible for inspection by the Engineer until installed. Store all items subject to moisture damage (such as controls) in dry, heated spaces.
- C. Provide equipment and materials of the same general type and of the same make throughout the work to provide uniform appearance, operation and maintenance.
- D. Tightly cover equipment and protect against dirt, water and chemical or mechanical injury and theft. At the completion of the work, clean fixtures, equipment and materials and polish thoroughly. Turn over to the Owner in a condition satisfactory to the Engineer. Repair damage or defects developing before acceptance of the work at no expense to the Owner.
- E. Insure that items to be furnished fit the space available. Make necessary field measurements to ascertain space requirements, including those for connections.  
Furnish and install such sizes and shapes of equipment that the final installation suits the true intent and meaning of the drawings and Specifications.
- F. Follow manufacturer's directions completely in the delivery, storage, protection and installation of all equipment and materials. Promptly notify the Engineer in writing of

23 01 00-6

any conflicts between any requirements of the Contract Documents and the manufacturers' directions. Obtain the Engineer's written instruction before proceeding with the work. Replace any work that does not comply with the manufacturers' directions or such written instructions from the Engineer, at no cost to the Owner.

- G. Support all products by service organizations with adequate spare parts inventory and personnel located reasonably close to the site.
- H. Where multiple units of the same type or class of products are required, provide all units of the same manufacturer.

## 2.2 EQUIPMENT ACCESSORIES

- A. Furnish and install all equipment, accessories, connections and incidental items necessary to fully complete all work, ready for use, occupancy and operation by the Owner.
- B. Where equipment requiring different arrangement or connections from those shown is provided, install the equipment to operate properly and in harmony with the intent of the drawings and Specifications.
- C. Support, plumb, rigid and true to line, all work and equipment furnished. Study thoroughly all general, structural, electrical, fire suppression and mechanical drawings, shop drawings and catalog data to determine how equipment, fixtures, piping, ductwork, etc., are to be supported, mounted or suspended and provide extra steel bolts, inserts, pipe stands, brackets and accessories for proper supports whether or not shown on the drawings. When directed, submit drawings showing supports.
- D. If accessories are required to complete the work and meet the intent of the specification, it is the responsibility of the Contractor to provide such accessories.

## 2.3 MATERIAL AND EQUIPMENT SCHEDULE

- A. Submit to the Engineer as soon as practical, six (6) complete sets of the schedule of materials and equipment proposed for the installation. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data and submit under one cover with an index sheet in front.
- B. Provide written certification that shop drawings are in accordance with the specifications and are dimensionally correct with reference to available space.

23 01 00-7

- C. All submittals will be reviewed a maximum of two (2) times. The cost of additional submittal reviews beyond those two specified will be charged to the Contractor.
- D. Shop drawings for the Engineer's files are required on the following items:
1. Packaged Rooftop Dedicated Outside Air Units.
  2. Packaged Roof Top Air Conditioning Units.
  3. Electric Wall Heaters
  4. Small Capacity Split System Air Conditioners.
  5. Filters.
  6. Exhaust Fans.
  7. Packaged Rooftop Direct Fired Kitchen Hood Make-up Air Units.
  8. Valves/Circulation Pumps/Flex Connectors and other Specialties.
  9. Grilles and Registers.
  10. VRV Condensers
  11. VRV Indoor units
  12. VRV refrigeration piping system components.
  13. Starters.
  14. Controls and Instrumentation.
  15. Air Balance Certification.
  16. Ductwork Materials Including Duct Accessories.
  17. Duct Insulation Materials.
  18. Complete Mechanical Equipment Electrical Data and Wiring Details.
  19. HVAC Controls - Including Sequences of Operation specific to the job.

23 01 00-8

## 2.4 EQUIPMENT AND MATERIAL SUBSTITUTIONS

- A. It is the responsibility of the Contractor to investigate any desired substitutions for specified equipment prior to submission of his bid. The Mechanical Contractor shall be responsible for any changes required in mechanical, electrical, structural or vibration isolation systems and shall bear all cost for those changes whether the substitute equipment is named by manufacturer in the specifications or is submitted to the Architect for "or equal" consideration. All changes shall be accomplished in a manner acceptable to the Architect per Section 01 60 00 at no additional cost to the Owner.
- B. In order to obtain prior approval on equipment or material not specified in Division 23 Specifications or Equipment Schedules, Mechanical Contractor MUST submit to the Engineer any proposed equipment or material ten (10) working days prior to the bid date.
- C. If ANY substitute equipment is submitted to Engineer for approval, without said equipment having been pre-approved, the entire submittal will be rejected for resubmittal.
- D. Any equipment manufacturers which are a subsidiary to the listed acceptable manufacturers are not considered equal. Therefore, it is the responsibility of the Contractor and equipment supplier to obtain prior approval as described in paragraph 2.4, this Section.

## 2.5 ELECTRICAL MOTORS

- A. Provide motors of a recognized manufacturer, wound for the voltage specified, and in conformance to latest standards of the manufacturer and performance of the National Electrical Manufacturers Association and the Institute of Electrical and Electronic Engineers. Provide motors as manufactured by General Electric, Westinghouse, Century or Siemens-Allis, Baldor or approved equal.
- B. Provide motors rated for continuous duty at 100% of rated capacity and temperature raise of 40 degrees Centigrade open type; 50 degrees Centigrade drip and splash proof; 55 degrees Centigrade explosion proof and totally enclosed above an ambient of 40 degrees Centigrade.
- C. Unless otherwise required, provide integral horsepower, polyphase motors, Class B, general purpose, squirrel cage, open type induction motors, T-frame.

23 01 00-9

- D. Provide single phase fractional horsepower motors of the open capacitor type. Generally, motors under 1/2 horsepower may be split phase type unless otherwise specified. Provide motors rated 1/2 horsepower or less with integral overcurrent protection.
- E. Insure the insulation resistance between stator conductor and frames of motors is not less than 1/2 megohm. Provide shop test of motors including temperature rise, insulation resistance, motor terminal voltage, normal operating line current, RPMs, breaker or switch size with fusing and overload relay sizes.
- F. Any motor to be utilized with VFD shall be supplied with shaft grounding.

## PART 3 EXECUTION

### 3.1 COORDINATION OF WORK

- A. Compare the mechanical drawings and Specifications with the drawings and Specifications for other trades and report any discrepancies between them to the Engineer and obtain from him written instruction for changes necessary in the mechanical work. Install the mechanical work in cooperation with other trades installing inter-related work. Before installation, make proper provisions to avoid interferences in a manner approved by the Engineer. Make all changes required in the work caused either by neglect or existing field conditions at no cost to the Owner.
- B. It is the responsibility of the General Contractor, Plumbing Contractors, Mechanical Contractor, Electrical Contractor and Sprinkler Contractor to coordinate installation of all equipment. Equipment installed prior to proper coordination, which interferes with the harmony and intent of the specifications and drawings, will be removed and reinstalled at the cost of the responsible Contractor.
- C. Furnish anchor bolts, sleeves, inserts and supports required for the mechanical work. Locate anchor bolts, sleeves, inserts and supports as directed by the trade requiring them and insure that they are properly installed.
- D. Slots, chases, openings and recesses in existing structure shall be cut, patched and repaired by the Contractor.
- E. Adjust locations of pipes, ducts, equipment fixtures, etc., to accommodate the work and for interferences anticipated and encountered. Determine the exact route and location of each pipe and duct prior to fabrication.

23 01 00-10

1. Provide right-of-way to lines that pitch over those that do not pitch. For example, Plumbing drains normally have right-of-way. Lines whose elevations cannot be changed have the right-of-way over lines whose elevations can be changed.
  2. Make offsets, transitions and changes in direction in pipes and ducts as required to maintain proper head room and pitch.
- F. Install all mechanical work to permit removal without damage to other parts, to coils, fan shafts and wheels, filters, belt guards, sheaves and drives and all other parts requiring periodic replacement or maintenance. Arrange pipes, ducts and equipment to permit ready access to valves, cocks, traps, starters, motors, control components and to clear the openings of swinging and overhead doors and of access panels.
- G. Change the cross sectional dimensions of ductwork when required to meet job conditions, but maintain at least the same equivalent cross sectional area. Secure the approval of the Engineer prior to fabrication of ductwork requiring such changes. Sizes shown on the plans are clear dimensions; add for internal insulation if specified.

### 3.2 RECORD DRAWINGS

- A. Maintain record drawings showing exact locations and sizes, as actually installed, of piping, drains, cleanouts, ductwork, controls and equipment as specified herein. Deliver to the Owner/Architect upon completion and acceptance of the work, one (1) complete set of contract drawings marked to indicate all deviations from intended installation.
- B. Record drawings shall be provide in hard copy form, as well as, on a DVD in PDF form.

### 3.3 CUTTING AND PATCHING

- A. The General Contractor shall be responsible for all required cutting, patching, etc., incidental to this work and shall make all required repairs thereafter to the satisfaction of the Engineer. Do not cut into any major structural element, beam or column without the written approval of the Engineer.
- B. Openings in fire or smoke barriers for air handling ductwork or air movement shall be protected in accordance with NFPA 90A and 90B and the Mechanical Code.
- C. Pipes, conduits, cables, wires, air ducts, pneumatic tubes and ducts and similar handling service equipment that pass through fire or smoke barriers shall be protected

23 01 00-11

in accordance with NFPA 101.

- D. All fire stopping assemblies must be UL approved assemblies.

### 3.4 EQUIPMENT START-UP AND TESTING

- A. Instruct the Owner's operating personnel during start-up and separate operating tests of each major item of equipment. During the operating tests, prove the operation of each item of equipment to the satisfaction of the Engineer. Give at least seven (7) days notice to the Engineer of equipment start-up and operating tests.
- B. Refer to Section 23 08 00 for additional information.

### 3.5 CATALOG DATA FOR OWNER

- A. Provide, in looseleaf binders, two (2) sets of a compilation of catalog data of each manufactured item of equipment used in the mechanical work and present this compilation to the Owner/Architect for transmittal to the Owner before final payment is made. Include descriptive data and printed installation, operating and maintenance instructions for each item of equipment. Provide a complete double index as follows:
  - 1. Listing of products alphabetically by name.
  - 2. Listing the names of manufacturers whose products have been incorporated in the work alphabetically together with their addresses and the names and addresses of the local sales representatives.
  - 3. Certificates of Final Inspections.
  - 4. Complete spare parts data with current prices and supply sources.
  - 5. Extended warranties.
- B. Deliver to the Owner all special tools, lubricants, extra materials and any other products necessary for the proper operation and maintenance of the mechanical and plumbing systems.
- C. Provide project record documents indicating all changes from contract documents made during construction.
- D. Submit all Certificates of Final Inspections from the Administrative Authorities.

23 01 00-12



- E. Submit TAB reports on approved forms. Final TAB report submittals shall include all required rebalances if any are required.

### 3.6 INSTRUCTION OF OWNER'S REPRESENTATIVE

- A. Instruct the representative of the Owner in the proper operation and maintenance of all elements of the mechanical system.
- B. Provide classroom and hands-on training of Owner's designated personnel on operation and maintenance of the HVAC system, control system, and all equipment items indicated. Provide the following training as required to fully qualify the Owner's designated personnel. All training must be video taped to a CD and a copy included in each operation and maintenance closeout manual.
  - 1. Dedicated Outside Air Units.
  - 2. VRV Cooling and Heating Systems.
  - 3. Electric Wall Heaters.
  - 4. Exhaust Fans Units.

### 3.7 PROTECTIVE COATINGS

- A. Paint exterior surfaces of steel piping run in or through concrete floor fill, under tile floors or underground, and aluminum surfaces in contact with masonry, with one coat of acid resisting bituminous base paint.
- B. Paint all exposed galvanized ducts behind grilles flat black.

### 3.8 TEST AND ACCEPTANCE

- A. Water Piping System: Test with water at 100 psi for ten (10) hours or with available city water pressure for twenty-four (24) hours to prove tight and free from leaks.
- B. Plumbing and Drainage System: Test the new system humidity and drain piping with water and prove tight. Test system with 10 feet of water for 24 hour period. Air test is not permitted.

### 3.9 NOISE CONTROL

- A. It is intended that the mechanical systems as installed under this contract be free from objectionable noise when the system is operating. The system shall operate at noise

23 01 00-13

levels below criteria recommended for the application by ASHRAE. Provide vibration isolation accessories and isolate equipment, pipeline, ductwork, etc., as required so as to insure an acceptable noise level in all of the mechanical systems.

### 3.10 CLEANING AND ADJUSTING

- A. Do not allow waste material and rubbish to accumulate in or above the premises. After completion of this work, remove rubbish, tools, scaffolding and surplus materials from and about the building and leave all work clean and ready for use. Clean all equipment, pipes, valves and fittings of grease, metal cuttings and sludge. Repair any stoppage, discoloration or other damage to parts of the building, its finish or furnishings due to failure to properly clean the mechanical systems, without additional cost to the Owner. Adjust all automatic control devices for proper operation.
- B. Flush hydronic piping to remove all black iron oxides, mill scale, and other foreign debris from the system. Flush system piping per section 23 25 00 part 3.2 and clean all strainers. repeat process until water runs clear and system is clean of debris.
- C. Exercise proper care during flushing and cleaning of systems to insure no damage done to equipment, valves, fitting, or work of other trades. restore damaged system components or work of other trades to new or original condition at no additional cost to owner.
- D. Remove or bypass all flow measuring devices before flushing of system to prevent damage to electronic devices.
- E. Remove all startup strainers from pumps before test and balance is started.
- F. The cooling tower is to be thoroughly flushed and cleaned before start up of system and condensing water pumps.
- G. The cooling tower is to be thoroughly flushed and cleaned at substantial completion to remove all dust and debris collected in tower during construction and site work.

### 3.11 SYSTEM OPERATING TESTS

- A. After the successful completion of all equipment start-up and test requirements, perform the following tests on the complete mechanical systems:
  - 1. First Operating Test by Contractor: Prove the operation of the mechanical systems and of each individual item in the systems. Give at least 10 day prior

23 01 00-14

notice to the Engineer of such tests. Adjust and set proper quantities to all items and equipment. Should any item of the systems fail to perform in an approved manner, repeat this test until approved by the Engineer. During this test, balance circulation of heating and cooling water to balancing cocks, valves, thermostats and similar Items to insure that the mechanical systems perform as intended.

2. Checking by Owner and Engineer: Following the successful completion of first operating tests by the Contractor, the Owner and the Engineer have the privilege of making such tests as they may desire during a period of three weeks to ascertain in detail if any corrections are to be made to the system. At the end of the testing by the Owner and the Engineer, the Engineer may direct the Contractor in writing to make such corrections to the systems as are within the scope of the contract.
3. Contractor's Corrections to Systems: Make all required corrections to the systems and notify the Engineer in writing that the corrections outlined have been completed. Give at least seven (7) days notice of a final three-day operating test.
4. Three-Day Operating Test: Perform an operating test to the satisfaction of the Engineer for a period of three (3) days. Should any element of the systems not perform properly, make all required corrections and repeat the test until successfully performed.
  - a. Submit the Form of Record proposed by the Contractor for the recording of all measurements to the Engineer for approval at least two weeks before the approved form will be required by the Contractor.
  - b. Measurements: Make the following measurements at two-hour intervals (5 measurements per 8-hour day) during the three-day operating test.
    - 1) Electrical: Running amperes and voltage of each motor 3/4 horsepower or larger.
    - 2) Air temperatures in each heated or air conditioned space and outdoor temperatures.
  - c. Instruments: Provide all instruments, materials and labor to perform the tests and to obtain and record the measurements specified herein, including the furnishing of all required record forms as approved by the Engineer. Submit for the Engineer's approval, complete shop drawings or catalog data for all instruments to be used for the three day operating test and obtain approval at

23 01 00-15

least two weeks before the instruments will be required for test measurements.

- d. Report: Submit four (4) copies of a written report of the three-day operating test on the approved Form of Record to the Engineer for approval and subsequent transmittal to the Owner.

### 3.12 MOTOR CONTROL

- A. General: Provide each motor 1/8 horsepower or larger with a suitable controller and devices that will perform the functions as specified for the respective motors, together with manual reset thermal overload, protection in each undergrounded conductor. Provide the controller either integral with circuit protective device or mounted in separate enclosure. Starters shall be Allen-Bradley, G.E., Westinghouse, Square D or approved equal.
- B. Control: Automatic control devices such as thermostats, float or pressure switches may control the starting and stopping of motor directly, provided the device used is designated for that purpose and has an adequate horsepower rating. When automatic control device does not have such a rating, use a magnetic starter with the automatic control device actuating the pilot control circuit. When combination manual and automatic control is specified and the control device operates the motor directly, provide a manual motor starter and selector switch. When combination manual and automatic control is specified and the automatic control device actuates the pilot control circuit, a magnetic control device actuates the pilot control provided. Provide all magnetic starters with push buttons or selector switches in the covers. Provide connections to the selector switch such that only the normal automatic regulating control devices will be bypassed when the switch is in the manual position. Connect all safety control devices, such as low or high pressure cutouts, high temperature cutouts and motor overload protective devices in the motor control circuit in both the manual and automatic positions of the selector switch control circuit. Make connections to any selector switch or to more than one (1) automatic regulatory control device in accordance with wiring diagrams recommended by the manufacturer and approved by the Engineer. Where required for manual control, provide push-button stations consisting of two (2) momentary contact operators, 600 volts, 10 amperes installed and wired for three wire control to provide under-voltage relays, auxiliary contacts or other devices required for a complete system.
- C. Location: Where the controller is located within sight of the motor driven equipment (fifty feet or less), the controller and circuit protective device shall be capable of being

23 01 00-16

locked in the open position. Where the controller is located out of sight of the motor driven equipment (more than fifty feet) provide a non-fused safety disconnect, suitable for the service, and which opens all ungrounded conductors simultaneously, at or on the motor driven equipment.

- D. Enclosure: Enclosure to be general purpose, NEMA Type 1 unless noted otherwise (NEMA Type 1 gasketed). The circuit breaker shall be operable by hand from outside the enclosure and shall be so interlocked with the door or doors that it must be returned to the "OFF" position before the door can be opened.
- E. Push-buttons: Provide maintained contact, standard duty type in a general purpose, NEMA Type 1 enclosure for surface mounting rated for 10 amperes continuous at 600 volts or less.

### 3.13 ACCESS PANELS

- A. Provide access panels as required in all walls, ceilings and ductwork to service and have access to all valves, operating parts and duct mounted fire dampers. For all ceiling and wall access doors that are required in gypsum board and plaster, provide minimum 24" x 24", Milcor type appropriate for the construction involved.

### 3.14 TEMPORARY HEATING AND COOLING

- A. Permanent heating and cooling systems may be used to provide temporary heating and cooling to the building during construction, if the following requirements are met:
  1. Provide filters in equipment filter racks.
  2. Provide filter material at entrance to all return air ducts or over permanent return air grilles. All return air ductwork is to be protected from construction dust and debris. If return air duct work is not protected prior to equipment startup for temporary use, the Contractor will pay to have the entire ductwork system of the affected equipment thoroughly cleaned prior to Owner occupancy.
  3. Contractor shall provide and pay for operation, maintenance, regular replacement of filters and worn or consumed parts.
  4. shall replace any equipment that is damaged during temporary usage with new equipment.
  5. All warranty periods shall not begin until Certificate of Substantial Completion is issued.

23 01 00-17

6. Verify with engineer that the installation is ready and approved for operation.
- B. Just prior to turning the building or portions of the building over to the Owner, Contractor will replace all filters on equipment used for temporary ventilation, heat or cooling during construction.
- C. Do not turn water into the system until the systems have been thoroughly cleaned and approved by the Engineer.

### 3.15 DEMOLITION

- A. There are areas in the existing building in which demolition will have to be performed due to the requirements for remodeling. The demolition work involved is not fully described herein; however, the information given on the electrical and mechanical drawings and the information set out in the specifications will substantially serve to inform the mechanical Contractor as to the full extent of the demolition required.
- B. Contractor should visit job site to verify extent of demolition required to complete project.
- C. It is the intent of this Specification that all required demolition work be fully and completely performed and all work be accomplished in a neat and workmanlike manner.
- D. Remove all existing piping, fittings, heating, cooling, ventilation equipment that is required to accomplish the remodel work. All existing utilities that are disconnected shall be capped recessed in walls and floors. Contractor shall be responsible for visiting building and determining the extent of the demolition work. Contractor shall provide any necessary temporary piping required to keep existing building utilities (water, gas and sewer) in operation until new construction is completed to the extent that the new utilities can be reconnected.
- E. All rubbish, debris and expendable items resulting from demolition work shall be removed from the premises as it accumulates and disposed of at an off-site location by the Contractor.

### 3.16 SALVAGE

- A. Except as otherwise specified herein, or noted on drawings, the Contractor shall receive title to all building materials indicated to be demolished or removed which are not specifically designated as being retained by the Owner, said title to vest in the

23 01 00-18

Contractor immediately upon receipt of Work Order. All salvage materials removed shall be taken from the premises promptly, as the storage of salvage materials on the site will not be permitted. Bidders shall take into account the salvage value to them of materials removed and such value shall be reflected in the bids.

- B. All items of usable equipment shall remain the property of the Owner. All such items of equipment which are to be removed and which are not to be reused shall be stored on the premises by the Contractor as directed by the Owner.
- C. Usable items shall be determined by the Owner and shall include existing heating and cooling pumps and other equipment so designated as "usable" by the Owner.

### 3.17 ASBESTOS DISCOVERY

- A. If the execution of this work requires the disturbing of any substance which appears to be asbestos or which may contain asbestos fibers, notify the Owner before continuing work at the suspect location. Any materials testing positive will be removed by the Owner before work continues.

### 3.18 FINALLY

- A. It is the intention that this specification shall provide a complete installation except as herein before specifically excepted. All accessory construction and apparatus necessary or advantageous in the operation and testing of the work shall be included. The omission of specific reference to any part of the work necessary for such complete installation shall not be interpreted as relieving this Contractor from furnishing and installing such parts.

END OF SECTION

23 01 00-19





## SECTION 23 05 13

### COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Single phase electric motors.
- B. Three phase electric motors.

##### 1.2 REFERENCE STANDARDS

- A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015.
- B. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators; 2017.
- C. NEMA MG 1 - Motors and Generators; 2021.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

##### 1.3 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.
- D. Operation Data: Include instructions for safe operating procedures.
- E. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

##### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacture of electric motors for Commercial use, and their accessories, with minimum five years documented product development, testing, and manufacturing experience.

23 05 13-1

- B. Conform to NFPA 70.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of high efficiency motors.
- D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Lincoln Motors.
- B. A. O. Smith Electrical Products Co.
- C. Reliance Electric/Rockwell Automation.
- D. Baldor Electric Company.
- E. Substitutions: See Section 23 01 00 - General HVAC Provisions.

### 2.2 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Electrical Service:
  - 1. Motors 1/2 HP and Smaller: 115 volts, single phase, 60 Hz.
  - 2. Motors Larger than 1/2 Horsepower: 460 volts, three phase, 60 Hz.
- B. Construction:
  - 1. Open drip-proof type except where specifically noted otherwise.
  - 2. Design for continuous operation in 40 degrees C environment.
  - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.

23 05 13-2

- 4. Motors with frame sizes 254T and larger: Energy Efficient Type.
- C. Explosion-Proof Motors: UL approved and labelled for hazard classification, with over temperature protection.
- D. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
  - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
  - 2. For fractional horsepower motors where connection is made directly, provide conduit connection in end frame.

### 2.3 APPLICATIONS

- A. Exception: Motors less than 250 watts, for intermittent service may be the equipment manufacturer's standard and need not conform to these specifications.
- B. Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.
- C. Motors located outdoors: Totally enclosed weatherproof epoxy-sealed type.

### 2.4 SINGLE PHASE POWER - SPLIT PHASE MOTORS

- A. Starting Torque: Less than 150 percent of full load torque.
- B. Starting Current: Up to seven times full load current.
- C. Breakdown Torque: Approximately 200 percent of full load torque.
- D. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.
- E. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

### 2.5 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

- A. Starting Torque: Exceeding one fourth of full load torque.

23 05 13-3

- B. Starting Current: Up to six times full load current.
- C. Multiple Speed: Through tapped windings.
- D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

## 2.6 SINGLE PHASE POWER - CAPACITOR START MOTORS

- A. Starting Torque: Three times full load torque.
- B. Starting Current: Less than five times full load current.
- C. Pull-up Torque: Up to 350 percent of full load torque.
- D. Breakdown Torque: Approximately 250 percent of full load torque.
- E. Motors: Capacitor in series with starting winding; provide capacitor-start/capacitor-run motors with two capacitors in parallel with run capacitor remaining in circuit at operating speeds.
- F. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve bearings.
- G. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

## 2.7 THREE PHASE POWER - SQUIRREL CAGE MOTORS

- A. Starting Torque: Between 1 and 1-1/2 times full load torque.
- B. Starting Current: Six times full load current.
- C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.
- D. Design, Construction, Testing, and Performance: Conform to NEMA MG 1 for Design B motors.
- E. Insulation System: NEMA Class B or better.
- F. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.

23 05 13-4

- G. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
- H. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors imbedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter.
- I. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA STD 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
- J. Sound Power Levels: To NEMA MG 1.
- K. Part Winding Start Above 254T Frame Size: Use part of winding to reduce locked rotor starting current to approximately 60 percent of full winding locked rotor current while providing approximately 50 percent of full winding locked rotor torque.
- L. Weatherproof Epoxy Sealed Motors: Epoxy coat windings with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.
- M. Nominal Efficiency: As scheduled at full load and rated voltage when tested in accordance with IEEE 112.
- N. Nominal Power Factor: As scheduled at full load and rated voltage when tested in accordance with IEEE 112.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- C. Check line voltage and phase and ensure agreement with nameplate.

### 3.2 SCHEDULE

- A. NEMA Open Motor Service Factors.

23 05 13-5

1. 1/6-1/3 hp:
    - a. 3600 rpm: 1.35.
    - b. 1800 rpm: 1.35.
  2. 1/2 hp:
    - a. 3600 rpm: 1.25.
    - b. 1800 rpm: 1.25.
  3. 3/4 hp:
    - a. 3600 rpm: 1.25.
    - b. 1800 rpm: 1.25.
- B. Three Phase - Energy Efficient, Open Drip-Proof Performance:
1. 1200 rpm.
    - a. 1 hp:
      - 1) NEMA Frame: 145T.
      - 2) Minimum Percent Power Factor: 72.
      - 3) Minimum Percent Efficiency: 81.
    - b. 1-1/2 hp:
      - 1) NEMA Frame: 182T.
      - 2) Minimum Percent Power Factor: 73.
      - 3) Minimum Percent Efficiency: 83.
    - c. 2 hp:
      - 1) NEMA Frame: 184T.
      - 2) Minimum Percent Power Factor: 75.
      - 3) Minimum Percent Efficiency: 85.

23 05 13-6

- d. 3 hp:
  - 1) NEMA Frame: 213T.
  - 2) Minimum Percent Power Factor: 60.
  - 3) Minimum Percent Efficiency: 86.
- e. 5 hp:
  - 1) NEMA Frame: 215T.
  - 2) Minimum Percent Power Factor: 65.
  - 3) Minimum Percent Efficiency: 87.
- f. 7-1/2 hp:
  - 1) NEMA Frame: 254T.
  - 2) Minimum Percent Power Factor: 73.
  - 3) Minimum Percent Efficiency: 89.
- g. 10 hp:
  - 1) NEMA Frame: 256T.
  - 2) Minimum Percent Power Factor: 74.
  - 3) Minimum Percent Efficiency: 89.
- h. 15 hp:
  - 1) NEMA Frame: 284T.
  - 2) Minimum Percent Power Factor: 77.
  - 3) Minimum Percent Efficiency: 90.
- i. 20 hp:
  - 1) NEMA Frame: 286T.
  - 2) Minimum Percent Power Factor: 78.

23 05 13-7

- 3) Minimum Percent Efficiency: 90.
- j. 25 hp:
  - 1) NEMA Frame: 324T.
  - 2) Minimum Percent Power Factor: 74.
  - 3) Minimum Percent Efficiency: 91.
- k. 30 hp:
  - 1) NEMA Frame: 326T.
  - 2) Minimum Percent Power Factor: 78.
  - 3) Minimum Percent Efficiency: 91.
- l. 40 hp:
  - 1) NEMA Frame: 364T.
  - 2) Minimum Percent Power Factor: 77.
  - 3) Minimum Percent Efficiency: 93.
- m. 50 hp:
  - 1) NEMA Frame: 365T.
  - 2) Minimum Percent Power Factor: 79.
  - 3) Minimum Percent Efficiency: 93.
- n. 60 hp:
  - 1) NEMA Frame: 404T.
  - 2) Minimum Percent Power Factor: 82.
  - 3) Minimum Percent Efficiency: 93.
- o. 75 hp:
  - 1) NEMA Frame: 405T.

23 05 13-8



- 2) Minimum Percent Power Factor: 80.
  - 3) Minimum Percent Efficiency: 93.
- p. 100 hp:
- 1) NEMA Frame: 444T.
  - 2) Minimum Percent Power Factor: 80.
  - 3) Minimum Percent Efficiency: 93.
- q. 125 hp:
- 1) NEMA Frame: 444T.
  - 2) Minimum Percent Power Factor: 84.
  - 3) Minimum Percent Efficiency: 93.
2. 1800 rpm.
- a. 1 hp:
- 1) NEMA Frame: 143T.
  - 2) Minimum Percent Power Factor: 84.
  - 3) Minimum Percent Efficiency: 82.
- b. 1-1/2 hp:
- 1) NEMA Frame: 145T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 84.
- c. 2 hp:
- 1) NEMA Frame: 145T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 84.

23 05 13-9

- d. 3 hp:
  - 1) NEMA Frame: 182T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 86.
- e. 5 hp:
  - 1) NEMA Frame: 184T.
  - 2) Minimum Percent Power Factor: 87.
  - 3) Minimum Percent Efficiency: 87.
- f. 7-1/2 hp:
  - 1) NEMA Frame: 213T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 88.
- g. 10 hp:
  - 1) NEMA Frame: 215T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 89.
- h. 15 hp:
  - 1) NEMA Frame: 256T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 91.
- i. 20 hp:
  - 1) NEMA Frame: 256T.
  - 2) Minimum Percent Power Factor: 86.

23 05 13-10

- 3) Minimum Percent Efficiency: 91.
- j. 25 hp:
  - 1) NEMA Frame: 284T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 91.
- k. 30 hp:
  - 1) NEMA Frame: 286T.
  - 2) Minimum Percent Power Factor: 88.
  - 3) Minimum Percent Efficiency: 92.
- l. 40 hp:
  - 1) NEMA Frame: 324T.
  - 2) Minimum Percent Power Factor: 83.
  - 3) Minimum Percent Efficiency: 92.
- m. 50 hp:
  - 1) NEMA Frame: 326T.
  - 2) Minimum Percent Power Factor: 88.
  - 3) Minimum Percent Efficiency: 93.
- n. 60 hp:
  - 1) NEMA Frame: 364T.
  - 2) Minimum Percent Power Factor: 88.
  - 3) Minimum Percent Efficiency: 93.
- o. 75 hp:
  - 1) NEMA Frame: 365T.

23 05 13-11

- 2) Minimum Percent Power Factor: 88.
  - 3) Minimum Percent Efficiency: 93.
- p. 100 hp:
- 1) NEMA Frame: 404T.
  - 2) Minimum Percent Power Factor: 83.
  - 3) Minimum Percent Efficiency: 93.
- q. 125 hp:
- 1) NEMA Frame: 405T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 93.
- r. 150 hp:
- 1) NEMA Frame: 444T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 93.
3. 3600 rpm.
- a. 1-1/2 hp:
- 1) NEMA Frame: 143T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 82.
- b. 2 hp:
- 1) NEMA Frame: 145T.
  - 2) Minimum Percent Power Factor: 87.
  - 3) Minimum Percent Efficiency: 82.

23 05 13-12

- c. 3 hp:
  - 1) NEMA Frame: 145T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 84.
- d. 5 hp:
  - 1) NEMA Frame: 182T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 85.
- e. 7-1/2 hp:
  - 1) NEMA Frame: 184T.
  - 2) Minimum Percent Power Factor: 88.
  - 3) Minimum Percent Efficiency: 86.
- f. 10 hp:
  - 1) NEMA Frame: 213T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 87.
- g. 15 hp:
  - 1) NEMA Frame: 215T.
  - 2) Minimum Percent Power Factor: 89.
  - 3) Minimum Percent Efficiency: 89.
- h. 20 hp:
  - 1) NEMA Frame: 254T.
  - 2) Minimum Percent Power Factor: 89.

23 05 13-13

- 3) Minimum Percent Efficiency: 90.
- i. 25 hp:
  - 1) NEMA Frame: 256T.
  - 2) Minimum Percent Power Factor: 92.
  - 3) Minimum Percent Efficiency: 90.
- j. 30 hp:
  - 1) NEMA Frame: 284T.
  - 2) Minimum Percent Power Factor: 91.
  - 3) Minimum Percent Efficiency: 91.
- k. 40 hp:
  - 1) NEMA Frame: 286T.
  - 2) Minimum Percent Power Factor: 92.
  - 3) Minimum Percent Efficiency: 92.
- l. 50 hp:
  - 1) NEMA Frame: 324T.
  - 2) Minimum Percent Power Factor: 89.
  - 3) Minimum Percent Efficiency: 93.
- m. 60 hp:
  - 1) NEMA Frame: 326T.
  - 2) Minimum Percent Power Factor: 91.
  - 3) Minimum Percent Efficiency: 93.
- n. 75 hp:
  - 1) NEMA Frame: 364T.

23 05 13-14

- 2) Minimum Percent Power Factor: 88.
- 3) Minimum Percent Efficiency: 93.
- o. 100 hp:
  - 1) NEMA Frame: 365T.
  - 2) Minimum Percent Power Factor: 88.
  - 3) Minimum Percent Efficiency: 92.
- C. Three Phase - Energy Efficient, Totally Enclosed, Fan Cooled Performance:
  - 1. 1800 rpm.
    - a. 1 hp:
      - 1) NEMA Frame: 143T.
      - 2) Minimum Percent Power Factor: 84.
      - 3) Minimum Percent Efficiency: 82.
    - b. 1-1/2 hp:
      - 1) NEMA Frame: 145T.
      - 2) Minimum Percent Power Factor: 85.
      - 3) Minimum Percent Efficiency: 84.
    - c. 2 hp:
      - 1) NEMA Frame: 145T.
      - 2) Minimum Percent Power Factor: 85.
      - 3) Minimum Percent Efficiency: 84.
    - d. 3 hp:
      - 1) NEMA Frame: 182T.
      - 2) Minimum Percent Power Factor: 83.

23 05 13-15

- 3) Minimum Percent Efficiency: 87.
- e. 5 hp:
  - 1) NEMA Frame: 184T.
  - 2) Minimum Percent Power Factor: 83.
  - 3) Minimum Percent Efficiency: 88.
- f. 7-1/2 hp:
  - 1) NEMA Frame: 213T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 89.
- g. 10 hp:
  - 1) NEMA Frame: 215T.
  - 2) Minimum Percent Power Factor: 84.
  - 3) Minimum Percent Efficiency: 90.
- h. 15 hp:
  - 1) NEMA Frame: 254T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 91.
- i. 20 hp:
  - 1) NEMA Frame: 256T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 91.
- j. 25 hp:
  - 1) NEMA Frame: 284T.

23 05 13-16



- 2) Minimum Percent Power Factor: 84.
- 3) Minimum Percent Efficiency: 92.
- k. 30 hp:
  - 1) NEMA Frame: 286T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 93.
- l. 40 hp:
  - 1) NEMA Frame: 324T.
  - 2) Minimum Percent Power Factor: 83.
  - 3) Minimum Percent Efficiency: 93.
- m. 50 hp:
  - 1) NEMA Frame: 326T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 93.
- n. 60 hp:
  - 1) NEMA Frame: 364T.
  - 2) Minimum Percent Power Factor: 87.
  - 3) Minimum Percent Efficiency: 93.
- o. 75 hp:
  - 1) NEMA Frame: 365T.
  - 2) Minimum Percent Power Factor: 87.
  - 3) Minimum Percent Efficiency: 93.
- p. 100 hp:

23 05 13-17

- 1) NEMA Frame: 405T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 94.
- q. 125 hp:
- 1) NEMA Frame: 444T.
  - 2) Minimum Percent Power Factor: 87.
  - 3) Minimum Percent Efficiency: 94.
- r. 150 hp:
- 1) NEMA Frame: 445T.
  - 2) Minimum Percent Power Factor: 88.
  - 3) Minimum Percent Efficiency: 94.
2. 3600 rpm.
- a. 1-1/2 hp:
- 1) NEMA Frame: 143T.
  - 2) Minimum Percent Power Factor: 85.
  - 3) Minimum Percent Efficiency: 82.
- b. 2 hp:
- 1) NEMA Frame: 145T.
  - 2) Minimum Percent Power Factor: 87.
  - 3) Minimum Percent Efficiency: 82.
- c. 3 hp:
- 1) NEMA Frame: 182T.
  - 2) Minimum Percent Power Factor: 87.

23 05 13-18

- 3) Minimum Percent Efficiency: 82.
- d. 5 hp:
  - 1) NEMA Frame: 184T.
  - 2) Minimum Percent Power Factor: 88.
  - 3) Minimum Percent Efficiency: 85.
- e. 7-1/2 hp:
  - 1) NEMA Frame: 213T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 86.
- f. 10 hp:
  - 1) NEMA Frame: 215T.
  - 2) Minimum Percent Power Factor: 86.
  - 3) Minimum Percent Efficiency: 87.
- g. 15 hp:
  - 1) NEMA Frame: 254T.
  - 2) Minimum Percent Power Factor: 91.
  - 3) Minimum Percent Efficiency: 88.
- h. 20 hp:
  - 1) NEMA Frame: 256T.
  - 2) Minimum Percent Power Factor: 89.
  - 3) Minimum Percent Efficiency: 89.
- i. 25 hp:
  - 1) NEMA Frame: 284T.

23 05 13-19

- 2) Minimum Percent Power Factor: 92.
  - 3) Minimum Percent Efficiency: 90.
- j. 30 hp:
- 1) NEMA Frame: 286T.
  - 2) Minimum Percent Power Factor: 92.
  - 3) Minimum Percent Efficiency: 91.
- k. 40 hp:
- 1) NEMA Frame: 324T.
  - 2) Minimum Percent Power Factor: 91.
  - 3) Minimum Percent Efficiency: 91.
- l. 50 hp:
- 1) NEMA Frame: 326T.
  - 2) Minimum Percent Power Factor: 92.
  - 3) Minimum Percent Efficiency: 90.
- m. 60 hp:
- 1) NEMA Frame: 364T.
  - 2) Minimum Percent Power Factor: 93.
  - 3) Minimum Percent Efficiency: 91.
- n. 75 hp:
- 1) NEMA Frame: 365T.
  - 2) Minimum Percent Power Factor: 91.
  - 3) Minimum Percent Efficiency: 91.
- o. 100 hp:

23 05 13-20

- 1) NEMA Frame: 405T.
- 2) Minimum Percent Power Factor: 92.
- 3) Minimum Percent Efficiency: 92.

23 05 13-21

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas



## SECTION 23 05 53

### IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe Markers.
- E. Ceiling tacks.

##### 1.2 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

##### 1.3 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

#### PART 2 PRODUCTS

##### 2.1 IDENTIFICATION APPLICATIONS

- A. Air Handling Units: Nameplates.

23 05 53-1

- B. Automatic Controls: Tags. Key to control schematic.
- C. Control Panels: Nameplates.
- D. Dampers: Ceiling tacks, where located above lay-in ceiling.
- E. Ductwork: Stencilled painting.
- F. Heat Transfer Equipment: Nameplates.
- G. Instrumentation: Tags.
- H. Major Control Components: Nameplates.
- I. Piping: Tags.
- J. Relays: Tags.
- K. Small-sized Equipment: Tags.
- L. Thermostats: Nameplates.
- M. Valves: Tags and ceiling tacks where located above lay-in ceiling.

## 2.2 NAMEPLATES

- A. Manufacturers:
  - 1. Advanced Graphic Engraving.
  - 2. Kolbi Pipe Marker Co.
  - 3. Seton Identification Products.
  - 4. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Description: Laminated three-layer plastic with engraved letters.
  - 1. Letter Color: White.
  - 2. Letter Height: 1/2 inch.
  - 3. Background Color: Black.
  - 4. Plastic: Conform to ASTM D709.

23 05 53-2



## 2.3 TAGS

- A. Manufacturers:
  - 1. Advanced Graphic Engraving.
  - 2. Brady Corporation.
  - 3. Kolbi Pipe Marker Co.
  - 4. Seton Identification Products.
  - 5. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

## 2.4 STENCILS

- A. Manufacturers:
  - 1. Brady Corporation.
  - 2. Kolbi Pipe Marker Co.
  - 3. Seton Identification Products.
  - 4. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Stencils: With clean cut symbols and letters of following size:
  - 1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
  - 2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
  - 3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.

23 05 53-3

4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.
5. Over 10 inch Outside Diameter of Insulation or Pipe: 32 inch long color field, 3-1/2 inch high letters.
6. Ductwork and Equipment: 2-1/2 inch high letters.

## 2.5 PIPE MARKERS

### A. Manufacturers:

1. Brady Corporation.
2. Kolbi Pipe Marker Co.
3. MIFAB.
4. Seton Identification Products.
5. Substitutions: See Section 23 01 00 - General HVAC Provisions.

### B. Color: Conform to ASME A13.1.

### C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

### D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

### E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

### F. Color code as follows:

1. Heating, Cooling, and Boiler Feedwater: Green with white letters.

## 2.6 CEILING TACKS

### A. Manufacturers:

1. Craftmark.
2. Substitutions: See Section 23 01 00 - General HVAC Provisions.

23 05 53-4

- B. Description: Steel with 3/4 inch diameter color coded head.
- C. Color code as follows:
  - 1. Yellow - HVAC equipment.
  - 2. Red - Fire dampers/smoke dampers.
  - 3. Blue - Heating/cooling valves.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 91 00 for stencil painting.

### 3.2 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Use tags on piping 3/4 inch diameter and smaller.
  - 1. Identify service, flow direction, and pressure.
  - 2. Install in clear view and align with axis of piping.
  - 3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- G. Install ductwork with stencilled painting. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of

23 05 53-5

penetration of structure or enclosure, and at each obstruction.

- H. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

23 05 53-6

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas

## SECTION 23 05 93

### TESTING, ADJUSTING, AND BALANCING

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Measurement of final operating condition of HVAC systems.

##### 1.2 REFERENCE STANDARDS

- A. AABC MN-1 - AABC National Standards for Total System Balance; Associated Air Balance Council; 2002.
- B. ASHRAE Std 111 - Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 1988, with 1997 Errata.
- C. NEBB (TAB) - Procedural Standards for Testing Adjusting Balancing of Environmental Systems; National Environmental Balancing Bureau; 2005, Seventh Edition.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting, and Balancing; Sheet Metal and Air Conditioning Contractors' National Association; 2002.

##### 1.3 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
  - 1. Submit to Architect.
  - 2. Submit six weeks prior to starting the testing, adjusting, and balancing work.

23 05 93-1

3. Include certification that the plan developer has reviewed the contract documents, the equipment and systems, and the control system with the Architect and other installers to sufficiently understand the design intent for each system.
4. Include at least the following in the plan:
  - a. Preface: An explanation of the intended use of the control system.
  - b. List of all air flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
  - c. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
  - d. Identification and types of measurement instruments to be used and their most recent calibration date.
  - e. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
  - f. Final test report forms to be used.
  - g. Detailed step-by-step procedures for TAB work for each system and issue, including:
    - 1) Terminal flow calibration (for each terminal type).
    - 2) Diffuser proportioning.
    - 3) Branch/submain proportioning.
    - 4) Rechecking.
    - 5) Diversity issues.
  - h. Expected problems and solutions, etc.
  - i. Criteria for using air flow straighteners or relocating flow stations and sensors .
  - j. Details of how TOTAL flow will be determined; for example:

23 05 93-2

- 1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
  - k. Specific procedures that will ensure that air side is operating at the lowest possible pressures and methods to verify this.
  - l. Confirmation of understanding of the outside air ventilation criteria under all conditions.
  - m. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
  - n. Method of checking building static and exhaust fan and/or relief damper capacity.
  - o. Methods for making coil or other system plant capacity measurements, if specified.
  - p. Time schedule for TAB work to be done in phases (by floor, etc.).
  - q. Description of TAB work for areas to be built out later, if any.
  - r. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
  - s. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
  - t. Procedures for formal progress reports, including scope and frequency.
  - u. Procedures for formal deficiency reports, including scope, frequency and distribution.
- D. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.
- E. Progress Reports.

23 05 93-3

- F. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
1. Submit to the Construction Manager, HVAC controls contractor, and Engineer within two weeks after completion of testing, adjusting, and balancing.
  2. Revise TAB plan to reflect actual procedures and submit as part of final report.
  3. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
  4. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
  5. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
  6. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
  7. Units of Measure: Report data in I-P (inch-pound) units only.
  8. Include the following on the title page of each report:
    - a. Name of Testing, Adjusting, and Balancing Agency.
    - b. Address of Testing, Adjusting, and Balancing Agency.
    - c. Telephone number of Testing, Adjusting, and Balancing Agency.
    - d. Project name.
    - e. Project location.
    - f. Project Architect.
    - g. Project Engineer.
    - h. Project Contractor.
    - i. Project altitude.

23 05 93-4



- j. Report date.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION

### 3.1 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
  - 1. AABC MN-1, AABC National Standards for Total System Balance.
  - 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
  - 3. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
  - 4. SMACNA HVAC Systems Testing, Adjusting, and Balancing.
  - 5. Maintain at least one copy of the standard to be used at project site at all times.
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
  - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
  - 2. Having minimum of two years documented experience.
  - 3. Certified by one of the following agencies or methods:
    - a. AABC, Associated Air Balance Council: [www.aabchq.com](http://www.aabchq.com); upon completion submit AABC National Performance Guaranty.
    - b. NEBB, National Environmental Balancing Bureau: [www.nebb.org](http://www.nebb.org).

23 05 93-5

- c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: [www.tabbcertified.org](http://www.tabbcertified.org).
  - d. Test and Balance under direct supervision of a Professional Engineer registered in the State of Arkansas.
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.
- F. Acceptable TAB Agencies:
- 1. NEBB.
  - 2. AABC.
  - 3. SMACNA.
  - 4. TABB.
  - 5. Substitutions: Not permitted.

### 3.2 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
- 1. Systems are started and operating in a safe and normal condition.
  - 2. Temperature control systems are installed complete and operable.
  - 3. Proper thermal overload protection is in place for electrical equipment.
  - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
  - 5. Duct systems are clean of debris.
  - 6. Fans are rotating correctly.
  - 7. Fire and volume dampers are in place and open.
  - 8. Air coil fins are cleaned and combed.
  - 9. Access doors are closed and duct end caps are in place.

23 05 93-6

10. Air outlets are installed and connected.
  11. Duct system leakage is minimized.
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
  - C. Beginning of work means acceptance of existing conditions. Since work will occur in phases, provide listing of system deficiencies for systems to be balanced during the specified phases.

### 3.3 PREPARATION

- A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
  1. Require attendance by all installers whose work will be tested, adjusted, or balanced.
- B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.
- C. Provide additional balancing devices as required.

### 3.4 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply and outside air systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

### 3.5 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
  1. Running log of events and issues.
  2. Discrepancies, deficient or uncompleted work by others.
  3. Contract interpretation requests.
  4. Lists of completed tests.

23 05 93-7

- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. Mark on the drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.
- H. Check and adjust systems approximately six months after final acceptance and submit report.
- I. After all adjustments and corrections have been performed to balance system as designed, additional readjustment shall be performed to satisfy desired temperature.

### 3.6 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities . Test and balance all air handlers for the three design positions i.e. minimum (5% adjustable) outside air, design outside air and economizer operation.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

23 05 93-8

- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. Where modulating dampers are provided, take measurements and balance at extreme conditions.
- L. Measure building static pressure and adjust supply, return, barometric relief dampers, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.
- M. Check multi-zone units for motorized damper leakage. Adjust air quantities with mixing dampers set first for cooling, then heating, then modulating.
- N. Measure and record supply, return, outside and exhaust air cfm, fan rpm, motor amps, coil entering and leaving air, temperatures (both wet and dry bulb temperatures), outside air (wet and dry bulb temperatures) for cooling and heating operations, system static pressures shall be measured at the required conditions at the minimum and maximum fan speeds.
- O. Measure and record the following air handling and distribution systems.
  - 1. Supply, return, outside air and exhaust when system is in the economizer operation. Measure and record supply air and outside air temperatures (both wet and dry bulb).

### 3.7 SCOPE

- A. Test, adjust, and balance the following:
  - 1. VRV- Indoor Units.

23 05 93-9

2. VRV- Outdoor Heat Recovery
3. Air Coils
4. Packaged Air Dedicated Outdoor Air Units.
5. Exhaust Fans
6. Air Filters
7. Air Inlets and Outlets

### 3.8 MINIMUM DATA TO BE REPORTED

#### A. Electric Motors:

1. Manufacturer
2. Model/Frame
3. HP/BHP
4. Phase, voltage, amperage; nameplate, actual, no load
5. RPM
6. Service factor
7. Starter size, rating, heater elements
8. Sheave Make/Size/Bore

#### B. V-Belt Drives:

1. Identification/location
2. Required driven RPM
3. Driven sheave, diameter and RPM
4. Belt, size and quantity
5. Motor sheave diameter and RPM
6. Center to center distance, maximum, minimum, and actual

23 05 93-10

C. Combustion Equipment:

1. Boiler manufacturer
2. Model number
3. Serial number
4. Firing rate
5. Overfire draft
6. Gas meter timing dial size
7. Gas meter time per revolution
8. Gas pressure at meter outlet
9. Gas flow rate
10. Heat input
11. Burner manifold gas pressure
12. Percent carbon monoxide (CO)
13. Percent carbon dioxide (CO<sub>2</sub>)
14. Percent oxygen (O<sub>2</sub>)
15. Percent excess air
16. Flue gas temperature at outlet
17. Ambient temperature
18. Net stack temperature
19. Percent stack loss
20. Percent combustion efficiency
21. Heat output

D. Air Cooled Condensers:

23 05 93-11

1. Identification/number
2. Location
3. Manufacturer
4. Model number
5. Serial number
6. Entering DB air temperature, design and actual
7. Leaving DB air temperature, design and actual
8. Number of compressors

E. Cooling Coils:

1. Identification/number
2. Location
3. Service
4. Manufacturer
5. Air flow, design and actual
6. Entering air DB temperature, design and actual
7. Entering air WB temperature, design and actual
8. Leaving air DB temperature, design and actual
9. Leaving air WB temperature, design and actual
10. Saturated suction temperature, design and actual
11. Air pressure drop, design and actual

F. Air Moving Equipment:

1. Location
2. Manufacturer

23 05 93-12



3. Model number
  4. Serial number
  5. Arrangement/Class/Discharge
  6. Air flow, specified and actual
  7. Return air flow, specified and actual
  8. Outside air flow, specified and actual
  9. Total static pressure (total external), specified and actual
  10. Inlet pressure
  11. Discharge pressure
  12. Sheave Make/Size/Bore
  13. Number of Belts/Make/Size
  14. Fan RPM
- G. Return Air/Outside Air:
1. Identification/location
  2. Design air flow
  3. Actual air flow
  4. Design return air flow
  5. Actual return air flow
  6. Design outside air flow
  7. Actual outside air flow
  8. Return air temperature
  9. Outside air temperature
  10. Required mixed air temperature

23 05 93-13

11. Actual mixed air temperature
12. Design outside/return air ratio
13. Actual outside/return air ratio

H. Exhaust Fans:

1. Location
2. Manufacturer
3. Model number
4. Serial number
5. Air flow, specified and actual
6. Total static pressure (total external), specified and actual
7. Inlet pressure
8. Discharge pressure
9. Sheave Make/Size/Bore
10. Number of Belts/Make/Size
11. Fan RPM

I. Duct Traverses:

1. System zone/branch
2. Duct size
3. Area
4. Design velocity
5. Design air flow
6. Test velocity
7. Test air flow

23 05 93-14

8. Duct static pressure
  9. Air temperature
  10. Air correction factor
- J. Air Distribution Tests:
1. Air terminal number
  2. Room number/location
  3. Terminal type
  4. Terminal size
  5. Area factor
  6. Design velocity
  7. Design air flow
  8. Test (final) velocity
  9. Test (final) air flow
  10. Percent of design air flow

END OF SECTION

23 05 93-15



SECTION 23 07 13

DUCT INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Duct insulation.
- B. Duct Liner.
- C. Weather barrier coatings.
- D. Insulation jackets.
- E. Adhesive, tie wires, tape

1.2 RELATED REQUIREMENTS

- A. Section 23 01 00 - General HVAC Provisions.
- B. Section 23 05 53 - Identification for HVAC Piping and Equipment.
- C. Section 23 31 00 - Ducts: Glass fiber ducts.

1.3 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- C. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
- D. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).
- E. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

23 07 13-1

- G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
- H. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- I. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
- J. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- K. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

#### 1.4 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than five years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with a minimum five years of documented experience and approved by manufacturer.
- C. Perform work at ambient and equivalent temperatures as recommended by the adhesive manufacturer. Work shall be performed only by mechanics who regularly perform this type of work only.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

23 07 13-2

- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

## 1.7 FIELD CONDITIONS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

## PART 2 PRODUCTS

### 2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

- A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with NFPA 255, NFPA 255, or UL 723.
- B. Adhesives to be waterproof.
- C. Recovering jackets 6 ounce per square yard canvas attached with a lagging fire retardant adhesive. Install on exposed ductwork insulation. Cover thoroughly with several coats of sizing.

### 2.2 GLASS FIBER, FLEXIBLE

- A. Manufacturer:
  - 1. Knauf Insulation.
  - 2. Johns Manville Corporation.
  - 3. Owens Corning Corp.
  - 4. CertainTeed Corporation.
  - 5. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Insulation: ASTM C553; flexible, noncombustible blanket.
  - 1. 'K' value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
  - 2. Maximum Service Temperature: 450 degrees F.
  - 3. Maximum Water Vapor Sorption: 5.0 percent by weight.

23 07 13-3

4. Maximum Moisture Absorption: 0.20 percent by volume.
- C. Vapor Barrier Jacket:
1. Kraft paper with glass fiber yarn and bonded to aluminized film.
  2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E 96/E 96M.
  3. Moisture Vapor Transmission: ASTM E 96; 0.02 perm.
  4. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- E. Outdoor Vapor Barrier Mastic:
1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- F. Tie Wire: Annealed steel, 16 gage.

## 2.3 GLASS FIBER, RIGID

- A. Manufacturer:
1. Knauf Insulation.
  2. Johns Manville Corporation.
  3. Owens Corning Corp.
  4. CertainTeed Corporation.
  5. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Insulation: ASTM C612; rigid, noncombustible blanket.
1. 'K' value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
  2. Maximum service temperature: 450 degrees F.
  3. Maximum Water Vapor Sorption: 5.0 percent.

23 07 13-4



4. Maximum Moisture Absorption: 0.20 percent by volume.
  5. Maximum Density: 8.0 lb/cu ft.
  6. Density: 3.0 lb/cu ft.
- C. Vapor Barrier Jacket:
1. Kraft paper with glass fiber yarn and bonded to aluminized film.
  2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E 96/E 96M.
  3. Moisture vapor transmission: ASTM E 96; 0.04 perm.
  4. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- E. Indoor Vapor Barrier Finish:
1. Cloth: Untreated; 9 oz/sq yd weight, glass fabric.
  2. Vinyl emulsion type acrylic, compatible with insulation, white color.

## 2.4 WEATHER BARRIER COATINGS

- A. Weather-Resistive Barrier Coating: Fire-resistive, UV resistant, water-based mastic for use over closed cell polyethylene and polyurethane foam insulation; applied with glass fiber or synthetic reinforcing mesh.
1. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A, when tested in accordance with ASTM E84.
  2. Water Vapor Permeance: Greater than 1.0 perm in accordance with ASTM E96/E96M.

23 07 13-5

## 2.5 JACKETS

- A. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.
  - 1. Lagging Adhesive:
    - a. Compatible with insulation.
- B. Mineral Fiber (Outdoor) Jacket: Asphalt impregnated and coated sheet, 50 lb/square.
- C. Aluminum Jacket: ASTM B209 (ASTM B209M).
  - 1. Thickness: 0.016 inch sheet.
  - 2. Finish: Embossed.
  - 3. Joining: Longitudinal slip joints and 2 inch laps.
  - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
  - 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

## 2.6 DUCT LINER

- A. Manufacturers:
  - 1. Knauf Insulation.
  - 2. Johns Manville Corporation.
  - 3. Owens Corning Corp.
  - 4. CertainTeed Corporation.
- B. Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; semi-rigid duct liner; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.
  - 1. Fungi Resistance: ASTM G21.
  - 2. Substitutions: See Section 23 01 00 - General HVAC Provisions.
  - 3. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.

23 07 13-6

4. Service Temperature: Up to 250 degrees F.
5. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
6. Minimum Noise Reduction Coefficients:
  - a. 1/2 inch Thickness: 0.30.
  - b. 1 inch Thickness: 0.45.
  - c. 1-1/2 inches Thickness: 0.60.
  - d. 2 inch Thickness: 0.70.
- C. Adhesive: Waterproof, fire-retardant type, ASTM C916.
- D. Liner Fasteners: Galvanized steel, welded with press-on head.

## 2.7 MATERIALS

### A. External Insulation

1. Exterior Exposed Rectangular Ducts: Rigid glass fiber insulation, minimum installed R-value of R-8, with factory applied reinforced aluminum foil vapor barrier for systems conveying air at less than room temperature with aluminum jacket.
2. Concealed Round Ducts: Flexible glass fiber insulation, minimum installed R-value of R-6, with factory applied reinforced aluminum foil vapor barrier for systems conveying air at less than room temperature.

### B. Internal Insulation

1. Rectangular Ducts and Plenums: Internal duct insulation shall be semi-rigid duct liner board manufactured from glass fibers bonded with a thermosetting resin. Insulation shall be coated on one side with a fire resistant black coating and shall have a minimum installed R-value of R-6. Duct liner shall be installed by cutting side pieces of insulation to lap both top and bottom sections for maximum support. Install side pieces first. Side pieces and bottom piece shall be attached with 4" strips of adhesive at one foot intervals. Top section of insulation shall be attached with Stick-Klip fasteners secured by Miracle adhesive spaced one fastener per two square feet of insulation. Edges of insulation shall be butted with adhesive to insure a tight joint and provide a smooth surface.

23 07 13-7

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that ducts have been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.
- C. Finish with system at ambient conditions.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Insulated ducts conveying air below ambient temperature:
  - 1. Provide insulation with vapor barrier jackets.
  - 2. Finish with tape and vapor barrier jacket.
  - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
  - 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- D. Insulated ducts conveying air above ambient temperature:
  - 1. Provide with or without standard vapor barrier jacket.
  - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- E. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces : Finish with canvas jacket sized for finish painting.
- F. Exterior Applications: Provide insulation with vapor barrier jacket. Cover with outdoor jacket finished, see Section \_\_\_\_\_.
- G. Slope exterior ductwork to shed water.
- H. External Duct Insulation Application:

23 07 13-8

1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
2. Secure insulation without vapor barrier with staples, tape, or wires.
3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

I. Duct and Plenum Liner Application:

1. Adhere insulation with adhesive for 100 percent coverage.
2. Secure insulation with welded mechanical liner fasteners. Refer to SMACNA HVAC Duct Construction Standards - Metal and Flexible and NAIMA Fibrous Glass Duct Liner Standards (latest edition) for spacing.
3. Seal and smooth joints. Seal and coat transverse joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

### 3.3 SCHEDULES

- A. Exhaust Ducts: Externally wrap.
- B. Outside Air Intake Ducts:
1. Round: Externally insulate with 2-inch thick insulation, minimum installed R-value of R-6.
  2. Rectangular: Internally insulate with 1-inch thick semi-rigid duct liner with adhesive and welded mechanical fasteners, minimum installed R-value of R-6.
- C. Concealed Supply Ducts:

23 07 13-9

1. Round Duct: Externally insulate with 2-inch thick insulation, minimum installed R-value of R-6.
  2. Rectangular: Internally insulate with 1-inch thick, semi-rigid duct liner, minimum installed R-value of R-6, with adhesive and welded mechanical fasteners.
- D. Concealed Return Air Ducts and Plenums:
1. Round: Externally insulate with 2-inch thick insulation, minimum installed R-value of R-6.
  2. Rectangular: Internally insulate with 1-inch thick, minimum installed R-value of R-6, semi-rigid duct liner with adhesive and welded mechanical fasteners.
- E. Ducts Exposed to Outdoors:
1. Internally line all rectangular duct, seal and weatherproof all joints and seams. Minimum installed R-value of R-8.

END OF SECTION

23 07 13-10

## SECTION 23 09 23

### VARIABLE REFRIGERANT VOLUME (VRV) HVAC SYSTEM REMOTE CONTROLLER

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Note: Equipment in this section shall be provided by Owner through a purchasing agreement. Contractor shall be responsible for installation and all accessories necessary to provide a complete and working system.
- B. Variable Refrigerant Volume HVAC system remote controller.

##### 1.2 PHYSICAL CHARACTERISTICS

- A. General:
  - 1. The local remote control shall be made from plastic materials with a neutral color. Each controller shall have a LCD (Liquid Crystal Display) that shows set point, room temperature, mode of operation (on/off/cool/heat), and fan speed.

##### 1.3 ELECTRICAL CHARACTERISTICS

- A. General:
  - 1. Each indoor unit control circuit board shall supply 16 volts DC to the local remote controller. The voltage may rise or fall in relation to the transmission packets that are sent and received.
- B. Wiring:
  - 1. The control wiring shall be terminated in a daisy chain design from outdoor unit, to branch selector, then daisy chaining to each indoor unit in the system and terminating at the farthest indoor unit. The remote control wiring shall run from the indoor unit control board terminal block to the remote controller connected to that indoor unit.
- C. Wiring size:

23 09 23-1

1. Wiring shall be non-shielded, 2-conductor sheathed vinyl cord or cable, and 18 AWG stranded copper wire.

#### 1.4 VRV CONTROLS NETWORK

- A. The VRV Controls Network is comprised of local remote controllers, multi-zone controllers, advanced multi-zone controllers, and open protocol software devices that transmit information via the high-speed communication bus and may also be controlled via a network PC. The VRV Controls Network supports operation monitoring, scheduling, error e-mail distribution, general user software, tenant billing, maintenance support, and integration with Building Management Systems (BMS) using open protocol via BACnet® or Lonworks® interfaces; all of which blend to provide the optimal control strategy for the best HVAC comfort solution.

#### 1.5 SUBMITTALS

- A. Furnished and installed by Harrison Energy Partners.
- B. Submit unit performance data including: capacity, nominal and operating performance.
- C. Submit Mechanical Specifications for unit and accessories describing construction, components and options.
- D. Submit shop drawings indicating overall dimensions as well as installation, operation and services clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.
- E. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

### PART 2 PRODUCTS

#### 2.1 REMOTE CONTROLLERS

- A. Daikin VRV local remote controllers are compatible with all VRV indoor units. The remote controller wiring consist of a non-polar two-wire connection to the indoor unit. The local remote controllers may be wall-mounted and can be adjusted to maintain the optimal operation of the connected indoor unit(s). Temperature setpoint can be adjusted in increments of 1°F/°C. In the cases where a system or unit error may occur, the VRV controllers will display a two-digit error code and the unit address. The local

23 09 23-2



remote controllers do not need to be addressed.

B. Navigation Remote Controller

1. BRC1E73

PART 3 SPECIFICATIONS

3.1 NAVIGATION REMOTE CONTROLLER

A. BRC1E73: Navigation (NAV) Remote Controller

B. The NAV Remote Controller can provide control for all VRV indoor units. The remote controller wiring consist of a non-polar two-wire connection to the indoor unit at terminals P1/P2. The NAV Remote Controller is wall mounted and can be adjusted to maintain the optimal operation of the connected indoor unit(s). The NAV Remote Controller does not need to be addressed.

C. The NAV Remote Controller can be used in conjunction with the BRC2A71 (Simplified Remote Controller) or another NAV Remote Controller to control the same indoor unit group. No more than 2 remote controllers can be placed in the same group.

1. 1. Mounting:

2. The NAV Remote Controller shall be mounted into a standard

3. 2" x 4" junction box.

4. 2. Display Features:

a. The NAV Remote Controller shall be approximately 4.75" x 4.75" in size with a 2.75" x 1.75" LCD display.

b. Backlit LCD display with contrast adjustment and auto off after 30 seconds.

c. Display language shall be selectable from English, French or Spanish.

d. Selectable display - Detailed, Standard and Simple

1) Detailed display

(a) Shall display Operation Mode, Cool, Heat and Setback setpoints, Fan Speed, Louver position, Room Temperature, Time and Day of

23 09 23-3

the Week

- (b) Standard display
  - (1) Shall display Operation Mode, Cool, Heat and Setback setpoints and Fan Speed
- (c) Simple display
  - (1) Shall display Operation Mode, Cool, Heat and Setback setpoints, Fan Speed and Room Temperature
  - (2) The room temperature shall be displayed with a large 11/16” font
- 2) All displayed items configurable
  - (a) Configure “Off” to be displayed when unit is turned off (field setting required)
    - (1) Prevents mode adjustment
    - (2) Setpoint can be removed from display when unit is turned Off (field setting required)
    - (3) Prevents setpoint adjustment
    - (4) Fan speed display removable (field setting required)
    - (5) Prevents fan speed adjustment
- 3) System Status icons.
- 4) The controller shall display temperature setpoint in one degree increments with a range of 60-90oF (16-32oC)
- 5) Detailed and Simple display will reflect room temperature (0-176oF/-18-80oC range in one degree increments).
  - (a) Display of temperature information shall be configurable for Fahrenheit or Celsius
- 6) On/Off status shall be displayed with an LED.

23 09 23-4

- 7) Error codes will be displayed with a two digit code in the event of system abnormality/error.
  - 8) A blinking LED will also signal system abnormality/error
  - 9) The following system temperatures can be displayed to assist service personnel in troubleshooting:
    - (a) Return Air Temperature
    - (b) Liquid Line Temperature
    - (c) Gas Line Temperature
    - (d) Discharge Air Temperature (depending on unit),
    - (e) Remote Controller Sensor Temperature
    - (f) Temperature used for Indoor Unit Control
- e. 3. Basic Operation:
- 1) Capable of controlling a group of up to 16 indoor units.
  - 2) Controller shall control the following group operations:
    - (a) On/Off, Operation Mode (Cool, Heat, Fan, Dry and Auto\* (\*with VRV Heat Recovery & Heat Pump Systems))
      - (1) Configure only the essential modes to be selectable - remove unnecessary mode selection(s) from display
    - (b) Independent Cooling and Heating setpoints in the occupied mode
      - (1) Dual setpoints (individual Cool and Heat setpoints with minimum setpoint differential 0 - 7oF (0 - 4oC) default 2oF (1oC)) or Single setpoint
    - (c) Independent Cooling Setup and Heating Setback setpoints in the unoccupied mode
    - (d) Fan Speed
      - (1) Up to 5 speeds (dependent on indoor unit type)

23 09 23-5

- (e) Vane direction and oscillation (dependent on indoor unit type)
  - (1) Airflow direction
  - (2) Up to 5 louver positions and auto swing
  - (3) Individual airflow
  - (4) Provides individual control of up to four (4) louvers on an indoor unit
  - (5) Dual airflow
  - (6) Provides control of both internal and external louver positions
  - (7) Automatic draft protection
  - (8) Automatically prevents air flow from blowing directly on occupants
- 3) The controller shall be able to limit the user adjustable setpoint ranges individually for cooling and heating in the occupied period
- 4) Function button lockout (On/Off, Mode, Fan Speed, Up/Down, Left, Right Arrows)
- 5) Indoor Unit group assignment
- 6) Filter indicator
  - (a) Filter service indicator shall be displayed after 100, 1250 or 2500 (default) hours of run time configurable via field setting
- 7) Clock (12/24 hour) and Day display
- 8) Automatic adjustment for Daylight Savings Time (DST)
  - (a) Set changeover period (second Sunday in March / first Sunday in November)
- f. 4. Programmability:
  - 1) Controller shall support schedule settings with selectable weekly pattern options.

23 09 23-6

- (a) 7-day
  - (b) Weekday + Weekend
  - (c) Weekday + Saturday + Sunday
  - (d) Everyday
  - (e) The schedule shall support unit On/Off
  - (f) Independent settings for Cooling and/or Heating setpoints when unit is on (occupied)
  - (g) Independent Setup (Cooling) and Setback (Heating) setpoints when unit is off (unoccupied)
  - (h) A maximum of 5 operations can be schedulable per day
  - (i) Time setting in 1-minute increments
- 2) The Controller shall support Auto-changeover mode for both Heat Pump and Heat Recovery systems, therefore, allowing the optimal room temperature to be maintained by automatically switching the indoor unit's mode between Cool and Heat according to the room temperature and temperature setpoint.
- (a) Changeover to cooling mode shall occur at cooling setpoint + 1oF (0.5oC) as the primary changeover deadband and takes the guard timer into consideration
    - (1) Configurable from 1 - 4oF (0.5 - 2oC)
  - (b) Changeover to cooling mode shall occur at the primary changeover deadband to cooling + 1oF (0.5oC) as the secondary changeover deadband.
    - (1) Configurable from 1 - 4oF (0.5 - 2oC)
  - (c) Changeover to heating mode shall occur at heating setpoint - 1oF (0.5oC) as the primary changeover deadband and takes the guard timer into consideration
    - (1) Configurable from 1 - 4oF (0.5 - 2oC)

23 09 23-7

- (d) Changeover to heating mode shall occur at the primary changeover deadband to heating - 1oF (0.5oC) as the secondary changeover deadband.
  - (1) Configurable from 1 - 4oF (0.5 - 2oC)
- (e) 1 hour guard timer
  - (1) Upon changeover, guard timer will prevent another changeover during this period.
  - (2) Guard timer is ignored by a change of setpoint manually from either the Multi-zone Controller, Remote Controller, or by schedule.
  - (3) The Guard timer is also ignored if the space temperature reaches the secondary changeover deadband (configurable from 1 - 4oF (0.5 - 2oC)) from the primary changeover deadband, and the guard timer has been activated
  - (4) 60 minutes as default, configurable to 15, 30, or 90 minutes
- 3) The controller shall support the Auto-setback by sensor function (dependent on indoor unit type)
  - (a) The cooling and heating setpoints shall gradually relax (configurable) internally when the room is determined to be unoccupied
    - (1) The internal setpoint shall return to the original setpoint when room occupancy is detected
- 4) The controller shall support the Auto-off by sensor function (dependent on indoor unit type)
  - (a) The indoor unit shall turn off when it is determined that the room is unoccupied after a specified time has elapsed
    - (1) The indoor unit shall be turned on manually when occupancy is detected
- 5) The controller shall support the Filter Auto Clean function to be performed once a day (dependent on indoor unit type)

23 09 23-8

- (a) Eight (8) time periods (00:00-03:00, 03:00-06:00, 06:00-09:00, 09:00-12:00, 12:00-15:00, 15:00-18:00, 18:00-21:00, 21:00-00:00) shall be available to select from to enable the automatic filter cleaning function
  - (1) Default time period (00:00 to 3:00) shall be used if the period for filter auto cleaning is not specified
  - (2) The indoor unit shall be stopped during auto filter cleaning function operation
- 6) The Controller shall support an Auto Off Timer for temporarily enabling indoor unit operation during the unoccupied period.
  - (a) When the Off Timer is enabled and when the unit is manually turned on at the remote controller
  - (b) The controller shall shut off the unit after a set time period
  - (c) The time period shall be configurable in the controller menu with a range of 30-180 minutes in 10 minute increments
- 7) The room temperature shall be capable of being sensed at either the NAV Remote Controller, the Indoor Unit return air temperature sensor (default), or Remote Temperature Sensor (KRCS01-1B) configured through the field settings.

END OF SECTION

23 09 23-9





## SECTION 23 09 24

### VRV ADVANCED MULTI-ZONE CONTROLLER

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Note: Equipment in this section shall be provided by Owner through a purchasing agreement. Contractor shall be responsible for installation and all accessories necessary to provide a complete and working system.
- B. VRV advanced Multi-zone Controller.

##### 1.2 PHYSICAL CHARACTERISTICS

- A. General:
  - 1. The advanced multi-zone controller shall be made from plastic materials with a neutral color. Each control shall have a LCD (Liquid Crystal Display) that shows On/Off, setpoint, room temperature, mode of operation (Cool/Heat/Dry/Fan/Auto), louver position, and fan speed.

##### 1.3 ELECTRICAL CHARACTERISTICS

- A. A. General:
  - 1. The advanced multi-zone controller will require 24 VAC to power the controller. The advanced multi-zone controller shall supply 16 VDC to the communication bus on the F1F2 (out-out) terminal of the outdoor unit. The voltage may rise or fall in relation to the transmission packets that are sent and received.
  - 2. Wiring:
    - a. The advanced multi-zone controller communication wiring shall be terminated in a daisy chain design at the outdoor unit, which is then daisy chained to branch selector (Heat Recovery system), then daisy chained to each indoor unit in the system and terminating at the farthest indoor unit. The termination of the wiring shall be non-polar. The remote control wiring shall run from the indoor unit control terminal block to the remote controller connected with that indoor unit.
- B. Wiring size:

23 09 24-1

- C. Wiring shall be non-shielded, 2-conductor sheathed vinyl cord or cable, and 18 AWG stranded copper wire.

#### 1.4 VRV CONTROLS NETWORK

- A. The VRV Controls Network is made up of local remote controllers, multi-zone controllers, advanced multi-zone controllers, and open protocol network devices that transmit information via the communication bus. The VRV Controls Network shall also have the ability to be accessed via a networked PC. The VRV Controls Network supports operation monitoring, scheduling, error e-mail distribution, general user software, tenant billing, maintenance support, and integration with Building Management Systems (BMS) using open protocol via BACnet® interface , Lonworks® interface or Modbus® adapter; all of which blend to provide the optimal control strategy for the best HVAC comfort solution.

#### 1.5 SUBMITTALS

- A. Furnished and installed by Harrison Energy Partners.
- B. Submit unit performance data including: capacity, nominal and operating performance.
- C. Submit Mechanical Specifications for unit and accessories describing construction, components and options.
- D. Submit shop drawings indicating overall dimensions as well as installation, operation and services clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.
- E. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

### PART 2 PRODUCTS

#### 2.1 ADVANCED MULTI-ZONE CONTROLLERS

- A. The Daikin AC VRV advanced multi-zone controllers are compatible with all VRV, SkyAir, and Daikin RA and FTXS indoor units with the use of the KRP928BB2S RA Adapter. The advanced multi-zone controller wiring consist of a non-polar two-wire connection to the outdoor unit. The advanced multi-zone controllers may be wall-mounted and can be adjusted to maintain the optimal operation of up to 64 connected

23 09 24-2

indoor unit groups and 128 indoor units. Set temperatures can be adjusted in increments of 1°F. In the cases where a system or unit error may occur, the VRV controllers will display a two-digit error code and the unit address.

B. DCM601A71: intelligent Touch Manager (iTM) V2.XX.XX

1. The intelligent Touch Manager (version 2.04) shall provide control for all VRV, SkyAir, and Daikin RA and FTXS indoor units with the use of the KRP928BB2S RA Adapter. It shall be capable of controlling a maximum of 64 indoor unit groups and 128 indoor units connected to a maximum of 10 outdoor units. The intelligent Touch Manager shall support operations superseding that of the local remote controller, system configuration, daily/weekly scheduling, monitoring of operation status, and malfunction monitoring.
2. The controller wiring shall consist of a non-polar two-wire connection to the indoor unit at terminals F1F2 (out-out) of the outdoor unit. The intelligent Touch Manager is wall mounted and can be adjusted to maintain the optimal operation of the connected indoor unit(s).
3. The intelligent Touch Manager can be used in conjunction with the BRC1E73 (Navigation Remote Controller), the BRC2A71 (Simplified Remote Controller), or the BRC4C82/7E83/7C812/7E818 (Wireless Remote Controller), BACnet interface, Lonworks interface, and Modbus adapter to control the same indoor unit groups. The remote controller shall require daisy chain wiring for grouping multiple indoor units (up to 16) together. Manual addressing is required of each remote controller group associated with the intelligent Touch Manager. DIII-NET address can be set for one (1) indoor unit or each indoor unit in the remote controller group. No more than 2 remote controllers can be placed in the same group.
4. The intelligent Touch Manager shall be equipped with two RJ-45 Ethernet ports for 100 Mbps network communication to support interconnection with a network PC via the Internet, Local Area Network (LAN), or connection with a non-networked PC after completed installation.
5. Web access functions shall be available so that facility staff can securely log into each Intelligent Touch Manager via the PC's web browser to support monitoring, scheduling, error recognition, and general user functions. Error emails are also sent to designated email addresses. An additional optional software function Power Proportional Distribution (PPD) tenant billing shall also be available. The

23 09 24-3

optional software shall require advanced purchase and can only be activated upon receipt of a license activation key from Daikin AC.

6. Mounting:

- a. The intelligent Touch Manager shall be mounted on the wall or into the mounting fixtures included with the intelligent Touch Manager.
- b. Display Features:
  - 1) The intelligent Touch Manager shall be approximately 11.42” x 9.57” x 1.97’ in size with a backlit 10.4” LCD display.
  - 2) Display information shall be selectable from English, French, Italian, Korean, Dutch, Portuguese, Chinese, Japanese, German, or Spanish.
  - 3) Featured backlit LCD with auto off after 30 minutes (default) is adjustable between 1 to 60 minutes, or the choice of 3 different screen savers.
  - 4) Area and Group configuration
    - (a) Area contains one (1) or more Area(s) or Group(s)
    - (b) A Group may be an indoor unit, Di, Dio point that has a DIII-Net address
    - (c) A Group may be an external management point such as a Di, Do, Bi, Bo, Bv, Ai, Ao, Av, Mi, Mo, Mv that does not have a DIII-Net address
    - (d) An Area is a tiered group where management points (indoor unit, digital input/output, and analog input/output groups) can be monitored and controlled by global settings. Up to 650 Areas can be created. Area hierarchy can have up to 10 tiered levels (ex. top level: 1st floor West, 2nd level: offices, hallways, 3rd level: Office 101, 102, and 103, etc.). Area configuration shall classify levels of monitoring and control for each management point
    - (e) Areas and Groups may be assigned names (ex. Office 101, Lobby, North Hallway, etc.)

23 09 24-4

- (f) The Controller shall display On/Off, Operation Mode, Setpoint, Space Temperature, Louver Position, Fan Speed for each Area or Group.
- (g) The Controller shall display Date (mm/dd/yyyy, yyyy/mm/dd, or dd/mm/yyyy format selectable) and day of the week along with the time of day (12hr or 24hr display selectable).
- (h) The Controller shall adjust for daylight savings time (DST) automatically.
- (i) Display information shall be updated every 3 seconds to show the latest status of the indoor unit groups.
- (j) System status icons shall display On/Off (color coded), Malfunction/Error (color coded), Forced Stop, Setback, Filter, Maintenance, and Screen Lock.
- (k) The controller shall display the temperature setpoint in one degree increments with a range of 60oF - 90oF, 1oF basis (16oC - 32oC, 0.1oC basis).
  - (1) Display of temperature setpoint information shall be configurable for Fahrenheit or Celsius
- (l) Display shall reflect room temperature in one tenth degree increments with a range of -58oF - 248oF, 0.1oF basis (-50oC - 120oC, 0.1oC basis) with 0.1oC accuracy.
- (m) Display of room temperature information shall be configurable for Fahrenheit or Celsius
- (n) The Menu List shall be used to configure options and display information for each Area or Group.
- (o) Error status shall be displayed in the event of system abnormality/error with one of three color coded icons placed over the indoor unit icon or lower task bar.
  - (1) System errors are generated when the intelligent Touch Manager system with other VRV controls systems are combined incorrectly or power proportional distribution

23 09 24-5

calculation errors occur. The intelligent Touch Manager shall display the error with a red triangle placed on the lower task bar.

- (2) Unit errors occurring within the VRV system shall be displayed with a yellow triangle placed over the indoor unit icon
- (3) Limit errors are based upon preconfigured analog input upper and lower limit settings and are generated when the limits have been met. When limit error is generated a yellow triangle will be placed over the unit icon.
- (4) Communication errors between the intelligent Touch Manager and the indoor units shall be displayed with a blue triangle placed over the indoor unit icon
- (5) Error history shall be available for viewing for up to 500,000 errors/abnormality events with operation events.

(p) Layout View

- (1) Capable of displaying site floor plan or graphical user interface (GUI) as the background for visual navigation. Indoor unit, DIII-Net Di and Dio, and External Di, Do, Ai, Ao, Av, Mi, Mo, Mv icons with operational status can be placed on the floor layout or GUI
- (2) Up to 4 status points can be assigned to the indoor unit icon (room name, room temperature, setpoint, and mode)
- (3) Digital input and output icons will display On/Off status
- (4) Analog icons will display Ai, Ao and Av.
- (5) Multistate icons will display Mi, Mo and Mv.
- (6) Up to 60 floor layout sections can be created

5) Basic Operation:

- (a) Capable of controlling by Area(s) or Group(s)
- (b) Controller shall control the following group operations:

23 09 24-6

- (1) On/Off
  - (2) Operation Mode (Cool, Heat, Fan, Dry, and Auto)
  - (3) Independent Cool and Heat dual Setpoints or single Setpoint for current mode in the occupied period
  - (4) Controller shall be able to limit the user adjustable setpoint ranges individually for cooling and heating based upon the Area or Group configurations
  - (5) Independent Setup (Cooling) and Setback (Heating) setpoints in the unoccupied mode adjustable to 50 - 950F
  - (6) Setup and Setback setpoints can only be set outside of the occupied setpoint range
  - (7) The Setup and Setback setpoints will automatically maintain a 2oF fixed differential from the highest possible occupied setpoints
  - (8) The recovery differential shall be 40F (default) and adjustable between 2 - 100F
  - (9) Settings shall be applied based upon the Area or Group configurations
  - (10) Fan Speed
  - (11) Up to 3 speeds (dependent upon indoor unit type)
  - (12) Airflow direction (dependent upon indoor unit type)
  - (13) 5 fixed positions or oscillating
  - (14) Remote controller permit/prohibit of On/Off, Mode, and Setpoint
  - (15) Lock out setting for Intelligent Touch Manager display
  - (16) Indoor unit Group/Area assignment
- (c) Capable of providing battery backup power for the clock at least 1 year when no AC power is applied.

23 09 24-7

- (1) The battery can last at least 13 years when AC power is applied
  - (2) Settings stored in non-volatile memory
- 6) Programmability:
- (a) Controller shall support weekly schedule settings.
    - (1) 7 day weekly pattern (7)
    - (2) Weekday + Weekend (5 + 2)
    - (3) Weekday + Saturday + Sunday (5 + 1 + 1)
    - (4) Everyday (1)
    - (5) The schedule shall have the capabilities of being enabled or disabled
    - (6) 100 independent schedules configurable with up to 20 events settable for each days schedule
    - (7) Each scheduled event shall specify time and target Area or Group
    - (8) Each scheduled event shall include On/Off, Optimum Start, Operation Mode, Occupied Setpoints, Setback Setpoints, Remote Controller On/Off Prohibit, Remote Controller Mode Prohibit, Remote Controller Setpoint Prohibit, Timer Extension Setting, Fan Speed, and Setpoint Range Limit
    - (9) Setpoint when unit is On (occupied)
    - (10) Configurable Setup (Cooling) and Setback (Heating) setpoints when unit is Off (unoccupied)
    - (11) Time setting in 1-minute increments
    - (12) Timer Extension shall be used for a timed override (settable from 30 - 180 minutes) to allow indoor unit operation during the unoccupied period
    - (13) A maximum of 40 exception days can be schedule on the yearly schedule (repeats yearly)

23 09 24-8



- (14) Exception days shall be used to override specified days on the weekly schedule based upon irregular occupied/unoccupied conditions
  - (15) Exception days can be configured on a set date (Jan 1) or floating date (1st Monday in September)
- (b) Controller shall support auto-changeover.
- (1) Auto-change shall provide Fixed (default), Individual, Averaging, and Vote changeover methods for both Heat Pump and Heat Recovery systems based upon the changeover group configuration. This will allow for the optimal room temperature to be maintained by automatically switching the indoor unit's mode between Cool and Heat in accordance with the room temperature and setpoint. The following changeover scheme shall be applicable to the Fixed, Individual, and Averaging methods.
  - (2) Changeover to cooling mode shall occur at cooling setpoint + 1oF (0.5oC) as the primary changeover deadband and takes the guard timer into consideration
  - (3) Configurable from 1 - 4oF (0.5 - 2oC)
  - (4) Changeover to cooling mode shall occur at the primary changeover deadband to cooling + 1oF (0.5oC) as the secondary changeover deadband.
  - (5) Configurable from 1 - 4oF (0.5 - 2oC)
  - (6) Changeover to heating mode shall occur at heating setpoint - 1oF (0.5oC) as the primary changeover deadband and takes the guard timer into consideration
  - (7) Configurable from 1 - 4oF (0.5 - 2oC)
  - (8) Changeover to heating mode shall occur at the primary changeover deadband to heating - 1oF (0.5oC) as the secondary changeover deadband.
  - (9) Configurable from 1 - 4oF (0.5 - 2oC)

23 09 24-9

- (10) A weighted demand shall be configurable for the Averaging and Vote methods.
- (11) Fixed Method
- (12) Changeover evaluated by room temperature and setpoint of the representative indoor unit (first registered indoor unit in changeover group) in the changeover group even when it is not operating (must be in Cool, Heat, or Auto mode)
- (13) Changeover affects all indoor unit groups in the changeover group.
- (14) Individual method (recommended for Heat Recovery Systems)
- (15) Changeover evaluated by room temperature and setpoints of the individual indoor unit group in the changeover group
- (16) Changeover affects individual indoor unit group in the changeover group
- (17) Average method
- (18) Changeover evaluated by the average of all indoor unit group's room temperatures and setpoints operating in Cool, Heat, or Auto mode in the changeover group list
- (19) If none of the indoor units in the group meet the above requirements the Fixed method of changeover will be applied
- (20) A weighted demand (0 - 3) can be configured for each indoor unit in the changeover group.
- (21) Changeover affects all indoor unit groups in the changeover group.
- (22) Vote Method
- (23) In each indoor unit, the cooling demand is calculated based upon the difference between the room temperature and cooling setpoint. If the room temperature falls below the primary cool changeover point (cool setpoint plus the primary changeover deadband) the cooling demand is considered as 0 (zero). Then

23 09 24-10

the total cooling demand is calculated as the sum of each indoor unit's cooling demand

- (24) The opposite is true for the total heating demand
- (25) A weight (0-3) can be added to each indoor unit's demand in the changeover group. The default setting is 1
- (26) The weight 0 (zero) means the indoor unit's demand is not added in the total demand, so the indoor unit's demand is considered to be 0 (zero)
- (27) The weight 2 or 3 means the indoor unit's demand is added 2 or 3 times in the total demand, respectively
- (28) Changeover to cooling mode shall occur when the total cooling demand is greater than the total heating demand.
- (29) The opposite is true for changeover to heating
- (30) Vote supports a Heating Override option, which prioritizes switching to the heating mode if at least one room temperature falls below the secondary heat changeover point (heat setpoint minus the secondary changeover deadband) even if the total cooling demand is greater than the total heating demand.
- (31) Changeover affects all indoor unit groups in the changeover group.
- (32) Changeover shall change the operation mode of the indoor unit that is set as the Changeover Master. The Changeover Master indoor unit shall then change the operation mode of all indoor unit groups daisy chained to the same outdoor unit in the Heat Pump system or branch selector box in the Heat Recovery system.
- (33) Guard timer
- (34) Upon changeover, guard timer will prevent another changeover during the guard timer activation period (15, 30, 60 (default) min).

23 09 24-11

(35) Guard timer is ignored by a change of setpoint manually from either intelligent Touch Manger or Remote Controller, by schedule, or the room temperature meets or exceeds the secondary changeover deadband of the mode opposite of the current mode setting

(c) Controller shall support Interlock

(1) Interlock feature for use with 3rd party equipment (DOAS, dampers, occupancy sensing, etc...) to automatically control Groups or Areas corresponding to the change of the operation states or the On/Off states of any Group.

(2) WAGO I/O unit - Di, Do, Ai, Ao

(3) On/Off based monitoring and control of equipment

(4) Manual or scheduled operation of equipment

(5) Operation based upon interlock with management points (group(s))

(6) Monitor equipment error/alarm status

(7) Digital Input/Output (DEC102A51-US2) unit or Digital Input (DEC101A51-US2) unit

(8) On/Off based monitoring and control of equipment

(9) Manual or scheduled operation of equipment

(10) Operation based upon interlock with management points (group(s))

(11) Monitor equipment error/alarm status

(d) Controller shall support force shutdown of associated indoor unit groups.

c. Web/Email Function

1) Each intelligent Touch Manager shall be capable of monitoring, operating, and scheduling a maximum of 64 indoor unit groups (up to

23 09 24-12

512 indoor unit groups with the addition of the iTM Plus Adapter) from a networked PC's web browser. It shall also be capable of creating general user access and sending detailed error emails to a customized distribution list (up to 10 email addresses).

- 2) All PCs shall be field supplied
- 3) Optional Software (Licensed per option, per intelligent Touch Manager shall be required.)

(a) DCM002A71: Power Proportional Distribution (PPD)

- (1) The tenant billing option shall be capable of calculating VRV Controls Network equipment energy usage in kWh based on the energy consumption of the outdoor unit(s) divided among the associated indoor units. This software is used in conjunction with the intelligent Touch Manager and a Watt Hour Meter (WHM). A maximum of 3 Watt Hour Meters can be connected to the intelligent Touch Manager. Up to 4 additional Watt Hour Meters can be connected to each iTM Plus Adapter, and up to 7 iTM Plus Adapters can be connected to the intelligent Touch Manager.
- (2) The Power Proportional Distribution results data can be saved to a USB flash drive, or on a PC with the use of the web access. Data is saved in the CSV format. Results can be stored up to 13 months in the intelligent Touch Manager.

(b) DCM009A51: BACnet Client Option - (Not used on this project)

- (1) The iTM BACnet Client Option shall be capable of making the intelligent Touch Manager work as a BACnet client using the BACnet/IP protocol. A BACnet client machine is able to send service requests to a BACnet server machine that then performs the services and reports the results to the client. By registering equipment and sensors connected to a BACnet server as management points, equipment and sensors can be monitored and controlled by the intelligent Touch Manager. The BACnet Client option must be enabled/ activated in each intelligent Touch Manager to be used.

23 09 24-13

- (2) System Capacity
- (3) A maximum of 50 BACnet servers can be monitored and/or controlled by one intelligent Touch Manager.
- (4) A maximum of 1536 objects can be monitored and/or controlled by one intelligent Touch Manager.
- (5) A maximum of 512 management points, including BACnet management points, external management points, internal Ai management points, AHU management points, and Chiller management points, can be registered in one intelligent Touch Manager.
- (6) Objects that can be used in BACnet management points are:
  - (7) Analog Input (Object Type Number 0)
  - (8) Analog Output (Object Type Number 1)
  - (9) Analog Value (Object Type Number 2)
  - (10) Binary Input (Object Type Number 3)
  - (11) Binary Output (Object Type Number 4)
  - (12) Binary Value (Object Type Number 5)
  - (13) Multi-Sate Input (Object Type Number 13)
  - (14) Multi-Sate Output (Object Type Number 14)
  - (15) Multi-Sate Value (Object Type Number 19)
- (c) DCM014A51: Provide BACnet Server Gateway Option
  - (1) The iTM BACnet Server Gateway Option shall be capable of making the intelligent Touch Manager work as a BACnet gateway using the BACnet/IP protocol. The iTM BACnet Server Gateway Option shall be capable of exposing indoor unit management points as BACnet objects to the (BMS). The iTM BACnet Server/Gateway Option shall be capable of allowing the BMS to monitor and control indoor units BACnet objects.

23 09 24-14

- (2) The iTM BACnet Server Gateway Option shall be compatible with VRV, SkyAir, Outdoor Air Processing Unit, Mini-Split system with use of KRP928, and FFQ indoor unit for Multi-split system.
- (3) Functions:
- (4) The iTM BACnet Server Gateway Option shall be capable of supporting Change of Value (COV) notification.
- (5) The iTM BACnet Server Gateway Option shall communicate to BMS using port number 47808 (configurable).
- (6) The iTM BACnet Server Gateway Option shall function as BACnet router to provide unique virtual BACnet device identification number (ID) for every indoor unit group address.
- (7) The iTM BACnet Server Gateway Option shall provide configurable BACnet Network number.
- (8) The iTM BACnet Server Gateway Option shall be capable of being configured as a foreign device. It shall be capable of communicating across BACnet Broadcast Management Devices (BBMD) in different subnet networks.
- (9) The iTM BACnet Server Gateway Option shall be run in environments with BACnet communication traffic up to 100 packets/second.
- (10) The iTM BACnet Server Gateway Option functions shall be configurable through CSV file which shall be downloaded from iTM and configured by trained personnel.
- (11) System Capacity
- (12) Max of 128 indoor units groups (Up to 256 indoor units) can be controlled from (BMS)
- (13) Max of 8 DIII-Net ports shall be connected to iTM.
- (14) The Building Management System shall monitor and control the following BACnet objects for indoor units

23 09 24-15

- (15) Indoor unit ON/OFF status.
- (16) Alarm status with error description
- (17) Room temperature.
- (18) Indoor Unit ON details
- (19) Off
- (20) Normal [ON]
- (21) Override
- (22) Setback
- (23) Filter sign status.
- (24) Fan status.
- (25) Communication status.
- (26) Thermo-on status.
- (27) Compressor status
- (28) On
- (29) Off
- (30) Defrost
- (31) Aux heater status.
- (32) Occupancy Mode
- (33) Unoccupied,
- (34) Occupied
- (35) Standby
- (36) Operation Mode (Cool, Heat, Fan, and Dry)
- (37) Cooling and Heating setpoints during occupied mode.

23 09 24-16



- (38) Cooling and Heating setpoints during unoccupied mode.
- (39) Maximum and minimum cooling setpoint.
- (40) Maximum and Minimum heating setpoint
- (41) Minimum cooling and heating setpoint differential.
- (42) Fan Speed
- (43) Up to 3 speeds (dependent upon indoor unit type)
- (44) Vane direction (dependent upon indoor unit type)
- (45) 5 fixed positions or swing position
- (46) Remote controller permit/prohibit
- (47) On/Off
- (48) Mode,
- (49) Setpoint
- (50) Filter sign reset for indoor units
- (51) Forced indoor units off.
- (52) The Building Management System may choose to monitor and control the following BACnet objects linked to iTM control logic:
  - (53) Enable/Disable iTM Schedule operation.
  - (54) Enable/Disable iTM Auto Changeover Operation.
  - (55) Set Timed Override Minutes.
  - (56) Monitor and configure timer extension on iTM (30, 60, 90, 120, 150, 180 minutes)
  - (57) System forced off
  - (58) Enable/Disable all emergency stop programs that are registered on the iTM.

23 09 24-17

- (59) Schedule
- (60) The BMS shall utilize iTM schedule function or support weekly schedule settings through its programming.
- (61) BMS schedule shall support the indoor unit:
- (62) Each scheduled event shall specify time and target group address.
- (63) Each scheduled event shall include Occupancy Mode, Operation Mode, Occupied Cooling Setpoint, Occupied Heating Setpoint, and Unoccupied cooling setpoint, Unoccupied heating setpoint, Remote Controller On/Off Permit/Prohibit, Remote Controller Mode Permit/Prohibit, Remote Controller Setpoint Permit/Prohibit, and Timed Override Enable.
- (64) An override shall be provided for use enabling indoor unit operation during the unoccupied period by the BMS programming.
- (65) Auto Changeover
- (66) The BMS shall utilize iTM Auto changeover function or support auto-changeover through its programming.
- (67) Auto-change shall provide changeover for both Heat Pump and Heat Recovery systems based upon the group configurations. This will allow the optimal room temperature to be maintained by automatically switching the indoor unit's mode between Cool and Heat in accordance with the room temperature and setpoint temperature.
- (68) Changeover shall change the operation mode of the indoor unit that is set as the Changeover Master. The Changeover Master indoor unit shall then change the operation mode of all indoor unit groups daisy chained on the same DIII-Net communication bus to the same outdoor unit in the Heat Pump system or the same branch selector box in the Heat Recovery system.

23 09 24-18

- (69) Changeover to cooling mode shall occur when the room temperature is great than or equal to the cooling setpoint
- (70) Differential to be determined by BACnet building management system programming
- (71) Changeover to heating mode shall occur when room temperature is less than or equal to the heating setpoint.
- (72) Differential to be determined by BACnet building management system programming
- (73) Guard timer
- (74) Upon changeover, guard timer will prevent another changeover during this period.
- (75) Guard timer should be ignored by a change of setpoint manually from the BMS, Intelligent Touch Controller, Remote Controller, or by schedule.
- (76) Guard timer to be configured by BMS programming (30 minute minimum recommended)
- (77) Setpoint limitation
- (78) The BMS shall utilize maximum and minimum cooling and heating setpoint to configure upper and lower setpoints range.
- (79) System shutdown:
- (80) BMS should utilize System forced off point to execute emergency stop program registered on the iTM.
- (81) Restricted functions:
- (82) The following iTM functions shall be prohibited when the BACnet Server Gateway option enabled:
- (83) Interlocking Control.
- (84) Emergency Stop (Emergency stop manual release).
- (85) Power Proportional Distribution (PPD) option.

23 09 24-19

(86) BACnet Client option.

(87) D-Net Service.

(88) External Management Point Registration

(d) DCM601A72: iTM Plus Adapter

- (1) The iTM Plus Adapter shall provide control for all VRV, SkyAir indoor units, and Daikin RA and FTXS indoor units with the use of the KRP928BB2S RA Adapter. It shall be capable of handling a maximum of 64 indoor unit groups and 128 indoor units connected to a maximum of 10 outdoor units. The iTM Plus Adapter is to be used in conjunction with intelligent Touch Manager. Up to 7 iTM Plus Adapters can be connected to a single intelligent Touch Manager. This combination will provide intelligent Touch Manager monitoring and control of up to 512 indoor unit groups, 1024 indoor units, and 80 outdoor units. The iTM Plus Adapter shall support operations superseding that of the local remote controller, system configuration, daily/weekly scheduling, monitoring of operation status, and malfunction monitoring.
- (2) The controller wiring shall consist of a non-polar two-wire connection to the outdoor unit at terminals F1F2 (out-out). The iTM Plus Adapter is wall mounted and is used in conjunction with the intelligent Touch Manager to maintain the optimal operation of the connected indoor unit(s). The iTM Plus Adapter is connected to the intelligent Touch Manager via a polarity sensitive 18-2 AWG stranded non-shielded wire (field supplied).
- (3) The iTM Plus Adapter can be used in conjunction with the BRC1E73 (Navigation Remote Controller), the BRC2A71 (Simplified Remote Controller), or the BRC4C82/7E83/7C812/7E818 (Wireless Remote Controller), BACnet interface, Lonworks interface and Modbus Adapter to control the same indoor unit groups. No more than 2 remote controllers can be placed in the same group. The remote controller shall require daisy chain wiring for grouping multiple

23 09 24-20

indoor units (up to 16) together. Manual addressing is required of each indoor unit group associated with the iTM Plus Adapter.

7. Mounting:

- a. The iTM Plus Adapter can be mounted on the wall or in a standard enclosure (field supplied).

8. Features:

- a. The iTM Plus Adapter shall be approximately 6.30" x 5.87" x 2.41" in size.

9. Basic Operation:

- a. Control of all associated indoor unit groups shall be done via the connected intelligent Touch Manager.

10. Programmability:

- 11. Programming of all associated indoor unit groups shall be done via the connected intelligent Touch Manager.

END OF SECTION

23 09 24-21



## SECTION 23 09 25

### DDC CONTROL SYSTEM

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. NOTE: HVAC DDC Controls are included in the specification for reference only. The HVAC controls system described in the specifications and on the drawings is to be provided by the owner under separate contract. The controls system will be bid directly to the owner at a date as specified elsewhere in this specification.
- B. Building Automation System (BAS), utilizing direct digital controls.

##### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Products Supplied But Not Installed Under This Section (where required by project specific plans):
  - 1. Control valves.
  - 2. Flow switches and flow meters.
  - 3. Wells, sockets and other inline hardware for water sensors (temperature, pressure, flow).
  - 4. Airflow measuring stations (where not supplied with factory equipment).
  - 5. Variable frequency drives. (This does not include VFDs integral to equipment such as chillers or packaged DX units).
- B. Products Installed But Not Supplied Under This Section:
  - 1. None.
- C. Products Not Furnished or Installed But Integrated with the Work of This Section (where required by project specific plans):
  - 1. Chiller control systems.
  - 2. Boiler control systems.
  - 3. Fire alarm relays for system shutdown

23 09 25-1

4. Smoke detectors (through alarm relay contacts).
  5. Occupancy sensors (used for lighting – spare contacts for use by DDC)
  6. Terminal unit 24V transformers
  7. VAV terminal unit control enclosures
- D. Work Required Under Other Divisions Related to This Section (where required by project specific plans):
1. Installation of VFD's.
  2. Installation of thermostat/zone sensor conduits between sensor zone location and the sensor's associated HVAC unit.
  3. Power wiring to line side of motor starters, disconnects or variable frequency drives.
  4. Power wiring to all controller enclosures.
  5. Provision and wiring of smoke detectors and other devices relating to fire alarm system.
  6. Campus LAN (Ethernet) connection to BAS system network controller.

### 1.3 SYSTEM DESCRIPTION

- A. Scope: Furnish all labor, materials and equipment necessary for a complete and operating Building Automation System (BAS), utilizing Direct Digital Controls as shown on the drawings and as described herein. Drawings are diagrammatic only. All controllers furnished in this section shall communicate on a peer-to-peer bus over the BACnet protocol. The BAS shall be an open Niagara based system. Proprietary systems are not acceptable.
1. System architecture shall fully support third party systems via integration utilizing protocols including BACnet, LonTalk, and MODBUS.
  2. System architecture shall provide secure Web-based access using any of the current versions of Microsoft Internet Explorer, Mozilla Firefox, or Google Chrome browsers from any computer on the owner's LAN.

23 09 25-2



3. The BAS server or system network controller shall host all graphic files for the control system.
4. Owner shall receive all Administrator level login and passwords for engineering toolset at first training session. The Owner shall have full licensing and full access rights for all network management, operating system server, engineering and programming software required for the ongoing maintenance and operation of the BAS.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Submit in electronic format. Submittals shall be representative of the entire control system and shall consist of a complete list of equipment and materials, including manufacturers' catalog data sheets. Provide BACnet Protocol Implementation Conformance (PICS) documentation for all DDC controllers upon Engineer request.
- C. Product Data: Submit manufacturer's data sheets on each product to be used.
- D. Control Drawings: Drawings shall contain complete wiring and schematic diagrams, sequences of operation, control system bus layout, material lists, and any other details required to demonstrate that the system has been coordinated and will properly function as a system.
- E. Upon completion of the work, provide electronic 'as-built' drawings and other project-specific documentation.
- F. Any deviations from these specifications or the work indicated on the drawings must be approved by the engineer and shall be clearly identified in the submittals and as-built documents.

#### 1.5 QUALITY ASSURANCE

- A. The Control System Contractor shall have a full service DDC office within 100 miles of the job site. This office shall be staffed with applications engineers, software engineers and field technicians. This office shall maintain parts inventory and shall have all testing and diagnostic equipment necessary to support this work, as well as staff trained in the use of this equipment.
- B. Single Source Responsibility of Supplier: The Control System Contractor shall be responsible for the complete installation and proper operation of the control system.

23 09 25-3

The Control System Contractor shall exclusively be in the regular and customary business of design, installation and service of computerized building automation systems similar in size and complexity to the system specified.

- C. Equipment and Materials: Equipment and materials shall be cataloged products of manufacturers regularly engaged in the production and installation of HVAC control systems. Products shall be manufacturer's latest standard design and have been tested and proven in actual use.
- D. Factory Authorization: The Control System Contractor shall be a direct distributor and authorized agent of the primary controls line being installed (system network controllers, programmable equipment controllers, digital sensors, etc.)

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Maintain integrity of shipping cartons for each piece of equipment and control device through shipping, storage and handling as required to prevent equipment damage. Store equipment and materials inside and protected from weather.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. KMC Controls by Harrison Energy Partners.
- B. Control system for new units shall be an extension of the existing campus wide KMC control system.
- C. Substitutions: None or Engineer Approved Equal

#### 2.2 GENERAL

- A. The Building Automation System (BAS) shall be based on the Niagara Framework. Proprietary systems are strictly prohibited.
- B. The BAS shall be comprised of a network of interoperable, stand-alone digital controllers, a network area controller, graphics and programming and other control devices for a complete system as specified herein.
- C. The installed system shall provide secure password access to all features, functions and data contained in the overall BAS.

23 09 25-4

## 2.3 OPEN, INTEROPERABLE, INTEGRATED ARCHITECTURE

- A. The intent of this specification is to provide a peer-to-peer networked, stand-alone, distributed control system utilizing open protocols in one open, interoperable system.
- B. The supplied system shall incorporate the ability to access all data using HTML5 enabled browsers without requiring proprietary operator interface and configuration programs or browser plug-ins.

## 2.4 BAS SUPERVISOR SERVER HARDWARE

- A. The BAS shall include a Supervisory Server device as required to meet the design intention for BAS performance including proper alarm management, trending performance and long term storage, backup data base storage, reasonable system performance speeds, etc. If a BAS Supervisor is not provided, the Control System Contractor shall provide sufficient performance documentation to the Engineer of Record for review and approval before acceptance. This performance documentation must prove that the provided System Network Controller (SNC) utilized in lieu of the Supervisor Server meets the Minimum Computer Hardware Configuration requirements specified herein.
- B. Minimum Computer Hardware Configuration
  - 1. Processor: Intel Pentium N4200 1.1 GHz CPU
  - 2. Memory: 4 GB LPDDR4 RAM
  - 3. Operating System: Windows 10 IoT version (must be able to disable automatic updates)
  - 4. Hard Drive: 64 GB Solid State Storage minimum, more recommended depending on archiving requirements. Minimum of 1 year of data storage.
  - 5. Network Support: Dual Gb LAN ports
  - 6. Connectivity: Full-time high-speed ISP connection shall be provided by the owner. Controls System Contractor shall offer remote connectivity via cellular service at an additional cost to the owner if needed.
- C. Standard Client: The thin-client Web Browser BAS graphical user interface shall be Google Chrome or browser equivalent. No special software shall be required to be installed on the PCs used to access the BAS via a web browser.

23 09 25-5

## 2.5 SYSTEM NETWORK CONTROLLER (SNC)

- A. These controllers are designed to manage communications between the programmable equipment controllers (PEC), application specific controllers (ASC), and integrated BACnet devices which are connected to its communications trunks. For sites utilizing a supervisory server, the SNC shall directly communicate with the BAS supervisor server. The SNC is also responsible to perform control and operating strategies for the system based on information from any controller connected to the BAS. The basis of design SNC shall be the Niagara JACE 8000 controller.
- B. The controllers shall be capable of peer-to-peer communications with other SNC's and with any Operator Workstation (OWS) connected to the BAS, whether the OWS is directly connected, connected via cellular modem or connected via the Internet.
- C. The SNC shall be capable of routing all BACnet ms/tp communications traffic. However, BACnet routers shall be installed to manage the ms/tp communications traffic. This requirement is enforced in order to minimize the workload of the SNC to ensure proper performance of the BAS.
- D. The SNC shall be capable of executing application control programs to provide:
  - 1. Calendar functions.
  - 2. Scheduling.
  - 3. Trending.
  - 4. Alarm monitoring and routing.
  - 5. Time synchronization.
  - 6. Integration BACnet controller data.
  - 7. Integration of LonWorks and MODBUS controller data via the use of additional drivers when required.
  - 8. Network management functions for all SNC, PEC and ASC based devices.
- E. The SNC shall provide the following hardware features as a minimum:
  - 1. Two 10/100 Mbps Ethernet ports.
  - 2. Two Isolated RS-485 ports with biasing switches.

23 09 25-6

3. 1 GB RAM
  4. 4 GB Flash Total Storage / 2 GB User Storage
  5. Wi-Fi (Client or WAP)
  6. USB Flash Drive
  7. High Speed Field Bus Expansion
  8. Integrated 24 VAC/DC Global Power Supply
  9. MicroSD Memory Card Employing Encrypted Safe Boot Technology
- F. The SNC shall support standard Web browser access via the Intranet/Internet. It shall support a minimum of 16 simultaneous users.
- G. The SNC shall provide alarm recognition, storage, routing, management and analysis to supplement distributed capabilities of equipment or application specific controllers.
- H. The SNC shall be able to route any alarm condition to any defined user location whether connected to a local network or remote via cellular modem, or wide-area network.
1. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including but not limited to:
    - a. Alarm.
    - b. Return to normal.
    - c. To default.
  2. Alarms shall be annunciated in any of the following manners as defined by the user:
    - a. Screen message text.
    - b. Email of complete alarm message to multiple recipients.
    - c. Graphics with flashing alarm object(s).
- I. Programming software and all controller "Setup Wizards" shall be embedded into the SNC.

23 09 25-7

- J. The SNC shall support the following security functions.
  - 1. Module code signing to verify the author of programming tool and confirm that the code has not been altered or corrupted.
  - 2. Role-Based Access Control (RBAC) for managing user roles and permissions.
  - 3. Require users to use strong credentials.
  - 4. Data in Motion and Sensitive Data at Rest be encrypted.
  - 5. LDAP and Kerberos integration of access management.
- K. The SNC shall be provided with a minimum 1 Year Software Maintenance license for system upgrades during the warranty period. Additional Software Maintenance licenses shall be provided as needed to include system upgrades throughout the entire first year of system use. Labor to implement not included.

## 2.6 PROGRAMMABLE EQUIPMENT CONTROLLERS (PEC)

- A. General: Controllers shall be responsible for monitoring and controlling directly connected HVAC equipment such as Chilled Water Systems, Cooling Towers, Hot Water Systems, Pump Systems, Geothermal Loop Systems, Domestic Water Systems, AHU's, RTU's, Split Systems, Heat Pumps, VAV Terminals, Fan Coil Units, Chilled Beams, Unit Ventilators, Exhaust Fans, Lighting Systems, and/or other building mechanical systems as required. Each controller shall be classified as a "native" BACnet device, supporting the BACnet Advanced Application Controllers (B-AAC) profile. Controllers that support a lesser profile such as B-ASC are not acceptable without written permission from the Engineer of Record. Controllers shall conform to the BACnet Advanced Application Controller (B-AAC) profile.
- B. Software Specifications
  - 1. General: The controller shall contain non-volatile memory to store both the resident operating system and application programming. Any program may affect the operation of any other program. This execution of control function shall not be interrupted due to normal user communications including interrogation, program entry, extraction of the program for storage, routing communications, etc.
  - 2. Automatic Restart after Power Failure: Upon restoration of power after an outage, the controller shall automatically and without human intervention update all monitored functions; resume operation based on current synchronized time and

23 09 25-8

status, and implement special start-up strategies as required.

3. User Programming Language: The application software shall be user programmable. This includes all strategies, sequences of operation, control algorithms, parameters, and set points. Controllers shall be capable of utilizing both line code based programming and Graphical Function Block programming interfaces.
  - a. Programs shall be generated by an English-language based (line) editor or a Graphical Function Block interface.
  - b. The language shall be structured to allow for the easy configuration of control programs and mathematical calculations.
  - c. Users shall be able to place comments anywhere in the body of a program. Program listings shall be configurable by the user in logical groupings.
  - d. Controllers that use non-editable factory programming only methods will not be accepted without written permission from the Engineer of Record.
4. Control Algorithms: The controller shall have the ability to perform the following control algorithms:
  - a. Proportional, Integral plus Derivative Control (PID)
  - b. Two Position Control
  - c. Digital Filter
  - d. Ratio Calculator
  - e. Equipment Cycling Protection
5. Mathematical Functions: Each controller shall be capable of performing basic mathematical functions (+, -, \*, /), squares, square roots, exponential, logarithms, trigonometric functions, Boolean logic statements, or combinations of all. The controllers shall be capable of performing complex logical statements including operators such as AND, OR, NOT, XOR, etc. These must be able to be used in the same equations with the mathematical operators.
6. Energy Management Applications: The controller shall have the ability to perform any or all of the following energy management routines where required by the sequence of operations or controls design:

23 09 25-9

- a. Time of Day Scheduling
  - b. Calendar Based Scheduling
  - c. Holiday Scheduling
  - d. Exception Scheduling
  - e. Temporary Schedule Overrides
  - f. Optimal Start
  - g. Optimal Stop
  - h. Night Setback Control
  - i. Enthalpy Switchover (Economizer)
  - j. Peak Demand Limiting, Load Shed
  - k. Temperature Compensated Duty Cycling
  - l. CFM Tracking
  - m. Heating/Cooling Interlock
  - n. Hot/Cold Deck Reset
  - o. Free Cooling
  - p. Hot Water Reset
  - q. Chilled Water Reset
  - r. Condenser Water Reset
  - s. Chiller Sequencing
  - t. Demand Ventilation
- C. History Logging: Each controller shall be capable of locally logging any input, output, calculated value, etc. over user defined time intervals (1 second minimum time). Up to 128 values shall be stored in each log. Logged data shall be downloadable to the Supervisory Server or SNC for long term archiving based upon user-defined time intervals, COV notification or manual command.

23 09 25-10



- D. Alarm Management: For each system point, alarms can be created based on high/low limits or conditional expressions. Alarms will be generated based on their priority. A minimum of 255 priority levels shall be provided. If communication with the Operator Workstation is temporarily interrupted, the alarm will be time-stamped and buffered in the controller. When communications return, the alarm will be transmitted to the Supervisory Server or SNC.
- E. Communications: The controllers shall be a native BACnet communications, available as EIA-485 (MS/TP) or Ethernet/IP physical connections as required. The controllers shall meet or exceed the specifications in the ANSI/ASHRAE BACnet Standard 135-2010 for BACnet Advanced Application.
1. MS/TP Devices: For devices with MS/TP connectivity, baud rates between 9600 and 115.2k baud shall be selectable. Segmentation shall be supported. Auto-baud functionality shall be supported.
- F. Firmware Upgrades: The controller firmware shall be upgradeable for updates as future enhancements and expanded functionality. Firmware updates shall be supported via BACnet communications (over-the-network).
- G. Hardware Platform Features:
1. Processor: The controller shall employ at minimum a 32-bit microprocessor.
  2. Memory: The operating system and the application programs for the controller shall be stored in non-volatile FLASH memory. The controller shall support up to 8 MB Flash memory and up to 2 MB of RAM. The controller shall include an on-board capacitor to back up the controller's RAM memory for a period of at least six hours. In the case of a power failure, the controller shall first try to restart from the RAM memory. If that memory is corrupted or unusable, then the controller shall restart itself from its application program stored in its FLASH memory.
  3. Inputs: The controller shall have on-board universal inputs. Each universal input shall have over-voltage protection. Manually set, hardware configuration jumpers shall not be necessary.
  4. Outputs: The controller shall have on-board universal outputs. Each universal outputs shall be software selectable as analog or binary.
  5. Terminal Block Connectors: The controller shall have removable screw terminal blocks that can accommodate wire sizes 14-22 AWG.

23 09 25-11

6. Power Supply: The power supply for the controller shall be 24VAC power (20 VAC minimum/30 VAC maximum). Voltage below the operating range of the system shall be considered an outage.

H. VAV Controller Specific Features:

1. Integrated Actuator: The controller shall have an integrated actuator with the following features:
  - a. The actuator shall be rated at a minimum of 35 inch-lbs.
  - b. Connection to the damper shall be with a v-bolt clamp, accepting 3/8" to 5/8" damper shaft sizes.
  - c. The actuator shall have an integrated gear disengagement mechanism.
2. Integrated Pressure Sensor: The controller shall have an integrated pressure sensor for airflow measurement. The sensor shall have a range of 0-2"wc, accurate to 5% of reading.
3. Inputs: The controller shall have the following inputs:
  - a. Inputs for room temperature and room setpoint from wall sensor.
  - b. Additional universal inputs, software configurable as analog or binary.
4. Outputs: The controller shall have the following outputs:
  - a. Damper Actuator, Clockwise and Counter-clockwise
  - b. Additional universal outputs, software configurable as analog or binary. Each output channel shall be capable of being manipulated individually, exclusive to any other output.
5. VAV Balancing: The VAV controller shall be capable of being balanced from the Digital Room Sensor without any specific pc-based software.

I. General Purpose Controller Specific Features:

1. Mounting: The controller shall be able to be mounted on standard DIN rail or to a panel using integrated mounting holes on 1" centers.
2. Modular Expandability: The controller shall allow expansion of the device Input and Output capacity via Expansion Modules, making it possible to add I/O as

23 09 25-12

desired to meet the requirements for individual control applications.

## 2.7 DIGITAL ROOM SENSOR

- A. General: The Digital Room Sensor shall provide the following types of functions and be field programmable:
  - 1. Space condition measurements and indications, including temperature, humidity, local motion/occupancy, and CO2 as required by specific application.
  - 2. User setpoint adjustments
  - 3. Equipment status and mode indication
- B. Integrated Sensors: The Digital Room Sensor shall have integrated sensors for temperature, humidity, motion/occupancy, and CO2 as required for the application. The intent of this requirement is to minimize the number of physical devices installed in the zone. The Controls Contractor shall inform the Engineer or Record if multiple zone sensor devices will be required for zone sensing of temperature, humidity, motion/occupancy, and CO2. The Engineer of Record will coordinate with the Architect for review/approval of the multiple zone sensors.
- C. User Set points: User/Occupant set points may be manipulated via the Digital Room Sensor. Single and/or multiple set points shall be supported and field configurable. Unique set point sequences shall be configurable and presented to the user based on a mode condition. Setpoint adjustment shall be capable of being locked out at the Digital Room Sensor. Setpoints shall be adjustable at the BAS when locked out locally.

## 2.8 BACNET ROUTER

- A. General: The BACnet router shall router BACnet traffic between BACnet networks, virtual and/or physical. The router shall be designed for both permanent installations as well as temporary use for BACnet device configuration and BACnet network troubleshooting.
- B. Connections:
  - 1. Power: The router shall be powered wither from 24VAC AC (-15%, +20%) or from USB. The 24VAC connections shall be a removable terminal block accepting 12 to 22 AWG wire.

23 09 25-13

2. Network Communication Ports: The controller shall have an on-board, 10/100bT Ethernet port and an EIA-485 port. The EIA-485 port shall be optically isolated and have integrated end-of-line (EOL) terminations. The EIA-485 port shall be a removable terminal block accepting 12 to 22 AWG wire.
- C. Mounting: The router shall be capable of being flush mounted via mounting holes on 1” centers, or DIN rail, without the use of additional mounting accessories.
- D. Communications: The router shall be a native BACnet device, available as EIA-485 (MS/TP) or Ethernet/IP physical connections as required.
1. MSTP: MSTP network baud rates between shall be selectable between 9600 and 115.2k baud. Segmentation shall be supported.
  2. Ethernet/IP: The following BACnet For devices enabled with Ethernet/IP connectivity, the user shall be able to select BACnet 8802-3, BACnet IP, BACnet BBMD, or BACnet Foreign Device. Segmentation shall be supported.
- E. Routing: The router shall support: one BACnet MSTP network, one BACnet 8802-3 network, and two BACnet IP networks, the IP networks selected able as IP, foreign devices or BBMD. The BBMD Foreign Devices table shall support up to 128 entries.
- F. Diagnostics
1. Device Status: The router shall report the status of each MSTP device that is detected on the MSTP network. MSTP MAC address status shall be indicated with the following color coded categories: no devices detected (white), offline (grey), router MAC (blue), active device (green), errors or duplicate (red). Metrics shall indicate the total device count online, average token cycle time, and the average token time per device.
  2. Token Use: The router shall report state of the MSTP token. The status of the token as it is passed between MSTP devices shall be indicated with the following color-coded categories: passed in less than 100ms (normal, green), passed in more than 100 ms but less than the APDU timeout (slow, yellow), passed in longer than the APDU timeout (red). Poll for Master (PFM) shall be indicated in light blue.
  3. Route Status: The router shall report all the known BACnet networks, both directly connected and remote connected. The status of each BACnet network should be identified, indicating the following network states: active, busy, down/gone, or duplicated network, duplicated MSTP MAC, sole MSTP master,

23 09 25-14

BBMD: Unknown, BBMD: Multiple, Foreign Devices NAK.

4. MSTP Metrics: The following MSTP network metrics shall be indicated: Tx Frame Count, Tx Data Count, TX Error Count, Rx Frame Count, Rx Unexpected Frame Count, Wait for Reply Error Count, Duplicate MAC Count, Token Retry Count, Token Timeout Count, Rx Token Count, Token Error Count, Rx PRM Count, PFM Error Count, Rx Discard Count, Rx FB Reparse Count.
- G. Time Master: The router shall be a BACnet time sync master, capable of syncing BACnet network time to either local (PC) or a SNTP Time server. Both UTC and local time shall be supported.
- H. Firmware Upgrades: The router firmware shall be upgradeable for updates as future enhancements and expanded functionality. Firmware updates shall be supported via BACnet communications (over-the-network) and through the integrated configuration webpages.

## 2.9 DIRECT DIGITAL CONTROL SYSTEM HARDWARE

- A. Control damper actuators shall be furnished by the Control System Contractor. Two-position or proportional electric actuators shall be direct-mount type sized to provide a minimum of 7 inch-lb torque per square foot of damper area. Damper actuators shall be capacitor-driven or spring-driven fail-safe with switch-selectable direction providing consistent torque in both powered and fail-safe modes. Damper actuators shall have gear disengagement button, and adjustable mechanical end stop. Operators shall be heavy-duty electronic type for positioning automatic dampers in response to a control signal. Motor shall be of sufficient size to operate damper positively and smoothly to obtain correct sequence as indicated. All applications requiring proportional operation shall utilize truly proportional electric actuators.
- B. Control Valves: Control valves shall be 2-way or 3-way pattern as shown and constructed for tight shutoff at the pump shut-off head or steam relief valve pressure. Control valves shall operate satisfactorily against system pressures and differentials. Two-position valves shall be 'line' size. Proportional control valves shall be sized for a maximum pressure drop of 4.0 psi at rated flow (unless otherwise noted or scheduled on the drawings). Valves with sizes up to and including 2.5 inches shall be "screwed" configuration and 3 inches and larger valves shall be "flanged" configuration. Electrically-actuated control valves shall include capacitor-driven or spring-driven fail-safe actuators with switch-selectable direction providing consistent torque in both powered and fail-safe modes sized for tight shut-off against system pressures (as

23 09 25-15

specified above) and, when specified, shall be furnished with integral switches or positive feedback for indication of valve position.

- C. Control Valve Actuators: Actuators for cooling and heating coil control valves shall be "proportional" type. All actuators shall have inherent current limiting motor protection. Valve actuators shall be 24-volt, electronic type, modulating or two-position as required for the correct operating sequence. Actuators on valves needing 'fail-safe' operation shall have capacitor-driven or spring-driven fail-safe actuators with switch-selectable direction.
- D. Only VAV terminal unit control valves and fan coil unit control valves shall allow for fail-in-place control valve actuators. All other hot water control valves shall be Normally-Open arrangement. Chilled water control valves shall be Normally-Closed arrangement.
- E. Sensor Only Wall Mount Room Temperature sensors: Where shown on plans as sensor only, provide stainless steel flat plate temperature sensors. Flat Plate Sensors shall have an accuracy of  $\pm 0.5$  Degrees F.
- F. Duct-mounted and Outside Air Temperature Sensors: Outside air sensors shall include an integral sun shield. Duct-mounted sensors shall have an insertion measuring probe of a length appropriate for the duct size. The sensor shall include a utility box and a gasket to prevent air leakage and vibration noise. For all mixed air, preheat air, and other locations where air stratification might affect temperature readings, install bendable averaging duct sensors. Sensor element length shall be selected for sufficient coverage equal to one foot of sensor length for every two square feet or coverage area. These devices shall have accuracy of  $\pm 0.5$  degrees Fahrenheit over the entire range.
- G. Humidity sensors shall have accuracy to  $\pm 2\%$  over the 10 to 90% RH. Operating range shall be 0 to 100% RH and 40 to 120 degrees Fahrenheit. Sensors shall be selected for wall, duct or outdoor type installation as appropriate for the application.
- H. Carbon Dioxide Sensors (CO<sub>2</sub>): Sensor default range shall be 0 - 2000 PPM. Accuracy shall be plus or minus 75 PPM. Sensor shall be wall or duct mounted type, as appropriate for the application.
- I. Current Switches: Solid state, split core current switch that operates when the current level (sensed by the internal current transformer) exceeds the adjustable trip point. Current switch to include an integral LED for indication of trip condition and a current

23 09 25-16

level below trip set point.

- J. Differential Static Pressure Transmitters: Provide a pressure transmitter with switch-selectable pressure ranges (inches water column). Accuracy shall be plus or minus 1% of full scale range. Provide push button auto zero capability. Device shall have integral static pickup tube.
- K. Differential Air Pressure Switches: Provide SPDT type, UL-approved, and selected for the appropriate operating range where applied. Switches shall have adjustable set points and barbed pressure tips or compression fittings.
- L. Water Flow Switches: Provide a SPST type contact switch with bronze paddle blade, sized for the actual pipe size at the location. If installed outdoors, provide a NEMA-4 enclosure. Flow switch shall be UL listed.
- M. Temperature Control Panels: Furnish temperature control panels of code gauge steel with locking doors for mounting all devices as shown. Indoor panels not subject to water damage shall be NEMA-1. Provide NEMA 3R panels for outdoor use or where subject to falling dirt, rain, sleet, snow, or external ice. In all cases where controls may be subject to windblown dust, splashing water, and hose-directed water, use NEMA-4 panels.
- N. Low Air Temperature Sensors: Switch shall be provided with at least two contacts. Switch shall have a range of 35 to 80 degrees Fahrenheit. Switch shall be manual reset type.
- O. Variable Frequency Drives: The variable frequency drive (VFD) shall be designed specifically for use in Heating, Ventilation, and Air Conditioning (HVAC) applications in which speed control of the motor can be applied. The VFD, including all factory installed options, shall have UL & CSA approval. VFD's shall include communications capability with DDC BAS via built-in interface card (BACnet) for information purposes. All control signals from VFD shall be controlled through direct, hardwired control signals (AO, BO, AI, BI).
- P. Relays: Start/stop relay model shall provide either momentary or maintained switching action as appropriate for the motor being started. All relays shall have indicating lamp. Relays installed outside of controlled devices shall be enclosed in a NEMA enclosure suitable for the location. Relays shall be labeled with UR symbol. RIB-style relays are acceptable for remote enable/disable.

23 09 25-17

- Q. Emergency Stop Switches: Provide toggle-type switch with normally-closed contact. Switch shall be labeled "EMERGENCY SHUTOFF".
- R. Natural Gas Shutoff Valves: Provide 2-way normally closed operation Gas Shutoff Valve. Valve shall be 120V model with watertight enclosure. Size valve for line size installation. Basis of design is ASCO Series 8214.
- S. Transducers: Differential pressure transducers shall be electronic with three output ranges: 4 to 20 mA, 0 to 5 VDC, and 0 to 10 VDC. Device shall have the following: push-button and remote zeroing terminal, uni-directional or bi-directional pressure-range selection switch, high/low port swap switch to solve incorrect plumbing for differential, normal or slow-surge damping switch to prevent false alarms and reduce noise and output polarity reverse switch so in reverse mode the analog output is maximum when the pressure differential is zero and decreases as pressure increases. Unit shall be designed to operate in the pressure ranges involved.
- T. Control Power Transformers: Provide step-down transformers for all DDC controllers and devices as required. Transformers shall be sized for the load, but shall be sized for 50 VA minimum. Transformers shall be UL listed Class 2 type, for 120 VAC/24 VAC operation.
- U. Line voltage protection: All DDC system control panels that are powered by 120 VAC circuits shall be provided with surge protection. The protection shall meet UL, ULC 1449, IEEE C62.41B. A grounding conductor, (minimum 12 AWG), shall be brought to each control panel.

## 2.10 BAS SYSTEM WEB BROWSER GUI - SYSTEM OVERVIEW

- A. The BAS Contractor shall provide system software based on thin-client architecture, designed around the open standards of web technology. The BAS Supervisory Server or SNC shall communicate using Ethernet and TCP. BAS shall be accessed using a web browser over Owner intranet and remotely over the Internet.
- B. The intent of the thin-client architecture is to provide the operator(s) complete access to the BAS system via a web browser. The thin-client web browser Graphical User Interface (GUI) shall be browser and operating system agnostic, meaning it will support HTML5 enabled browsers without requiring proprietary operator interface and configuration programs or browser plug-ins. No installation of any custom software shall be required on the operator's GUI workstation/client. Connection shall be over an intranet or the Internet.

23 09 25-18



- C. The web browser GUI shall provide a completely interactive user interface and shall provide a HTML5 experience that supports the following features as a minimum:
1. Real time 'live' Graphic Programs.
  2. Trending.
  3. Scheduling.
  4. Parameter change of properties.
  5. Set point adjustments.
  6. Consolidated system reports
  7. Alarm / event information.
  8. Configuration of operators.
  9. Execution of global commands.
- D. Secure Socket Layers: Communication between the Web Browser GUI and BAS server shall offer encryption using 128-bit encryption technology within Secure Socket Layers (SSL). Communication protocol shall be Hyper-Text Transfer Protocol (HTTP).
- E. Software Components: All software shall be the most current version. All software components of the BAS system software shall be provided and installed as part of this project. BAS software components shall include:
1. Server/SNC Software, Database and Web Browser Graphical User Interface.
  2. 1 Year Software Maintenance license. Labor to implement not included.
  3. Embedded System Configuration Utilities for future modifications to the system and controllers.
  4. Embedded Graphical Programming Tools.
  5. Embedded Direct Digital Control software.
  6. Embedded Application Software.

23 09 25-19

## 2.11 GRAPHICAL USER INTERFACE

- A. Web Browser Navigation: The Thin Client web browser GUI shall provide a comprehensive user interface. Using a collection of web pages, it shall be constructed to "feel" like a single application, and provide a complete and intuitive mouse/menu driven operator interface. It shall be possible to navigate through the system using a web browser to accomplish requirements of this specification. The Web Browser GUI shall (as a minimum) provide for navigation, and for display of animated graphics, schedules, alarms/events, live graphic programs, active graphic set point controls, configuration menus for operator access, reports and reporting actions for events.
- B. Login: On launching the web browser and selecting the appropriate domain name or IP address, the operator shall be presented with a login page that will require a login name and strong password. Navigation in the system shall be dependent on the operator's role-based application control privileges.
- C. Navigation: Navigation through the GUI shall be accomplished by selecting dynamic links to system graphics.
- D. Color Graphics: The Web Browser GUI shall make extensive use of color in the graphic view to communicate information related to set points and comfort. Animated .gifs or .jpg, vector scalable, active set point graphic controls shall be used to enhance usability. Graphics tools used to create Web Browser graphics shall be non-proprietary and conform to the following basic criteria:
  - 1. Display Size: The GUI workstation software shall graphically display in a minimum of 1024 by 768 pixels 24 bit True Color.
  - 2. General Graphic: General area maps shall show locations of controlled buildings in relation to local landmarks.
  - 3. Color Floor Plans: Floor plan graphics shall show heating and cooling zones throughout the buildings in a range of colors, as selected by Owner. Provide a visual display of temperature relative to their respective set points. The colors shall be updated dynamically as a zone's actual comfort condition changes.
  - 4. Mechanical Systems: Mechanical system graphics shall show the type of mechanical system components serving any zone through the use of a pictorial representation of components. Selected I/O points being controlled or monitored for each piece of equipment shall be displayed with the appropriate engineering units. Animation shall be used for rotation or moving mechanical components to

23 09 25-20

enhance usability.

5. Minimum System Color Graphics: Color graphics shall be selected and displayed via a web browser for the following:
  - a. Each building.
  - b. Each floor and zone controlled.
  - c. Each piece of equipment monitored or controlled including each terminal unit.
  
- E. Hierarchical Schedules: An operator (with proper access credentials) shall be able to define a Normal, Holiday or Override schedule for an individual piece of equipment or room, or choose to apply a hierarchical schedule to the entire system, site or floor area. All schedules that affect the system/area/equipment highlighted in the Navigation Tree shall be shown in a summary schedule table and graph.
  1. Schedules: Schedules shall comply with BACnet standards and shall allow events to be scheduled based on:
    - a. Types of schedule shall be Normal, Holiday or Override.
    - b. A specific date.
    - c. A range of dates.
  2. Schedule Summary Graph: The schedule summary graph shall clearly show Normal versus Holiday versus Override Schedules and the net operating schedule that results from all contributing schedules. Note: In case of priority conflict between schedules at the different geographic hierarchy, the schedule for the more detailed geographic level shall apply.
  
- F. Alarms: Alarms associated with a specific system or area shall be displayed in the 'Alarms' view. Alarms, and reporting actions shall have the following capabilities:
  1. Alarms View: Each Alarm shall display an Alarms Category (using a different icon for each alarm category), date/time of occurrence, current status, alarm report and a URL link to the associated graphic for the selected system or area.
  2. Alarm Templates: Alarm template shall define different types of alarms and their associated properties. As a minimum, properties shall include a reference name, verbose description, severity of alarm, acknowledgement requirements, and

23 09 25-21

high/low limit and out of range information.

3. Alarm Areas: Alarm Areas enable an operator to assign specific Alarm Categories to specific Alarm Reporting Actions. For example, it shall be possible for an operator to assign all HVAC Maintenance Alarm on the 1st floor of a building to email the technician responsible for maintenance.
  4. Alarm Time/Date Stamp: All events shall be generated at the DDC control module level and comprise the Time/Date Stamp using the standalone control module time and date.
- G. Trends: As system is engineered, all critical points shall be enabled to trend. Trends shall both be displayed and user configurable through the Web Browser GUI. Trends shall comprise analog, digital or calculated points simultaneously.
1. Viewing Trends: The operator shall have the ability to view trends by using the BAS GUI. The system shall be able to simultaneously graphically display multiple trends per graph.
  2. Local Trends: Trend data shall be collected locally by Multi-Equipment/Single Equipment general-purpose controllers, and periodically uploaded to the BAS server or SNC. Trend data, including run time hours and start time date shall be retained in non-volatile module memory.
  3. Resolution. Sample intervals shall be as small as one second. Each trended point will have the ability to be trended at a different trend interval.
  4. Dynamic Update. Trends shall be able to dynamically update at operator-defined intervals.
- H. Security Access: Systems that Security access from the web browser GUI to BAS server or SNC shall require a Login Name and Strong Password. Access to different areas of the BAS system shall be defined in terms of Role-Based Access Control privileges as specified:
1. Roles: Roles shall reflect the actual roles of different types of operators. Each role shall comprise a set of 'easily understood English language' privileges. Roles shall be defined in terms of View, Edit and Function Privileges.
    - a. View Privileges shall comprise: Navigation, Network, and Configuration Trees, Operators, Roles and Privileges, Alarm/Event Template and Reporting

23 09 25-22

Action.

- b. Edit Privileges shall comprise: Set point, Tuning and Logic, Manual Override, and Point Assignment Parameters.
  - c. Function Privileges shall comprise: Alarm/Event Acknowledgement, Control Module Memory Download, Upload, Schedules, Schedule Groups, Manual Commands, Print and Alarm/Event Maintenance.
2. Geographic Assignment of Roles: Roles shall be geographically assigned using a similar expandable/collapsible navigation tree. For example, it shall be possible to assign two HVAC Technicians with similar competencies (and the same operator defined HVAC Role) to different areas of the system.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. Install system and materials in accordance with manufacturer's instructions and as detailed on the project drawing set.
- B. Low voltage electrical connections to control equipment shown specified or shown on the control diagrams shall be furnished and installed by the Control System Contractor in accordance with these specifications.
- C. Equipment furnished by the Mechanical Contractor that is normally wired before installation shall be furnished completely wired. Control wiring normally performed in the field will be furnished and installed by the Control System Contractor.
- D. All control devices mounted on the face of control panels shall be clearly identified as to function and system served with permanently engraved phenolic labels.

### 3.2 WIRING

- A. All low voltage electrical control wiring to the control panels shall be the responsibility of the Control System Contractor unless noted otherwise on plans.
- B. All wiring shall be in accordance with the Project Electrical Specifications (Division 26), the National Electrical Code and any applicable local codes.
- C. Use manufacturer-specified wire for all network connections.
- D. Wiring installed outside or exposed is to be installed in EMT conduit.

23 09 25-23

- E. Wiring above accessible ceiling can be installed without raceway. Wiring should be installed neatly and suspended with j-hooks.

### 3.3 ACCEPTANCE TESTING

- A. Upon completion of the installation, the Control System Contractor shall load all system software and start-up the system. The Control System Contractor shall perform all necessary calibration, testing and de-debugging and perform all required operational checks to insure that the system is functioning in full accordance with these specifications.
- B. System Acceptance: Satisfactory completion is when the Control System Contractor has performed successfully all the required testing to show performance compliance with the requirements of the Contract Documents to the satisfaction of the Owner's Representative or Engineer of Record. System acceptance shall be contingent upon completion and review of all corrected deficiencies.

### 3.4 OPERATOR TRAINING

- A. The Control System Contractor shall provide one day of comprehensive training for the Owner's representative to enable proficient operation of the system. Training shall be provided after final commissioning of the project.

### 3.5 TEST AND BALANCE ASSISTANCE

- A. The Control System Contractor shall provide up to 4 hours of training to the test and balance contractor on the use of test and balancing tool – provided by the Control System Contractor for adjusting of system setpoints needed to balance the system. If no tool is available, the Control System Contractor shall provide up to 24 hours of assistance to the test and balance contractor.

### 3.6 COMMISSIONING AGENT ASSISTANCE

- A. The Control System Contractor shall provide up to 40 hours of assistance to the Commissioning Agent during final commissioning inspection. If additional hours are necessary, the Control System Contractor shall provide an hourly labor rate to the Commissioning Agent for the purchase of additional assistance labor hours as necessary for the completion of the commissioning process.
- B. The Control System Contractor shall not make changes to the final control system design or sequence of operations without written approval from the Engineer of

23 09 25-24

Record. Any proposed changes to the control system design shall be prepared and submitted in writing by the Commissioning Agent.

### 3.7 WARRANTY PERIOD SERVICES

- A. Equipment, materials and workmanship incorporated into the work shall be warranted for a period of one year from the time of system acceptance. Within this period, upon notice by the Owner, any defects in the BAS due to faulty materials, methods of installation or workmanship shall be promptly repaired or replaced by the Control System Contractor at no expense to the Owner.

### 3.8 WARRANTY ACCESS

- A. The Owner shall grant to the Control System Contractor reasonable access to the BAS during the warranty period. Remote access to the BAS (for the purpose of diagnostics and troubleshooting, via the Internet, during the warranty period) will be allowed.

### 3.9 OPERATION & MAINTENANCE MANUALS

- A. See Division 1 for requirements. O&M manuals shall include the following elements, as a minimum:
  - 1. As-built control drawings.
  - 2. General description and specifications for all components.

END OF SECTION

23 09 25-25





## SECTION 23 23 00

### REFRIGERANT PIPING AND SPECIALTIES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Piping.
- B. Refrigerant.
- C. Moisture and liquid indicators.
- D. Valves.
- E. Strainers.
- F. Check valves.
- G. Filter-driers.
- H. Solenoid valves.
- I. Expansion valves.

##### 1.2 RELATED REQUIREMENTS

- A. Section 23 07 19 - HVAC Piping Insulation.
- B. Section 23 36 06 - Air Terminals - Variable Volume.
- C. Division 26 - Equipment Wiring: Electrical characteristics and wiring connections.

##### 1.3 REFERENCE STANDARDS

- A. AHRI 710 - Performance Rating of Liquid-Line Driers; 2009.
- B. AHRI 750 - Thermostatic Refrigerant Expansion Valves; 2007.
- C. AHRI 760 - Performance Rating of Solenoid Valves for Use With Volatile Refrigerants; 2007.
- D. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2022, with Addendum (2024).

23 23 00-1

- E. ASHRAE Std 34 - Designation and Safety Classification of Refrigerants; 2022, with Errata (2024).
- F. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2023.
- G. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2023.
- H. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2018.
- I. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; 2022.
- J. ASME B31.9 - Building Services Piping; 2020.
- K. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- L. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.
- M. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.

#### 1.4 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.
- C. Liquid Indicators:
  - 1. Use line size liquid indicators in main liquid line leaving condenser.
  - 2. If receiver is provided, install in liquid line leaving receiver.
  - 3. Use line size on leaving side of liquid solenoid valves.
- D. Valves:

23 23 00-2

1. Use service valves on suction and discharge of compressors.
  2. Use gage taps at compressor inlet and outlet.
  3. Use gage taps at hot gas bypass regulators, inlet and outlet.
  4. Use check valves on compressor discharge.
  5. Use check valves on condenser liquid lines on multiple condenser systems.
- E. Refrigerant Charging (Packed Angle) Valve: Use in liquid line between receiver shut-off valve and expansion valve.
- F. Strainers:
1. Use line size strainer upstream of each automatic valve.
  2. Where multiple expansion valves with integral strainers are used, use single main liquid line strainer.
  3. On steel piping systems, use strainer in suction line.
  4. Use shut-off valve on each side of strainer.
- G. Filter-Driers:
1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.
  2. Use a filter-drier on suction line just ahead of compressor.
  3. Use sealed filter-driers in lines smaller than 1/2 inch outside diameter.
  4. Use sealed filter-driers in low temperature systems.
  5. Use sealed filter-driers in systems utilizing hermetic compressors.
  6. Use replaceable core filter-driers in lines of 3/4 inch outside diameter or greater.
  7. Use filter-driers for each solenoid valve.
- H. Solenoid Valves:
1. Use in liquid line of systems operating with single pump-out or pump-down compressor control.

23 23 00-3

2. Use in liquid line of single or multiple evaporator systems.
3. Use in oil bleeder lines from flooded evaporators to stop flow of oil and refrigerant into the suction line when system shuts down.

#### 1.5 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.
- C. Shop Drawings: Indicate schematic layout of system, including equipment, critical dimensions, and sizes.
- D. Design Data: Submit design data indicating pipe sizing. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- E. Test Reports: Indicate results of leak test, acid test.
- F. Manufacturer's Installation Instructions: Indicate support, connection requirements, and isolation for servicing.
- G. Project Record Documents: Record exact locations of equipment and refrigeration accessories on record drawings.
- H. Maintenance Data: Include instructions for changing cartridges, assembly views, spare parts lists.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of documented experience.
- B. Design piping system under direct supervision of a licensed hvac company experienced in design of this type of work and licensed in the state where the Project is located.

#### 1.7 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9 for installation of piping system.
- B. Welding Materials and Procedures: Conform to ASME (BPV IX) .

23 23 00-4

- C. Welders Certification: In accordance with ASME (BPV IX).
- D. Products Requiring Electrical Connection: Listed and classified by UL, as suitable for the purpose indicated.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store piping and specialties in shipping containers with labeling in place.
- B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.
- C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

## PART 2 PRODUCTS

### 2.1 PIPING

- A. Copper Tube to 7/8 inch OD: ASTM B88 (ASTM B88M), Type K (A), annealed.
  - 1. Fittings: ASME B16.26 cast copper.
  - 2. Joints: Flared.
- B. Pipe Supports and Anchors:
  - 1. Conform to ASME B31.5.
  - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Carbon steel adjustable swivel, split ring.
  - 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
  - 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  - 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
  - 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
  - 7. Vertical Support: Steel riser clamp.

23 23 00-5

8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
10. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
11. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

## 2.2 REFRIGERANT

- A. Refrigerant: As defined in ASHRAE Std 34.
  1. R-410A.
  2. R-32.
  3. R-454B.

## 2.3 MOISTURE AND LIQUID INDICATORS

- A. Manufacturers:
  1. Henry Technologies.
  2. Parker Hannifin/Refrigeration and Air Conditioning.
  3. Sporlan Valve Company.
  4. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator and plastic cap; for maximum temperature of 200 degrees F and maximum working pressure of 460 psi.

## 2.4 VALVES

- A. Manufacturers:
  1. Hansen Technologies Corporation.
  2. Henry Technologies.

23 23 00-6

3. Danfoss Automatic Controls.
4. Substitutions: See Section 23 01 00 - General HVAC Provisions.

B. Diaphragm Packless Valves:

1. UL listed, globe or angle pattern, forged brass body and bonnet, phosphor bronze and stainless steel diaphragms, rising stem and handwheel, stainless steel spring, nylon seat disc, solder or flared ends, with positive backseating; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.

C. Packed Angle Valves:

1. Forged brass , forged brass seal caps with copper gasket, rising stem and seat , molded stem packing, solder or flared ends; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.

D. Ball Valves:

1. Two piece forged brass body with teflon ball seals and copper tube extensions, brass seal cap, chrome plated ball, stem with neoprene ring stem seals; for maximum working pressure of 500 psi and maximum temperature of 325 degrees F.

E. Service Valves:

1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or solder ends, for maximum pressure of 500 psi.

## 2.5 STRAINERS

A. Straight Line or Angle Line Type:

1. Brass or steel shell, steel cap and flange, and replaceable cartridge, with screen of stainless steel wire or monel reinforced with brass; for maximum working pressure of 430 psi.

B. Straight Line, Non-Cleanable Type:

1. Steel shell, copper plated fittings, stainless steel wire screen, for maximum working pressure of 500 psi.

23 23 00-7

## 2.6 CHECK VALVES

### A. Manufacturers:

1. Hansen Technologies Corporation.
2. Parker Hannifin/Refrigeration and Air Conditioning.
3. Sporlan Valve Company.
4. Substitutions: See Section 01 60 00 - Product Requirements.
5. Substitutions: See Section 23 01 00 - General HVAC Provisions.

### B. Globe Type:

1. Cast bronze or forged brass body, forged brass cap with neoprene seal, brass guide and disc holder, phosphor-bronze or stainless steel spring, teflon seat disc; for maximum temperature of 300 degrees F and maximum working pressure of 425 psi.

### C. Straight Through Type:

1. Brass body and disc, phosphor-bronze or stainless steel spring, neoprene seat; for maximum working pressure of 500 psi and maximum temperature of 250 degrees F.

## 2.7 FILTER-DRIERS

### A. Manufacturers:

1. Flow Controls Division Emerson Electric Co.
2. Parker Hannifin/Refrigeration and Air Conditioning.
3. Sporlan Valve Company.
4. Substitutions: See Section 23 01 00 - General HVAC Provisions.

### B. Performance:

1. Flow Capacity - Liquid Line: As indicated in schedule, minimum, rated in accordance with AHRI 710.

23 23 00-8



2. Flow Capacity - Suction Line: As indicated in schedule, minimum, rated in accordance with AHRI 730 (I-P).
  3. Pressure Drop: 2 psi, maximum, when operating at full connected evaporator capacity.
  4. Design Working Pressure: 500 psi, minimum.
- C. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, and filtration to 40 microns; of construction that will not pass into refrigerant lines.
- D. Construction: UL listed.
1. Replaceable Core Type: Steel shell with removable cap.
  2. Sealed Type: Copper shell.
  3. Connections: As specified for applicable pipe type.

## 2.8 SOLENOID VALVES

- A. Manufacturers:
1. Flow Controls Division of Emerson Electric.
  2. Parker Hannifin/Refrigeration and Air Conditioning.
  3. Sporlan Valve Company.
  4. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Valve: AHRI 760, pilot operated, copper or brass body and internal parts, synthetic seat, stainless steel stem and plunger assembly (permitting manual operation in case of coil failure), integral strainer, with flared, solder, or threaded ends; for maximum working pressure of 500 psi.
- C. Coil Assembly: UL listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color coded lead wires, integral junction box.

## 2.9 EXPANSION VALVES

- A. Manufacturers:

23 23 00-9

1. Flow Controls Division of Emerson Electric.
  2. Parker Hannifin/Refrigeration and Air Conditioning.
  3. Sporlan Valve Company.
  4. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Angle or Straight Through Type: AHRI 750; design suitable for refrigerant, brass body, internal or external equalizer, mechanical pressure limit (maximum operating pressure MOP feature), adjustable superheat setting, replaceable inlet strainer, with replaceable capillary tube and remote sensing bulb.
- C. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop across valve. Select valve for maximum load at design operating pressure and minimum 10 degrees F superheat. Select to avoid being undersized at full load and excessively oversized at part load.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

### 3.2 INSTALLATION

- A. Install refrigeration specialties in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and avoid interference with use of space.
- D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Inserts:

23 23 00-10

1. Provide inserts for placement in concrete formwork.
  2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
  3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
  4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
  5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- G. Pipe Hangers and Supports:
1. Install in accordance with ASME B31.5.
  2. Support horizontal piping as scheduled.
  3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
  4. Place hangers within 12 inches of each horizontal elbow.
  5. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
  6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  7. Provide copper plated hangers and supports for copper piping.
- H. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.
- I. Provide clearance for installation of insulation and access to valves and fittings.
- J. Provide access to concealed valves and fittings.
- K. Flood piping system with nitrogen when brazing.
- L. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.

23 23 00-11

- M. Prepare unfinished pipe, fittings, supports, and accessories ready for finish painting.
- N. Insulate piping and equipment; refer to Section and Section 23 07 16.
- O. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.
- P. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.
- Q. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.
- R. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.
- S. Install flexible connectors at right angles to axial movement of compressor, parallel to crankshaft.
- T. Fully charge completed system with refrigerant after testing.
- U. Provide electrical connection to solenoid valves. Refer to Division 26.

### 3.3 FIELD QUALITY CONTROL

- A. Test refrigeration system in accordance with ASME B31.5.
- B. Pressure test system with dry nitrogen to 200 psi. Perform final tests at 27 inches vacuum and 200 psi using electronic leak detector. Test to no leakage.

### 3.4 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
  1. 1/2 inch, 5/8 inch, and 7/8 inch OD: Maximum span, 5 feet; minimum rod size, 1/4 inch.
  2. 1-1/8 inch OD: Maximum span, 6 feet; minimum rod size, 1/4 inch.
  3. 1-3/8 inch OD: Maximum span, 7 feet; minimum rod size, 3/8 inch.
  4. 1-5/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.
  5. 2-1/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.
  6. 2-5/8 inch OD: Maximum span, 9 feet; minimum rod size, 3/8 inch.

23 23 00-12

7. 3-1/8 inch OD: Maximum span, 10 feet; minimum rod size, 3/8 inch.
8. 3-5/8 inch OD: Maximum span, 11 feet; minimum rod size, 1/2 inch.
9. 4-1/8 inch OD: Maximum span, 12 feet; minimum rod size, 1/2 inch.

END OF SECTION

23 23 00-13

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas



## SECTION 23 31 00

### DUCTS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Metal ductwork.

##### 1.2 RELATED REQUIREMENTS

- A. Section 23 07 13 - Duct Insulation: External insulation and duct liner.
- B. Section 23 33 00 - Duct Accessories.
- C. Section 23 37 00 - Air Outlets and Inlets: Fabric air distribution devices.
- D. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.

##### 1.3 REFERENCE STANDARDS

- A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- F. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- G. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.
- H. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

23 31 00-1

#### 1.4 DEFINITIONS

- A. Duct Sizes: Duct sizes indicated on drawings are inside clear dimensions.
- B. Low Pressure: Static pressure in duct less than 2" WG and velocities less than 2000 fpm (10 meters/second).

#### 1.5 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Manufacturer's Installation Instructions: Indicate special procedures for glass fiber ducts.
- C. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.
- D. Confirm ductwork has been fabricated and installed in accordance with recommendations and SMACNA standards.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum five years of documented experience.

#### 1.7 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A, NFPA 90B, and NFPA 96, standards.

#### 1.8 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

23 31 00-2



## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.
- B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
  - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
  - 2. Surface Burning Characteristics: Flame spread of zero, smoke developed of zero, when tested in accordance with ASTM E84.
- C. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

### 2.2 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE Handbook - Fundamentals.
- C. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- D. Provide air foil turning vanes when rectangular elbows must be used.
- E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- F. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- G. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Joints shall be minimum 4 inch

23 31 00-3

cemented slip joint, brazed or electric welded. Prime coat welded joints.

- H. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.
- I. Lap metal duct in direction of air flow. Hammer down edges and slips to leave smooth duct interior.
- J. Size round ducts installed in place of rectangular ducts from ASHRAE Table of Equivalent Rectangular and Round Ducts. No variation of duct configuration or sizes permitted except by written permission.
- K. Seal all joints and seams on sheet metal supply, return, makeup air and exhaust ductwork with "Hardcast" type DT sealing tape and type FTA adhesive or "Hardcast" iron grip 601 duct sealant installed in strict accordance with manufacturer's instructions. Clean all dirt, oil, moisture, etc., before applying adhesive. Duct tape, UL listed or not, is not acceptable.
- L. Provide easements where low pressure ductwork conflicts with piping and structure where easements exceed duct area, split into two ducts maintaining original duct area.
- M. Rigidly construct metal ducts with joints mechanically tight, substantially airtight, braced and stiffened so as not to breathe, rattle, vibrate or sag. Caulk duct joints and connections with sealant as ducts are being assembled.

### 2.3 MANUFACTURED DUCTWORK AND FITTINGS

- A. Flexible Ducts: Two ply vinyl film supported by helically wound spring steel wire.
  - 1. Insulation: Fiberglass insulation with aluminized fiberglass scrim vapor barrier film.
  - 2. Pressure Rating: 6 inches WG positive and 1.0 inches WG negative.
  - 3. Maximum Velocity: 5000 fpm.
  - 4. Temperature Range: -10 degrees F to 160 degrees F.
  - 5. R-6.0 Formaldehyde free insulation.
  - 6. UL -181 (UL listed).
  - 7. Manufacturers:

23 31 00-4

- a. Substitutions: See Section 23 01 00 - General HVAC Provisions.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- F. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- G. Use double nuts and lock washers on threaded rod supports.
- H. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.
- I. Connect terminal units to supply ducts directly.
- J. Connect flexible ducts to metal ducts per manufacturer's recommendations.
- K. Duct Insulation: Provide duct insulation in compliance with Section 23 07 13.
- L. All round and rectangular duct installed in exposed areas shall be paint lock duct.

### 3.2 CLEANING

- A. Cleaning of duct system is required if duct is not properly stored and sealed during construction to prevent dust and debris collection within duct. Cleaning shall be completed with high powered vacuum machines. Protect equipment that could be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

23 31 00-5

### 3.3 SCHEDULES

#### A. Ductwork Material:

1. Low Pressure Supply (Heating Systems): Steel.
2. Medium and High Pressure Supply: Steel.
3. Return and Relief: Steel.
4. General Exhaust: Steel.
5. Outside Air Intake: Steel.

#### B. Ductwork Pressure Class:

1. Low Pressure Supply (Heating Systems): 1 inch
2. Return and Relief: 1 inch.
3. General Exhaust: 1 inch.
4. Outside Air Intake: 1 inch.
5. Medium Pressure Supply (Heating and Cooling) : 3 inch.

END OF SECTION

23 31 00-6

## SECTION 23 33 00

### DUCT ACCESSORIES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Air turning devices/extractors.
- B. Backdraft dampers - metal.
- C. Duct access doors.
- D. Duct test holes.
- E. Fire dampers.
- F. Flexible duct connections.
- G. Volume control dampers.

##### 1.2 RELATED REQUIREMENTS

- A. Section 23 31 00 - Ducts.
- B. Division 26 - Electrical: Electrical characteristics and wiring connections.

##### 1.3 REFERENCE STANDARDS

- A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating; 2018.
- B. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.
- C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- E. UL 33 - Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.
- F. UL 263 - Standard for Fire Tests of Building Construction and Materials; Current Edition, Including All Revisions.

23 33 00-1

- G. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.
- H. UL 555C - Standard for Safety Ceiling Dampers; Current Edition, Including All Revisions.

#### 1.4 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Project Record Drawings: Record actual locations of access doors, volume dampers, and test holes.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. Extra Fusible Links: Two of each type and size.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- C. Demonstrate resetting of fire dampers to authorities having jurisdiction and Owner's Representative.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect dampers from damage to operating linkages and blades.

### PART 2 PRODUCTS

#### 2.1 AIR TURNING DEVICES/EXTRACTORS

- A. Manufacturers:
  - 1. Krueger.
  - 2. PCI Industries, Inc; Pottorff Brand.
  - 3. Ruskin Company.
  - 4. Titus.

23 33 00-2

5. Substitutions: See Section 23 01 00 - General HVAC Provisions.

B. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

C. Multi-blade device with radius blades attached to pivoting frame and bracket, steel or aluminum construction, with worm drive mechanism with removable key operator.

## 2.2 BACKDRAFT DAMPERS - METAL

A. Manufacturers:

1. Louvers & Dampers, Inc.

2. Nailor Industries Inc.

3. PCI Industries, Inc; Pottorff Brand.

4. Ruskin Company.

5. Substitutions: See Section 23 01 00 - General HVAC Provisions.

B. Gravity Backdraft Dampers, Size 18 x 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

C. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

## 2.3 DUCT ACCESS DOORS

A. Manufacturers:

1. Nailor Industries Inc.

2. Ruskin Company.

3. Greenheck Fan Corporation.

4. SEMCO Incorporated.

5. Substitutions: See Section 23 01 00 - General HVAC Provisions.

23 33 00-3

- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- C. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
  - 1. Less Than 12 inches Square: Secure with sash locks.
  - 2. Up to 18 inches Square: Provide two hinges and two sash locks.
  - 3. Up to 24 x 48 inches: Three hinges and two compression latches with outside and inside handles.
  - 4. Larger Sizes: Provide an additional hinge.
- D. Access doors with sheet metal screw fasteners are not acceptable.

#### 2.4 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

#### 2.5 FIRE DAMPERS

- A. Manufacturers:
  - 1. Louvers & Dampers, Inc.
  - 2. Nailor Industries Inc.
  - 3. Ruskin Company.
  - 4. Greenheck Fan Corporation.
  - 5. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
- C. Ceiling Dampers: Galvanized steel, 22 gage frame and 16 gage flap, two layers 0.125 inch ceramic fiber on top side and one layer on bottom side for round flaps, with

23 33 00-4



locking clip.

- D. Horizontal Dampers: Galvanized steel, 22 gage frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.
- E. Multiple Blade Dampers: 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.
- F. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide dynamic style dampers with stainless steel closure springs and latches for closure under air flow conditions. Configure with blades out of air stream.
- G. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.

## 2.6 FLEXIBLE DUCT CONNECTIONS

- A. Manufacturers:
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- C. Connector: Fabric crimped into metal edging strip.
  - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
    - a. Net Fabric Width: Approximately 3 inches wide.
  - 2. Metal: 3 inches wide, 24 gage thick galvanized steel.

## 2.7 VOLUME CONTROL DAMPERS

- A. Manufacturers:
  - 1. Louvers & Dampers, Inc.
  - 2. Nailor Industries Inc.
  - 3. Ruskin Company.
  - 4. Greenheck Fan Company.

23 33 00-5

5. Jer-Air Manufacturing.
  6. United Enertech.
  7. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
1. Fabricate for duct sizes up to 6 x 30 inch.
  2. Blade: 24 gage, minimum.
- D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
1. Blade: 18 gage, minimum.
- E. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.
- F. Quadrants:
1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
  2. On insulated ducts mount quadrant regulators on minimum 2-inch stand-off mounting brackets, bases, or adapters.
  3. Where rod lengths exceed 30 inches provide regulator at both ends.

## 2.8 MISCELLANEOUS PRODUCTS

- A. Duct Opening Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during construction.
1. Thickness: 2 mils.
  2. High tack water based adhesive.
  3. UV stable light blue color.

23 33 00-6

4. Elongation Before Break: 325 percent, minimum.

## 2.9 LOW VOLTAGE ELECTRO-BALANCE DAMPER

- A. Provide a factory-mounted battery-operated damper drive to manually control dampers from a remote location. The damper drive shall have universal mounting capabilities to accommodate damper shafts ranging in size from 1/4 inch to 3/8 inch square and 1/4 inch to 1/2 inch round. The system shall consist of a battery powered damper drive pre-wired with plenum rated cable and female over-molded connector, wall or ceiling connector termination as indicated and handheld control module. Plastic surface termination plates shall be UL 94-10 flammability rated. The damper drive shall be operated by a handheld remote control module. The handheld remote control module shall include open circuit indicator, 2-color LED array damper position indicator and automatic motor shut-off feature at full open and full closed positions.
- B. Dampers provided by others shall meet the following requirements.
  1. Standoff bracket with minimum mounting surface of 3-1/2 inch x 4 inch for the drive unit.
  2. 90 degree open-close motion.
  3. Maximum torque to open/close 5 inch-lbs.
  4. Standoff bracket mounting holes located to ensure that the worm gear axis is concentric with damper shaft axis.

## 2.10 REMOTE CONTROLLED VOLUME DAMPERS

- A. Manufacturers
  1. Roto Twist.
  2. Young Regulator Company.
  3. United Enertech.
  4. Substitutions: Refer to Section 23 01 00 - General HVAC Provisions.
- B. Furnish cable operated remote controlled volume dampers in branch ducts located in inaccessible ceilings and where indicated on the plans.
- C. Provide ceiling cups for damper control adjustment flush with ceiling.

23 33 00-7

- D. Damper shall be worm gear actuated via rotary cable.
- E. Furnish additional factory cable retainer supports as required by the cable length. Mechanical Contractor shall be responsible for providing required cable lengths based upon actual field dimensions.
- F. Ceiling cup, rotary cable and worm gear shall be furnished as one piece for installation with no linkage adjustment.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

### 3.2 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, size for shoulder access, and as indicated. Provide 4 x 4 inch for balancing dampers only. Review locations prior to fabrication.
- D. Provide duct test holes where indicated and required for testing and balancing purposes.
- E. Provide fire dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- F. Demonstrate re-setting of fire dampers to Owner's representative.
- G. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

23 33 00-8

- H. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- I. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- J. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

23 33 00-9



## SECTION 23 33 30

### AIR DUCT SEALANTS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Air duct sealants for permanently sealing fabricated joints and seams of HVAC air ducts and thermal insulation.
- B. Reinforcing membrane for sealants.

##### 1.2 RELATED SECTIONS

- A. Section 23 07 13 - Duct Insulation.
- B. Section 23 31 00 - HVAC Ducts and Casings.
- C. Section 23 33 00 - Duct Accessories.

##### 1.3 REFERENCES

- A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2005.
- B. ASTM E 96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials; 2005.
- C. UL 181A - Closure Systems for Use with Rigid Air Ducts and Air Connectors; Underwriters Laboratories Inc.; 2005.
- D. UL 181B - Closure Systems for Use with Flexible Air Ducts and Air Connectors; Underwriters Laboratories Inc.; 2005.

##### 1.4 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Manufacturer's product data, including physical properties and application instructions.

23 33 30-1

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
- B. Store materials in accordance with manufacturer's instructions. Protect from freezing.
  - 1. Storage Temperature: 40 to 100 degrees F.

## 1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply below 35 degrees F. or above 120 degrees F.
- B. Avoid high humidity.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer:
  - 1. Hardcast, Inc.
  - 2. RCD Corporation.
- B. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- C. Supply all products specified in this section from a single manufacturer.

### 2.2 AIR DUCT SEALANTS

- A. Low to High Velocity Air Duct Sealant: Non-toxic, water-based, fiber-reinforced adhesive-sealant; for permanently sealing fabricated joints and seams of sheet metal air ducts, UL 181 listed rigid fiberglass air ducts, UL 181 listed flexible air ducts, and thermal insulation; for repairing damaged and leaking air ducts; for sealing conditioned spaces from air infiltration.
  - 1. Type: Elastomeric terpolymer emulsion.
  - 2. Underwriters Laboratories Listed: UL 181A-M and UL 181B-M.
  - 3. Solids by Weight: 67 percent, plus or minus 2 percent.
  - 4. Weight per Gallon: 10.5 pounds, plus or minus 0.20 pounds.

23 33 30-2



5. Wet Film Coverage: 100 linear feet per gallon at 1/16 inch thick by 3 inches wide.
  6. Consistency: Thixotropic, non-sagging.
  7. Adhesive Cure: 72 hours at 50 percent humidity and 70 degrees F.
  8. Service Temperature Limits: Minus 10 degrees to 180 degrees F.
  9. Water Vapor Transmission Rate: 0.6157 perms in accordance with ASTM E 96.
  10. Flame Spread Index: Not greater than 5, when tested in accordance with ASTM E 84.
  11. Smoke Developed Index: Zero, when tested in accordance with ASTM E 84.
- B. Low to High Velocity Air Duct Sealant: Hardcast Iron Grip 601 non-toxic, water-based, adhesive-sealant; for permanently sealing fabricated joints and seams of sheet metal air ducts, UL 181 listed rigid fiberglass air ducts, UL 181 listed flexible air ducts, and thermal insulation; for repairing damaged and leaking air ducts; for sealing conditioned spaces from air infiltration.
1. Type: Elastomeric terpolymer emulsion.
  2. Underwriters Laboratories Listed: UL 181A-M and UL 181B-M.
  3. Solids by Weight: 70 percent, plus or minus 2 percent.
  4. Wet Film Coverage: 320 linear feet per gallon at 20 mil thick by 3 inches wide.
  5. Consistency: Thixotropic, non-sagging.
  6. Adhesive Cure: 48 hours at 50 percent humidity and 70 degrees F.
  7. Flame Spread Index: Not greater than 5, when tested in accordance with UL-723.
  8. Smoke Developed Index: Zero, when tested in accordance with UL-723.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine surfaces to receive air duct sealants.

23 33 30-3

- B. Notify Architect of conditions that would adversely affect application of sealants. Do not proceed with application until unsatisfactory conditions are corrected.

### 3.2 SURFACE PREPARATION

- A. Prepare surfaces in accordance with manufacturer's instructions.
- B. Remove water, dirt, oil, grease, and corrosion from surfaces to receive air duct sealants.

### 3.3 APPLICATION

- A. Apply air duct sealants in accordance with manufacturer's instructions.
- B. Apply to sheet metal air ducts, UL 181 listed rigid fiberglass air ducts, UL 181 listed flexible air ducts, thermal insulation, and other surfaces where indicated.
- C. Do not thin or mix.
- D. Apply tack coat at rate of 2 gallons per 100 square feet.
- E. Embed reinforcing membrane into tack coat.
- F. Apply finish coat at rate of 2 gallons per 100 square feet.
- G. Allow drying time as follows:
  - 1. Minimum 6 hours when used outdoors if wet weather is imminent.
  - 2. Minimum 24 hours before using air duct system.
  - 3. Additional time as required by air temperature and humidity conditions.

END OF SECTION

## SECTION 23 34 23

### POWER VENTILATORS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Ceiling exhaust fans.

##### 1.2 RELATED REQUIREMENTS

- A. Section 23 05 13 - Common Motor Requirements for HVAC Equipment.
- B. Section 23 31 00 - HVAC Ducts.
- C. Section 23 33 00 - Duct Accessories: Backdraft dampers.
- D. Division 26 - Electrical: Equipment Wiring.

##### 1.3 REFERENCE STANDARDS

- A. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2016, with Errata (2018).
- B. AMCA 261 - Directory of Products Licensed to Use the AMCA Certified Ratings Seal; Air Movement and Control Association International, Inc.; <http://www.amca.org/licenses/search.aspx>.
- C. AMCA 300 - Reverberation Room Methods of Sound Testing of Fans; 2024.
- D. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2022.
- E. NEMA MG 1 - Motors and Generators; 2021.
- F. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- G. UL 705 - Power Ventilators; Current Edition, Including All Revisions.

##### 1.4 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.

23 34 23-1

- B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- C. Manufacturer's Instructions: Indicate installation instructions.
- D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.
- B. Equivalent fan selections shall not increase or decrease motor horsepower, increase top speed by more than 10%, or increase inlet air velocity by more than 20% from that specified.
- C. Provide fans capable of accommodating static pressure variations of plus or minus 10%.
- D. Provide balanced variable for motors 15 horsepower and under.
- E. Statically and dynamically balance fans to eliminate vibration or noise transmission to occupied areas of the building.
- F. Provide belt guards on belt driven fans.
- G. Provide safety screen where inlet or outlet is exposed.
- H. Prime coat fan wheels and housing factory inside and outside. Prime coating on aluminum parts is not required.

## 1.6 FIELD CONDITIONS

- A. Permanent ventilators may be used for ventilation during construction only after ductwork is clean, filters are in place, bearings have been lubricated, and fan has been test run under observation.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acme.

23 34 23-2

- B. Captive Aire.
- C. Greenheck.
- D. Loren Cook Company.
- E. Twin Cities Blower.
- F. Substitutions: See Section 23 01 00 - General HVAC Provisions.

## 2.2 POWER VENTILATORS - GENERAL

- A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.
- B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
- C. Sound Ratings: AMCA 301, tested to AMCA 300, and bearing AMCA Certified Sound Rating Seal.
- D. Fabrication: Conform to AMCA 99.
- E. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
- F. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

## 2.3 CABINET AND CEILING EXHAUST FANS

- A. Performance Ratings:
  - 1. Refer to fan schedule on plan sheet for fan performance.
- B. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing lined with acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.
- C. Disconnect Switch: Cord and plug in housing for thermal overload protected motor and factory mounted solid state speed controller.
- D. Grille: Aluminum with baked white enamel finish.

23 34 23-3

- E. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.
- F. Performance Ratings: As indicated on drawings.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Hung Cabinet Fans:
  - 1. Install flexible connections specified in Section 23 33 00 between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- C. Provide sheaves required for final air balance.
- D. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.

### 3.2 SCHEDULES

- A. Drawing Code: See plan Schedule.
- B. Air Flow Capacity: See plan Schedule.
- C. Static Pressure: See plan Schedule.
- D. Motor hp:
  - 1. Electrical Characteristics: See plan Schedule.
- E. Accessories:
  - 1. See plan Schedule.

END OF SECTION

23 34 23-4

## SECTION 23 37 00

### AIR OUTLETS AND INLETS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Square ceiling diffusers.
- B. Registers/grilles.
  - 1. Ceiling-mounted, egg crate exhaust and return register/grilles.
  - 2. Wall-mounted, exhaust and return register/grilles.

##### 1.2 REFERENCE STANDARDS

- A. AHRI 880 (I-P) - Performance Rating of Air Terminals; 2017 (Reaffirmed 2023).
- B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Air Inlets; 2023.
- C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

##### 1.3 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.
- C. Project Record Documents: Record actual locations of air outlets and inlets.

##### 1.4 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

##### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.

23 37 00-1

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Krueger.
- B. Nailor.
- C. Price Industries.
- D. Titus.
- E. Substitutions: See Section 23 01 00 - General HVAC Provisions.

### 2.2 SQAURE CEILING DIFFUSERS

- A. Type: Surface mount or inverted T-Bar type, diffuser to discharge air in 360 degree pattern .
- B. Frame: Surface mount or inverted T-Bar type. In plaster ceilings, provide plaster frame and ceiling frame.
- C. Fabrication: Steel or aluminum as indicated on drawings with baked enamel finish.
- D. Color: As shown on drawings.
- E. See Air Distribution Schedule on drawings for details and accessories.

### 2.3 CEILING RETURN REGISTERS/GRILLES

- A. Type: Streamlined blades, 1/2 inch minimum depth, 1/2 inch maximum spacing, with blades set at 45 degrees, horizontal face.
- B. Frame: Surface mount, inverted T-Bar type. In plaster ceilings, provide plaster frame and ceiling frame.
- C. Fabrication: Steel or aluminum as indicated on drawings with baked enamel finish.
- D. Color: As shown on the drawings.
- E. See Air Distribution Schedule on drawings for details and accessories.

### 2.4 CEILING GRID CORE EXHAUST REGISTERS/GRILLES

- A. Type: Fixed grilles of 1/2 x 1/2 x 1/2 inch louvers.

23 37 00-2



- B. Fabrication: Aluminum with factory baked enamel finish.
- C. Frame: Surface mount, inverted T-Bar type. In plaster ceilings, provide plaster frame and ceiling frame.
- D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face, where indicated on plans.
- E. See Air Distribution Schedule on drawings for details and accessories.

## 2.5 WALL RETURN REGISTERS/GRILLES

- A. Type: Streamlined blades, 1/2 inch minimum depth, 1/2 inch maximum spacing, with spring or other device to set blades, horizontal face.
- B. Frame: 1-1/4 inch margin with countersunk screw mounting.
- C. Fabrication: Steel or aluminum as indicated on drawings with factory baked enamel finish.
- D. Color: As shown on the drawings.
- E. See Air Distribution Schedule for details and accessories.
- F. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face, where indicated on plans.

## 2.6 ROOF HOODS

- A. Fabricate air inlet or exhaust hoods in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Fabricate of galvanized steel, minimum 16 gage base and 20 gage hood, or aluminum, minimum 16 gage base and 18 gage hood; suitably reinforced; with removable hood; birdscreen with 1/2 inch square mesh for exhaust and 3/4 inch for intake, and factory baked enamel finish.
- C. Fabricate louver penthouses with mitered corners and reinforce with structural angles.
- D. Mount unit on minimum 14 inch high curb base with insulation between duct and curb.
- E. Make hood outlet area minimum of twice throat area.

23 37 00-3

## 2.7 GOOSENECKS

- A. Manufacturers:
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, of minimum 18 gage galvanized steel.
- C. Mount on minimum 14 inch high curb base where size exceeds 8 x 8 inch.

## 2.8 COUNTER BALANCED BACKDRAFT DAMPERS

- A. Frame shall be 0.90 inch minimum wall thickness extruded aluminum with 12 gage galvanized steel structural brace at each corner.
- B. Blades shall be 0.025 inch minimum roll-formed aluminum with extruded vinyl blade edge seals mechanically locked into the blades.
- C. Blades shall include field adjustable, zinc plated steel counter balance weights to allow pressure relief at less than .05 inches water gage.
- D. Bearings shall be corrosive resistant, long life synthetic type for quiet operation.
- E. Linkage shall be 1/2 inch wide tiebar concealed in the frame.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
- E. Paint ductwork visible behind air outlets and inlets matte black.
- F. Provide minimum 6" deep plenum box on back of all return and exhaust grilles.
- G. Install counter balanced backdraft dampers where indicated on the plans.

23 37 00-4

## 3.2 SCHEDULES

### A. Air Outlet and Inlet Schedule

1. Drawing Code: Refer to plan schedule.
2. Manufacturer: As scheduled on drawings.
3. Model: As scheduled on drawings.
4. Description: As scheduled on drawings.
5. Finish: As scheduled on drawings.
6. Service: As scheduled on drawings.
7. Mounting: As scheduled on drawings.
8. Accessories: As scheduled on drawings.

END OF SECTION

23 37 00-5



## SECTION 23 40 00

### AIR CLEANING DEVICES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Disposable, extended area panel filters.
- B. Filter frames.
- C. Filter gages.

##### 1.2 RELATED REQUIREMENTS

- A. Division 26 - Electrical: Electrical characteristics and wiring connections.

##### 1.3 REFERENCE STANDARDS

- A. AHRI 850 (I-P) - Performance Rating of Commercial and Industrial Air Filter Equipment; 2013 (Reaffirmed 2023).
- B. ASHRAE Std 52.1 - Gravimetric and Dust-Spot Procedures for Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

##### 1.4 PERFORMANCE REQUIREMENTS

- A. Conform to 1 Section 7.4.
  - 1. Dust Spot Efficiency: Plus or minus 5 percent.

##### 1.5 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide data on filter media, filter performance data, filter assembly and filter frames, dimensions, motor locations and electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate filter assembly and filter frames, dimensions, motor locations, and electrical characteristics and connection requirements.

23 40 00-1

- D. Manufacturer's Installation Instructions: Indicate assembly and change-out procedures.
- E. Operation and Maintenance Data: Include instructions for operation, changing, and periodic cleaning.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. Extra Filters: One additional set of each type and size of disposable panel filters to be installed at the time the building is conveyed to the Owner.

## 1.6 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

## PART 2 PRODUCTS

### 2.1 FILTER MANUFACTURERS

- A. American Filtration Inc.
- B. AAF International/American Air Filter.
- C. Camfil Farr Company.
- D. Substitutions: See Section 23 01 00 - General HVAC Provisions.

### 2.2 DISPOSABLE, EXTENDED AREA PANEL FILTERS

- A. Media: UL 900 Class 1, pleated, lofted, non-woven, reinforced cotton and synthetic fabric; supported and bonded to welded wire grid by corrugated aluminum separators.
  - 1. Frame: Cardboard.
  - 2. Nominal size: to match equipment filter size requirements.
  - 3. Nominal thickness: 2 inches.
- B. Rating, per ASHRAE Std 52.1:
  - 1. Dust spot efficiency: MERV 8.
  - 2. Initial resistance at 500 FPM face velocity: 0.30 inch WG.

23 40 00-2

3. Recommended final resistance: 0.9 inch WG.

## 2.3 FILTER FRAMES AND HOUSINGS

- A. General: Fabricate filter frames and supporting structures of 16 gage galvanized steel or extruded aluminum T-section construction with necessary gasketing between frames and walls.
- B. Standard Sizes: Provide for interchangeability of filter media of other manufacturers; for panel filters, size for equipment filter media, minimum 2 inches thick; for extended surface and high efficiency particulate air filters, provide for upstream mounting of panel filters.
- C. Side Servicing Housings: Flanged for insertion into ductwork, of reinforced 16 gage galvanized steel; access doors with continuous gasketing and positive locking devices on both sides; extruded aluminum tracks or channels for primary secondary filters with positive sealing gaskets.

## 2.4 FILTER GAGES

- A. Manufacturers:
  - 1. Dwyer Instruments, Inc
  - 2. Substitutions: Approved Equal
- B. Direct Reading Dial: 3-1/2 inch diameter diaphragm actuated dial in metal case, vent valves, black figures on white background, front recalibration adjustment, range 0-0.5 inch WG, 2 percent of full scale accuracy. Rated for use outdoors where required.
- C. Accessories: Static pressure tips with integral compression fittings, 1/4 inch aluminum tubing, 2-way or 3-way vent valves.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install air cleaning devices in accordance with manufacturer's instructions.
- B. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.
- C. Install filter gage static pressure tips upstream and downstream of filters. Mount filter gages on outside of filter housing or filter plenum, in accessible position. Adjust and

23 40 00-3

level.

- D. Install filter gage static pressure tips upstream and downstream of filters.
- E. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with clean set.
- F. Provide filter gages on filter banks, installed with separate static pressure tips upstream and downstream of filters.

### 3.2 SCHEDULES

#### A. Air Filter Schedule

- 1. Refer to plan Equipment Schedule.

END OF SECTION

23 40 00-4



## SECTION 23 55 33

### ELECTRIC WALL HEATERS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Note: Equipment in this section shall be provided by Owner through a purchasing agreement. Contractor shall be responsible for installation and all accessories necessary to provide a complete and working system.
- B. Electric unit heaters.

##### 1.2 RELATED REQUIREMENTS

- A. Division 26 - Electrical.

##### 1.3 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2002.
- B. NFPA 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems; National Fire Protection Association; 2006.
- C. UL - Underwriters Laboratories Inc.

##### 1.4 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide manufacturer's literature and data indicating rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Shop Drawings: Indicate assembly, required clearances, and locations and sizes of field connections.
- D. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.
- E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listing.

23 55 33-1

- F. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner s name and registered with manufacturer.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

## 1.6 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

## 1.7 WARRANTY

- A. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

## PART 2 PRODUCTS

### 2.1 UNIT HEATER MANUFACTURERS

- A. Modine Manufacturing Company.
- B. Sterling HVAC/Mestek Technology, Inc.
- C. Reznor/Thomas & Betts Corporation.
- D. Markel.
- E. Substitutions: See Section 23 01 00 - General HVAC Provisions.

### 2.2 ELECTRIC UNIT HEATERS

- A. Contractor shall supply and install heavy duty wall mounted forced air electric heaters of the wattage, voltage and phase as specified on the drawings. The heater shall so be designed to provide an even distribution of heated air to the space to be heated by drawing return air in the peripheral area of the heater across and through the element which shall then be discharged from the center section of the heater by means of an electric motor and axial flow fan blade
- B. Heaters shall be surface mounted to extend no more than 5 3/4" from the finished wall.

23 55 33-2

- C. Heater front shall withstand 10.8 ft. lbs. (324 poundals) impact and 400 lbs. static force applied to an 8 sq. in. area at center grille location with less than 1/16" permanent distortion. The combination return and supply grille assembly shall be constructed of 1/16" x 3/8" rounded edge horizontal steel louvers which shall be spaced for maximum opening of 1/4". Louvers shall be welded at every intersection to three evenly spaced 1/16" diameter vertical members and completely framed in a heavy gauge natural anodized Aluminum extrusion. Front assembly shall be attached to the chassis by hidden tamper-resistant (Allen-head) machine screws. All other parts shall be 16 Gauge steel Zinc coated, both sides finished in a high gloss or bronze colored baked powder coat finish.
- D. Motor shall be a permanently lubricated unit bearing, totally enclosed shaded pole type with impedance protection. Motors shall operate at no more than 1400 RPM and shall be same voltage as the heater. A protective shield shall surround the motor to separate return air from heated air.
- E. Heater shall have a rating as indicated on the drawings.
- F. Element assemblies shall consist of two or three corrosion resistant steel sheathed type elements mechanically bonded to common corrosion resistant steel fins. Each sheathed element shall consist of helically coiled Nickel Chromium alloy resistant wire completely embedded in and surrounded by Magnesium Oxide, enclosed and wedged into corrosion resistant steel sheaths. Elements shall have 2" cold conductor pins extending into the sheath and shall have a density of no more than 60 Watts per inch.
- G. Heaters shall be equipped with a "manual reset" thermal overload which disconnects elements and motor in the event normal operating temperatures are exceeded. For safety, if opened due to abnormal temperature, thermal overload shall remain open until manually reset. Automatic reset thermal overloads which allow the element to continue to cycle under abnormal conditions will not be accepted.
- H. Heaters shall be ETL Listed.

## 2.3 ROOM THERMOSTATS

- A. Manufacturers:
  - 1. Honeywell.
  - 2. Johnson Controls, Inc.

23 55 33-3

3. Siemens Building Technologies, Inc.
  4. Substitutions: See Section 23 01 00 - General hvsProvisions.
- B. Adjustable Room Thermostat: Low voltage, to control heater stages in sequence with delay between stages, and supply fan to maintain temperature setting.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify that space is ready for installation of units and openings are as indicated on shop drawings.
- B. Verify that proper power supply is available.

#### 3.2 INSTALLATION

- A. Install in accordance with NFPA 90A and NFPA 90B.
- B. Provide connection to electrical power systems.

#### 3.3 SCHEDULES

- A. Electrical Unit Heaters
  1. Refer to plan Schedule.

END OF SECTION

23 55 33-4

## SECTION 23 74 33

### PACKAGED DEDICATED OUTSIDE AIR UNITS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Note: Equipment in this section shall be provided by Owner through a purchasing agreement. Contractor shall be responsible for installation and all accessories necessary to provide a complete and working system.
- B. Packaged Rooftop air conditioners.

##### 1.2 REFERENCES

- A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. AMCA 99—Standards Handbook
- C. AMCA 210—Laboratory Methods of Testing Fans for Rating Purposes
- D. AMCA 500—Test Methods for Louver, Dampers, and Shutters.
- E. AHRI 340/360 - Unitary Large Equipment
- F. NEMA MG1—Motors and Generators
- G. National Electrical Code.
- H. NFPA 70—National Fire Protection Agency.
- I. SMACNA—HVAC Duct Construction Standards—Metal and Flexible.
- J. UL 900—Test Performance of Air Filter Units.

##### 1.3 SUBMITTALS

- A. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, electrical characteristics, and connection requirements.
- B. Product Data:

23 74 33-1

1. Provide literature that indicates dimensions, weights, capacities, ratings, fan performance, and electrical characteristics and connection requirements.
2. Provide computer generated fan curves with specified operating point clearly plotted.
3. Manufacturer's Installation Instructions.

#### 1.4 OPERATION AND MAINTENANCE DATA

- A. Maintenance Data: Provide instructions for installation, maintenance and service.

#### 1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience, who issues complete catalog data on total product.
- B. Startup must be done by trained personnel experienced with rooftop equipment.
- C. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters and remote controls are in place, bearings lubricated, and manufacturers' installation instructions have been followed.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site.
- B. Accept products on site and inspect for damage.
- C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

### PART 1 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Daikin.
- B. Greenheck.
- C. Trane.
- D. Substitutions: See Section 23 01 00 - General HVAC Provisions.

23 74 33-2

## 2.2 GENERAL DESCRIPTION

- A. Furnish as shown on plans, Daikin Applied Rebel Single Zone Heating and Cooling Unit(s) model DPS. Unit performance and electrical characteristics shall be per the job schedule.
- B. Configuration: Fabricate as detailed on prints and drawings:
  - 1. Return plenum / economizer section
  - 2. Filter section
  - 3. Cooling coil section
  - 4. Supply fan section
  - 5. Gas heating section.
  - 6. Condensing unit section
- C. The complete unit shall be cETLus listed.
- D. The unit shall be ASHRAE 90.1-2019 compliant and labeled.
- E. Each unit shall be specifically designed for outdoor rooftop application and include a weatherproof cabinet. Each unit shall be completely factory assembled and shipped in one piece. Packaged units shall be shipped fully charged with R-32 Refrigerant and oil.
- F. The unit shall undergo a complete factory run test prior to shipment. The factory test shall include a refrigeration circuit run test, a unit control system operations checkout, a unit refrigerant leak test and a final unit inspection.
- G. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.
- H. Performance: All scheduled EER, IEER, capacities and face areas are minimum accepted values. All scheduled amps, kW, and HP are maximum accepted values that allow scheduled capacity to be met.

23 74 33-3

- I. Warranty: The manufacturer shall provide 12-month parts only warranty. Defective parts shall be repaired or replaced during the warranty period at no charge. The warranty period shall commence at startup or six months after shipment, whichever occurs first.

## 2.3 CABINET, CASING, AND FRAME

- A. Panel construction shall be double-wall construction for all panels. All floor panels shall have a solid galvanized steel inner liner on the air stream side of the unit to protect insulation during service and maintenance. Insulation shall be a minimum of 1" thick with an R-value of 7.0 on sizes 3-17 tons, and 2" 2" thick with an R-value of 13 for 16-31 Tons, and shall be 2 part injected foam. Panel design shall include no exposed insulation edges. Unit cabinet shall be designed to operate at total static pressures up to 5.0 inches w.g.
- B. Unit construction for all walls, doors, ceiling and floor shall be double wall with a solid stainless-steel liner that provides a cleanable, corrosion resistant. interior.
- C. Exterior surfaces shall be constructed of painted galvanized steel, for aesthetics and long-term durability. Paint finish will include a base primer with a high-quality polyester resin topcoat. Finished, unabraded panel surfaces shall be exposed to an ASTM B117 salt spray environment and exhibit no visible red rust at a minimum of 3,000 hours exposure. Finished, abraded surfaces shall be tested per ASTM D1654, having a mean scribe creepage not exceeding 1/16" at 1,000 hours minimum exposure to an ASTM B117 salt spray environment. Measurements of results shall be quantified using ASTM D1654 in conjunction with ASTM D610 and ASTM D714 to evaluate blister and rust ratings.
- D. Service doors shall be provided on the fan section, filter section, control panel section, and heating vestibule in order to provide user access to unit components. All service access doors shall be mounted on multiple, stainless-steel hinges and shall be secured by a latch system. Removable service panels secured by multiple mechanical fasteners are not acceptable.
- E. The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weathertight seal.
- F. The unit base frame shall be constructed pre-painted steel to prevent base rail corrosion.



## 2.4 OUTDOOR/RETURN AIR SECTION

- A. Unit shall be provided with an outdoor air economizer section. The economizer section shall include outdoor, return, and exhaust air dampers. The economizer operation shall be fully integral to the mechanical cooling and allow up to 100% of mechanical cooling if needed to maintain the cooling discharge air temperature. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same durable paint finish as the main unit. The hood shall include moisture eliminator filters to drain water away from the entering air stream. The outside and return air dampers shall be sized to handle 100% of the supply air volume. The dampers shall be parallel blade design. Damper blades shall be gasketed with side seals to provide an air leakage rate of 1.5 cfm / square foot of damper area at 1” differential pressure in according with testing defined in AMCA 500. A barometric exhaust damper shall be provided to exhaust air out of the back of the unit. A bird screen shall be provided to prevent infiltration of rain and foreign materials. Exhaust damper blades shall be lined with vinyl gasketing on contact edges. Control of the dampers shall be by a factory installed direct coupled actuator. Damper actuator shall be of the modulating, spring return type. A comparative enthalpy control shall be provided to sense and compare enthalpy in both the outdoor and return air streams to determine if outdoor air is suitable for “free” cooling. If outdoor air is suitable for “free” cooling, the outdoor air dampers shall modulate in response to the unit’s temperature control system.
- B. Unit shall be provided with a 100% outdoor air hood. The 100% outdoor air hood shall allow outdoor air to enter from the back of the unit, at the draw-through filter section. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same durable paint finish as the main unit. The hood shall include a bird screen to prevent infiltration of foreign materials and a rain lip to drain water away from the entering air stream.

## 2.5 ENERGY RECOVERY

- A. Enthalpy Wheel
1. Unit shall be provided with an AHRI certified rotary wheel air-to-air heat exchanger in a cassette frame complete with seals, drive motor and drive belt. The energy recovery wheel shall be an integral part of the rooftop unit with unitary construction and does not require field assembly. Bolt-on energy recovery units that require field assembly and section to section gasketing and sealing are not acceptable.

23 74 33-5

2. The wheel capacity, air pressure drop and effectiveness shall be AHRI certified per AHRI Standard 1060. Thermal performance shall be certified by the manufacturer in accordance with ASHRAE Standard 84, Method of Testing Air-to-Air Heat Exchangers and AHRI Standard 1060, Rating Air-to-Air Heat Exchangers For Energy Recovery Ventilation Equipment.
3. The rooftop unit shall be designed with a track so the entire energy recovery wheel cassette can slide out from the rooftop unit to facilitate cleaning.
4. The unit shall have 2" Merv 7 filters for the outdoor air before the wheel to help keep the wheel clean and reduce maintenance. Filter access shall be by a hinged access door with ¼ turn latches.
5. The matrix design shall have channels to reduce cross contamination between the outdoor air and the exhaust air. The layers shall be effectively captured in aluminum and stainless steel segment frames that provide a rigid and self-supporting matrix. All diameter and perimeter seals shall be provided as part of the cassette assembly and shall be factory set. Drive belt(s) of stretch urethane shall be provided for wheel rim drive without the need for external tensioners or adjustment.
6. The total energy recovery wheel shall be coated with silica gel desiccant permanently bonded without the use of binders or adhesives, which may degrade desiccant performance. The substrate shall be lightweight polymer and shall not degrade nor require additional coatings for application in marine or coastal environments. Coated segments shall be washable with detergent or alkaline coil cleaner and water. Desiccant shall not dissolve nor deliquesce in the presence of water or high humidity.
7. Wheels shall be provided with removable energy transfer matrix. Wheel frame construction shall be a welded hub, spoke and rim assembly of stainless, plated and/or coated steel and shall be self-supporting without matrix segments in place. Segments shall be removable without the use of tools to facilitate maintenance and cleaning.
8. Wheel bearings shall be selected to provide an L-10 life in excess of 400,000 hours. Rim shall be continuous rolled stainless steel. Wheels shall be connected to the shaft by means of taper lock hubs.

23 74 33-6

9. The exhaust air fan shall be a direct drive SWSI plenum fan. The exhaust fan shall be sized for the airflow requirements per the construction schedule. The unit controller shall control the exhaust fan to maintain building pressure. A VFD shall be provided for the exhaust fan motor or the exhaust fan motor shall be an ECM motor. The rooftop unit shall have single point electrical power connection and shall be ETL listed.
10. The control of the energy recovery wheel shall be an integral part of the rooftop unit's DDC controller. The DDC controller shall have visibility of the outdoor air temperature, leaving wheel temperature, return air temperature, and exhaust air temperature. These temperatures shall be displayed at the rooftop units DDC controller LCD display. All of these temperatures shall be made available through the BACnet interface.
11. The rooftop unit with the energy recovery wheel shall incorporate the economizer operation. The energy recovery wheel shall have a bypass damper. When the unit is in the economizer mode of operation the energy recovery wheel shall stop and the bypass dampers shall be opened. The outdoor air shall be drawn through the bypass dampers to reduce the pressure drop of the outdoor airstream.
12. The rooftop unit DDC controller shall provide frost control for the energy recovery wheel. When a frost condition is encountered the unit controller shall stop the wheel. When in the frost control mode the wheel shall be jogged periodically and not be allowed to stay in the stationary position.

## 2.6 EXHAUST FAN

- A. Exhaust fan shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with aluminum fan blades that are continuously welded to the hub plate and end rim. The exhaust fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.
- B. The fan motor shall be a totally enclosed EC motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.

- C. The unit DDC controller shall provide building static pressure control. The unit controller shall provide proportional control of the exhaust fans from 25% to 100% of the supply air fan designed airflow to maintain the adjustable building pressure setpoint. The field shall mount the required sensing tubing from the building to the factory mounted building static pressure sensor.

## 2.7 FILTERS

- A. Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept a 2" MERV 8 filters. The unit design shall have a hinged access door for the filter section. The manufacturer shall ship the rooftop unit with 2" MERV 8 construction filters. The contractor shall furnish and install, at building occupancy, the final set of filters per the contract documents.

## 2.8 COOLING COIL

- A. The indoor coil section shall be installed in a draw through configuration, upstream of the supply air fan. The coil section shall be complete with a factory piped cooling coil and an ASHRAE 62.1 compliant double sloped drain pan.
- B. The direct expansion (DX) cooling coils shall be fabricated of seamless high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 3 rows. All cooling coils shall have an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak tested with high pressure air under water.
- C. The cooling coil shall have an electronic controlled expansion valve. The unit controller shall control the expansion valve to maintain liquid subcooling and the superheat of the refrigerant system.
- D. The refrigerant suction lines shall be fully insulated from the expansion valve to the compressors.
- E. The drain pan shall be stainless steel and positively sloped. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall extend beyond the leaving side of the coil. The drain pan shall have a threaded drain connection extending through the unit base.

- F. A drain pan overflow safety shall shut off the unit and issue a warning before overflow occurs.

## 2.9 HOT GAS REHEAT

- A. Unit shall be equipped with a fully modulating hot gas reheat coil with hot gas coming from the unit condenser.
- B. Hot gas reheat coil shall be a Micro Channel design. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. The capacity of the reheat coil shall allow for a 20°F temperature rise at all operating conditions.
- C. The modulating hot gas reheat systems shall allow for independent control of the cooling coil leaving air temperature and the reheat coil leaving air temperature. The cooling coil and reheat coil leaving air temperature setpoints shall be adjustable through the unit controller. During the dehumidification cycle the unit shall be capable of 100% of the cooling capacity. The hot gas reheat coil shall provide discharge temperature control within +/- 2°F.
- D. Each coil shall be factory leak tested with high-pressure air under water.

## 2.10 SUPPLY FAN

- A. Supply fan shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with fan blades that are continuously welded to the hub plate and end rim. The supply fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.
- B. Supply fan and motor assembly combinations larger than 8 hp or 22" diameter shall be internally isolated on 1" deflection, spring isolators and include removable shipping tie downs.
- C. The fan motor shall be a totally enclosed EC motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.

## 2.11 HEATING SECTION

- A. The rooftop unit shall include a natural gas heating section. The gas furnace design shall be one natural gas fired heating module factory installed downstream of the supply air fan in the heat section. The heating module shall be a tubular design with in-shot gas burners.
- B. The module shall be complete with furnace controller and control valve capable of 5:1 modulating operation.
- C. The heat exchanger tubes shall be constructed of stainless steel.
- D. The module shall have an induced draft fan that will maintain a negative pressure in the heat exchanger tubes for the removal of the flue gases.
- E. Each burner module shall have two flame roll-out safety protection switches and a high temperature limit switch that will shut the gas valve off upon detection of improper burner manifold operation. The induced draft fan shall have an airflow safety switch that will prevent the heating module from turning on in the event of no airflow in the flue chamber.
- F. The factory installed DDC unit control system shall control the gas heat module. Field installed heating modules shall require a field ETL certification. The manufacturer's rooftop unit ETL certification shall cover the complete unit including the gas heating modules.

## 2.12 ELECTRICAL

- A. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a single point power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, and a high temperature sensor shall also be provided with the unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply fan motors shall have contactors and external overload protection. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance.

- B. A GFI receptacle shall be unit mounted that is field powered.
- C. A single non-fused disconnect switch shall be provided for disconnecting electrical power at the unit. Disconnect switches shall be mounted internally to the control panel and operated by an externally mounted handle.

## 2.13 CONTROLS

- A. Provide a complete integrated microprocessor based Direct Digital Control (DDC) system to control all unit functions including temperature control, scheduling, monitoring, unit safety protection, including compressor minimum run and minimum off times, and diagnostics. This system shall consist of all required temperature sensors, pressure sensors, controller and keypad/display operator interface. All MCBs and sensors shall be factory mounted, wired and tested.
- B. The stand-alone DDC controllers shall not be dependent on communications with any on-site or remote PC or master control panel for proper unit operation. The microprocessor shall maintain existing set points and operate stand-alone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set schedules and control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.
- C. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.
- D. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.
- E. All digital inputs and outputs shall be protected against damage from transients or incorrect voltages. All field wiring shall be terminated at a separate, clearly marked terminal strip.
- F. The DDC controller shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in

nonvolatile memory to ensure that it is not lost during a power failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications.

G. The keypad interface shall allow convenient navigation and access to all control functions. The unit keypad/display character format shall be 4 lines x 20 characters. All control settings shall be password protected against unauthorized changes. For ease of service, the display format shall be English language readout. Coded formats with look-up tables will not be accepted. The user interaction with the display shall provide the following information as a minimum:

1. Return air temperature
2. Discharge air temperature
3. Outdoor air temperature
4. Space air temperature
5. Outdoor enthalpy, high/low
6. Compressor suction temperature and pressure
7. Compressor head pressure and temperature
8. Expansion valve position
9. Condenser fan speed
10. Inverter compressor speed
11. Dirty filter indication
12. Airflow verification
13. Cooling status
14. Control temperature (Changeover).
15. VAV box output status
16. Cooling status/capacity

23 74 33-12



17. Unit status
  18. All time schedules
  19. All time schedules
  20. Previous alarms with time and date
  21. Optimal start
  22. Supply fan and exhaust fan speed
  23. System operating hours
- H. The user interaction with the keypad shall provide the following:
1. Controls mode
  2. Cooling and heating change-over temperature with deadband
  3. Cooling discharge air temperature (DAT)
  4. Supply reset options
  5. Temperature alarm limits
  6. Lockout control for compressors
  7. Compressor interstage timers
  8. Night setback and setup space temperature
  9. Building static pressure
  10. Economizer changeover
  11. Currently time and date
  12. Tenant override time
  13. Occupied/unoccupied time schedule
  14. One event schedule
  15. Holiday dates and duration

23 74 33-13

16. Adjustable set points
17. Service mode
- I. If the unit is to be programmed with a night setback or setup function, an optional space sensor shall be provided. Space sensors shall be available to support field selectable features. Sensor options shall include:
  1. Zone sensor with tenant override switch
  2. Zone sensor with tenant override switch plus heating and cooling set point adjustment. (Space Comfort Control systems only)
- J. To increase the efficiency of the cooling system the DDC controller shall include a discharge air temperature reset program for part load operating conditions. The discharge air temperature shall be controlled between a minimum and a maximum discharge air temperature (DAT) based on one of the following inputs:
  1. Airflow
  2. Outside air temperature
  3. Space temperature
  4. Return air temperature
  5. External signal of 1-5 vdc
  6. External signal of 0-20 mA
  7. Network signal
- K. Units shall contain eight programmable input/output control ports to be controlled using the connected building automation system. These ports shall be input/output capable of utilizing the following signal types:
  1. mA signal (0-20 mA – Adjustable)
  2. VDC (0-10 VDC – Adjustable)
  3. 10k Thermistor
  4. Digital on/off

23 74 33-14

- L. Provide a microprocessor based system to control all refrigeration functions including compressor speed, condenser fan function, unit safety protection, including compressor minimum run and minimum off times, and diagnostics. This system shall operate the unit at peak efficiency utilizing variable head pressure control and electronic expansion valve while maintaining the cooling, or heating in heat pump operation, call per third party control. The microprocessor control shall consist of only direct expansion required temperature sensors, pressure sensors, controller and keypad/display operator interface. Refrigeration sensors and controller shall be factory mounted, wired and tested.
- M. The microprocessor controls shall be solely dependent on communications with any on-site or remote PC or master control panel for proper unit operation. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. No commissioning settings shall be lost, even during extended power shutdowns.
- N. The microprocessor controls shall be dependent on starting and stopping of the unit via terminal strip control and logic. The control system shall be capable of providing a remote alarm indication. The microprocessor shall provide compressor capacity & status, defrost status (heat pump only), condensate overflow alarm, and dirty filter alarm.
- O. All digital and analog inputs and outputs shall be protected against damage from transients or incorrect voltages. All field wiring shall be terminated at a separate, clearly marked terminal strip.
- P. The keypad interface shall allow convenient navigation and access to the commissioning functions. The unit keypad/display character format shall be 4 lines x 20 characters. All control settings shall be password protected against unauthorized changes. For ease of service, the display format shall be English language readout. Coded formats with look-up tables will not be accepted. The user interaction with the display shall provide the following information as a minimum:
  - 1. Supply and exhaust fan speed control
  - 2. Refrigeration alarm details.

## 2.14 ROOF CURB

- A. A prefabricated heavy gauge galvanized steel, mounting curb shall be provided for field assembly on the roof decking prior to unit shipment. The roof curb shall be a full perimeter type with complete perimeter support of the air handling section and condensing section. The curb shall be a minimum of 14" high and include a nominal 2" x 4" wood nailing strip. Gasket shall be provided for field mounting between the unit base and roof curb.

END OF SECTION

23 74 33-16

## SECTION 23 75 30

### VRV - OUTDOOR HEAT RECOVERY

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Note: Equipment in this section shall be provided by Owner through a purchasing agreement. Contractor shall be responsible for installation and all accessories necessary to provide a complete and working system.
- B. Variable refrigerant volume HVAC system includes:
  - 1. Outdoor/Condensing unit(s):
    - a. Size Range: 6 to 38 Tons Nominal
    - b. Daikin Model Numbers: As indicated in the plans and schedules.
  - 2. Branch Selector Boxes
  - 3. Indoor Units

##### 1.2 SUBMITTALS

- A. Submit unit performance data including: capacity, nominal and operating performance.
- B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.
- C. Submit shop drawings indicating overall dimensions as well as installation, operation and services clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.
- D. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

23 75 30-1

### 1.3 DELIVERY, STORAGE AND HANDLING - PERFORMED BY INSTALLING CONTRACTOR

- A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
- B. Protect units from physical damage. Leave factory-shipping covers in place until installation.

### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  - 1. The units shall be tested by a National Recognized Testing Laboratory (NRTL), in accordance with ANSI/UL 1995 - Heating and Cooling Equipment and bear the Listed Mark.
  - 2. All wiring shall be in accordance with the National Electric Code (NEC).
  - 3. The system will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.
  - 4. The condensing unit will be factory charged with R410A.
  - 5. All installing contractors will become certified for installing the system by attending a Daikin 3 day class in the city of their choice before installation. Daikin will include the price of the class itself in their bid. Contractors will bear the cost of travel to/from the Daikin training site.

### 1.5 WARRANTY

- A. Standard Limited Warranty
  - 1. Complete warranty details available from your local Daikin representative or at [www.daikincomfort.com](http://www.daikincomfort.com).
  - 2. Daikin North America LLC warrants original owner of the non-residential building, multifamily residence or residence in which the Daikin products are installed that under normal use and maintenance for comfort cooling and conditioning applications such products (the "Products") will be free from defects in material and workmanship. This warranty applies to compressor and all parts and is limited in duration to ten (10) years starting from the 'installation date'

23 75 30-2

which is one of the two dates below:

- a. The installation date is the date that the unit is originally commissioned, but no later than 18 months after the manufacture date noted on the unit's rating plate.
- b. If the date the unit is originally commissioned cannot be verified, the installation date is three months after the manufacture date.

## PART 2 PRODUCTS

### 2.1 SUMMARY

- A. The contractor shall install owner furnished equipment as shown and scheduled on the contract documents. The equipment shall be installed in accordance with this specification and perform at the specified conditions as scheduled.
- B. Equipment shall be manufactured by Daikin.

### 2.2 MANUFACTURERS

- A. Design Basis:
  1. The HVAC equipment basis of design is Daikin North America, no substitute. All bidders shall furnish the minimum system standards as defined by the base bid model numbers, model families or as otherwise specified herein. In any event, the contractor shall be responsible for all specified items and intents of this document without further compensation.

### 2.3 HVAC SYSTEM DESIGN

- A. System Description:
  1. The variable capacity heat recovery air conditioning system shall be a Daikin Variable Refrigerant Volume Series (heat or cool model) system as specified.
  2. The system shall consist of multiple evaporators, branch selector boxes, REFNET™ joints and headers, a three-pipe refrigeration distribution system using PID control and Daikin VRVâ condenser unit.
  3. The condenser shall be a direct expansion (DX), air-cooled heat recovery, multi-zone air-conditioning system with variable speed inverter driven compressors using R-410A refrigerant.

23 75 30-3

4. The condensing unit may connect an indoor evaporator capacity up to 200% of the condensing unit nominal capacity. All zones are each capable of operating separately with individual temperature control.
5. A dedicated hot gas pipe shall be required to ensure optimum heating operation performance.
  - a. Two-pipe, heat recovery systems utilizing a lower temperature mixed liquid/gas refrigerant to perform heat recovery are not acceptable due to reduced heating capabilities.
6. The Daikin condensing unit shall be interconnected to indoor unit models FXFQ, FXHQ, FXUQ, FXEQ, FXMQ, FXLQ, FXNQ, FXTQ, FXDQ, FXZQ, FXAQ and FXMQ\_MF, and shall range in capacity from 7,500 Btu/h to 96,000 Btu/h in accordance with Daikin's engineering data book detailing each available indoor unit.
  - a. The indoor units shall be connected to the condensing unit utilizing Daikin's REFNET™ specified piping joints and headers to ensure correct refrigerant flow and balancing. T style joints are not acceptable for a variable refrigerant system.
7. Operation of the system shall permit either individual cooling or heating of each indoor unit simultaneously or all of the indoor units associated with each branch of the cool/heat selector box (BSQ\_T / BS\_Q54T). Each indoor unit or group of indoor units shall be able to provide set temperature independently via a local remote controller, an Intelligent Controller, an Intelligent Manager or a BMS interface.
8. Branch selector boxes:
  - a. The branch selector boxes shall have the capacity to control up to 290 MBH (cooling) downstream of the branch selector box.
  - b. Each branch of the branch selector box shall consist of three electronic expansion valves, refrigerant control piping and electronics to facilitate communications between the box and main processor and between the box and indoor units.
  - c. The branch selector box shall control the operational mode of the subordinate indoor units. The use of three EEV's ensures continuous heating during

23 75 30-4



defrost (multiple condenser systems), no heating impact during changeover and reduced sound levels.

- d. The use of solenoid valves for changeover and pressure equalization shall not be acceptable due to refrigerant noise.
9. The REYQ\_TA condensing unit model numbers and the associated number of connectable indoor units per REYQ\_TA condensing unit is indicated in the following table. Each indoor unit or group of indoor units shall be independently controlled.

#### B. VRV IV Features And Benefits

1. Voltage Platform - Heat pump condensing units shall be available with a 208-230V/3ph/60Hz power supply.
2. Advanced Zoning - A single system shall provide for up to 64 zones.
3. Independent Control - Each indoor unit shall use a dedicated electronic expansion valve with 2000 positions for independent control.
4. VFD Inverter Control and Variable Refrigerant Temperature - Each condensing unit shall use high efficiency, variable speed all “inverter” compressor(s) coupled with inverter fan motors to optimize part load performance. The system capacity and refrigerant temperatures shall be modulated automatically to set suction and condensing pressures while varying the refrigerant volume for the needs of the cooling or heating loads. The control will be automatic and customizable depending on load and weather conditions.
  - a. Indoor shall use PID to control superheat to deliver a comfortable room temperature condition and optimize efficiency.
5. Configurator software - Each system shall be available with configurator software package to allow for remote configuration of operational settings and also for assessment of operational data and error codes.
  - a. If this software is not provided by an alternate manufacturer, for each individual outdoor unit the contractor shall do the settings manually and keep detailed records for future maintenance purposes.
6. Each system shall be capable of seamless integration with Daikin DVS series Dedicated Outside Air System (DOAS).

23 75 30-5

7. Autocharging - Each system shall have a refrigerant auto-charging function.
8. Defrost Heating - Multiple condenser VRV systems shall maintain continuous heating during defrost operation. Reverse cycle (cooling mode) defrost operation shall not be permitted due to the potential reduction in space temperature.
9. Oil Return Heating - Multiple condenser VRV systems shall maintain continuous heating during oil return operation. Reverse cycle (cooling mode) oil return during heating operation shall not be permitted due to the potential reduction in space temperature.
10. Low Ambient Cooling - Each system shall be capable of low ambient cooling operation to -4°F DB (-20°CDB).
11. Independent Control - Each indoor unit shall use a dedicated electronic expansion valve for independent control.
12. Flexible Design -
  - a. Systems shall be capable of up to 540ft (165m) [623 ft. (190m) equivalent] of linear piping between the condensing unit and furthest located indoor unit.
  - b. Systems shall be capable of up to 3,280ft (1,000m) total “one-way” piping in the piping network.
  - c. Systems shall have a vertical (height) separation of up to 295ft between the condensing unit and the indoor units.
  - d. Systems shall be capable of up to 295ft (90m) from the first REFNET™ / branch point.
  - e. The condensing unit shall have the ability to connect an indoor unit evaporator capacity of up to 200% of the condensing unit nominal capacity.
  - f. Systems shall be capable of 98ft (30m) vertical separation between indoor units.
  - g. Condensing units shall be supported with a fan motor ESP up to 0.32” WG as standard to allow connection of discharge ductwork and to prevent discharge air short circuiting.
13. Oil return - Each system shall be furnished with a centrifugal oil separator and active oil recovery cycle.

23 75 30-6

14. Simple wiring - Systems shall use 16/18 AWG, 2 wire, stranded, non-shielded and non-polarized daisy chain control wiring.
15. Outside Air - Systems shall provide outside air capability.
16. Space saving - Each system shall have a condensing unit module footprint no larger than 48-7/8" x 30-3/16" (1694mm x 1242mm x 767mm).
17. Advanced diagnostics - Systems shall include a self-diagnostic, auto-check function to detect a malfunction and display the type and location.
18. Each condensing unit shall incorporate contacts for electrical demand shedding with optional 3 stage demand control with 12 customizable demand settings.
19. Advanced controls - Each system shall have at least one remote controller capable of controlling up to 16 indoor units.
20. Each system shall be capable of integrating with open protocol BACnet and LonWorks building management systems.
21. Low sound levels - Each system shall use indoor and condensing units with quiet operation as low as 27 dB(A).

C. Performance:

1. The VRV IV REYQ\_TA system shall perform as indicated on the schedules in the plans.
2. Performance Conditions:
  - a. Cooling: Indoor temperature of 80°FDB (26.7°CDB), 67°FWB (19.5°CWB) and outdoor temperature of 95°FDB (35°CDB).
  - b. Heating: Indoor temperature of 70°FDB (21.1°CDB) and outdoor temperature of 47°FDB (8.3°CDB), 43°FWB (6.1°CDB).
  - c. Equivalent piping length: 25ft (7.5m)
3. Cooling or Cooling Dominant Operation:
  - a. The operating range in cooling or cooling dominant simultaneous cooling/heating will be 23°FDB (-5°CDB) ~ 110°FDB (43.3°CDB).

23 75 30-7

- b. Cooling mode indoor room temperature range will be 57-77°F WB (13.8 - 25°C WB).
  - c. Each system as standard shall be capable of onsite reprogramming to allow low ambient cooling operation down to -4°F DB (-20°C DB).
4. Heating or Heating Dominant Operation:
- a. The operating range in heating or heating dominant simultaneous cooling/heating will be -22° - 61°F WB (-30 - 16°C WB).
    - 1) If an alternate equipment manufacturer is selected, the mechanical contractor shall provide, at their own risk and cost, all additional material and labor to meet low ambient operating condition and performance
  - b. Heating mode indoor room temperature range will be 59°F DB - 80°F DB (15°C DB - 26.7°C DB).

## 2.4 EQUIPMENT

### A. Electrical:

- 1. The power supply to the condensing unit shall be as indicated in the schedules on the plans.

### B. Wiring:

- 1. The control voltage between the indoor and condensing unit shall be 16VDC non-shielded, stranded 2 conductor cable.
- 2. The control wiring shall be a two-wire multiplex transmission system, making it possible to connect multiple indoor units to one condensing unit with one 2-cable wire, thus simplifying the wiring installation.
- 3. The control wiring maximum lengths shall be as shown below:

WIRE TYPE	16/18 AWG, 2 wire, non-polarity, non-shielded, stranded
-----------	---

### C. Refrigerant Piping:

- 1. The system shall be capable of refrigerant piping up to 540ft (165m) actual or 623ft (190m) equivalent from the condensing unit to the furthest indoor unit, a

total combined liquid line length of 3,280ft (1,000m) of piping between the condensing and indoor units with 295ft (90m) maximum vertical difference, without any oil traps or additional components.

2. REFNET™ piping joints and headers shall be used to ensure proper refrigerant balance and flow for optimum system capacity and performance.
  - a. T style joints shall not be acceptable as this will negatively impact proper refrigerant balance and flow for optimum system capacity and performance.

## 2.5 OUTDOOR/CONDENSING UNIT

### A. GENERAL:

1. The condensing unit is designed specifically for use with VRV series components.
2. The condensing unit shall be factory assembled in the USA and pre-wired with all necessary electronic and refrigerant controls.
3. The refrigeration circuit of the condensing unit shall consist of Daikin inverter scroll compressors, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut off valves, oil separators, service ports and refrigerant accumulator.
4. Liquid and suction lines must be individually insulated between the condensing and indoor units.
5. The condensing unit can be wired and piped with access from the left, right, rear or bottom.
6. The connection ratio of indoor units to condensing unit shall be permitted up to 200% of nominal capacity.
7. Each condensing system shall be able to support the connection of up to 64 indoor units dependent on the model of the condensing unit.
8. The sound pressure level standard shall be that value as listed in the Daikin engineering manual for the specified models at 3 feet from the front of the unit. The condensing unit shall be capable of operating automatically at further reduced noise during night time or via an external input.
9. The system will automatically restart operation after a power failure and will not cause any settings to be lost, thus eliminating the need for reprogramming.

23 75 30-9

10. The unit shall incorporate an auto-charging feature to ensure optimum performance. Manual changing should be support with a minimum of 2 hours of system operation data to ensure correct operation.
  11. The condensing unit shall be modular in design and should allow for side-by-side installation with minimum spacing.
  12. The following safety devices shall be included on the condensing unit; high pressure sensor and switch, low pressure sensor, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, over current protection for the inverter and anti-recycling timers.
  13. To ensure the liquid refrigerant does not flash when supplying to the various indoor units, the circuit shall be provided with a sub-cooling feature.
  14. Oil recovery cycle shall be automatic occurring 2 hours after start of operation and then every 8 hours of operation. Each system shall maintain continuous heating during oil return operation.
  15. The condensing unit shall be capable of heating operation at -13°F (-25°C) wet bulb ambient temperature without additional low ambient controls or an auxiliary heat source.
  16. The multiple condenser VRV systems shall continue to provide heat to the indoor units in heating operation while in the defrost mode.
- B. Unit Cabinet:
- C. The condensing unit shall be completely weatherproof and corrosion resistant. The unit shall be constructed from rust-proofed galvanized steel panels coated with a baked enamel finish.
- D. Fan:
1. The condensing unit shall consist of one or more propeller type, direct-drive 350, 400 or 800W fan motors that have multiple speed operation via a DC (digitally commutating) inverter. Reference table below.
  2. The condensing unit fan motor shall have multiple speed operation of the DC (digitally commutating) inverter type, and be of high external static pressure and shall be factory set as standard at 0.12 in. WG. A field setting switch to a

23 75 30-10

maximum 0.32 in. WG pressure is available to accommodate field applied duct for indoor mounting of condensing units.

3. The fan shall be a vertical discharge configuration with a nominal airflow maximum range of 5,544 CFM to 24,684 CFM dependent on model specified.
4. The fan motor shall have inherent protection and permanently lubricated bearings and be mounted.
5. The fan motor shall be provided with a fan guard to prevent contact with moving parts.

E. Sound:

1. Nominal sound pressure levels shall be as shown below.

<b>MODEL NUMBER</b>	<b>SOUND PRESSURE LEVEL dB(A)</b>
REYQ72TATJ*	58
REYQ96TATJ*	61
REYQ120TATJ*	61
REYQ144TATJ*	65
REYQ168TATJ*	65
REYQ192TATJ*	63
REYQ216TATJ*	64
REYQ240TATJ*	66
REYQ264TATJ*	66
REYQ288TATJ*	68
REYQ312TATJ*	68
REYQ336TATJ*	68
REYQ360TATJ*	66
REYQ384TATJ*	68
REYQ408TATJ*	69
REYQ432TATJ*	70
REYQ456TATJ*	70

2. Night setback control of the fan motor for low noise operation by way of automatically limiting the maximum speed shall be a standard feature. Operation sound level shall be selectable from 3 steps.

<b>OPERATION SOUND dB(A)</b>	<b>NIGHT MODE SOUND PRESSURE LEVEL dB(A) APPROX.</b>
Level 1	55
Level 2	50
Level 3	45

F. Condenser Coil:

1. The condenser coil shall be manufactured from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The heat exchanger coil shall be of a waffle louver fin and rifled bore tube design to ensure high efficiency performance.
3. The heat exchanger on the condensing units shall be manufactured from Hi-X seamless copper tube with N-shape internal grooves mechanically bonded on to aluminum fins to an e-Pass Design.
4. The fins shall be coated with an anti-corrosion hydrophilic blue coating as standard from factory with a salt spray test rating of 1000hr per ASTM test standards.
5. The outdoor coil shall have three-circuit heat exchanger design eliminating the need for a drain pan heater. The lower part of the coil shall be used for inverter cooling and be on or off during heating operation enhancing the defrost operation.
  - a. An alternate manufacturer must provide a drain pan heater to enable adequate defrosting of the unit in defrost operation.
6. The condensing unit shall be factory equipped with condenser coil guards on all sides.

G. Compressor:

1. The Daikin inverter scroll compressors shall be variable speed (PVM inverter) controlled which is capable of changing the speed to follow the variations in total cooling and heating load as determined by the suction gas pressure as measured in the condensing unit.
  - a. In addition, samplings of evaporator and condenser temperatures shall be made so that the high/low pressures detected are read every 20 seconds and



calculated. With each reading, the compressor capacity (INV frequency) shall be controlled to eliminate deviation from target value.

- 1) Non -inverter-driven compressors, which may cause starting motor current to exceed the nominal motor current (RLA) and require larger wire sizing, shall not be allowed.
2. The inverter driven compressors in the condensing unit shall be of highly efficient reluctance DC (digitally commutating), hermetically sealed scroll “G-type” or “J-type”.
3. Neodymium magnets shall be adopted in the rotor construction to yield a higher torque and efficiency in the compressor instead of the normal ferrite magnet type.
  - a. At complete stop of the compressor, the neodymium magnets will position the rotor into the optimum position for a low torque start.
4. The capacity control range shall be as low as 3% to 100%.
5. The compressor’s motor shall have a cooling system using discharge gas, to avoid sudden changes in temperature resulting in significant stresses on winding and bearings.
6. Each compressor shall be equipped with a crankcase heater, high pressure safety switch, and internal thermal overload protector.
7. Oil separators shall be standard with the equipment together with an intelligent oil management system.
8. The compressor shall be spring mounted to avoid the transmission of vibration eliminating the standard need for spring insulation.
9. In the event of compressor failure, the remaining compressors shall continue to operate and provide heating or cooling as required at a proportionally reduced capacity. The microprocessor and associated controls shall be manually activated to specifically address this condition for single module and manifolded systems.
10. In the case of multiple condenser modules, conjoined operation hours of the compressors shall be balanced by means of the Duty Cycling Function, ensuring sequential starting of each module at each start/stop cycle, completion of oil return, completion of defrost or every 8 hours. When connected to a central control system sequential start is activated for all system on each DIII network.

23 75 30-13

## 2.6 BRANCH SELCTOR UNITS

### A. General:

1. The BSQ36TVJ, BSQ60TVJ, BSQ96TVJ, BS4Q54TVJ, BS6Q54TVJ, BS8Q54TVJ, BS10Q54TVJ and BS12Q54TVJ branch selector boxes are designed specifically for use with VRV IV series heat recovery system components.
  - a. These selector boxes shall be factory assembled, wired, and piped.
  - b. These BSQ\_T / BS(4/6/8/10/12)Q54T branch controllers must be run tested at the factory.
  - c. These selector boxes must be mounted indoors.
  - d. When simultaneously heating and cooling, the units in heating mode shall energize their subcooling electronic expansion valve.
  - e. The number of connectable indoor units shall be in accordance with the table below:

<b>MODEL NUMBER</b>	<b>MAXIMUM CONNECTABLE COOLING CAPACITY</b>	<b>MAXIMUM NUMBER OF CONNECTABLE INDOOR UNITS PER PORT</b>
BSQ36TVJ	36,000 Btu/h	4
BSQ60TVJ	60,000 Btu/h	8
BSQ96TVJ	96,000 Btu/h	8
BS4Q54TVJ	144,000 Btu/h	5
BS6Q54TVJ	216,000 Btu/h	5
BS8Q54TVJ	290,000 Btu/h	5
BS10Q54TVJ	290,000 Btu/h	5
BS12Q54TVJ	290,000 Btu/h	5

### B. Unit Cabinet

1. These units shall have a galvanized steel plate casing.
2. Each cabinet shall house 3 electronic expansion valves for refrigerant control per branch.

23 75 30-14

3. The cabinet shall contain one subcooling heat exchanger per branch.
4. The unit shall have sound absorption thermal insulation material made of flame and heat resistant foamed polyethylene.
5. Nominal sound pressure levels must be measured and published on the submittals by the manufacturer. These sound levels must not exceed the values below.
  - a. If an alternative manufacturer is selected, the mechanical contractor shall provide, at their own cost and expense, any additional material and labor to meet the published sound levels above.

<b>MODEL NUMBER</b>	<b>SOUND LEVEL dB(A) OPERATION</b>	<b>SOUND LEVEL dB(A) MAX</b>
BSQ36TVJ	35	40
BSQ60TVJ	41	45
BSQ96TVJ	41	45
BS4Q54TVJ	38	45
BS6Q54TVJ	39	47
BS8Q54TVJ	39	47
BS10Q54TVJ	40	48
BS12Q54TVJ	40	48

C. Dimensions (H x L x W)

1. BSQ\_T unit shall be no larger than 8-1/8" x 15-1/4" x 12-13/16" (206.4mm x 387.4mm x 325.4mm).
2. BS4Q\_T shall be no larger than 11-3/4" x 18-15/16" x 14-9/16" (298.5mm x 481mm x 370mm).
3. BS(6/8)Q\_T shall be no larger than 11-3/4" x 22-13/16" x 18-15/16" (298.5mm x 579.4mm x 481mm).
4. BS(10/12)Q\_T shall be no larger than 11-3/4" x 32-5/16" x 18-15/16" (298.5mm x 821mm x 481mm).

D. Refrigerant Valves:

1. The unit shall be furnished with 3 electronic expansion valves per branch to control the direction of refrigerant flow. The use of solenoid valves for

23 75 30-15

changeover and pressure equalization shall not be acceptable due to refrigerant noise.

2. The refrigerant connections must be of the braze type.
3. In multi-port units, each port shall have its own electronic expansion valves. If common expansion/solenoid valves are used, redundancy must be provided.
4. Each circuit shall have at least one (36,000 Btu/h indoor unit or smaller for the BSQ36TVJ, 54,000 Btu/h indoor unit or smaller for the BS(4/6/8/10/12)Q54TVJ, 60,000 Btu/h indoor unit or smaller for the BSQ60TVJ and 96,000 Btu/h indoor unit or smaller for the BSQ96TVJ) branch selector box.
5. Multiple indoor units may be connected to a branch selector box with the use of a REFNET™ joint provided they are within the capacity range of the branch selector.

E. Condensate Removal:

1. The unit shall not require provisions for condensate removal. A safety device or secondary drain pan shall be installed by the mechanical contractor to comply with the applicable mechanical code, if an alternate manufacturer is selected.

F. Electrical:

1. The unit electrical power shall be 208/230 volts, 1 phase, 60 hertz.
2. The unit shall be capable of operation within the limits of 187 volts to 255 volts.
3. The minimum circuit amps (MCA) shall be 0.1 and the maximum overcurrent protection amps (MOP) shall be 15.
4. The control voltage between the indoor and condensing unit shall be 16VDC non-shielded 2 conductor cable.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Contractor shall verify that proper power supply is available.

### 3.2 INSTALLATION

- A. Contractor shall install in accordance with manufacturer's instructions.

23 75 30-16

### 3.3 MANUFACTURER'S FIELD SERVICES

- A. The contractor shall furnish manufacturer complete submittal wiring diagrams of the package unit as applicable for field maintenance and service.

END OF SECTION

23 75 30-17

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas



## SECTION 23 81 40

### VRV - INDOOR (HEAT RECOVERY, HEAT PUMP)

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Note: Equipment in this section shall be provided by Owner through a purchasing agreement. Contractor shall be responsible for installation and all accessories necessary to provide a complete and working system.
- B. Indoor VRV air handling units.

##### 1.2 QUALITY ASSURANCE

- A. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL), in accordance with ANSI/UL 1995/CAN/CSA-C22.2 No. 236-05 (R2009) - Heating and Cooling Equipment and bear the Listed Mark.
- B. All wiring shall be in accordance with the National Electric Code (NEC)/Canadian Electrical Code (CEC).
- C. The system will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.
- D. The outdoor unit will be factory charged with R-410A.
- E. All installing contractors will become certified for installing the system by attending a Daikin 3 day class in the city of their choice before installation. Daikin will include the price of the class itself in their bid. Contractors will bear the cost of travel to/from the Daikin training site.

##### 1.3 SUBMITTALS

- A. Submit unit performance data including: capacity, nominal and operating performance.
- B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.

23 81 40-1

- C. Submit shop drawings indicating overall dimensions as well as installation, operation and services clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.
- D. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

#### 1.4 DELIVERY, STORAGE AND HANDLING - PERFORMED BY INSTALLING CONTRACTOR

- A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
- B. Protect units from physical damage. Leave factory-shipping covers in place until installation.

#### 1.5 STANDARD LIMITED WARRANTY

- A. Daikin North America LLC warrants original owner of the non-residential building, multifamily residence or residence in which the Daikin products are installed that under normal use and maintenance for comfort cooling and conditioning applications such products (the "Products") will be free from defects in material and workmanship. This warranty applies to compressor and all parts and is limited in duration to ten (10) years starting from the "installation date" which is one of the two dates below:
  - 1. The installation date is the date that the unit is originally commissioned, but no later than 18 months after the manufacture date noted on the unit's rating plate.
  - 2. If the date the unit is originally commissioned cannot be verified, the installation date is three months after the manufacture date.
- B. Complete warranty details available from your local Daikin representative or at [www.daikincomfort.com](http://www.daikincomfort.com) -
- C. All warranties shall begin at date of substantial completion as accepted by the owner.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS:

- A. The HVAC equipment basis of design is Daikin, no substitution. All bidders shall furnish the minimum system standards as defined by the base bid model numbers,  
23 81 40-2



model families or as otherwise specified herein. In any event the contractor shall be responsible for all specified items and intents of this document without further compensation.

## 2.2 SUMMARY

- A. The contractor shall install owner furnished equipment as shown and scheduled on the contract documents. The equipment shall be installed in accordance with this specification and perform at the specified conditions as scheduled.
- B. Equipment shall be manufactured by Daikin.
- C. FXSQ - CONCEALED CEILING DUCTED UNIT (MED. STATIC)

### 1. General Requirements:

- a. All indoor/evaporator units shall be factory assembled and tested DX-fan coil units, operable with refrigerant R-410a.
- b. All units shall be completely factory assembled and tested, and shall be charged with dehydrated air prior to shipment from the factory.
- c. All units shall be equipped with an electronic expansion valve controlled using a PID loop to automatically adjust the refrigerant flow rate through the unit.
- d. All units shall be equipped with a programmed drying operation that dehumidifies while limiting changes in room temperature when used with Daikin remote controllers BRC1E73 and BRC2A71.
- e. All units shall feature self-diagnostics, auto-restart functionality, 3-minute fused time delay, and a test run switch.
- f. All refrigerant piping, both liquid and suction, shall be fully insulated from the outdoor unit.

### 2. Performance: Each unit's performance is based on nominal operating conditions:

<b>Model Number</b>	<b>Cooling (Btu/h)</b>	<b>Heating (Btu/h)</b>
	(Indoor 80°FDB / 67°FWB, Outdoor 95°FDB, 25 ft pipe length)	(Indoor 70°FDB, Outdoor 47°FDB / 43°FWB, 25 ft pipe length)
FXSQ05T-VJU	5,800	6,500
FXSQ07T-VJU	7,500	8,500
FXSQ09T-VJU	9,500	10,500

23 81 40-3

FXSQ12T-VJU	12,000	13,500
FXSQ15T-VJU	15,000	16,500
FXSQ18T-VJU	18,000	20,000
FXSQ24T-VJU	24,000	27,000
FXSQ30T-VJU	30,000	34,000
FXSQ36T-VJU	36,000	40,000
FXSQ48T-VJU	48,000	54,000
FXSQ54T-VJU	54,000	60,000

1. Indoor Unit:

- a. The Daikin indoor unit FXSQ shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate drain pump, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch. The unit shall be equipment with automatically adjusting external static pressure logic that is selectable during commissioning. This adjusts the airflow based on the installed external static pressure.
- b. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
- c. Both refrigerant lines shall be insulated from the outdoor unit.
- d. The indoor units shall be equipped with a return air thermistor.
- e. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
- f. The voltage range will be 253 volts maximum and 187 volts minimum.

2. Unit Cabinet:

- a. The unit cabinet shall be constructed of heavy gauge galvanized steel.
- b. The unit shall be internally insulated and shall be capable of installation in indoor environments up to 80% relative humidity without requiring additional field installed insulation.
- c. The unit shall ship from the factory in a rear-return configuration, and shall be field-convertible to a bottom-return configuration.

23 81 40-4

- d. The unit shall be equipped with a return air thermistor.
- e. The cabinet shall be constructed with sound absorbing foamed fiber-less closed cell polystyrene and polyethylene insulation.

3. Fan:

- a. The fan shall be a direct-drive, brushless DC fan motor with (3) user-selectable fan speeds (H, M, L).
- b. The unit shall be equipment with automatically adjusting external static pressure logic selectable during commissioning.
- c. The unit shall be equipped with internal controls to allow the fan to automatically select the operating fan curve to deliver nominal airflow CFM (within +/- 10%) when the connect ductwork has been designed with a total external static within the range of the FXSQ. This setting shall be accessible as a setting to be used during startup and commissioning of the system
- d. The fan motor shall be capable of Auto fan speed control when the unit is connected to the BRC1E73 Navigation Remote Control, BRC1H71W Madoka Control or the DCM601A71 Intelligent Touch Manager centralized control. The Auto fan speed control shall automatically adjust the unit's fan speed in response to the difference between the indoor unit's current set point and the current room temperature measurement. The Auto fan speed control shall utilize (5) fan speeds.
- e. The fan motor shall be internally isolated using rubber grommets to reduce transmission of vibrations to the unit.
- f. The airflow rate shall be available in three settings.
- g. The fan motor shall be thermally protected.
- h. Fan motor external static pressure range for nominal airflow:

<b>Model Number</b>	<b>Fan ESP (in. w.g.)</b>
FXSQ05T-VJU	0.12 – 0.60
FXSQ07T-VJU	0.12 – 0.60
FXSQ09T-VJU	0.12 – 0.60
FXSQ12T-VJU	0.12 – 0.60
FXSQ15T-VJU	0.12 – 0.60

FXSQ18T-VJU	0.20 – 0.60
FXSQ24T-VJU	0.20 – 0.60
FXSQ30T-VJU	0.20 – 0.60
FXSQ36T-VJU	0.20 – 0.60
FXSQ48T-VJU	0.20 – 0.60
FXSQ54T-VJU	0.20 – 0.54

1. Fan Blade

- a. The fan blade shall be constructed of lightweight polymer.
- b. The fan blade shall be statically and dynamically balanced to minimize vibration.

2. Coil:

- a. Coils shall be of the direct expansion type, constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
- b. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
- c. The coil shall be 2 or 3 row cross fin copper evaporator coil with 18 fpi design, completely factory tested.
- d. The refrigerant connections shall be flare connections.
- e. Factory mounted thermistors shall be installed on the liquid and gas lines.

3. Condensate Drainage

- a. The unit shall be equipped with a condensate drain pan under the coil.
- b. The condensate drain outlet shall be of PVC construction and VP25 (1" ID, 1-1/4" OD).
- c. The unit shall be equipped with a factory-integral condensate pump capable of 25-5/16" lift from the condensate drain outlet. The condensate pump shall be equipped with a float switch to automatically stop unit operation and provide a system error code in the event drain pan water level rises too high.

4. Electrical:

23 81 40-6

- a. Provide a separate power supply connection of 208/230V, 1 phase, 60 hertz. The allowable voltage range shall be 187 to 253 volts.
  - b. Refer to the engineering data book for all other electrical data including MCA, MOCP, and FLA values.
  - c. The transmission (control) wiring distance between the indoor unit and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
  - d. The transmission (control) wiring between the indoor unit and the remote controller shall be a maximum distance of 1,640 feet.
5. Control:
- a. The unit shall be controlled with a Daikin remote controller to perform input functions necessary to operate the system.
  - b. The unit shall be compatible with interfacing with a building management system (BMS) via optional BACnet or LonWorks gateways.
  - c. The unit shall be compatible with a Daikin Intelligent Touch Manager advanced multi-zone controller.

**B. FXSQ - CONCEALED CEILING DUCTED UNIT (MED. STATIC)**

1. General: Daikin indoor unit FXSQ shall be a built-in ceiling concealed fan coil unit, operable with refrigerant R-410A, equipped with an electronic expansion valve, direct-drive DC (ECM) type fan with auto CFM adjustment at commissioning, for installation into the ceiling cavity. It is constructed of a galvanized steel casing. It shall be available in capacities from 5,000 Btu/h to 54,000 Btu/h. Models to be connected to outdoor unit model RXYQ /REYQ heat recovery or heat pump models. It shall be a horizontal discharge air with horizontal return air configuration. All models feature a low height cabinet making them applicable to ceiling pockets that tend to be shallow. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while limiting changes in room temperature when used with Daikin remote control specified in related specification sections on indicated by the plans. Included as standard equipment, a condensate drain pan and drain pump kit that pumps to 18-3/8" from the drain pipe opening. The indoor units sound pressure shall range from 29 dB(A) to 43 dB(A) at low speed

23 81 40-7

measured 5 feet below the ducted unit.

2. Performance: See data on schedules on plans.
3. Indoor Unit:
  - a. The Daikin indoor unit FXSQ shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate drain pump, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch. The unit shall be equipped with automatically adjusting external static pressure logic that is selectable during commissioning. This adjusts the airflow based on the installed external static pressure.
  - b. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
  - c. Both refrigerant lines shall be insulated from the outdoor unit.
  - d. The indoor units shall be equipped with a condensate pan and condensate pump. The condensate pump provides up to 18-3/8" of lift from the center of the drain outlet and has a built in safety shutoff and alarm.
  - e. The indoor units shall be equipped with a return air thermistor.
  - f. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
  - g. The voltage range will be 253 volts maximum and 187 volts minimum.
  - h. Unit Cabinet:
    - 1) The cabinet shall be located into the ceiling and ducted to the supply and return openings.
    - 2) The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.
  - i. Fan:
    - 1) The fan shall be direct-drive DC (ECM) type fan, statically and dynamically balanced impeller with three fan speeds available.

23 81 40-8

- 2) The unit shall be equipment with automatically adjusting external static pressure logic selectable during commissioning.
- 3) The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz with a motor output range of 0.12 to 0.47 HP respectively.
- 4) The airflow rate shall be available in three settings.
- 5) The fan motor shall be thermally protected.
- 6) The fan motor shall be equipped as standard with adjustable external static pressure (ESP) settings.
- 7) Fan motor external static pressure range for nominal airflow:

<b>Model Number/In-Ceiling Ht.</b>	<b>Fan ESP (in. WG)</b>
FXSQ 05 – 12/ 9 11/16”	0.20 – 0.60
FXSQ 15 – 54/ 9 11/16”	0.40 – 0.60
FXMQ 72 – 96/ 18 1/8”	1.0

j. Coil:

- 1) Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
- 2) The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
- 3) The coil shall be a 3 row cross fin copper evaporator coil with 15 fpi design completely factory tested.
- 4) The refrigerant connections shall be flare connections and the condensate will be 1-1/4” outside diameter PVC.
- 5) A condensate pan shall be located under the coil.
- 6) A condensate pump with an 18-3/8” lift shall be located below the coil in the condensate pan with a built in safety alarm.
- 7) A thermistor will be located on the liquid and gas line.

k. Electrical:

23 81 40-9

- 1) A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
- 2) Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
- 3) Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.

l. Control:

- 1) The unit shall have controls provided by Daikin to perform input functions necessary to operate the system.
- 2) The unit shall be compatible with interfacing with a BMS system via BACnet gateways.
- 3) The unit shall be compatible with a Daikin Intelligent Touch Manager advanced multi-zone controller.
- 4) Provide Daikin Navigation Remote Controller with Each Unit

m. Optional Accessories Available:

- 1) MERV 8 Filter kit. Can be configured for right or left access. Filters replaceable without tools. See plans for units with special space and filter access requirements. Provide filter rack/access as indicated.

## 1.2 FXFQ\_T – ROUND FLOW SENSING CEILING CASSETTE UNIT

- A. General: Daikin indoor unit model FXFQ\_T shall be a round flow ceiling cassette fan coil unit, operable with R-410A refrigerant, equipped with an electronic expansion valve, direct drive DC (ECM) type fan, for installation into the ceiling cavity equipped with an air panel grill. It shall be available in capacities from 7,500 Btu/h to 48,000 Btu/h. Model numbers are FXFQ07TVJU, FXFQ09TVJU, FXFQ12TVJU, FXFQ15TVJU, FXFQ18TVJU, FXFQ24TVJU, FXFQ30TVJU, FXFQ36TVJU, FXFQ48TVJU to be connected to outdoor unit model RXYQ / RXYMQ / RWEYQ heat pump and REYQ / RWEYQ heat recovery model. It shall be a round flow air distribution type, fresh white, impact resistant decoration panel, or optional self-cleaning filter panel. The supply air is distributed via four individually motorized louvers. To save energy and optimize occupancy comfort, the indoor unit shall be equipped with built in occupancy sensor and surface temperature sensor.

23 81 40-10



Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while limiting changes in room temperature when used with Daikin remote control BRC1E72, BRC1E73, BRC2A71 and BRC1E52B7. The indoor units sound pressure shall range from 30 dB(A) to 45 dB(A) at High speed measured at 5 feet below the unit.

B. Performance: Each unit’s performance is based on nominal operating conditions:

<b>Model Number</b>	<b>Cooling(Indoor 80°F DB / 67°F WB, Outdoor 95°F DB, 25 ft pipe length)</b>	<b>Heating(Indoor 70°F DB Outdoor 47F / 43F, 25 ft pipe length)</b>
FXFQ07TVJU	7,500	8,500
FXFQ09TVJU	9,500	10,500
FXFQ12TVJU	12,000	13,500
FXFQ15TVJU	15,000	16,500
FXFQ18TVJU	18,000	20,000
FXFQ24TVJU	24,000	27,000
FXFQ30TVJU	30,000	34,000
FXFQ36TVJU	36,000	40,000
FXFQ48TVJU	48,000	54,000

C. Indoor Unit:

1. The Daikin indoor unit FXFQ\_T shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate drain pump, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.
2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
3. Both refrigerant lines shall be insulated from the outdoor unit.
4. The round flow supply air flow can be field modified to 23 different airflow patterns to accommodate various installation configurations including corner installations.

5. Return air shall be through the concentric panel, which includes a resin net, mold resistant, antibacterial filter.
6. The indoor units shall be equipped with a condensate pan with antibacterial treatment and condensate pump. The condensate pump provides up to 33-1/2" of lift from bottom of unit to top of drain piping and has a built in safety shutoff and alarm.
7. The indoor units shall be equipped with a return air thermistor.
8. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
9. The voltage range will be 253 volts maximum and 187 volts minimum.
10. To save energy and optimize occupancy comfort, the indoor unit shall be equipped with built in occupancy sensor and surface temperature sensor.
11. Supplied air shall be directed automatically by four individually controlled louvers.

D. Unit Cabinet:

1. The cabinet shall be space saving and shall be located into the ceiling.
2. Four auto-adjusted louvers shall be available to choose, which include standard, draft prevention and ceiling stain prevention.
3. The airflow of the unit shall have the ability to shut down outlets with multiple patterns allowing for simpler installation in irregular spaces.
4. Fresh air intake shall be possible by way of Daikin's optional fresh air intake kit.
5. A branch duct knockout shall exist for branch ducting of supply air.
6. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.
7. Optional high efficiency air filters are available for each model unit.

E. Fan:

1. The fan shall be direct-drive DC (ECM) type fan, statically and dynamically balanced impeller with three fan speeds available.

23 81 40-12

2. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz with a motor output range from 0.08 to 0.16 HP.
3. The airflow rate shall be available in three manual settings.
4. The DC fan shall be able to automatically adjust the fan speed in 5 speeds based on the space load.
5. The fan motor shall be equipped as standard with adjustable external static pressure (ESP) settings to allow operation with the high efficiency air filter options.
6. The fan motor shall be thermally protected.

F. Filter:

1. The return air shall be filtered by means of a washable long-life filter with mildew proof resin and antibacterial treatment.
2. Optional high efficiency disposable air filters shall be available.
3. Optional Self-Cleaning Filter Panel, which performs automatic filter cleaning up to once a day, with dust collection box that indicates when to be emptied.

G. Coil:

1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
3. The coil shall be a 2, or 3-row cross fin copper evaporator coil with up to 21 FPI design completely factory tested.
4. The refrigerant connections shall be flare connections and the condensate will be 1 -1/4 inch outside diameter PVC.
5. A condensate pan with antibacterial treatment shall be located under the coil.
6. A thermistor will be located on the liquid and gas line.

H. Electrical:

23 81 40-13

1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.

I. Control:

1. The unit shall have controls provided by Daikin to perform input functions necessary to operate the system.
2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways.
3. The unit shall be compatible with a Daikin Intelligent Touch Manager advanced multi-zone controller.
4. For the Sensing functions and the optional Self-Cleaning Filter functions, Remote controller BRC1E73/BRC1E52B7 shall be used. Consult with Daikin prior to applying controls.

1.3 FXZQ-TAVJU –VISTA™ 2X2 CASSETTE UNIT

- A. General: Daikin indoor unit model FXZQ-TAVJU shall be a ceiling cassette fan coil unit, operable with R-410A refrigerant, equipped with an electronic expansion valve, for installation into the ceiling cavity equipped with a decoration panel grille. It shall be available in capacities from 5,800 Btu/h to 18,000 Btu/h. Model numbers are FXZQ05TAVJU, FXZQ07TAVJU, FXZQ09TAVJU, FXZQ12TAVJU, FXZQ15TAVJU, FXZQ18TAVJU to be connected to outdoor unit model RXYQ / RXYMQ / RWEYQ / RWEQ heat pump and REYQ / RELQ / RWEYQ / RWEQ heat recovery model. The decoration panel shall be a four-way air distribution type, with fresh white (Munsell N9.5) or Daikin Silver color, impact resistant with a washable decoration panel. The supply air is distributed via motorized louvers which can be horizontally and vertically adjusted from 0° to 90°. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while limiting changes in room temperature when used with Daikin remote controls. The indoor units sound pressure shall range from 25.5 dB(A) to 33 dB(A) at low speed

23 81 40-14

measured at 5 feet below the unit.

B. Performance: Each unit's performance is based on nominal operating

Model Number	Cooling (Indoor 80°F DB / 67°F WB, Outdoor 95°F DB, 25 ft pipe length)	Heating (Indoor 70°F DB / 60°F WB, Outdoor 47°F DB, 25 ft pipe length)
FXZQ05TAVJU	5,800	6,500
FXZQ07TAVJU	7,500	8,500
FXZQ09TAVJU	9,500	10,500
FXZQ12TAVJU	12,000	13,500
FXZQ15TAVJU	15,000	17,000
FXZQ18TAVJU	18,000	20,000

C. Indoor Unit:

1. The Daikin indoor unit FXZQ-TAVJU shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, flare connections, condensate drain pan, condensate drain pump, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.
2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
3. Both refrigerant lines shall be fully insulated from the outdoor unit or nearest branch connection into the refrigerant network.
4. The 4-way supply air flow can be field modified to 3-way and 2-way airflow to accommodate various installation configurations including corner installations.
5. Return air shall be through the concentric panel, which includes a resin net mold resistant filter.
6. The indoor units shall be equipped with a condensate pan and condensate pump. The condensate pump provides up to 24-13/16" of lift, measured from the drain outlet, and has a built in safety shutoff and alarm.
7. The indoor units shall be equipped with a return air thermistor.
8. The indoor unit will be powered with 208~230V/1-phase/60Hz.

23 81 40-15

9. The voltage range will be 253 volts maximum and 187 volts minimum.

D. Unit Cabinet:

1. The cabinet shall be space saving and shall be located into the ceiling.
2. Three auto-swing positions shall be available to choose from via field setting.
3. The airflow of the unit shall have the ability to shut down one or two sides allowing for simpler corner installation.
4. Fresh air intake shall be possible by way of direct duct installation to the side of the indoor unit cabinet.
5. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.

E. Fan:

1. The fan shall be driven by a direct-drive DC motor with statically and dynamically balanced impeller and shall have three user-selectable speeds available: high, medium, and low.
2. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz with a motor output of 50W.
3. The airflow rate shall be available in high, medium, and low settings.
4. When FXZQ-TAVJU is connected with either the BRC1E73 Navigation Remote Controller or the DCM601A71 I-Touch Manager, the Auto fan mode shall be selectable.

F. Filter:

1. The return air shall be filtered by means of a washable long-life filter with mildew proof resin.

G. Coil:

1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.

23 81 40-16

3. The coil shall be a 2-row cross fin copper evaporator coil with 22 FPI design completely factory tested.
4. The refrigerant connections shall be flare connections and the condensate will be 1 -1/32 inch outside diameter PVC.
5. A condensate pan shall be located under the coil.
6. A condensate pump with a 24-13/16" lift, measured from the drain outlet, shall be located below the coil in the condensate pan with a built in safety alarm.
7. A thermistor will be located on the liquid and gas line.

H. Electrical:

1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.

I. Control:

1. The unit shall have controls provided by Daikin to perform input functions necessary to operate the system.
2. The unit shall be compatible with a Daikin Intelligent Touch Manager advanced multi-zone controller.

## PART 3 EXECUTION

### 2.1 EXAMINATION

- A. Contractor shall verify that proper power supply is available.

### 2.2 INSTALLATION

- A. Contractor shall install in accordance with manufacturer's instructions.

23 81 40-17

## 2.3 MANUFACTURER'S FIELD SERVICES

- A. The contractor shall furnish manufacturer complete submittal wiring diagrams of the package unit as applicable for field maintenance and service.

END OF SECTION

23 81 40-18

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas



## SECTION 26 00 10

### GENERAL ELECTRICAL PROVISIONS

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Furnish and install all electrical wiring, systems, equipment and accessories in accordance with the specifications and drawings. Specifications and drawings are complimentary except that, in case of conflict, the most stringent will govern.
- B. Judgment shall be exercised to install electrical work in a practical manner to function properly, simplify future maintenance, and to fit building construction and finish. Items not shown or specified which are required to produce a complete, operative and finished system shall be provided.
- C. The electrical plans are a guide to the Contractor to show general arrangement of conduit and wiring and equipment required. If any error omissions or obscurities appear therein, which are questionable, do not conform to good practice, or appear contrary to the purpose and intent of the work, the Contractor shall promptly notify the Architect and Engineer and apply for directions before construction. The exact location of conduit runs and lengths shall be determined by the Contractor in the field.
- D. The drawings may be superseded by later revised or detailed drawings or specification addenda prepared by the Architect. The Contractor shall conform to all reasonable change without extra cost to the Owner. All items not specifically mentioned in the specifications or noted on the drawings, but which are obviously necessary to make a complete working installation, shall be included.
- E. Examine the premises in accordance with Division 1 and Division 2 of the specifications.
- F. The Owner may furnish some equipment. Electrical Contractor is responsible to check the drawings and specifications for equipment that will be furnished by the Owner. Furnish the electrical connections, etc., on all Owner furnished equipment.
- G. Should the particular equipment which any bidder proposes to install, require other space conditions than those indicated on the drawings, arrange for such space with the Engineer before submitting a bid. Should changes become necessary because of failure to comply with this clause, install the changes without additional expense.

26 00 10-1

- H. Where electrical equipment is installed that causes electrical noise interference with other electrical systems installed under this contract, equip the offending equipment with isolating transformers, filters, shielding or any other means as required for the satisfactory suppression of the interference as determined by the Engineer.
- I. Comply with National Electric Code, NFPA, appropriate Building Code, and all local, state, and national ordinances.

## 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. The General Conditions and Supplementary General Conditions of the contract are an integral part of Division 26 of the Specifications. Carefully note its contents in performance of the work.
- B. The General Requirements as included in Division 1 of the Specifications are an integral part of Division 26. Carefully note its contents in performance of the work.
- C. Examine all of the contract drawings and specifications, field verify existing conditions, or otherwise determine the extent of related work in other divisions before submitting a quotation for the work in this division. Coordinate the work in this division with work in other divisions through the Electrical Contractor. No extra payment will be made for additional work required by failure to coordinate the work. Should drastic changes from original drawings be necessary, the Contractor shall notify the Architect and secure written approval and agreement from the Architect on necessary adjustments.
- D. The architectural, mechanical and structural plans and specifications, including Information to Bidders and other pertinent documents issued by the Architect or Engineer are a part of this Specification and the accompanying electrical plans. Comply with them in every respect. Examine all the above carefully.
  - 1. Failure to comply does not relieve the Contractor of responsibility nor may it be used as a basis for additional compensation due to omission of architectural, mechanical and structural details from the electrical drawings.
- E. Related work in other divisions requiring cooperation and coordination with this division includes, but is not limited to, the following:
  - 1. Power arranged under Division 1.
  - 2. Perform all cutting and patching as required under Division 1.

26 00 10-2

3. Furnish all sleeves, inserts, anchors and supports required by this work to be installed in concrete or masonry and coordinate with the respective trades under Division 3 and 4 for proper locations and installation.
4. Flash and seal roof penetrations in accordance with Division 7. Furnish locations and sizes and coordinate the installation with the respective trade.
5. Perform painting of electrical equipment and materials in finished areas as required under Division 9. Touch up or prime any surfaces required in this division in accordance with Division 9. Provide factory finishes as specified in other sections of this division.
6. Install branch circuits and make final connections to any equipment requiring electric power that is furnished and installed by the Contractor or by the Owner. Perform the electrical work according to approved shop drawings.
7. Install empty raceways and outlet boxes or branch circuits for equipment to be furnished by others and installed after completion of the contract.
8. Install and connect motor starters furnished under Division 23 where starters are not an integral part of the equipment. Insure that starters generally conform to the requirements of this division.
9. 120 volt control wiring is furnished and installed by the Electrical Contractor in accordance with the requirements of Division 23.
10. Mechanical equipment control conduit system furnished and installed by the Mechanical Contractor.
11. Motors are furnished and installed generally as an integral part of equipment specified under Division 23 and must conform to the requirements of this division.

### 1.3 FEES, PERMITS AND INSPECTIONS

- A. Obtain any and all required permits in connection with this work under the Contract and pay any and all fees in connection therewith to include fees by the utility companies.
- B. Under this section of work the Contractor shall, upon completion of the work, furnish a certificate of final inspection to the Architect from the inspection department having jurisdiction.

26 00 10-3

## 1.4 CODES AND STANDARDS

- A. All work shall be done in a good workmanlike manner. Materials and workmanship shall comply with all applicable local state and federal codes including, but not limited to, the following:
1. National Electrical Code, Latest Edition (NEC).
  2. Underwriters' Laboratories, Inc. (UL).
  3. Institute of Electrical and Electronic Engineers (IEEE).
  4. Insulated Power Cable Engineers' Association (IPCEA).
  5. National Electrical Manufacturers' Association (NEMA).
  6. American Standards Association (ASA).
  7. American Society for Testing Materials (ASTM).
  8. State Fire Prevention Code.
  9. Occupational Safety and Health Act (OSHA).
  10. National Fire Protection Association (NFPA).
  11. International Building Code (IBC).
- B. Comply with all State and Federal ADA Accessible Guidelines in regard to accessible or handicapped features.
- C. The latest specifications and standards available shall be used for the above.
- D. In case of discrepancy between the applicable codes, plans and specifications, the most stringent shall govern.
- E. Should the Contractor perform any work that does not comply with requirements of the applicable authorities, he shall bear all cost arising in correcting the deficiencies.
- F. Equipment and materials which are not covered by UL standard will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory.

26 00 10-4

## 1.5 DEMOLITION

- A. Coordinate all demolition with the General Contractor. All existing wiring is to be removed as necessary. Reuse existing circuits for relocated devices and light fixtures.

## PART 2 PRODUCTS

### 2.1 QUALIFICATION (PRODUCTS AND SERVICES)

- A. Approvals are required of products or services of proposed manufacturers, suppliers and installers and will be based upon submission by Contractor of certification.
- B. Manufacturer's Qualifications, provide submittal information with the following:  
Manufacturer regularly and presently manufactures as one of the manufacturer's principal products the following items and has manufactured these items for at least five (5) years.
  1. Wire and Cable - all types.
  2. Light Fixtures.
  3. Lighting Switches and Receptacles.
  4. Dimmers.
  5. Molded Case Circuit Breakers.
  6. Fuses.
  7. Conduit.
  8. Wiring Devices.
  9. Low Voltage Fusible and Non-Fusible Switches.
  10. Fire Alarm Systems and Equipment.
  11. Conduit Supports and Fittings.
  12. Panelboards.
  13. Fire Sealant.
  14. Structured Telecommunications Cabling.

26 00 10-5

- C. Manufacturer's product submitted must have been in satisfactory operation on three (3) installations similar to this project for approximately five (5) years.
- D. There must be a permanent service organization maintained or trained by manufacturer which will render satisfactory service to this installation within eight (8) hours of receipt of notification that service is needed.
- E. Installer must have the technical qualifications, experiences, trained personnel and facilities to install specified items including at least three (3) years of successful installation of electrical work similar to that required on this project. Approval will not be given where the experience record is one of unsatisfactory performance.
- F. The lighting wholesale supplier shall have an office and a stocking warehouse within 100 miles of the project site. The distributor/manufacturer's representative shall have an office within 100 miles of the project site, and shall have on staff a full time lighting designer as well as personnel who are available to service the project after completion.

## 2.2 MANUFACTURED PRODUCTS

- A. Insure that materials and equipment furnished is of current production by manufacturers regularly engaged in the manufacture of such items for which replacement parts should be available.
  - 1. Items not meeting this requirement but which otherwise meet technical specifications and merits of which can be established through reliable test reports or physical examination of representative samples will be considered.
- B. Provide products of a single manufacturer when more than one (1) unit of the same product is needed.
- C. Equipment Assemblies and Components:
  - 1. All components of an assembled unit need not be products of the same manufacturer.
  - 2. Manufacturers of equipment assemblies which include components made by others must assume complete responsibility for the final assembled unit.
  - 3. Components must be compatible with each other and with the total assembly for the intended service.

26 00 10-6

4. Constituent parts which are similar must be the product of a single manufacturer.
  5. Moving parts of any element of equipment of the units normally requiring lubrication must have means provided for such lubrication and must be adequately lubricated at factory prior to delivery.
- D. Identify all factory wiring on the equipment being furnished and on all wiring diagrams.
  - E. Equipment and materials shall be new and shall bear the manufacturer's name, trade name and the UL label in every case where a standard has been established for the particular material.
  - F. Equipment and materials of the same general type shall be of the same make throughout the work to provide uniform appearance, operation and maintenance.
  - G. Dimensions: It shall be the responsibility of the Contractor to insure that items furnished fit the space available. He shall make necessary field measurements to ascertain space requirements, including those for connections, and shall furnish and install such sizes and shapes of equipment that the final installation shall suit the true intent and meaning of the drawings and specifications. Dimensions are to be taken from the architectural drawings.
  - H. Manufacturer's directions shall be followed completely in the delivery, storage, protection and installation of equipment and materials. Notify the Architect of any conflict between any requirement of the contract documents and the manufacturer's directions and obtain the Architect's written instruction before proceeding with the work. Should the Contractor perform any work that does not comply with the manufacturer's directions or such written instructions from the Architect, he shall bear all costs arising in correcting the deficiencies.
  - I. The Contractor shall provide and install all accessories, and incidental items to complete the work, ready to use and fully operational.

### 2.3 EQUIPMENT RATINGS AND APPROVAL OF "EQUAL" EQUIPMENT

- A. Equipment voltage ratings must be in accordance with the requirements indicated on the drawings or as specified.
- B. Obtain written approval for any equipment which differs from the requirements of the drawings and specifications.

26 00 10-7

1. Furnish drawings showing all installation details, shop drawings, technical data and other pertinent information as required.
  2. Approval by the Engineer of the equal equipment does not relieve the Contractor of the responsibility of furnishing and installing the equipment at no additional cost.
  3. Furnish and install any other items required for the satisfactory installation of the equal equipment at no additional cost. This includes, but is not limited to, changes in branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels, and correlation with other work, subject to the jurisdiction and approval of the Engineer.
- C. Equipment and materials specified herein are named to establish a standard of quality. Other material of equal quality may be substituted per Section 01 60 00 and with approval by the Architect.
- D. It is the responsibility of the Contractor to investigate any desired substitutions for specified equipment prior to submission of his bid. The contractor shall be responsible for any changes required in mechanical, electrical or structural systems resulting from equipment substitutions and shall bear all costs for those changes whether the substitute equipment is named by Architect for "equal" consideration or not. All changes shall be accomplished in a manner acceptable to the Architect at no additional cost to the Owner.
- E. In order to obtain prior approval on equipment or material not specified in Division 26, 27 and 28 Specifications or Equipment Schedules, Contractor MUST submit to the Engineer any proposed equipment or material ten (10) working days prior to the bid date.

## 2.4 EQUIPMENT PROTECTION

- A. Store all materials and equipment to be installed in the work so as to insure the preservation of their quality, workability, and fitness for the work intended. Provide storage provisions for protection from the elements, rust and physical damage. Place stored materials on clean, hard surfaces above ground and keep covered at all times to insure protection from paint, plaster, dust, water and other construction debris or operations. Install heaters under the protective cover where the equipment may be damaged due to moisture and weather conditions. Keep conduit ends plugged or capped and all covers closed on boxes, panels, switches, fixtures, etc., until installation

26 00 10-8



of each item. Store all plastic conduit or duct out of direct sunlight in shaded areas. Located stored materials and equipment to facilitate prompt inspection. All boxes and packaging must remain intact.

- B. Protect during installation, all equipment, controls, controllers, circuit protective devices, etc., against entry of foreign matter on the inside and be vacuum clean both inside and outside before testing, operating and painting.
- C. Replace damaged equipment, as determined by the Engineer, in first class operating condition or return to source of supply for repair or replacement.
- D. Protect painted surfaces with removable heavy Kraft paper, sheet vinyl or equal, installed at the factory and removed prior to final inspection.
- E. Repair damaged paint on equipment and materials. Finish with same quality of paint and workmanship as used by manufacturer so repaired areas are not obvious.
- F. All lighting fixtures are to be stored on the project in their original factory cartons.

## 2.5 EQUIPMENT ACCESSORIES

- A. Furnish and install all equipment, accessories, connections and incidental items necessary to fully complete all work, ready for use, occupancy and operation by the Owner.
- B. Where equipment requiring different arrangement or connections from those shown is provided, install the equipment to operate properly and in harmony with the intent of the drawings and specifications.
- C. Support, plumb, rigid and true to line all work and equipment included. Study thoroughly all general, structural, electrical and mechanical drawings, shop drawings and catalog data to determine how equipment is to be supported, mounted or suspended and provide extra steel bolts, inserts, pipe stands, brackets and accessories for proper supports whether or not shown on the drawings. When directed, submit drawings showing supports.

## PART 3 EXECUTION

### 3.1 WORK PERFORMANCE

- A. Furnish and install a temporary electrical distribution system of adequate feeder sizes to prevent excessive voltage drop. Install all temporary work in a neat and safe

26 00 10-9

manner. Provide temporary lighting as necessary to furnish 2.5 footcandles on all work surfaces.

- B. Field coordinate with other trades in ample time to build all chases and openings, set all sleeves, inserts and concealed materials, and provide clearances that may be required to accommodate materials and equipment. Lay out electrical work so that in case of interference with other items the layout may be altered to suit conditions encountered.
- C. Cutting and Patching:
  - 1. The Electrical Contractor shall be responsible for all required cutting, patching, etc., incidental to this work and shall make all required repairs thereafter to the satisfaction of the Engineer. Do not cut into any structural element, beam or column without the written approval of the Engineer.
  - 2. Pipes, conduits, cables, wires, wire ducts and similar equipment that pass through fire or smoke barriers shall be protected in accordance with NFPA 101.
- D. Wall Penetrations: When conduit, wireways, bus duct and other electrical raceways pass through fire partitions, fire walls, or walls and floors, install a firestop that provides an effective barrier against the spread of fire, smoke and gases. Firestop material must be packed tight and completely fill clearances between raceways and openings. Use firestop material conforming to the following:
  - 1. All wall penetrations shall be caulked and sealed. Provide fire barrier pillows to protect the interior of conduits/sleeves passing through fire rated walls.
  - 2. The Contractor shall furnish and install all necessary sleeves and chases for all work passing through and attaching to walls, ceilings or the roof.
  - 3. Provide UL listed, fire rated poke through devices for floor penetrations as required by the Standard Building Code, National Fire Code and Life Safety Code.
  - 4. Provide UL approved fire rated chases and fire sealing as required to maintain fire rating for all penetrations in fire rated walls.
  - 5. Firestopping material must be of the latest type as supplied by leading manufacturers such as "3M".

26 00 10-10

6. Floor, exterior wall and roof seals must be watertight. Sleeve walls and floors which are cored for installation of conduit with steel tubing, grouted and the space between the conduit and sleeve filled as specified herein. Where conduits pierce the roof, refer to architectural specifications and drawings for details. Provide pourable sealant as specified by the Roofing Contractor.
- E. Do not use electrical hangers and other supports for other than electrical equipment and materials. Provide not less than a safety factor of five (5) and conform with any specific requirements as shown on the drawings or in the specifications.
- F. Do not deviate from the plans and specifications without the full knowledge and consent of the Engineer. Should, at any time during the progress of the work, a new or existing condition be found which makes desirable a modification of the requirements of any particular item, report such item promptly to the Engineer for his decision and instruction.
- G. Notify all other contractors of any deviations or special conditions. Resolve interferences between the work of the various contractors prior to installation. Remove, if necessary, work installed which is not in compliance with the plans and specifications as specified above, and properly reinstall without additional cost to the Owner.
- H. This Contractor shall furnish all necessary scaffolding, cranes, tackle, tools and appurtenances of all kinds, and all labor required for the safe and expeditious execution of his contract.

### 3.2 EQUIPMENT INSTALLATION AND EQUIPMENT

- A. Installation:
  1. "Provide" and "Install" as used on the drawings and in the specifications means furnish, install, connect, adjust and test except where otherwise specified.
  2. Install coordinated electrical systems, equipment and materials complete with auxiliaries and accessories installed.
- B. Equipment Location: As close as practical to locations shown on drawings.
- C. Working Spaces: Not less than specified in the National Electrical Code for all voltages specified.
- D. Inaccessible Equipment:

26 00 10-11

1. Where the Engineer determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, remove and reinstall equipment as directed at no additional cost.
  2. "Conveniently Accessible" is defined as being capable of being reached without the use of ladders or without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping and ductwork.
- E. Equipment and Materials:
1. Install new equipment and materials unless otherwise specified.
  2. Insure that equipment and materials are designed to provide satisfactory operation and operating life for environmental conditions where being installed. NEC and other code requirements applied to the installation and other code requirements apply to the installation in areas requiring special protection such as explosion proof, vapor-proof, water tight and weather-proof construction.

### 3.3 EQUIPMENT IDENTIFICATION

- A. In addition to the requirements of the National Electrical Code, install identification signage which will clearly indicate information required for use and maintenance of items such as panelboards, cabinets, motor controllers (starters), safety switches, time clocks, contactors, separately enclosed circuit breakers, individual breakers, and controllers in switchgear and motor control assemblies, control devices and other significant equipment.

### 3.4 DRAWINGS AND SPECIFICATIONS

- A. The drawings and specifications indicate the requirements for the systems, equipment, materials, operation and quality. They are not to be construed to mean limitation of competition to the products of specific manufacturers.

### 3.5 SYSTEM VOLTAGES

- A. System voltage is 120/208 volts, three-phase, four-wire.

### 3.6 SUBMITTALS

- A. Obtain the Engineer's approval for all equipment and materials before purchasing or delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval is not permitted at the job site. Only equipment and

26 00 10-12

material which have been approved by submittals may be used on this project. Refer to Section 26 00 10, Paragraph 2.3.E for substitutions.

- B. Include in all submittals adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Engineer to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval must be legible and clearly identify equipment being submitted.
- C. Submit to the Engineer within (30) days after the awarding of the Contract, a complete set of brochures of shop drawings and descriptive data of all material and equipment proposed for the installation. All information shall be submitted electronically in "pdf" format, and shall be separated into electronic "pdf" files in three groups, lighting, switchgear and all others.
- D. The submittals must include the following:
  - 1. Information which confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
  - 2. Elementary and interconnection wiring diagrams for communication and signal systems, control system and equipment assemblies. All terminal points and wiring must be identified on wiring diagrams.
  - 3. Parts list which must include those replacement parts recommended by the equipment manufacturer.
  - 4. Approvals will be based on complete submission only.
- E. Furnish shop drawings for the work involved in sufficient time so that no delay or changes will be caused. Thermofax copies are not acceptable - only permanent type prints are allowed.
- F. Verify that shop drawings comply in all respects with the item originally specified. It is the Contractor's responsibility to procure the proper sizes, quantities, rearrangements, structural modifications or other modifications in order for the substituted item to comply with the established requirements.
- G. Any shop drawings prepared to illustrate how equipment, conduit, fixtures, etc., can be fitted into available spaces will be examined under the assumption that the Contractor has verified all the conditions. Obtaining approval thereon does not relieve the

26 00 10-13

Contractor of responsibility in the event the material cannot be installed as shown on the drawings.

- H. Shop drawings need not cover detailed installation drawings prepared for the Contractor's own use, but be limited, as in the case of raceways, to necessary departures from the plans as prepared by the Engineer.
- I. Submit working scale drawings of apparatus and equipment which in any way varies from these specifications and plans, to be reviewed by the Engineer before the work is started. Correct interferences with the structural conditions before the work proceeds.
- J. Submit all shop drawings at the same time in a loose-leaf binder with double index as follows:
  - 1. List the products by designated letter or number as indicated on plan sheets.
  - 2. List the name and manufacturers whose products have been incorporated in the work alphabetically together with their addresses and the name and addresses of the local sales representative.
  - 3. Provide indexes with sheet numbers and quantities of the products listed.

### 3.7 TESTS AND DEMONSTRATION

- A. As equipment and materials are being installed and connected, test the installation for the following:
  - 1. Short circuits and ground faults.
  - 2. Insulation resistance at 500 volts DC.
  - 3. Grounding continuity.
- B. After tests are completed and necessary corrections are made, put each system into operation and demonstrate its performance to the satisfaction of the Owner's authorized representative.
- C. Provide written documentation of tests and performance as requested by the Owner's authorized representative. The results are to be made part of the Closeout Documents.
- D. Furnish all instruments, test equipment and personnel that are required for the particular test. Certify that equipment and gauges are in good working order. Remove equipment subject to damage during test from line before test is applied.

26 00 10-14

- E. After installation is complete the Contractor shall conduct operating test of all electrical systems for approval by the Architect. Test shall include verification of direction of rotation for all motors. The equipment shall be demonstrated to operate in accordance with the requirements of the plans and specifications. The test shall be performed in the presence of the Architect or Engineer.
- F. Provide certified test of the grounding electrode system. It shall test to 5 ohms or less.

### 3.8 COMPLETION AND ACCEPTANCE

- A. Upon completion of the work and before final acceptance, perform the duties and provide the documents as follows in accordance with the General Conditions, Supplementary Conditions and Division 1 of Contract.
- B. Remove all rubbish, tools and surplus materials accumulated during the execution of the work in this Division.
- C. Touch up any equipment or finishes damaged during delivery or installation from the work in this Division.
- D. Provide a written one-year guarantee of materials and work except for items that are specified to have a longer warranty. Items that have a published or normal life expectancy of less than one year, such as incandescent lamps are to be covered by the manufacturer's guarantee.
- E. Provide systems and equipment installation, operating and maintenance instructions and catalog data for transmittal to the Owner. Place the data in a loose-leaf binder which contains an index of the products listed alphabetically by name and a separate index listing the manufacturers alphabetically by name and including the manufacturer's address and the name and address of their local representative.
- F. Instruct the Owner's representative in the proper operation and maintenance of the systems and their elements as required or directed to familiarize the Owner in the operation and maintenance of the systems.

### 3.9 RECORD DRAWINGS

- A. The Contractor shall keep a neat and accurate record of field changes made during construction. Changes shall be penciled in on a separate set of drawings used only for recording changes. At completion of the project the Contractor shall deliver this set to the Architect for preparation of record drawings.

26 00 10-15

- B. Record drawings shall include corrected panel schedules and riser diagram as well as all plan sheets.

### 3.10 FINALLY

- A. It is the intention that this specifications shall provide a complete installation. All accessories and apparatus necessary for complete operational systems shall be included. The omission of specific reference to any part of the work necessary for such complete installation shall not be interpreted as relieving this Contractor from furnishing and installing such parts.

END OF SECTION

26 00 10-16



## SECTION 26 05 19

### WIRES AND CABLES

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Wires and cables.

##### 1.2 RELATED WORK

- A. Section 26 05 53: Identification.

#### PART 2 PRODUCTS

##### 2.1 MATERIALS

- A. Wire and cable shall be new, shall have size, grade of insulation, voltage and manufacturer name, permanently marked on outer covering at regular intervals.
- B. Building Wiring: 95% conductivity, soft drawn conforming to requirements of the NEC and relevant ASTM specifications, copper, 600 volt insulation, dual rated THHN-THWN.
- C. Branch Circuit Wiring: Conductors smaller than No. 12 AWG not permitted; No. 8 AWG and larger, stranded construction; smaller than No. 8, either solid or stranded.
- D. Fire Alarm System Wiring: UL Listed plenum-rated cable for conductors installed in plenum rated spaces. Coordinate with Authority Having Jurisdiction.
- E. Exterior Wiring: Bare stranded for ground, THWN-THHN for all other.
- F. Use pre-insulated pressure connectors such as Scotchlock on stranded conductors No. 10 and smaller. Use approved high-pressure crimp sleeve connectors on No. 8 and larger conductors.
- G. Where allowed by local inspecting authorities, type "MC" cable shall be allowed for fixture whips. It shall be installed using proper fittings and installation tools per NEC.
- H. Low voltage cable is to be installed in conduit in areas with no ceiling or inaccessible hard ceiling.

26 05 19-1

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Make conductor length for parallel feeders identical.
- B. Lace or clip groups of conductors at panelboards, pull boxes and wireways.
- C. Provide copper grounding conductors and straps.
- D. Install wire and cable in code conforming raceway.
- E. Use wire pulling lubricant for pulling No. 4 AWG and larger wire.
- F. Install wire in conduit runs after concrete and masonry work is complete and after moisture is swabbed from conduits.
- G. Splice only in accessible junction or outlet boxes. Install splices and taps which have mechanical strength and insulation rating equivalent-or-better than conductor and are compatible with conductor material.
- H. Color code conductors to designate neutral conductor and phase as follows: 120/208V (phases) black, red, blue, (neutral) white, (ground) green; 277/480V (phases) orange, brown, yellow, (neutral) white with color stripe, (ground) green.
- I. All 20 amp circuits are 2-#12, 1-#12 ground unless noted. Use #10 AWG conductors on 20 amp branch circuits which exceed 75 feet to the first outlet.
- J. Install home runs as indicated on the panel schedules. Circuits may be grouped into 3-Phase home runs but in no case are more than 3 phase conductors allowed.
- K. Sharing of neutrals is not allowed, to include lighting and power circuits.
- L. Where conduit and wire are installed on the roof, refer to NEC Section 310.15.(B.)(2)(C) for derating/correcting factors for the distance installed from the roof.
- M. No low-voltage wiring is to be visible in open ceiling areas; install in conduit.

### 3.2 MARKING

- A. Identify circuits using wire markers at the following locations:

26 05 19-2

1. All power and lighting branch circuits and feeders at pull boxes, fixtures, outlets, motors, etc., indicating panel and circuit number at which each circuit or feeder originates.
2. All branch circuits in the panelboard gutters indicating corresponding branch circuit numbers.
3. All signal and control wires at all termination points such as cabinets, terminal boxes, equipment racks, control panels, consoles, etc. Install in accordance with approved schedules prepared by the equipment manufacturer or by the Contractor.
4. Mark both ends of all pull wires with tag reading "PULL WIRE" and numbered to refer to the same pull wire.

END OF SECTION

26 05 19-3

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas



## SECTION 26 05 26

### GROUNDING

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Power system grounding.
- B. Communication system grounding.
- C. Building ground system.

##### 1.2 RELATED WORK

- A. Section 26 05 19: Wires and Cables.
- B. Section 26 05 34: Conduit.

##### 1.3 REGULATORY REQUIREMENTS

- A. Install complete grounding system for the building(s) and all electrical equipment in accordance with National Electrical Code, Section 250.

#### PART 2 PRODUCTS

##### 2.1 GROUNDING

- A. Provide copper grounding conductors for grounding connections sized according to NEC.

#### PART 3 EXECUTION

##### 3.1 POWER SYSTEM GROUNDING

- A. Install NEC sized ground conductor, #12 AWG minimum, in all branch circuit and equipment conduits.
- B. Bonding Jumpers: Provide green insulated wire, size correlated with over-current device protecting the wire. Connect to neutral only at service neutral bar.
- C. Bonding Wires: Install bonding wire in flexible conduit connected at each end to a grounding bushing.

26 05 26-1

- D. No strap type grounding clamps shall be used. All connections shall be made only after surfaces have been cleaned or ground to exposed metal.
- E. The building structural steel shall be grounded as follows:
  - 1. All locations noted on the plans or if not shown, at approximately 75 foot intervals where structural columns are located.
  - 2. All grounding locations are to be made with 1/0 bare copper wire with exothermic welds or Burndy "HyGround" to the column, to in-footing rebar, and to a 3/4" x 8' copper ground rod. Include "Eupher" grounds at all locations shown with grounding symbol.
- F. Provide one 1-1/0 bare copper ground wire from the electrical service, and from nearest branch panel, grounding electrode, in 1 1/4" conduit, to the location of each telephone terminal board and Data Room. Provide "Intersystem Bonding Termination" bars at these locations and at the electrical meter where applicable. Termination bars in data or telephone rooms are to be equal to Chatsworth Products, Inc; Model 40153-020. Ground all equipment and metal parts using #6 bare copper ground from this terminal bar.
- G. Bond the neutral (grounded conductor) to ground at one location only once per building at the building's main service disconnect. Bond per NEC Article 250.
- H. Ground cable trays per N.E.C.

END OF SECTION

26 05 26-2

## SECTION 26 05 29

### SUPPORTING DEVICES

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Conduit supports.

#### PART 2 PRODUCTS

##### 2.1 CONDUIT SUPPORTS

- A. Single Runs: Galvanized conduit straps or ring bolt type hangers with specialty spring clips. All "Caddy" and "B-Line" hangers are approved.
- B. Multiple conduits running horizontally at the same grade and elevation may be supported by trapezes or channels suspended on rods. All support components shall be adequate size for loaded weights being supported. Provide conduit racks with 25% spare capacity.
- C. Perforated strap iron or wire shall not be used for supporting conduits or equipment.
- D. Where large conduits are supported beneath bar joist, hanger rods shall be secured to angle irons of adequate size. Each angle shall span two or more joist to distribute the weight properly.
- E. Supports shall be installed within three (3) feet of each coupling or connector.
- F. Vertical Runs: Channel support with conduit fittings, clamp type supports where conduits penetrate floors.

##### 2.2 ANCHOR METHODS

- A. Hollow Masonry: Toggle bolts or spider type expansion anchors.
- B. Solid Masonry: Lead expansion anchors or preset inserts.
- C. Metal Surfaces: Machine screws, bolts or welded studs.
- D. Wood Surfaces: Wood screws.
- E. Concrete Surfaces: Self drilling anchors or power driven studs.

26 05 29-1

## 2.3 METAL FRAMING SYSTEMS

- A. Provide metal framing systems for electrical equipment and conduits as required for proper support spacing and approved for the purpose. Powerstrut, Unistrut, Kindorf or equal.

## 2.4 CABLE SUPPORTING SYSTEMS

- A. Along each corridor on one side of the corridor, install cable supports, above the ceiling, supported by the wall studs. They shall be four tier, two-inch galvanized steel, equal to B-Line # BCH 32-4S. Install at four-foot intervals.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Layout to maintain headroom, neat mechanical appearance, and to support equipment loads required.
- B. Install horizontal supports at eight feet (8') on centers, at fittings and corners, and as required for proper support.
- C. Provide a complete installation with all channels, accessories, screws, nuts, washers, inserts, springs, clamps, hangers, clips, fittings, brackets framing fittings, post bases and brackets to provide a structural rigid support or mounting system.
- D. On the roof, provide B-Line DB series roof top support bases. Provide two supports per 10' length of conduit. Conduit to be 24" off the roof, minimum. Provide 1/2" rubber pads under the B-Line support blocks. Coordinate to be higher than other trades' piping on the roof. Install conduit in the ceiling space below where possible.

END OF SECTION

26 05 29-2



## SECTION 26 05 34

### CONDUIT

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Conduit and couplings.
- B. Flexible conduit.

##### 1.2 RELATED WORK

- A. Section 26 05 53: Identification.

#### PART 2 PRODUCTS

##### 2.1 MATERIALS

- A. Conduit/Elbows: Rigid steel threaded ANSI C80.1; electrical metallic tubing ANSI C80.3, Schedule 40 PVC.
- B. Couplings/Connectors: Threaded; liquid-tight; compression gland. Set screw type products are not allowed.
- C. Flexible Conduit: Aluminum or steel armor, plastic jacketed type with liquid-tight connectors used only at motor/equipment terminations. Connectors are to be metal.
- D. Metal Clad Cable: Type "MC" cable may be used where allowed by local codes for fixture whips only.
- E. PVC or High Density Polyethylene Conduit: HDPE or PVC conduit is acceptable for underground and innerduct applications.

##### 2.2 TYPE

- A. Utilize rigid steel conduit (3/4" minimum) in the following locations:
  - 1. In concrete.
  - 2. In exterior locations.
  - 3. Areas subject mechanical abuse.

26 05 34-1

- B. Utilize electrical metallic tubing in other locations, 3/4" minimum. Only E.M.T. is allowed in walls. E.M.T. may be Steel or Aluminum.
- C. Make connections to motors and equipment with PVC jacketed flexible conduit and liquid-tight connectors. Minimum size 1/2" for motor connections. Use 3/8" Greenfield flexible conduit only for fixture wiring. Provide sufficient length of flexible conduit to avoid transmission of vibration. Install straps per NEC.
- D. PVC conduit may be used for underground service entrance conduits and all low voltage under-slab applications. It is not to be installed exposed. Elbows for service conduits and panel feeders are to be galvanized rigid.
- E. Flexible conduit is not allowed within walls.
- F. Only service entrance conduits and panel feeder conduits may be installed under the slab, Exception being for floor boxes, cabinets and equipment located away from walls.
- G. Conduit on the roof is rigid aluminum.

## 2.3 MARKING

- A. All empty conduit shall be left with a pull string for future use, and shall be permanently marked on each end with like numbers.
- B. Mark the conduits and boxes mentioned in this Section paragraph 2.2F as to circuits included and on the record drawings.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. All wiring systems shall be installed in raceways consisting of galvanized steel tubing, PVC conduit, HDPE conduit, rigid galvanized steel, flexible steel conduit or neoprene covered flexible steel conduit.
- B. Water tight junction boxes, fittings, expansion joints, compression fittings (for use with all electrical tubing), conduit hubs, etc., shall be provided, for all electrical systems wherever construction dictates, including, but not limited to, outdoor locations.
- C. Flexible conduit used in outdoor locations or indoor locations where exposed to continuous or intermittent moisture shall be liquid tight, neoprene covered and UL listed. All fittings for such applications shall be liquid tight, nylon insulated throat

26 05 34-2

type as manufactured by Thomas and Betts, Series 5331, or approved equal.

- D. Sufficient slack shall be provided in all flexible conduit connections to reduce the effects of vibration.
- E. Insulated bushings shall be used where rigid conduit is installed in any enclosure or junction box. In addition, insulated bushings shall be used on all conduits 1 1/4-inch and larger.
- F. All conduit bends shall have a radius greater than or equal to that stipulated by the NEC.
- G. Install conduit concealed in all areas excluding mechanical and electrical rooms and conduit to fixtures in rooms without ceilings.
- H. For exposed runs, attach surface mounted conduit with clamps.
- I. Coordinate installation of conduit in masonry work.
- J. Install conduit free from dents and bruises. Plug ends to prevent entry of dirt or moisture.
- K. All conduit systems shall be installed complete and shall be cleaned out before installation of conductors.
- L. Alter conduit routing to avoid structural obstructions, minimizing crossovers.
- M. Seal conduit with glass fiber where conduits leave heated area and enter unheated area.
- N. Provide flashing and pitch pockets making watertight joints where conduits pass through roof or waterproofing membranes. Provide pourable sealant as approved by the Roofing Contractor.
- O. Install UL approved expansion fittings complete with grounding jumpers where conduits cross building expansion joints (review architectural and structural drawings and coordinate with General Contractor to determine expansion joint locations). Provide bends or offsets in conduit adjacent to building expansion joints where conduit is installed above suspended ceilings.
- P. Avoid routing conduit through public spaces with exposed structure where possible.

26 05 34-3

- Q. Route all exposed conduits parallel or perpendicular to building lines. Coordinate all exposed conduit locations with the Architect prior to rough-in.
- R. In exposed ceiling areas stub conduits feeding devices in walls out of the wall as high as possible at bottom of structure or bond beam, whichever is higher.
- S. Allow minimum of 6-inch clearance at flues, steam pipes and heat sources. Allow 12-inch clearance at telephone conduits. Where possible, install horizontal raceway runs above water and steam piping.
- T. Install conduit system from cabinets to boxes, boxes to outlet and outlet to outlet in such a manner as to be electrically continuous throughout.
- U. Make bends or offsets with approved bender or hickey.
- V. Where conduits are stubbed up for low voltage cabling or future use, do so neatly; furnish with nylon pull string, conduit caps and labeling on each end.
- W. Securely support conduits from the structure using approved type clamps, hangers and assemblies. Space supports according to manufacturer's recommendations and accepted practice. Do not support conduits from ceiling suspension system. In no case exceed support spacing per NEC maximum.
- X. Avoid installing conduit on the roof. Where necessary, support conduits via B-Line type DB supports and the appropriate strut straps. Support twice per 10' length of conduit. Use supports which hold conduit 24 inches above roof. Conduit on the roof is rigid aluminum. Provide 1/2" rubber pads under the conduit supports.
- Y. Leave a nylon pull string in all empty conduits. Terminate empty conduit stubouts with bushing manufactured for that purpose.
- Z. Install properly sized grounding conductor in all conduit.
- AA. Elbows for service and panel feeders are to be galvanized rigid conduit.
- BB. No conduit may be installed in slab. Conduit for stub-ups and panel feeders are to be installed with the top of the conduit at a minimum of four inches under the slab. Bed with one-half inch washed rock. Conduit for floor boxes is to be installed coming out of the bottom of the floor box and installed under slab.
- CC. Provide conduit for all low voltage cable installed in areas which have no ceiling or hard ceilings.

26 05 34-4

- DD. All data/telephone conduits are to be "home-run" to an area above an accessible ceiling. No "Daisy Chaining" allowed.
- EE. No "Daisy Chaining" of fixtures is allowed.
- FF. Seal conduits where they transition from underground distribution system to the interior of a building or structure, refer to N.E.C. 225.27.
- GG. Where conduit penetrates walk-in coolers or freezers it shall be non-metallic. All fittings, conduit, and boxes touching the wall of the coolers or freezers shall be non-metallic. On the non-conditioned side of the penetration provide a "seal-off" fitting and pour it with the recommended sealant after the installation of wiring. All spaces around the penetrations shall be sealed with the appropriate type sealant as recommended by the equipment manufacturer. This shall apply to low voltage wiring as well as line voltage wiring.

END OF SECTION

26 05 34-5



## SECTION 26 05 37

### OUTLET AND PULL BOXES

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Outlet boxes.
- B. Pull and junction boxes.

##### 1.2 RELATED WORK

- A. Section 26 05 53: Identification.
- B. Section 26 27 26: Wall Switches, Receptacles and Plate Covers.
- C. Section 27 10 05: Conduit for Telephone/Data and TV Raceway System.

#### PART 2 PRODUCTS

##### 2.1 MATERIALS

- A. Boxes: Hot dip galvanized, 1.25 oz/sq.ft. or cadmium plated, conforming to UL requirements.
- B. Interior Boxes: Pressed sheet steel blanked for conduit.
- C. Exterior Boxes: Corrosion-resistant cast, deep type, with face plate gasket and corrosion-resistant fasteners.
- D. For Ceiling: 4" square boxes for receiving three or less 3/4" conduits.
- E. For Flush Mounting in Walls: 4" square boxes with matching plaster cover for single or two gang outlets. For larger boxes, use solid type or special units, with flush plates.
- F. Surface Mounted: 4" square.
- G. Pull Boxes and Junction Boxes: Metal construction, conforming to National Electrical Code, with screw-on or hinged cover.
- H. Flush Mounted Pull Boxes: Provide overlapping covers with flush head cover retaining screws, prime coated.

26 05 37-1

- I. For floor boxes, refer to the electrical legend on the plans.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Mount outlet boxes flush in areas other than mechanical rooms, electrical rooms, above removable ceilings, and on exposed structure in rooms without ceilings.
- B. Do not install boxes back-to-back in same wall, allow 6" minimum horizontal spacing between boxes.
- C. Do not use sectional or handy boxes unless specifically requested.
- D. For boxes mounted in exterior walls, make sure that there is insulation behind outlet boxes to prevent condensation in boxes.
- E. For outlets mounted above counters, benches and splashbacks, coordinate location and mounting heights with built-in units. Adjust outlet mounting height to agree with required location for equipment served.
- F. Securely mount each outlet box to metal studs with outlet box mounting supports. Secure to at least two studs or install box stabilizers as manufactured by "B-Line" and "Caddy".
- G. Do not install more than three 3/4" conduits into one 4" outlet box. Do not use more than one extension ring on a box.
- H. For heights of outlets above the finished floor in permanent partitions, use the following unless otherwise noted: To Center of Device:
  - 1. Convenience Receptacles: 18" or as directed.
  - 2. Brackets: As directed.
  - 3. Switches: 46" or as directed.
  - 4. Telephone Outlets: 18" or as directed.
  - 5. Other Outlets: As directed or indicated.
  - 6. Over Counters: 6" above countertop, horizontal at windows or where indicated.

26 05 37-2



7. Fire Alarm Pull stations: Minimum 42” and Max 48” measured vertically, from the floor level to activating handle or lever.
  8. Fire Alarm Audio Visual Device: 80” to top of box
- I. Locate pull boxes and junction boxes above removable ceiling or in electrical rooms, utility rooms or storage areas.
  - J. Install pull boxes of the proper size and depth to accommodate the required conduits and wires.
  - K. When installing outlet boxes in fire rated walls, provide fire blocking material on the back side of the boxes.
  - L. Coordinate box mounting height with brick courses, where applicable.
  - M. Study all devices and light fixtures, providing and installing applicable outlet and back boxes as necessary.
  - N. Boxes for fire alarm systems are to be painted red.

END OF SECTION

26 05 37-3



## SECTION 26 05 53

### IDENTIFICATION

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Provide and install identification markers.

##### 1.2 RELATED WORK

- A. Section 26 05 19: Wires and Cables.
- B. Section 26 05 34: Conduit.
- C. Section 26 05 37: Outlet and Pull Boxes.
- D. Section 26 24 16: Panelboards.
- E. Section 26 28 18: Motor and Circuit Disconnects.

#### PART 2 PRODUCTS

##### 2.1 MATERIALS

- A. Provide nameplates of laminated phenolic plastic with engraved letters 3/16" high at push-button stations, thermal overload switches, receptacles, wall switches and similar devices where the nameplate is attached to the device plate. At all other locations, make lettering 1/4" high, unless otherwise detailed on the drawings. Securely fasten nameplates to the equipment. Motor nameplates may be non-ferrous metal not less than 0.03" thick, die stamped.
- B. Pre-marked, self adhesive, wrap around type markers, manufacturers: Brady, T&B, E-Z Code.

#### PART 3 EXECUTION

##### 3.1 INSTALLATION

- A. General: Equip the following items with nameplates:
  - 1. All motors, motor starters, motor control center, push-button stations, control panels, time switches.

26 05 53-1

2. Disconnect switches, fused or unfused, switchboards and panelboards, circuit breakers, contactors or relays in separate enclosure.
  3. Power receptacles where the nominal voltage between any pair of contacts is greater than 150 volts.
  4. Wall switches controlling outlets for lighting fixtures or equipment where the outlets are not located within sight of the controlling switch.
  5. Special electrical systems at junction and pull boxes terminal cabinets and equipment racks.
- B. Adequately describe the function of or use of the particular equipment involved. Where nameplates are detailed on the drawings, use inscription and size of letters as shown. Include on nameplates for panelboards and switchboards the panel designation, voltage and phase of the supply. The name of the machine or the motor nameplates for a particular machine must be the same as the one used on all motor starter, disconnect and push button station nameplates for that machine.
- C. The Contractor shall provide typed panel schedules for all electrical panels. Schedules shall reflect actual wiring incorporating all field changes. Copies of Panel Schedules from the construction drawings are not acceptable.
1. Panel Schedules shall reflect room numbers as depicted by the Owner as well as construction numbers.
- D. Label all junction boxes with a black permanent marker indicating circuit number and distribution panel or motor control center feeding the circuits contained therein.
- E. At each panel, provide a phenolic plastic plate with 1/4-inch high engraved letters, stating the voltages in the panel, the color code of the wires in the panel, power supply origination, the arc flash hazard, and the date of the installation. Attach to the panel cover with stainless steel bolts, locknuts and nuts or locking nuts. At the main disconnect, provide a label noting the available fault current and date of installation.
- F. All breakers within each panel are to be labeled.
- G. All underground conduits are to be labeled as to each end.

END OF SECTION

26 05 53-2

## SECTION 26 05 73

### OVERCURRENT PROTECTIVE DEVICES

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Fuses.
- B. Molded-case circuit breakers.

##### 1.2 RELATED WORK

- A. Section 26 24 16: Panelboards.
- B. Section 26 28 18: Motor and Circuit Disconnects.

#### PART 2 PRODUCTS

##### 2.1 ACCEPTABLE MANUFACTURERS

- A. Fuses:
  - 1. Bussman.
  - 2. Littlefuse.
- B. Breakers and Relays:
  - 1. Eaton.
  - 2. General Electric.
  - 3. Siemens.
  - 4. Square D.

##### 2.2 CIRCUIT BREAKERS

- A. General: Except as otherwise indicated, provide circuit breakers and ancillary components, of types, sizes, ratings and electrical characteristics indicated, which comply with manufacturer's standard design, materials, components and construction in accordance with published product information and as required for a complete installation.

26 05 73-1

- B. Molded-Case Circuit Breakers: Provide factory assembled molded-case circuit breakers of frame assembled molded-case circuit breakers of frame size voltage and interrupting ratings as indicated on the drawings. Provide breakers with permanent thermal and instantaneous magnetic trips in each pole and ampere ratings and indicated. Construct with overcenter, trip-free, toggle type operating mechanisms with quick-make, quick break action and positive handle indication. Construct breakers for mounting and operating in any physical position and operating in an ambient temperature of 40 Deg. C. Provide breakers with mechanical screw type removable connector lugs, AL/CU rated.
- C. Any overcurrent protection device rated 1200A or higher shall be furnished with an energy-reducing maintenance switching feature with local status indication. This feature shall be furnished with the overcurrent device by the manufacturer.
- D. Tandem circuit breakers are not acceptable.

### 2.3 FUSES

- A. General: Except as otherwise indicated, provide fuses of types, sizes, ratings and average time-current and peak let through current characteristics indicated, which comply with manufacturers' standard design, materials and construction in accordance with published product information and with industry standards and configurations.
- B. Class RK1 and Class J Current Limiting Fuses: Provide UL Class RK1 and Class J current limiting fuses rated 200,000 RMS symmetrical interrupting current for protecting motors and equipment, equal to Buss LPN-RK or LPS-RK.

## PART 3 EXECUTION

### 3.1 INSTALLATION OF OVERCURRENT PROTECTIVE DEVICES

- A. Install overcurrent protective devices as indicated in accordance with the manufacturer's written instructions and with recognized industry practices to insure that protective devices comply with requirements. Comply with NEC and NEMA standards for installation of overcurrent protective devices.
- B. Coordinate with other work, including electrical wiring work as necessary to interface installation of overcurrent protective devices.
- C. Fasten circuit breakers without mechanical stresses, twisting or misalignment being exerted by clamps, supports or cabling.

26 05 73-2

### 3.2 FIELD QUALITY CONTROL

- A. Prior to energization of overcurrent protective devices, test devices for continuity of circuitry and for short circuits. Correct malfunctioning units and then demonstrate compliance with requirements.

END OF SECTION

26 05 73-3





## SECTION 26 09 24

### LIGHTING CONTROLS - LUTRON VIVE

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Single space wireless lighting control systems and associated components:
  - 1. Wireless occupancy/vacancy sensors.
  - 2. Wired load control modules with wireless communication inputs.
  - 3. Wireless control stations.

##### 1.2 RELATED REQUIREMENTS

- A. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- B. Section 26 27 26 - Wiring Devices:
  - 1. Finish requirements for wall controls specified in this section.
- C. Section 26 51 00 - Interior Lighting.

##### 1.3 REFERENCE STANDARDS

- A. 47 CFR 15 - Radio Frequency Devices; current edition.
- B. ASTM D4674 - Standard Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments; 2019.
- C. IEC 60929 - AC and/or DC-Supplied Electronic Control Gear for Tubular Fluorescent Lamps - Performance Requirements; 2011, with Amendment (2015).
- D. IEC 61000-4-2 - Electromagnetic Compatibility (EMC) - Part 4-2: Testing and Measurement Techniques - Electrostatic Discharge Immunity Test; 2008.
- E. ISO 9001 - Quality Management Systems — Requirements; 2015, with Amendment (2024).
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

26 09 24-1

- G. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
- H. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2023.
- I. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).
- J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

#### 1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Coordinate the placement of sensors and wall controls with millwork, furniture, equipment, etc. installed under other sections or by others.
  - 2. Coordinate the placement of wall controls with actual installed door swings.
  - 3. Coordinate the work to provide luminaires and lamps compatible with the lighting controls to be installed.
  - 4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
- B. Pre-Wire Meeting; Lutron LSC-PREWIRE: Include as part of the base bid additional costs for Lighting Control Manufacturer to conduct on-site meeting prior to commencing work. Manufacturer to review with installer:
- C. Sequencing:
  - 1. Do not install sensors and wall controls until final surface finishes and painting are complete.

#### 1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Design Documents: Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", Lighting Control Manufacturer to provide plans indicating occupancy/vacancy and/or daylight sensor locations.

26 09 24-2

- C. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
  - 1. Occupancy/Vacancy Sensors: Include detailed basic motion detection coverage range diagrams.
- D. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Project Record Documents: Record actual installed locations and settings for lighting control system components.
- F. Operation and Maintenance Data: Include detailed information on lighting control system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
- G. Warranty: Submit sample of manufacturer's Warranty or Enhanced Warranty as specified in Part 1 under "WARRANTY". Submit documentation of final executed warranty completed in Owner's name and registered with manufacturer.

#### 1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications:
  - 1. Company with not less than ten years of experience manufacturing lighting control products using wireless communication between devices.
  - 2. Registered to ISO 9001, including in-house engineering for product design activities.
  - 3. Provides factory direct technical support hotline available 24 hours per day, 7 days per week.
  - 4. Qualified to supply specified products and to honor claims against product presented in accordance with warranty.

26 09 24-3

## 1.7 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Manufacturer's Standard Warranty, Without Manufacturer Full-Scope Start-Up:
  - 1. Manufacturer Lighting Control System Components, Except Wireless Sensors, Drivers and Load Control Modules: One year 100 percent parts coverage, no manufacturer labor coverage.
  - 2. Wireless Sensors: Five years 100 percent parts coverage, no manufacturer labor coverage.
  - 3. Drivers and Load Control Modules: Three years 100 percent parts coverage, no manufacturer labor coverage.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis of Design Manufacturer: Lutron Electronics Company, Inc; Vive;  
[www.lutron.com/#sle](http://www.lutron.com/#sle).

### 2.2 LIGHTING CONTROLS - GENERAL REQUIREMENTS

- A. Sensor Layout and Tuning: Include as part of the base bid additional costs for Lighting Control Manufacturer's Sensor Layout and Tuning service; Lutron LSC-SENS-LT:
- B. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) as suitable for the purpose indicated.
- C. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, programming, etc. as necessary for a complete operating system that provides the control intent indicated.
- D. Design lighting control equipment for 10 year operational life while operating continually at any temperature in an ambient temperature range of 32 degrees F to 104 degrees F and 90 percent non-condensing relative humidity.
- E. Electrostatic Discharge Tolerance: Design and test equipment to withstand electrostatic discharges without impairment when tested according to IEC 61000-4-2.

26 09 24-4

- F. Power Failure Recovery: When power is interrupted for periods up to 10 years and subsequently restored, lights to automatically return to same levels (dimmed setting, full on, or full off) as prior to power interruption.
- G. Wireless Devices:
1. Wireless device family includes area or fixture level sensors, area or fixture level load controls for dimming or switching, and load controls that can be mounted in a wallbox, on a junction box, or at the fixture.
  2. Wireless devices including sensors, load controls, and wireless remotes or wall stations, can be set up using simple button press programming without needing any other equipment (e.g. central hub, processor, computer, or other smart device).
  3. Wireless hub adds the ability to set up the system using any smart device with a web browser (e.g. smartphone, tablet, PC, or laptop).
  4. System does not require a factory technician to set up or program the system.
  5. Capable of diagnosing system communications.
  6. Capable of having addresses automatically assigned to them.
  7. Receives signals from other wireless devices and provides feedback to user.
  8. Capable of determining which devices have been addressed.
  9. RF Range: 60 feet line-of-sight or 30 feet through typical construction materials between RF transmitting devices and compatible RF receiving devices.
  10. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class B application.
- H. Wireless Network:
1. RF Frequency: 434 MHz; operate in FCC governed frequency spectrum for periodic operation; continuous transmission spectrum is not permitted.
    - a. Wireless sensors, wireless wall stations and wireless load control devices do not operate in the noisy 2.4 GHz frequency band where high potential for RF interference exists.

26 09 24-5

- b. Wireless devices operate in an uncongested frequency band providing reliable operation.
    - c. Fixed network architecture ensures all associated lights and load controls respond in a simultaneous and coordinated fashion from a button press, sensor signal, or command from the wireless hub (i.e. no popcorning).
  - 2. Distributed Architecture: Local room devices communicate directly with each other. If the wireless hub is removed or damaged, local control, sensing, and operation continues to function without interruption.
  - 3. Local room devices communicate directly with each other (and not through a central hub or processor) to ensure:
    - a. Reliability of system performance.
    - b. Fast response time to events in the space (e.g. button presses or sensor signals).
    - c. Independent operation in the event of the wireless hub being removed or damaged.
- I. Device Finishes:
  - 1. Wall Controls: Match finishes for Wiring Devices in Section 26 27 26 - Wiring Devices, unless otherwise indicated.
  - 2. Standard Colors: Comply with NEMA WD 1 where applicable.
  - 3. Color Variation in Same Product Family: Maximum delta E of 1, CIE L\*a\*b color units.
  - 4. Visible Parts: Exhibit ultraviolet color stability when tested with multiple actinic light sources as defined in ASTM D4674. Provide proof of testing upon request.

## 2.3 WIRELESS SENSORS

### A. General Requirements:

- 1. Operational life of 10 years without the need to replace batteries when installed per manufacturer's instructions.

26 09 24-6

2. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.
3. Does not require external power packs, power wiring, or communication wiring.
4. Capable of being placed in test mode to verify correct operation from the face of the unit.

B. Wireless Occupancy/Vacancy Sensors:

1. General Requirements:

- a. Provides a clearly visible method of indication to verify that motion is being detected during testing and that the unit is communicating to compatible RF receiving devices.
- b. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
- c. Sensing Mechanism: Passive infrared coupled with technology for sensing fine motions; Lutron XCT Technology. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
- d. Provide optional, readily accessible, user-adjustable controls for timeout, automatic/manual-on, and sensitivity.
- e. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area. Provide adjustable timeout settings of 1, 5, 15, and 30 minutes.
- f. Capable of turning dimmer's lighting load on to an optional locked preset level selectable by the user. Locked preset range to be selectable on the dimmer from 1 percent to 100 percent.
- g. Color: White.
- h. Provide all necessary mounting hardware and instructions for both temporary and permanent mounting.
- i. Provide temporary mounting means for drop ceilings to allow user to check proper performance and relocate as needed before permanently mounting sensor. Temporary mounting method to be design for easy, damage-free

26 09 24-7

removal.

- j. Sensor lens to illuminate during test mode when motion is detected to allow installer to place sensor in ideal location and to verify coverage prior to permanent mounting.
- k. Ceiling-Mounted Sensors:
  - 1) Provide surface mounting bracket compatible with drywall, plaster, wood, concrete, and compressed fiber ceilings.
- l. Wall-Mounted Sensors: Provide wall or corner mounting brackets compatible with drywall and plaster walls.

## 2.4 LOAD CONTROL MODULES

- A. Provide wireless load control modules as indicated or as required to control the loads as indicated.
- B. Junction Box-Mounted Modules:
  - 1. Plenum rated.
  - 2. 0-10 V Dimming Modules:
    - a. Product(s):
      - 1) 8 A dimming module with 0-10V control, without emergency mode; Lutron PowPak Dimming Module Model RMJS-8T-DV-B.
    - b. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.
    - c. Single low voltage dimming module with Class 1 or Class 2 isolated 0-10V output signal conforming to IEC 60929 Annex E.2; source or sink automatically configures.
    - d. Selectable minimum light level.
    - e. Configurable high- and low-end trim.
    - f. Relay: Rated for 0-10 V ballasts, LED drivers, or fixtures that conform with NEMA 410.

26 09 24-8



3. Relay Modules:

a. Product(s):

- 1) 16 A relay module, without emergency mode, with contact closure output; Lutron PowPak Relay Module Model RMJS-16RCCO1-DV-B.

b. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.

c. Relay:

- 1) Rated Life of Relay: Typical of 1,000,000 cycles at fully rated 16 A for all lighting loads.
- 2) Load switched in manner that prevents arcing at mechanical contacts when power is applied to and removed from load circuits.
- 3) Fully rated output continuous duty for inductive, capacitive, and resistive loads.

d. Contact Closure Output:

- 1) Single contact closure output with normally open and normally closed dry maintained contacts suitable for connection to third party equipment (e.g. building management system, HVAC system, etc.).
- 2) Contact Ratings: Resistive load; 1 A at 0-24 VDC, 0.5 A at 0-24 VAC.
- 3) Controlled by associated occupancy/vacancy sensors and wall controls.

## 2.5 WIRELESS CONTROL STATIONS

A. General Requirements:

1. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.
2. Allows for easy reprogramming without replacing unit.
3. Button Programming:
  - a. Single action.

26 09 24-9

- b. Toggle action.
  - 4. Includes LED to indicate button press or programming mode status.
  - 5. Faceplates: Provide concealed mounting hardware.
  - 6. Finish: As specified for wall controls in "Device Finishes" under LIGHTING CONTROLS - GENERAL REQUIREMENTS article above.
- B. Battery-Powered Wireless Control Stations:
- 1. Quantity: As indicated on the drawings.
  - 2. Does not require external power packs, power or communication wiring.
  - 3. Power: Battery-operated with minimum ten-year battery life (3-year battery life for night light models).
  - 4. Mounting:
    - a. Capable of being mounted with a table stand or directly to a wall under a faceplate.
  - 5. Product(s):
    - a. Type \_\_\_\_\_ - 2-Button Control; Lutron Pico Wireless Control Model PJ2-2B.
      - 1) Button Marking: Light (icons).
    - b. Type \_\_\_\_\_ - 2-Button with Raise/Lower Control; Lutron Pico Wireless Control Model PJ2-2BRL.
      - 1) Button Marking: Light (icons).

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that ratings and configurations of system components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive system components.

26 09 24-10

- D. Verify that conditions are satisfactory for installation prior to starting work.

### 3.2 INSTALLATION

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, except for mounting heights specified in those standards.
- B. Install products in accordance with manufacturer's instructions.
- C. Sensor Locations:
  - 1. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", locate sensors in accordance with layout provided by Lighting Control Manufacturer. Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated. Where Lighting Control Manufacturer Sensor Layout and Tuning service is not specified, locate sensors in accordance with Drawings.
  - 2. Sensor locations indicated are diagrammatic. Within the design intent, reasonably minor adjustments to locations may be made in order to optimize coverage and avoid conflicts or problems affecting coverage, in accordance with manufacturer's recommendations.
- D. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.
- E. Identify system components in accordance with Section 26 05 53.

### 3.3 ADJUSTING

- A. Sensor Fine-Tuning: Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", Lighting Control Manufacturer to provide up to two additional post-startup on-site service visits for fine-tuning of sensor calibration. Where Lighting Control Manufacturer Sensor Layout and Tuning is not specified, Contractor to provide fine-tuning of sensor calibration.

26 09 24-11

### 3.4 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

### 3.5 CLOSEOUT ACTIVITIES

- A. Training:
  - 1. Include services of manufacturer's certified service representative to perform on-site training of Owner's personnel on operation, adjustment, and maintenance of lighting control system as part of on-site system start-up services.

### 3.6 PROTECTION

- A. Protect installed products from subsequent construction operations.

END OF SECTION

26 09 24-12

## SECTION 26 21 02

### UNDERGROUND DISTRIBUTION

#### PART 1 GENERAL

##### 1.1 DESCRIPTION

- A. Work in contract: As indicated on plans.
- B. Work not in contract:
  - 1. Service transformer(s): Provided by serving utility.
  - 2. Primary conductors: Provided by serving utility.

##### 1.2 SUBMITTALS

- A. Shop drawings:
  - 1. Pull Boxes.
- B. Product data:
  - 1. Specification comparison.
  - 2. Duct bank conduit separation.
- C. Project information:
  - 1. Test reports.

##### 1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Store conduit to avoid warping or deterioration.
- B. Store plastic conduit on flat surface protected from direct rays of sun.

##### 1.4 JOB CONDITIONS

- A. Protect existing utilities and structures as indicated in Section 26 00 10.
- B. Avoid overloading. Keep surcharge sufficient distance back from edge of excavation to prevent slides or caving. Maintain and trim excavated materials in such a manner to be as little inconvenience as possible to public and adjoining property owners.

26 21 02-1

- C. Provide full access to public and private premises, to fire hydrants, at street crossings, sidewalks and other points as designated by Engineer to prevent serious interruption of travel.

## PART 2 PRODUCTS

### 2.1 DUCT SYSTEM

- A. Primary duct system: Multiple (or single) 4-inch single, round-bore PVC conduits, coordinate with the local utility company.
  - 1. Rigid PVC conduit: As specified in Section 26 05 34.
  - 2. Separators: Concrete, plastic or other non-metallic, non-decaying material.
- B. Pull wire: 1/4-inch heavy nylon cord or 1/4-inch pull tape, free of kinks and splices.

### 2.2 PULL BOXES

- A. Conduit pull boxes equal to Quazite # PC1324 BB12/00, cover # PC1324CA-17. Modify size to match quantity of conduits used. Space per NEC.
- B. Provide gravel bed with drainage and install per manufacturer's instructions.

### 2.3 BACKFILL MATERIAL

- A. Backfill material:
  - 1. 1/2 inch washed rock.

## PART 3 EXECUTION

### 3.1 EXCAVATING AND TRENCHING - GENERAL

- A. Remove and dispose of materials determined by Civil Engineer to be unsuitable.
- B. Trench, backfill and compact for all underground utilities.

### 3.2 TRENCH EXCAVATION

- A. Excavate trenches by open cut method to depth necessary to accommodate the work.
  - 1. Permission may be granted for tunnel work for crossing under crosswalks, driveways or existing utility lines.

26 21 02-2

- B. Open no more than 300 LF of trench at one time, or less, as required by Engineer. Failure to comply may necessitate shutdown of entire project until backfilling is performed.
- C. Carry rock excavations minimum of 12 inches below indicated grades.
- D. Avoid over-excavating below indicated grades unless required to remove unsuitable material.
- E. Back-fill over-excavations with 1/2 inch rock.
- F. Trench size: Excavate only sufficient width to accommodate free working space.
  - 1. Cut trench walls vertically from bottom of trench to top of conduit.
- G. Keep trenches free of water.

### 3.3 EXISTING UTILITIES

- A. Protect all existing utilities.
- B. Pay fees for all new services.

### 3.4 INSTALLATION OF PRIMARY AND SECONDARY DUCT SYSTEM

- A. Install duct lines so that top of conduit is not less than 30 inches for secondary ducts and 48 inches for primary ducts below finished grade or finished paving at any point.
- B. Accomplish changes in direction of runs exceeding total of 10 degrees, either vertical or horizontal, by long sweep elbows.
  - 1. Manufactured bends: Minimum radius of 48 inches for primary ducts of 4 inches in diameter and larger, 24 inches for secondary ducts.
- C. Thoroughly clean conduit before using or laying.
- D. Lay no conduit in water or in unsuitable weather or trench conditions.
- E. During construction and after duct line is completed, plug ends of conduits to prevent water washing into conduit or manholes.
  - 1. Take particular care to keep conduits clear of concrete, dirt, and any other substance during course of construction.

26 21 02-3

- F. After duct line has been completed, pull standard flexible mandrel not less than 12 inches long, with diameter approximately 1/4 inch less than inside diameter of conduit, through each conduit. Then pull brush with stiff bristles through each conduit to make certain that no particles of earth, sand, or gravel have been left in line.
- G. Pneumatic rodding may be used.
- H. Install nylon pull string in all unused new ducts.
  - 1. Extend minimum of 3 feet into each manhole or above pads beyond ends of ducts.
- I. Encase each secondary conduit completely in concrete not less than 3 inches beyond any surface of conduit.
  - 1. Do not place concrete until conduits have been inspected by Architect/Engineer.
- J. Provide uniform spacing between conduits: Not less than 3.5 inches.
  - 1. Place separators on maximum 4 feet centers.
  - 2. Securely anchor ducts to prevent movement during placement of concrete.
- K. Make conduit joints in accordance with manufacturer's recommendations for conduit and coupling selected.
  - 1. Make plastic conduit joints by brushing plastic solvent cement on inside of plastic coupling fitting and outside of conduit ends.
  - 2. Slip conduit and fitting together with quick one-quarter-turn twist to set joint tightly.
- L. Coordinate service conduits entering the building with the Structural Engineer.

### 3.5 BACKFILLING

- A. Do not backfill until all tests are performed on system, and system complies with specified requirements.
- B. Hand or pneumatic tamp backfill around and over pipe in lifts not exceeding 8 inches loose thickness.
- C. Compact to density specified, so pipe will not be injured.

26 21 02-4



- D. Exercise care in backfilling operations to avoid displacing pipe joints either horizontally or vertically and to avoid breaking pipe.
- E. Do not water flush for consolidation.

### 3.6 COMPACTION

- A. Compact all trench backfill in areas under paved roads, parking areas, sidewalks and other structures as directed by Civil Engineer to at least 95 percent of maximum dry density.
- B. In locations where trench will not be under paved areas, compact backfill to minimum 90 percent of maximum dry density.
- C. Remove materials which cannot be compacted as specified.
- D. Backfill with 1/2 inch washed rock.

END OF SECTION

26 21 02-5



## SECTION 26 24 16

### PANELBOARDS

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Branch circuit panelboards.

##### 1.2 REGULATORY REQUIREMENTS

- A. Construct panelboards to UL standards and provide UL labels.

#### PART 2 PRODUCTS

##### 2.1 ACCEPTABLE MANUFACTURERS

- A. Eaton.
- B. General Electric.
- C. Siemens.
- D. Square D.

##### 2.2 ENCLOSURES

- A. Panels: Surface (or flush) mounted complete with hinged trim with outer door lock and metal directory frame.
- B. Panel Can: Galvanized, painted to match trim.
- C. Keys: Provide two keys for each panel. Make keys interchangeable for panels on this project.

##### 2.3 120/208 AND 277/480 VOLT PANELBOARDS

- A. Panelboards: Three phase, 4-wire, solid neutral design with sequence style bussing, full capacity neutral and bare uninsulated grounding bar bolted to enclosure, composed of an assembly of bolt-in-place molded case automatic air circuit breakers with thermal and magnetic trip and trip free position separate from either "ON" or "OFF".

26 24 16-1

- B. Furnish and install power and distribution panelboards, equipped with thermal magnetic molded case circuit breakers of frame, trip ratings and interrupting capacities, as shown on the panelboard schedule, manufactured in accordance with the latest NEMA standards, listed by Underwriters' Laboratories, Inc. and bearing the UL label.
- C. Panelboard Main Bus, Main Lugs and/or Main Breaker: Copper only with current ratings as shown on the panelboard schedule. Current density in accordance with Underwriters' Laboratories requirements. Bus mounting for circuit breakers of the bolted connection type and accommodating any combination of circuit breaker units without further modification, wiring lugs suitable for copper conductors.
- D. Circuit Breakers: Quick make and quick break trip free on overload or short circuit; multi-pole breakers with common trip, wiring terminals suitable for the type conductor specified, bolt-on connections to the bus.
- E. Steel Box: As specified by Underwriters' Laboratories standards, end walls removable, size of wiring gutters in accordance with Underwriters' Laboratories standards, trim of code-gauge steel with primer and durable enamel finish, trim doors equipped with spring latch and cylinder lock keyed alike. Each individual circuit to be clearly numbered on the face of the panelboard and a directory for circuit identification provided.
- F. Where noted on the plans, provide "SPD" units.
  - 1. On main service equipment provide units equal or better than 125 kA per mode, minimum.
  - 2. On sub panels provide units equal to 80 kA per mode, where called for.
  - 3. All units to be built in to the panels called for. Provide with phase indicating lights and disconnecting means.
- G. The panelboard wholesale supplier shall have an office and a stocking warehouse within 100 miles of the project site. The distributor/manufacturer's representative shall have an office within 100 miles of the project site, and shall have on staff a full time designer as well as personnel who are available to service the project after completion.

26 24 16-2

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Provide mounting brackets, busbar drillings and filler pieces for unused spaces.
- B. Prepare and affix typewritten directory to inside cover of panelboard indicating loads controlled by each circuit. Label with construction and permanent room numbers.
- C. Provide 4-inch housekeeping concrete pads for all floor mounted units which are located inside the building or outdoors.
- D. At each panel, provide a phenolic plastic plate with 1/4-inch high engraved letters, stating the voltages in the panel and the color code of the wires in the panel and the available fault current and date of installation. Attach to the panel cover with stainless steel bolts, locknuts and nuts or locking nuts.

END OF SECTION

26 24 16-3



## SECTION 26 27 26

### WALL SWITCHES, RECEPTACLES, AND PLATE COVERS

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Wall switches.
- B. Receptacles.
- C. Plate covers.

##### 1.2 RELATED WORK

- A. Section 26 05 26: Grounding.
- B. Section 26 05 37: Outlet and Pull Boxes.
- C. Section 26 05 53: Identification.

#### PART 2 PRODUCTS

##### 2.1 ACCEPTABLE MANUFACTURERS

- A. Arrow Hart.
- B. Bryant.
- C. Eagle.
- D. General Electric.
- E. Hubbell.
- F. Leviton.
- G. P&S.
- H. Substitutions: See Section 26 00 10 - General Electrical Provisions.

##### 2.2 WALL SWITCHES

- A. Acceptable Devices

26 27 26-1

1. Single Pole Switch: Type 1221, or equal.
2. Double Pole Switch: Type 1222, or equal.
3. Three-way Switch: Type 1223, or equal.
4. Four-way Switch: Type 1224, or equal.
5. Dimmers: Lutron "NOVA" Series or equal; size as required per the circuit wattage, 600 watt minimum. Provide type for the fixtures being dimmed.
6. Two-pole switches used to control two loads, like lights and exhaust fans in restrooms, must be "rated" for that duty.
7. Keyed Switches: Provide four keys per switch.

B. Materials

1. 120/277 Volt Switches: Quite slow make, slow break design, toggle handle with totally enclosed case, rated 20 ampere, specification grade. Provide matching two pole, three-way and four-way switches.
2. Color: Coordinate with the Architect.
3. Dimmers: Electronic switching type with toroid filter coil to eliminate RF interference.
4. Two-pole switches used to control two loads, like lights and exhaust fans in restrooms, must be "rated" for that duty.
5. Provide metal barrier between gangs in boxes, where adjacent switches have a potential in excess of 300V between conductors.

## 2.3 RECEPTACLES

- A. Device: Receptacles In General Use Areas of Project: All receptacles shall be commercial grade and shall be "Tamper Resistant."
1. Duplex Receptacle: Type BR20TR, or equal.
  2. Duplex Receptacle, GFCI: Type GFTR20, or equal.
  3. Single Receptacle: Type 5361, or equal.

26 27 26-2



4. Special Outlets: See Plans.
5. Isolated Ground Receptacle: Type 5362IG, or equal.

B. Devices

1. Standard Duplex Receptacle: Nema 5-20R. Full gang size, polarized, duplex, parallel blade, U grounding slot, rated at 20 amperes, 125 volts, designed for split feed service.
2. Nameplates: Provide engraved or embossed plastic for receptacles other than standard duplex and standard single receptacles indicating voltage, phase and amperes.
3. Isolated ground outlets to be orange, emergency circuit devices to be red, all other device colors to be coordinated with the Architect.
4. Exterior receptacles are to be "GFI" and rated as "weather resistant".

## 2.4 PLATE COVERS

A. Materials

1. Stainless Steel: Type 302 or 304, No. 4 finish, 0.040 inches thick, accurately die cut, protected with release paper.
2. Cast Metal: Die cast profile, ribbed or strength, flash removed, primed with grey enamel, furnished complete with four mounting screws.
3. Gaskets: Resilient rubber or closed cell foam urethane.
4. Nylon: High-performance, molded nylon.
5. Stamped Metal: For use on 4" square boxes.

B. Device

1. Flush Mounting Plates: Beveled type with smooth rolled outer edge.
2. Surface Box Plates: Beveled, steel, pressure formed for smooth edge to fit box.
3. Weatherproof Plates: CAST METAL, gasketed; for receptacles, provide the weatherproof "while in use" type.

26 27 26-3

4. Where two-gang boxes are required for single gang devices, provide special plates with device opening in one gang and second gang blank.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Coordinate switch mounting location with architectural detail and heights as noted on plans.
- B. Run separate neutral for each lighting circuit.
- C. Install switches at 46" to center above finished floor, coordinate with brick layers where applicable.
- D. Mount receptacles at mounting heights specified on the plans, 18" to center of the box unless noted otherwise.
- E. Connect all devices using pigtails. Do not through-wire on device terminals.
- F. Mount outlets for electric water coolers and other similar permanently installed plug connected equipment behind equipment according to approved installation drawing, coordinate with the equipment installer.
- G. Install coverplates on wiring devices level and with all four edges in contact with finished surface.
- H. Use stainless steel plates in all interior areas unless noted. Use steel plates in mechanical and utility type areas.

END OF SECTION

## SECTION 26 28 18

### MOTOR AND CIRCUIT DISCONNECTS

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Provide and install motor and circuit disconnects.

##### 1.2 REGULATORY REQUIREMENTS

- A. Conform to National Electrical Code and to applicable inspection authority.

##### 1.3 REFERENCES

- A. Underwriters' Labs, Inc. Annual Product Directories.
- B. Classification of Standard Types of Non-ventilated Enclosures for Electric Controllers, National Electrical Manufacturers Association.

#### PART 2 PRODUCTS

##### 2.1 ACCEPTABLE MANUFACTURERS

- A. Eaton.
- B. General Electric.
- C. Hubbell.
- D. Leviton.
- E. Square D.

##### 2.2 EQUIPMENT

- A. Provide motor and circuit disconnects with UL label.
- B. Single Phase 120 Volt Disconnect Switches: Double pole toggle switch, Leviton MS302.
- C. Provide with lockable covers.

26 28 18-1

- D. Three-Phase Motor Disconnect Switches and Single Phase 240 Volt Disconnect Switches: 2 or 3 pole heavy duty fusible or non-fusible as shown, 250 or 480 volt as required in NEMA Type 1 or 3 enclosures. Provide with lugs for suitable wire range, with ground lug, copper current carrying parts, silver-tungsten contacts, reinforced fuse clips for type R rejection fuses.
- E. Provide NEMA "4/4X" type disconnects within the kitchen area.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install motor and circuit disconnect as recommended by manufacturer and as required by Code.
- B. Where required by local authorities, install disconnects for all roof mounted equipment separate from that equipment. Furnish (galvanized) "Unistrut" or angle iron mounting stands with B-Line DB series roof top support base. Coordinate with the equipment supplier and Roofing Contractor.

END OF SECTION

26 28 18-2

## SECTION 26 51 00

### INTERIOR BUILDING LIGHTING

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Installation of luminaires, supports and accessories.
- B. Emergency lighting units.
- C. Exit signs.
- D. Lamps.
- E. Ballasts, drivers, and accessories.

##### 1.2 RELATED WORK

- A. Section 26 05 19: Wires and Cables.
- B. Section 26 05 29: Supporting Devices.

##### 1.3 REFERENCES

- A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

##### 1.4 SUBMITTALS

- A. Submit shop drawings and product data in accordance with General Conditions including pertinent physical characteristics and complete photometric data reports from independent testing laboratory.
- B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: Provide dimensions, ratings, and performance data.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Quality Assurance. Include instructions for storage, handling, protection, examination,

26 51 00-1

preparation, and installation of product.

- E. Operation and Maintenance Data: Instructions for each product. Installation manuals are required.

## 1.5 COORDINATION

- A. Confirm compatibility and interface of other materials with luminaire and ceiling system. Report discrepancies to the Engineer/Architect and defer ordering until clarified.
- B. Supply plaster frames, trim rings and backboxes to other trades.
- C. Coordinate with Division 23 to avoid conflicts between luminaires, supports, fittings and mechanical equipment.
- D. Conform to requirements of NFPA 70.
- E. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- F. Products: Listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.
- G. The lighting wholesale supplier shall have an office and a stocking warehouse within 100 miles of the project site. The distributor/manufacturer's representative shall have an office within 100 miles of the project site, and shall have on staff a full time lighting designer as well as personnel who are available to service the project after completion.
- H. Any substitutions to the light fixture schedule shall be proven, by the manufacturer at the discretion of the Engineer, to be of equal or superior quality, material, and performance than the specified light fixtures. All requests for substitutions shall be submitted along with fixture specification sheets, photometric calculations and electronic ies files 10 days prior to bid opening date for review. Substitutions shall be requested in writing only, accompanied by the above listed electronic ies files.  
Substitutions will not be considered if they are indicated or implied in shop drawing submission without previous formal request. Substitutions will not be considered if they require substantial revision of the contract documents. The Contractor shall be responsible for any and all additional costs required by modifications to architectural,

26 51 00-2

structural, mechanical or electrical facilities, devices, systems, etc. resulting from the approved substitution.

- I. Light fixtures and ballasts are to comply with the fixture schedule and the Specifications.

## PART 2 PRODUCTS

### 2.1 LUMINAIRES

#### A. Acceptable Manufacturers

1. Provide products of manufacturers as listed in the lighting fixture schedule or equal, subject to compliance with requirements.
2. Fixtures are to be supplied in manufacturer's standard cartons.
3. Substitutions: See Section 26 00 10 - General Electrical Provisions.

#### B. Lensed Luminaires

1. Pre-treat housing and finish in high reflectance baked white powder paint on exposed and reflective surfaces giving reflectance of 90% minimum average. Paint shall be applied after fabrication.
2. Reflective end plates may be 20 gauge metal.
3. Provide full 22 gauge steel housing.
4. Provide hinged frames with fully enclosed spring loaded cam latches and T-type hinges, removable for cleaning without tools. Support lay-in lenses on four sides with flip ends on short dimension.
5. Provide gasketing, stops and barriers to form light traps and prevent light leaks.
6. Design luminaire to dissipate ballast and lamp heat.
7. Use formed or ribbed backplates, endplates, reinforcing channels.
8. Provide virgin acrylic diffusers, 0.125" thick nominal, number 12 pattern, 7.8 oz. weight per square foot.
9. Furnish products as indicated in Fixture Schedule, or equal.

26 51 00-3

C. Recessed Luminaires

1. Supply recessed luminaire complete with trim type required for ceiling system installed. Before ordering, confirm ceiling construction details and architectural finish for each area. Supply with "IC" type housing or gyp board hat over the fixture, where insulation will cover.
2. Fixtures shall be delivered to the job site in factory provided individual cartons.
3. All damaged fixtures are to be replaced

2.2 LAMPS

A. Acceptable Manufacturers

1. General Electric.
2. Osram/Sylvania.
3. Philips.

B. LED Lamps

1. LED Lamps: Manufacturers must have Energy Star/DLC rating or shall offer LM-80 and TM-21 test reports to the public online.
2. LED estimated useful life: Minimum of 50,000 hours at 70% lumen maintenance, calculated based on LM-80 test data.
3. LED fixtures shall be modular and allow for separate replacement of LED lamps and drivers. User serviceable LED lamps and drivers shall be accessible and replaceable from the room side.
4. Light fixture provider shall provide all low voltage control wiring for dimmable fixture.
5. Note lamp color specifications on the fixture schedule, minimum CRI shall be 80.
6. All light fixtures shall be provided with a 5 year warranty on the LED and driver system.

26 51 00-4



## 2.3 BALLASTS AND DRIVERS

- A. Provide ballasts that meet standards of an electrical testing laboratory and the Certified Ballasts Manufacturers' Association.
- B. Acceptable Manufacturers:
  - 1. Universal.
  - 2. Philips/Advance.
  - 3. Osram/Sylvania.
- C. LED Drivers
  - 1. LED drivers shall be electric-type, labeled as compliant with radio frequency interference (RFI) requirements of FCC Title 47 Part 15, and comply with NEMA SSL 1 "Electronic Drivers for LED Devices, Arrays, or System". LED drivers shall have a sound rating of "A", have a minimum efficiency of 85%, and be rated for a THD of less than 20 percent at all input voltages.
  - 2. Dimmable LED drivers shall be 0-10V type unless otherwise noted on the schedule. Dimmable LED drivers shall be capable of dimming without LED strobing or flicker across their full dimming range.
  - 3. Emergency LED drivers shall be manufactured by a company with a minimum of five (5) years service. They shall be factory installed and tested, to include red pilot lights. They shall be manufactured by Bodine Mfg. and be rated at 1100 lumens, minimum.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install lamps in accordance with manufacturer's instructions.
- B. Provide spare lamps in the amount of 5% of the total count, or 5 each type, whichever is the greater number.
- C. All incandescent lamps shall be replaced at the Date of Substantial Completion.
- D. Provide ballasts of compatible design to lamps specified.
- E. No "Daisy Chaining" of fixtures is allowed.

26 51 00-5

- F. Install fixtures securely, in a neat and workmanlike manner.
- G. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.
- H. Support all luminaires independent of ceiling framing, directly from building structure by rod hangers and inserts or suspension wire, two per fixture.
- I. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- J. Install recessed luminaires to permit removal from below.
- K. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- L. Install clips to secure recessed grid-supported luminaires in place.
- M. Install wall mounted luminaires, emergency lighting units, and exit signs at height as scheduled.
- N. Manufactured wiring systems are approved. Provide submittals per Specifications.

### 3.2 RECESSED LUMINAIRES

- A. Perform field inspection, testing, and adjusting in accordance with Section 26 00 10.
- B. Install recessed luminaires to permit removal from below to gain access to outlet or pre-wired fixture box.
- C. Install an accessible junction box not less than two feet away from the fixture and connect to it by not less than four feet nor more than six feet of flexible conduit, using type of fixture wire approved for this purpose.
- D. Mount in suspended ceiling with exposed tee bar grid system, support directly from the building structure by a minimum of two support wires.
- E. Hold insulation back from all fixtures by three (3) inches and clear on top.
- F. A disconnecting means is required for all ballasted luminaires with double ended lamps. Install per NEC 410.130(G).

26 51 00-6

### 3.3 ALIGNMENT

- A. Aim and adjust luminaires.
- B. Align luminaires, clean diffusers and replace burned out lamps prior to final acceptance.

### 3.4 FIRE RATED CEILINGS

- A. Where recessed fixtures will penetrate either fire-rated ceilings or fire rated gypsum board located above suspended ceilings, the fire-rated ceiling or gypsum board shall be continuous over and around the fixture housing and outlet box. Coordinate the ceiling and fixture installations to insure a continuous fire rated ceiling.

### 3.5 FINALLY

- A. Remove dirt and debris from enclosures.
- B. Clean photometric control surfaces as recommended by manufacturer.
- C. Clean finishes and touch up damage.
- D. Relamp luminaires that have failed lamps at Substantial Completion and all lamps that have been energized during construction for more than 500 hours.

END OF SECTION

26 51 00-7



## SECTION 26 56 00

### EXTERIOR LIGHTING

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Installation of luminaires, supports and accessories.

##### 1.2 RELATED WORK

- A. Section 26 05 19: Wires and Cables.
- B. Section 26 51 00: Interior Building Lighting.

##### 1.3 REFERENCES

- A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

##### 1.4 SUBMITTALS

- A. Submit shop drawings and product data in accordance with General Conditions including pertinent physical characteristics and complete photometric data reports from independent testing laboratory.
- B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: Provide dimensions, ratings, and performance data.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Quality Assurance. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation and Maintenance Data: Instructions for each product.

##### 1.5 COORDINATION

- A. Products: Listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and

26 56 00-1

indicated.

## PART 2 PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Provide products of manufacturers as listed in the lighting fixture schedule, or equal.
- B. LED Lamps
  - 1. LED Lamps: manufacturers must have Energy Star/DLC rating or shall offer LM-80 and TM-21 test reports to the public online.
  - 2. LED estimated useful life: Minimum of 50,000 hours at 70% lumen maintenance, calculated based on LM-80 test data.
  - 3. LED fixtures shall be modular and allow for separate replacement of LED lamps and drivers.
  - 4. Light fixture provider shall provide all low voltage control wiring for dimmable fixture.
  - 5. All light fixtures shall be provided with a 5 year warranty on the LED and driver system.
  - 6. Note lamp color specifications on the fixture schedule, minimum CRI shall be 80.
  - 7. All exterior light fixtures shall be, at a minimum, IP64 rated.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- B. Install wall mounted luminaires, emergency lighting units, and exit signs at height as scheduled.

### 3.2 FINALLY

- A. Remove dirt and debris from enclosures.
- B. Clean photometric control surfaces as recommended by manufacturer.

26 56 00-2

C. Clean finishes and touch up damage.

END OF SECTION

26 56 00-3

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas





## SECTION 27 10 05

### CONDUIT FOR TELEPHONE/DATA AND TV RACEWAY SYSTEM

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Telephone/Data and TV raceway system.

##### 1.2 RELATED WORK

- A. Section 26 05 19: Wires and Cable.
- B. Section 26 05 34: Conduit.
- C. Section 26 05 37: Outlet and Pull Boxes.
- D. Section 26 05 53: Identification.

##### 1.3 SYSTEM DESCRIPTION

- A. At TV locations, provide a 4" outlet box and plaster ring with 3/4" raceway to above a drop ceiling in an accessible area. Leave a pull string in each raceway. End each stub up with a 90-degree elbow. Mount as shown on the plans.
- B. At all telephone/data locations, provide a 4" outlet box and plaster ring with 1" raceway to an accessible area above a ceiling. Leave a pull string in each raceway. End each stub-up with a 90-degree elbow.
- C. At each classroom, install 2-1" conduit sleeves into the corridors, for low voltage cabling. Seal/firestop as required. Install all other sleeves as sized on the drawings.

#### PART 2 PRODUCTS

##### 2.1 MATERIALS

- A. Conduit: Refer to Section 26 05 34.
- B. Outlet and Pull Boxes: Refer to Section 26 05 37.

27 10 05-1

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Provide an insulated throat connector or plastic bushing where raceways are stubbed out above the ceiling, including a 90-degree elbow on the end of the conduit.
- B. Provide a nylon blank cover plate for any outlet location which is not to be used.  
Allow for this quantity to be 50% of total data outlets.
- C. Provide conduit for all low voltage wiring which is installed in areas which have no ceiling or hard ceiling.
- D. All device plates are to be nylon.

END OF SECTION

27 10 05-2

## SECTION 27 10 11

### STRUCTURED TELECOMMUNICATIONS CABLING AND ENCLOSURES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Cabling and pathways inside the building.
- B. Distribution frames, cross-connection equipment, enclosures, and outlets.
- C. Grounding and bonding the telecommunications distribution system.

##### 1.2 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Storage and handling requirements and recommendations.
  - 2. Installation methods.
- B. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations.
- C. Manufacturer Qualifications.
- D. Installer Qualifications.
- E. Project Record Documents:
  - 1. Record actual locations of distribution frames.
  - 2. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.
  - 3. Identify distribution frames and equipment rooms by room number on contract drawings.
- F. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of project record documents.

27 10 11-1

### 1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: At least 5 years experience manufacturing products of the type specified.
- B. Installer qualifications: A company having at least 5 years experience in the installation and testing of the type of system specified, and:
  - 1. Employing a BICSI Registered Communications Distribution Designer (RCDD) or Registered Professional Engineer. Contracted services not allowed.
  - 2. Supervisors and installers factory certified by manufacturers of products to be installed.
  - 3. Employing experienced technicians for all work; show at least 3 years experience in the installation of the type of system specified, with evidence from at least 2 projects that have been in use for at least 18 months; submit project name, address, and written certification by user.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep stored products clean and dry.

### 1.5 WARRANTY

- A. See Section 01 77 00 - Contract Closeout, for additional warranty requirements.
- B. Correct defective Work within a 1 year period after Date of Substantial Completion.
- C. The Contractor shall facilitate a 20 year performance warranty between the manufacturer and the Owner. An extended component warranty shall be provided which warrants functionality of all components used in the system for 20 years from the date of acceptance. The performance warranty shall warrant the installed 250 MHz horizontal copper, and both the horizontal and backbone optical fiber portions of the cabling system. Copper links shall be warranted against the links performance minimum expected results defined in TIA/EIA-568-B.1. Fiber optic links shall be warranted against the link and segment performance minimum expected results defined in the TIA/EIA-568-B-1.
- D. The Contractor shall furnish an hourly rate with the proposal submittal which shall be valid for a period of one year from the date of acceptance. This rate will be used when

27 10 11-2

cabling support is required to affect moves, adds, and changes to the system. These occurrences shall not void the contractor's or manufacturer's warranty.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Cable: Belden, Corning, AT&T, Berk-Tek, Siemons, Mohawk, Commscope.
- B. Racks: Ortronics, Leviton, Black Box, B-Line/Cooper, Hubbell.
- C. Patch Panels: Ortronics, Leviton, Hubbell, Siemons, Belden, Panduit, Commscope.
- D. Modular Jacks: Leviton, Panduit, Hubbell, Siemons, Belden, Ortronics, Commscope.
- E. Substitution: See Section 26 00 10 - General Electrical Provisions.

### 2.2 SYSTEM DESIGN

- A. Provide a complete permanent structured building cabling system composed of cabling and pathways supporting both computers and VoIP telephone stations, including cables, support structures, enclosures and cabinets, and computer modular outlets.
  - 1. Comply with TIA/EIA-568 and TIA/EIA-569, latest editions.
  - 2. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F at relative humidity of 0 to 95 percent, noncondensing.
- B. Capacity:
  - 1. Provide optical fiber backbone cabling between data communication rooms, with copper backbone cabling within the building. Refer to the Plan Sheets.
  - 2. Horizontal Cabling: Copper.
  - 3. Provide one data outlet at each location shown on the plans unless otherwise noted. On the plan sheet, the number next to the outlet symbol denotes the number of cables to be installed.
  - 4. Provide two telephone cables to the fire alarm panel. These lines to be dedicated outside lines.

27 10 11-3

5. Provide one data cable to each TV location. Stainless Steel plate is by this Contractor.
  6. Provide two data cables to the HVAC control panel.
  7. Provide two data cables to the center of each classroom for WiFi access point. Coil 10' of extra cable at each classroom.
- C. Main Distribution Frame (MDF): Centrally located support structure for terminating backbone cables, functioning as point of presence to external service provider.
1. Locate main distribution frames as indicated on the drawings.
  2. Capacity: As required to terminate all cables required by design criteria plus minimum 25 percent spare space.
- D. Intermediate Distribution Frames (IDF): Support structures for terminating horizontal cables that extend to telecommunications outlets.
1. Locate intermediate distribution frames in secondary data closets.
- E. Backbone Cabling: Cabling, pathways, and terminal hardware connecting intermediate distribution frames (IDF's) with main distribution frame (MDF), wired in star topology with main distribution frame at center hub of star.
- F. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".
- G. Owner shall purchase and install the telephone switch, computer system, telephone equipment, rack mounted UPS system, switches, and all items past the patch panel/cords.

## 2.3 PATHWAYS

- A. Conduits are supplied by the Electrical Contractor. No cable is to be installed in the open unless above accessible ceilings.
- B. Provide all J-hooks and supports necessary, mounted at four-foot intervals.

## 2.4 COPPER CABLE AND TERMINATIONS

- A. Structured VoIP Copper Horizontal Data Cable: TIA/EIA-568 Category 6 solid conductor unshielded twisted pair (UTP), 24 AWG, 100 ohm; 4 individually twisted

27 10 11-4

pairs; jacket colors listed below, coordinate colors with owners system, and complying with all relevant parts of and addenda to latest edition of TIA/EIA-568 and UL 444.

1. Cable jacketing shall be lead free.
  2. Individual conductors shall be 100% FEP insulated.
  3. Cable shall be independently verified by ETL and shall exceed all TIA/EIA and ISO Enhanced Category 6/Class D requirements.
  4. Cable performance shall be independently verified and characterized to 250 MHz.
  5. Cable shall be independently verified for flammability by UL and listed under file number E138034.
  6. Cable Jacket Colors:
    - a. VoIP - Blue
    - b. Cameras - Green
    - c. Wireless Access System - White
- B. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.
- C. Jacks and Connectors: RJ-45, non-keyed, terminated with 110-style insulation displacement connectors; high impact thermoplastic housing; complying with same standard as specified horizontal cable and UL 1863.
1. Performance: 500 mating cycles.
  2. Voice and Data Jacks: 4-pair, pre-wired to T568B configuration, with color-coded indications for T568B configuration.
  3. Color of jacks and connectors are to match cabling color as listed above.
- D. Provide device plates to match color/type as called for in Section 26 27 26.
- E. Provide HDMI cabling as noted on drawing sheets. Cabling is to be high speed type cabling to provide a minum resolution of 4K on the screen.

27 10 11-5

## 2.5 FIBER OPTIC CABLE AND ADAPTORS

- A. Fiber Optic Backbone Cable: 12-fiber, single mode, 1310/1383/1550nm, 8.2um, OS2, complying with TIA-492CAAA; covered with cable jacket complying with relevant portions of and addenda to latest edition of TIA/EIA-568.
  - 1. Provide NFPA 70 type OFNP nonconductive-plenum-rated cable.
  - 2. Install in 1" orange inner duct.
- B. Fiber Optic Adapters and Connectors: Duplex LC, push-on-push-off type, single mode adapters with zirconia ceramic alignment sleeves; complying with relevant parts and addenda to latest edition of TIA/EIA-568 and with maximum attenuation of 0.3 dB at 1300 nm with less than 0.2 dB change after 500 mating cycles when tested in accordance with TIA-455-21.
- C. Provide orange innerduct for fiber optic cable.

## 2.6 CROSS-CONNECTION EQUIPMENT

- A. Patch Panels for Category 6 Cabling: Type 110 insulation displacement connectors; capacity sufficient for cables to be terminated, plus 25 percent spare.
- B. Patch Panels for Copper Cabling: Sized to fit EIA standard 19 inch wide equipment racks; 0.09 inch thick aluminum; cabling terminated on Type RJ45 insulation displacement connectors; printed circuit board interface.
  - 1. Jacks: Non-keyed RJ-45, suitable for and complying with same standard as cable to be terminated; minimum 48 ports and 2 rack units high per standard width panel.
  - 2. Capacity: Provide ports sufficient for cables to be terminated plus 25 percent spare.
  - 3. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA/EIA-606 using encoded identifiers.
  - 4. Provide separate 48 port patch panels, as many as required, for each of the following systems:
    - a. Data/voice
    - b. Wifi

27 10 11-6



- c. Access Control
  - d. Security Cameras
- C. Patch Panels for Fiber Optic Cabling: Sized to fit EIA standard 19-inch wide equipment racks; 0.09 inch thick aluminum.
- 1. Adaptors: As specified above under FIBER OPTIC CABLING; maximum of 24 duplex adaptors per standard panel width.
  - 2. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA/EIA-606 using encoded identifiers.
  - 3. Provide incoming cable strain relief and routing guides on back of panel.
  - 4. Provide rear cable management tray at least 8 inches deep with removable cover.
  - 5. Provide dust covers for unused adaptors.

## 2.7 ENCLOSURES

- A. Equipment Racks and Cabinets: CEA-310 standard 19-inch wide component racks.
- 1. Floor Mounted Racks: Four post, open, 28" deep, 16 gage steel construction with corrosion resistant finish; vertical and horizontal cable management channels, threaded vertical rails, top and bottom cable troughs, and grounding lug.
  - 2. Provide Ladder Cable Tray from wall to wall across the room over the equipment racks.

## PART 3 EXECUTION

### 3.1 INSTALLATION - GENERAL

- A. Comply with latest editions and addenda of TIA/EIA-568, TIA/EIA-569, ANSI/J-STD-607, NFPA 70, and SYSTEM DESIGN as specified in PART 2.

### 3.2 INSTALLATION OF EQUIPMENT AND CABLING

- A. Cabling:
- 1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.

27 10 11-7

2. Do not over-cinch or crush cables.
  3. Do not exceed manufacturer's recommended cable pull tension.
  4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.
  5. Do not overfill conduit or other raceways, refer to National Electrical Code.
  6. Cables shall be continuous, no splices are allowed.
  7. At no time shall cables rest on acoustic ceiling grids or panels. Cables shall be independently supported.
  8. The maximum number of cables in a bundle is 40.
  9. Attache cable to the structure above fire sprinkler and other systems.
  10. Do not attach cable to lighting grid support wire.
  11. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the Contractor prior to final acceptance at no cost to the Owner.
  12. Pulling tension on 4 pair UTP cables shall not exceed 25 pounds for a single cable or cable bundle.
  13. Backbone cable shall be installed separately from horizontal distribution cables.
  14. Where cables are installed in an air return plenum, the cable shall be installed in conduit, or plenum rated cable shall be installed in a plenum inner duct.
  15. Where cabling is installed in/under floor slab, use only cabling rated for that installation.
- B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
1. At Distribution Frames: 120 inches.
  2. At Outlets - Copper: 12 inches.
  3. At Outlets - Optical Fiber: 39 inches.

27 10 11-8

C. Copper Cabling:

1. Category 6: Maintain cable geometry; do not untwist more than 1/2 inch from point of termination.
2. Copper Cabling Not in Conduit: Use only type CMP plenum-rated cable as specified.
3. The cable jacket shall be maintained as close as possible to the termination point.

D. Fiber Optic Cabling:

1. Prepare for pulling by cutting outer jacket for 10 inches from end, leaving strength members exposed. Twist strength members together and attach to pulling eye.
2. Support vertical cable at intervals as recommended by manufacturer.

E. Floor-Mounted Racks and Enclosures: Permanently anchor to floor in accordance with manufacturer's recommendations.

1. All racks and enclosure shall be grounded to the telecommunications bus bar which is furnished by this Contractor and installed by licensed electrical contractor.

F. Field-Installed Labels: Comply with TIA/EIA-606 using encoded identifiers.

1. Cables: Install color coded labels on both ends.
2. Outlets: Label each jack on its face plate as to its type and function, with a unique numerical identifier. Jack numbering shall match the corresponding patch panel labeled A to Z and corresponding port numbered 1 to 48 in the data room.
3. Patch Panels: Label each jack as to its type and function, with a unique numerical identifier.
4. Each cable shall be labeled at a location that can be viewed without removing the bundle support ties.
5. Dust caps shall be installed on the connectors and couplings at all times unless physically connected.

27 10 11-9

6. Each cable shall be clearly labeled at the entrance to the termination panel. Cables labeled within the bundle shall not be acceptable.
  7. Each outlet plate shall be labeled with permanent labeling and shall include the telecommunication room number.
  8. Labels are to be machine made; hand written labels are unacceptable.
- G. Coordinate the installation of all cable with the Electrical Contractor and other low voltage contractors on the project.
  - H. Provide fire stop systems at all rated penetrations.
  - I. Provide grounding per ANSI/J-STD-607. Provide a Telecommunications Bonding Backbone to be used to bond all telecommunications cable shields, equipment, racks, cabinets, raceways, basket/ladder tray, and other associated hardware that has the potential for acting as a current carrying conductor.
  - J. The main entrance facility equipment room in each building shall be equipped with a telecommunications main grounding bus bar (TMGB). Each telecommunications closet shall be provided with a telecommunications ground bus bar (TGB). The TMGB shall be connected to the building electrical service entrance grounding electrode. This is to be accomplished by a licensed electrical contractor employed by this Contractor.
  - K. All wires used for telecommunications grounding purposes shall be identified with green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape. All cables and bus bars are to be identified and labeled.
  - L. The TBB shall adhere to the recommendations of the ANSI/J-STD-607-A standard and be designed or approved by a qualified PE, licensed in the State of Arkansas. All grounding is to be installed by a licensed electrical contractor who is an employee of this Contractor.

### 3.3 TESTING

- A. Comply with inspection and testing requirements of specified installation standards.
- B. Visual Inspection:
  1. Inspect cable jackets for certification markings.
  2. Inspect cable terminations for color coded labels of proper type.

27 10 11-10

3. Inspect outlet plates and patch panels for complete labels.
- C. Testing - Copper Cabling and Associated Equipment:
1. Test backbone cables after termination but before cross-connection.
  2. Test backbone cables for DC loop resistance, shorts, opens, intermittent faults, and polarity between connectors and between conductors and shield, if cable has overall shield.
  3. Test operation of shorting bars in connection blocks.
  4. Category 6 Links: Perform tests for wire map, length, attenuation, NEXT, and propagation delay. Test each pair for short circuit continuity, short to ground, crosses, reversed polarity.
  5. All cables and termination hardware shall be 100% tested for defects in installation and to verify cable performance under installed conditions.
  6. Copper cables are to be tested using a Class 1 or Class 2 cable analyzer.
  7. Each installed cable shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet, as appropriate. The cable length shall conform to the maximum distance set forth in the TIA/EIA-568-B Standard.
  8. Test results shall be automatically evaluated by the equipment, using the most up-to-date criteria from the TIA/EIA Standard and the result shown as pass/fail. Test results shall be printed directly from the test unit or from a download file using an application from the test equipment manufacturer. The printed test results shall include all tests performed, the expected test result and the actual test result achieved. A pass or fail result for each parameter is determined by comparing the measured values with the specified test limits for that parameter.
  9. The Owner reserves the right to witness any or all testing. The Contractor shall advise the Owner in writing when testing is scheduled at least one week in advance of actual testing.
  10. All test results are to be documented and submitted as part of the construction close out documents. They shall be approved by the Owner Representative prior to substantial completion.

27 10 11-11

D. Testing - Fiber Optic Cabling:

1. Backbone: Perform optical fiber end-to-end attenuation test and manufacturer's recommended test procedures; perform verification acceptance tests.
2. The Owner reserves the right to witness any or all testing. The Contractor shall advise the Owner in writing when testing is scheduled at least one week in advance of actual testing.
3. All test results are to be documented and submitted as part of the construction close out documents. They shall be approved by the Owner Representative prior to substantial completion.

E. Finally:

1. Provide labeling on both ends of each cable.
2. Provide riser diagrams with all cables labeled.
3. All server equipment is by the Owner.
4. All test results are to be documented and submitted as part of the construction close out documents. They shall be approved by the Owner Representative prior to substantial completion.
5. The Owner reserves the right to witness any or all testing. The Contractor shall advise the Owner in writing when testing is scheduled at least one week in advance of actual testing.
6. All cables shall be terminated in approved modular jacks or termination enclosures. No cables shall be left "free" unless so stated on the Drawings.
7. This Contractor is to provide complete system labeling, Accurate As-Built Drawings, complete system riser diagrams, and complete Test Documentation bound in a three ring binder(s) prior to acceptance by the Owner's Representative, and substantial completion.
8. The Contractor shall warrant the cabling system against defects in workmanship for a period of one year from the date of system acceptance. The warranty shall cover all labor and materials necessary to correct a failed portion of the system and to demonstrate performance within the original installation specifications after repairs are accomplished. This warranty shall be provided at no additional

27 10 11-12

cost to the Owner.

END OF SECTION

27 10 11-13

Tillery K5 ALE Remodel  
Rogers Public Schools  
Rogers, Arkansas





## SECTION 28 31 04

### FIRE DETECTION AND VOICE EVACUATION SYSTEM

#### PART 1 GENERAL

##### 1.1 SCOPE

- A. This specification describes a Fire Detection and Voice Evacuation system. The control panel, to be intelligent device addressable, analog detecting, low voltage and modular, with digital communication technology, in full compliance with all applicable codes and standards. This system shall operate as a stand-alone panel, with transponders or peer-to-peer operation. The features and capacities described in this specification are required as a minimum for this project and shall be furnished by the successful contractor.
- B. The system shall be in full compliance with National and Local Codes.
- C. The system shall include all required hardware, piping, raceways, interconnecting wiring and software to accomplish the requirements of this specification and the contract drawings, whether or not specifically itemized herein.
- D. All equipment furnished shall be new and the latest state of the art products of a single manufacturer, engaged in the manufacturing and sale of fire detection devices for over ten years.
- E. The system as specified shall be supplied, installed, tested and approved by the local Authority Having Jurisdiction, and turned over to the Owner in an operational condition.

##### 1.2 RELATED WORK

- A. Division 1 - Bidding Requirements and Conditions Of The Contract.
- B. Section 26 00 10 - General Electrical Provisions.

##### 1.3 STANDARDS AND CODES

- A. The publications listed below form a part of this publication to the extent referenced. The publications are referenced in the text by the basic designation only. The latest version of each listed publication shall be used as a guide unless the authority having jurisdiction has adopted an earlier version.

28 31 04-1

- B. National Fire Protection Association (NFPA) Most current or approved Standard
  - 1. NFPA 70 National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
  - 2. NFPA 72 National Fire Alarm Code.
- C. Underwriters' Laboratories, Inc. (UL) Appropriate "UL" equipment standards.
  - 1. UL 864 Control Panels.
  - 2. UL 268 Smoke Detectors.
  - 3. UL 268A Smoke Detectors (HVAC).
  - 4. UL1480 Speakers for Fire Protection Signaling Systems.
  - 5. UL 1971, Standard for Visual Signaling Appliances.
- D. Building Codes
  - 1. International Building Code and the International Fire Code.
  - 2. State and Local Building Codes as adopted and/or amended by The Authority Having Jurisdiction.
  - 3. ADA, and/or State and local equivalency standards as adopted by The Authority Having Jurisdiction.

#### 1.4 QUALIFICATIONS OF INSTALLERS

- A. Before commencing work, submit data showing that the manufacturer has successfully installed fire alarm and suppression systems of the same scope, type and design as specified.
- B. The Contractor shall submit copies of all required Licenses and Bonds as required in the state of Arkansas.
- C. The Contractor shall employ on staff a minimum of one NICET level III technician or a professional engineer, registered in the state of Arkansas.
- D. The Contractor shall be qualified by UL for certifying fire alarm systems. Upon completion of the installation the Contractor shall certify the final system meets UL

28 31 04-2

ongoing maintenance.

- E. Fire alarm sales and installation shall be the primary function of this Contractor with minimum of five years experience.
- F. Contractor's business shall be within 100 miles of this project site.

#### 1.5 MANUFACTURER'S REPRESENTATIVE

- A. Provide the services of a factory trained and certified representative or technician, experienced in the installation and operation of the type of system provided. The representative shall be licensed in the State.
- B. Contractor shall maintain a factory trained service department with service personnel available on a 24 hour, 7-day per week basis. Provide a 24-hour emergency service number with a maximum telephone response time of 1 hour.
- C. Contractor shall maintain a spare parts inventory of critical function components.
- D. Contractor's personnel shall have a minimum of five years experience in service and maintenance of fire detection, and alarm systems.
- E. Preapproved manufacturer is Silent Knight.

#### 1.6 SUBMITTAL

- A. The Contractor shall include the following information in the equipment submittal:
  - 1. Power calculations. Battery capacity calculations. Battery size shall be a minimum of 125% of the calculated requirement.
  - 2. Supervisory power requirements for all equipment.
  - 3. Alarm power requirements for all equipment.
  - 4. Power supply rating justification showing power requirements for each of the system power supplies. Power supplies shall be sized to furnish the total connected load in a worst-case condition plus 25% spare capacity.
  - 5. Voltage drop calculations for wiring runs demonstrating worst-case condition.
  - 6. Complete manufacturers catalog data including supervisory power usage, alarm power usage, physical dimensions, and finish and mounting requirements.

28 31 04-3

7. Complete drawings covering the following shall be submitted by the Contractor for the proposed system:
  - a. Floor plans shall show all equipment and raceways, marked for size, conductor count with type and size, showing the percentage of allowable National Electric Code fill used.
  - b. Provide a fire alarm system function matrix as referenced by NFPA 72. Matrix shall illustrate alarm input/out events in association with initiation devices. Matrix summary shall include system supervisory and trouble output functions. Include any and all departures, exceptions, variances or substitutions from these specifications and/or drawings at time of bid.
  - c. Provide complete fire alarm installation plans which have been signed by the Authority Having Jurisdiction. Any required modifications to the issued documents shall be included in this contractor's bid.
8. Installation drawings shop drawings, and record drawings shall be prepared by an individual who is experienced with the work specified herein.
9. Verbiage of voice evacuation message that are to be used by the voice evacuation system.
10. Incomplete submittals shall be returned without review, unless with prior approval of the Engineer.

#### 1.7 SYSTEM REQUIREMENTS

- A. The system shall be a complete, electrically supervised fire detection and notification and voice paging system, microprocessor based operating system having the following; capabilities, features and capacities:
  1. Audible and visual notification alarm circuit zone control.
  2. Status indicators for sprinkling system water-flow and valve supervisory devices.
  3. Each intelligent addressable device on the system shall be displayed at the Control Panel Display.
  4. Remote annunciators shall have alphanumeric display with the same characteristic as the fire alarm control panel. The remote display shall be programmable to have complete system control or just as an annunciator.

28 31 04-4

5. The Fire Alarm System is to be capable of performing emergency announcements. Coordinate with owner to program the required emergency announcements.

## 1.8 SYSTEM OPERATION

- A. Activation of any system fire, supervisory, trouble, or status initiating device shall cause the following actions at the panel annunciator.
- B. Fire Alarm Condition:
  1. Sound an audible alarm and display a custom screen/message defining the building in alarm and the specific alarm point initiating the alarm in a graphic display.
  2. Log to the system history archives all activity pertaining to the alarm condition.
  3. Sound the ANSI 117-1 signal followed by a voice message with synchronized strobes.
  4. Audible signals shall be silenced from the fire alarm control panel by an alarm silence switch. Visual signals shall be programmable to flash until system reset or alarm silencing, as required.
  5. A signal dedicated to sprinkler system water flow alarm shall not be silenced while the sprinkler system is flowing at a rate of flow equal to a single head.
  6. Record within system history the initiating device and time of occurrence of the event.
- C. Supervisory Condition:
  1. Display the origin of the supervisory condition report at the fire alarm control panel.
  2. Activate supervisory audible and dedicated visual signal.
  3. Audible signals shall be silenced from the control panel by the supervisory acknowledge switch.
  4. Record within system history the initiating device and time of occurrence of the event.

28 31 04-5

D. Trouble Condition:

1. Display at the local fire alarm control panel, the origin of the trouble condition report.
2. Activate trouble audible and visual signals at the control panel and as indicated on the drawings.
3. Audible signals shall be silenced from the fire alarm control panel by a trouble acknowledge switch.
4. Trouble reports for primary system power failure to the master control shall be automatically delayed for a period of time equal to 25% of the system standby battery capacity to eliminate spurious reports as a result of power fluctuations.
5. Record within system history, the occurrence of the event, the time of occurrence and the device initiating the event.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: The equipment and service described in this specification represent the base bid for the equipment.
1. Subject to compliance with requirements, preapproved manufacturers are by the following:
    - a. Silent Knight.
- B. Being listed as an acceptable Manufacturer in no way relieves the Contractors obligation to provide all equipment and features in accordance with these specifications.

### 2.2 CONTROL PANEL

- A. The control panel and all system interface panels shall be modular in construction and shall include, but not limited to: the hardware, software and firmware required to perform the following major system functions:
1. Steel, satin red, baked enamel cabinet with indicator viewing window, removable hinged outer door with cylinder lock and dead front construction with the outer door open. The inner dead front doors shall be hinged for ease of system

28 31 04-6

operation by firefighters and access by technicians for testing and maintenance modes.

2. System power supplies, including necessary transformers rectifiers, regulators, filters and surge protection required for system operation, with the capacity to power the system in a worst case condition with all devices in alarm and all local indicating appliances active without exceeding the listed ratings. All system devices shall display normal and alarm conditions consistently whether operating from normal power or reserve (standby) power.
3. Surge protection shall be supplied at the power input to each cabinet. The surge suppression shall be of the phase to neutral (normal mode suppression). Phase to ground devices, MOV based devices and pure inductive devices shall not be considered acceptable. Protection shall also be furnished for SLC and NAC circuits where exiting and entering any structure, connected prior to any system devices within the structure.
4. Standby power source shall meet the requirements for standby capacity as detailed in paragraph 1-5.2.6, NFPA 72, i.e. supervisory for 24 hours with local systems, central station and proprietary systems and 60 hours for auxiliary and remote station systems. Additionally, the supply shall be capable, at the end of this period of operating the system with all evacuation appliances active for a period of five minutes using conventional signaling or fifteen minutes using voice evacuation.
5. Control panel and CIP power supply input and output voltages, battery charging currents and terminal voltages shall be displayed on the main control panel LCD display when requested via the panel service menu. It shall not be required to be at the cabinet being interrogated to measure service voltages.
6. System 16 bit core processor, with internal operating system to process incoming alarm signals and issue output commands required as a result of the alarm reception, by system programming or by manual commands. Total system response time shall not exceed 4 seconds on a system configured to the 2000 input address maximum capacity. All system processors shall be supervised by individual watchdog circuitry furnishing automatic restart after loss of activity.
7. Digital communication capabilities supporting Style 4 (Class B) or Style 7 (Class A) communications using either DC digital or fiber optics technologies or combinations of both as required for the control panel to communicate with up to

28 31 04-7

63 local network nodes including CIP's, annunciators, and displaying local network information.

8. Provide an internally mounted internet dialer Digital Alarm Communication Transmitter (IP-DACT). It shall be a UL 864 listed network dialer capable of operating on a VoIP system. Router used for network transmission shall have battery backup. AND Provide dual path commercial fire communicator connected to the IP\_DACT capable of providing three selectable reporting paths which include: cellular only, IP only or IP primary/cellular backup.
9. Capability shall exist within the system to extend the network at any node. The system shall support a maximum of two network extension circuits in series on any system branch, extending the inherent distance limitations for network communications.
10. Communication protocol shall be of the CS/MACD (carrier sense, multiple access, collision detect) type, eliminating delays incorporated into other protocols. Communication techniques using token passing and requiring sensing of delays and re-generation of the token to re-establish network communications in the event of a fault shall not be acceptable.
11. Capability shall exist within the system to extend the network at any node. The system shall support a maximum of two network extension circuits in series on any system branch, extending the inherent distance limitations for network communications.
12. NFPA 72 Style 4 operation analog signaling circuit with isolation capability for circuit survival in a shorted circuit mode, as required to communicate with 120 points consisting of a maximum of sixty intelligent analog alarm initiating and sixty intelligent controllable output devices.
13. Analog loops shall be configured with loop isolators and wired in a manner that prevents a catastrophic wiring event in a smoke zone or on a floor from effecting the performance of other floors.
14. Limited energy output circuits as required for operation of direct current audible or visual indicating appliances, leased line or city tie, or extinguisher system release shall be provided by controllable signal modules.
15. Outputs shall be programmable as device coded, zone coded, march time coded, temporal code 3, or continuous sounding and shall be configured as required for

28 31 04-8



Style Y (Class B) or Style Z (Class A).

16. Control of operations requiring switching functions, where required, shall be provided a software controllable relay module. Relay coils shall be supervised when in the standby state. Relay contacts shall be rated at 2 amperes minimum.
17. System display/keyboard shall be usable at any network node and shall have the following capabilities, capacities, indicators and controls:
  - a. An 80-character back lighted alphanumeric super twist LCD display readable at any angle.
  - b. Thirty-two character user defined custom messages shall describe the location of the active device.
  - c. Display shall indicate desired message in a sequence, including; English/Spanish, English/Portuguese, English/French and English. Either of the selected languages shall be selectable as the primary display.
  - d. The local system display shall have the capability to display a minimum of 6,000 custom messages activated as a result of alarms originated at other local panels resident on the external network. Systems unable to perform to this level shall supply PC based terminals displaying the required messages.
18. The system shall be capable of programming to allow troubles occurring and restored in the system to be automatically removed from the display queue.
  - a. As a minimum, an LED display for "ALARM", "AUDIBLES SILENCED", "SUPERVISORY", "TROUBLE", "SECURITY", "POWER ON" and "PARTIAL SYSTEM DISABLED".
  - b. Touch activated, audible feed-back, membrane switches for "ALARM ACKNOWLEDGE", "AUDIBLE SILENCE", "SUPERVISORY ACKNOWLEDGE", "TROUBLE ACKNOWLEDGE", "SECURITY ACKNOWLEDGE", "RESET", "DISPLAY HOLD" and "DISPLAY NEXT".
  - c. Touch activated, audible feed-back, membrane switch functions, programmable to perform a minimum of twelve custom designed and programmed functions such as drill, disable, bypass automatic control commands or other special functions as required by the system user.

28 31 04-9

- d. The membrane switches shall also be used for the entry of multiple key sequences to be used for passcode protection inputs into logic strings, preventing un-authorized command entry.
  - e. Ten-digit keypad for passcode entry to perform programming and maintenance functions.
19. The system shall support a minimum of three supervised remote alphanumeric annunciators as full function remote control points.
  20. Each system display shall be programmable, as a software function at the Fire Alarm Control Panel to be full function or display only, with its own set of function commands, as described above. Selection in software shall also determine the display of either local only or global information.
  21. Real time clock with lithium battery for the maintenance of time through a full system power down, assuring the accuracy of time labels in the historical events log.
  22. Selective historical log, up to 800 events of all types, shall be stored in flash memory and displayed, printed or downloaded by classification for selective event reports.
    - a. The system shall allow selection of events to be logged, including inputs, as; alarms, troubles, supervisory, security, status changes, walk tests and device verification, outputs as; audible control and output activation, actions as; reset, set sensitivity, arm/disarm, override, password, set time and acknowledge.
    - b. Data format for downloading shall be adaptable to a data base management program allowing custom report generation to track alarms, troubles and maintenance.
    - c. Audible and visual indications shall be generated when memory is 80% and 90% full to allow downloading of data.
  23. The system shall be configured paging as campus system.
  24. Software and hardware shall be furnished to allow an authorized service provider the ability to communicate with the control panel via phone lines, running diagnostic reports, historical reports, recording system voltage levels and

28 31 04-10

recording system sensitivity levels.

25. The local control shall have voice evacuation capabilities integrated into the software, hardware and operating system. The audio control modules supplied shall communicate with the fire alarm master via high-speed network communications lines.
26. The master microphone module shall be permanently mounted behind the locked access door, visible through the viewing window and provide firefighters with the means of issuing voice message instructions to specific audio zones, groups of zones or all zones. The microphone and the press-to-talk switches shall be supervised. This module shall contain a local speaker with volume control to monitor selected audio channels.
27. A tone generator capable of providing a variety of tones for use in the system shall be included. Software configuration shall determine tone usage.
28. Coded or pulsed at:
  - a. 120 ppm.
  - b. 30 ppm.
  - c. Temporal code 3.
  - d. 4-4-4.
29. A backup tone card shall be furnished for the audio control module.
30. The integrated voice system shall utilize local or distributed amplification as required for optimum system performance and configuration.
31. The voice system amplifiers and speakers as required to optimize system performance shall be 25 vrms.
32. The integrated voice system shall be capable of operation of three voice channels simultaneously; Evacuation, Alert and Auxiliary. Systems using a dedicated paging channel shall not be considered equal.
33. The amplifiers shall be modular to meet the system requirements providing power as required to supply a minimum of 2.0 watts of power for each connected system speaker. Amplifiers shall automatically transfer to standby battery when commercial power fails or is disconnected. Provide the amplifier wattage of 100

28 31 04-11

watt.

34. Amplifiers shall be configured for:
  - a. Two channel.
35. All amplifiers shall be supervised and provide automatic switching to backup amplifier output in the event of amplifier failure.
36. The voice system shall be operable as a voice node on the external voice network composed of up to 63 self standing network panels, allowing paging to or from other external network nodes as selected in system programming.
37. The voice network shall be capable of configuration using conventional hard-wired techniques or fiber optics transmission systems.
38. Furnish supervisory circuitry for amplifiers, speaker circuits and visual circuits in quantities as required by system design. All audible and visual notification circuits shall be power limited.
39. Furnish manual switch and annunciator modules on the face of the control panel in quantities required by the system. Manual switch modules shall be grouped and labeled in a color-coded configuration to indicate speaker circuit control, telephone circuit control, HVAC smoke control, and water flow and valve supervision. Each LED shall be capable of displaying status of the controlled zone via three different colors in either a steady or flashing state to denote the active status circuit and indicate trouble. All switch activation and LED status indications shall be software mapped to any system functions desired. Systems requiring the use of multiple switches to activate groups of zones or functions shall not be acceptable.
40. Furnish for the indication and control of all system speaker zone modules as follows:
  - a. Speakers shall be zoned in logical divisions of the building.
  - b. The remote annunciator shall be either a system display as indicated on the drawings. The remote annunciator shall have all the capabilities of the system annunciator. The remote annunciator shall have the ability to be programmed as an annunciator only or an annunciator with full system control.

28 31 04-12

- c. An off-site dialer shall be provided. The dialer shall be listed with the system and shall be capable of transmitting Ademco Contact ID and SIA protocols. Ademco Contact ID shall be capable of transmitting up to 999 points. SIA protocol shall be capable of transmitting all 2040 MXL points. The dialer shall have a minimum of 5 inputs until system completion in which the dialer shall transmit individual point information.

## 2.3 POWER SUPPLY

- A. System power supply, including necessary transformers rectifiers, regulators, filters and surge protection required for system operation, with the capacity to power the system in a worst case condition with all devices in alarm and all local indicating appliances active without exceeding the listed ratings. All system devices shall display normal and alarm conditions consistently whether operating from normal power or reserve (standby) power.
- B. Standby power source shall meet the requirements for standby capacity as detailed in NFPA 72, i.e. supervisory for 24 hours and sufficient power to provide the required discharge, control and notification.
- C. Supply a 12 amp power supply model MPS-12.

## 2.4 SYSTEM ENCLOSURES

- A. Provide the enclosure needed to hold all the cards and modules as specified with at least spare capacity for two cards. The enclosures shall be red. The outer doors shall be capable of being a left hand open or a right hand open. The inner door shall have a left hand opening. System enclosure doors shall provide where required ventilation for the modules or cards in the enclosure.
- B. Enclosures housing amplifiers shall provide venting as per the manufacturers recommendation.
- C. Provide a "plan box" located at the fire alarm control panel to hold approved As-built plans.

## 2.5 SYSTEM PRINTER (CAPABILITY ONLY)

- A. Provide capability for system printer. Printer information below included for reference only.

28 31 04-13

1. The system printer shall be operated from a Printer Modules (PIM-1 which mounts inside the enclosure and PIM-2, which outside the enclosure.
2. The logging printer shall be “UL” listed with the system. This parallel printer shall be supervised for: On/Off line, out of paper, paper jam, power off, and connection the system. The printer shall be a; high speed, 24 dot matrix, wide carriage, and capable of using tractor or friction fed paper. Supervised network connection shall be either Style 4 or 7 as required by local requirements. The printer shall contain diagnostic LED’s for ease in maintenance.

## 2.6 INITIATION DEVICES INTELLIGENT

- A. System intelligent alarm initiation devices shall be furnished and installed where indicated on the drawings.
  1. Detectors not listed for sensitivity testing from the control panel shall not be deemed acceptable due to the additional maintenance expense involved in the required removal, calibrated smoke generation and testing as described by NFPA 72.
  2. Sensitivity testing performed from the control panel shall be logged by the system printer or stored in system memory as specified, as a permanent record of the performance of code mandated testing.
  3. Detectors shall be operational with addressable relay bases, addressable audible bases and remote indicating LED's, programmable by the control panel and controlled by the detector electronics. They shall be supplied and installed with one of these options where indicated on the drawings or required by the operational requirements of this specification.
  4. Detector shall be readily disassembled without the requirement for special tools to gain access to the detection chamber for cleaning and maintenance.
  5. Detectors shall be assigned a sensitivity level for alarm threshold by the central controller, if not programmed to respond to a specific fire occupancy profile, based on environment, time of day or other programmable functions as required by the system user and shall respond at that level whether in the on line mode or default mode.
- B. Fire Detectors, Application Specific

28 31 04-14

1. Detectors shall be listed for use as open area protective coverage, in duct installation and sampling assembly installation and shall be insensitive to air velocity changes.
  2. Low profile, white case shall not exceed 2.5 inches of extension below the finish ceiling.
  3. The detector shall be designed to eliminate calibration errors associated with field cleaning of the chamber.
  4. Detectors shall be programmable as application specific, selected in software for a minimum of eleven specific environmental fire profiles unique to the installed location. These fire profiles shall eliminate the possibility of false indications caused by dust, moisture, RFI/EMI, chemical fumes and air movement while factoring fire burn rates, ambient temperature rise, obscuration rate changes and hot/cold smoke phenomenon into the alarm decision to give the earliest possible real alarm condition report.
  5. Detection technologies using time delays to verify the existence of an alarm condition shall not be considered acceptable.
  6. Detector electronics shall utilize surface mounted techniques and be conformal coated with a substance rendering the electronics impervious to stray conduction caused by dust and moisture. The coating shall remain stable to 135 degrees F.
  7. Detector shall be listed for duct smoke sampling when mounted in a compatible housing and shall be specifically programmable as a duct smoke detector in the software database. When used as a duct detector it shall support the use of a remote test switch and LED indicator.
- C. Heat Detectors, Intelligent, Electronic Thermistor Type shall be rated at 135 degrees and 15 degrees per minute rate of rise. Detectors shall be constructed to compensate for the thermal inertia inherent in conventional type detectors due to the thermal mass, and alarm at the set point of 135 degrees Fahrenheit.
1. The choice of alarm reporting as a fixed temperature detector or a combination of fixed and rate of rise shall be made in system software and be changeable at any time without the necessity of hardware replacement.
  2. The detectors furnished shall have a listed spacing for coverage up to 2,500 square feet for use in environments as covered by Factory Mutual and “UL”

28 31 04-15

(UQGS) and shall be installed according to the requirements of NFPA 72 for open area coverage.

- D. Detector bases shall be low profile twist lock type with screw clamp terminals and self wiping contacts. Bases shall be installed on an industry standard, 4" square or octagonal electrical outlet box. Bases shall be supplied with the following features as required for performance to this specification.
  - 1. Detector relay base with software programmed addressable relay integral to the base.
- E. The manual pull station shall be addressable and semi flush mounted. Where surface mounted is required supply the manufacturers surface mount box.
  - 1. Furnish a double action pull station.
  - 2. Furnish with clear, tamper proof polycarbonate shield and frame that fits over the pull station. Provide with the optional horn.
- F. Smoke Detector/Carbon Monoxide (CO) Detector
  - 1. Smoke Detector/Carbon Monoxide Detector shall be listed to UL 268 and UL 2075 for Carbon Monoxide Gas Detection.
  - 2. The Detector shall be photoelectric smoke sensing and electrochemical CO sensing and equipped with a sounder capable of Temp 3 and Temp 4 audible signals.
  - 3. The Detector shall have nominal sensitivity of 2.5% per foot as measured in the UL smoke box.
  - 4. The Detector shall be capable of automatically adjusting its sensitivity by means of drift compensation and smoothing algorithms.
  - 5. The Detector's base shall be able to mount to a single-gang electrical box or direct (surface mount) to the wall or ceiling.
  - 6. The Detector shall provide LED indication that blinks to indicate normal standby, smoke alarm, smoke maintenance, CO alarm, CO trouble/end-of-life. When the detector is in CO trouble condition, it shall send a trouble signal to the panel.
  - 7. The Detector shall provide a means to test CO gas entry into the CO sensing cell. The detector shall provide this with a test mode that accepts CO gas from a test

28 31 04-16



agent and alarms immediately upon sensing CO entry. The 2-wire model shall include a maintenance signal to indicate the need for maintenance at the alarm control panel and shall provide a loop testing capability to verify the circuit without testing each detector individually.

8. The Detector shall have a replaceable CO cell that can be replaced at end of cell life.

## 2.7 NOTIFICATION APPLIANCES

- A. The speaker/strobe or speaker appliance as indicated on the drawings shall be a multiple tap speaker. The S-LP series having taps for  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1 and 2 watts. The S-HP series having taps for  $\frac{1}{16}$ ,  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1, 2, and 4 watts. The speaker/strobes shall have a synchronized strobe light with multiple candela taps to meet the intended application. The strobe light taps shall be adjustable for 15/75, 30/75, 75, and 110 candela. The appliance shall be red for wall mounting and white for ceiling mounted. Ceiling mounted appliances shall be rated for that application.
- B. The strobe only appliance as indicated on the drawings shall be a synchronized strobe light with multiple candela taps to meet the intended application. The strobe light taps shall be adjustable for 15/75, 30/75, 75, and 110 candela. The appliance shall be red for wall mounting and white for ceiling mounted. Ceiling mounted appliances shall be rated for that application.
- C. An alarm extender panel shall be provided where needed. The power supply shall be a minimum of 6 amps. The power supply shall contain four supervised notification circuits maximum of 3 amps each circuit. The power supply shall contain built-in synchronizing modules for strobes and audibles. There shall be a 3 amp filtered auxiliary power limited output. There shall be a minimum of 8 options as to the operations of the inputs and outputs. Locate away from any sources of heat.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Perform work in accordance with the requirements of NFPA 70, NFPA 72.
- B. Fasten equipment to structural members of building or metal supports attached to structure, or to concrete surfaces.

28 31 04-17

- C. In the event that limited energy cable installation is allowed under Division 26, all cable runs shall be run at right angles to building walls, supported from structure at intervals not exceeding 8 feet and shall be plenum rated.
- D. All necessary devices and wiring which are necessary for a complete, acceptable system shall be supplied regardless whether shown on the plans or not.
- E. Provide all wiring necessary to connect the control panel to a monitoring service. Coordinate connection with the Owner.

### 3.2 BOXES, ENCLOSURES AND WIRING DEVICES

- A. Boxes shall be installed plumb and firmly in position.
- B. Extension rings with blank covers shall be installed on junction boxes where required.
- C. Junction boxes served by concealed conduit shall be flush mounted.
- D. Upon initial installation, all wiring outlets, junction, pull and outlet boxes shall have dust covers installed. Dust covers shall not be removed until wiring installation when permanent dust covers or devices are installed.
- E. Provide all working necessary to connect the control panel to a monitoring service. Coordinate connection with the Owner.

### 3.3 CONDUCTORS

- A. Each conductor shall be identified as shown on the drawings at each with wire markers at terminal points. Attach permanent wire markers within 2 inches of the wire termination. Marker legends shall be visible.
- B. All wiring shall be supplied and installed in compliance with the requirements of the National Electric Code, NFPA 70, Article 760, and that of the manufacturer. All wiring is to be plenum rated.
- C. Wiring for strobe and audible circuits shall be a minimum 14 AWG, signal line circuits; 18 AWG twisted shielded, speaker circuits; 18 AWG twisted, telephone circuit; 18 AWG twisted shielded.
- D. All splices shall be made using solderless connectors. All connectors shall be installed in conformance with the manufacturer recommendations.

28 31 04-18

- E. Crimp-on type spade lugs shall be used for terminations of stranded conductors to binder screw or stud type terminals. Spade lugs shall have upset legs and insulation sleeves sized for the conductors.
- F. Permanently label or mark each conductor at both ends with permanent alphanumeric wire markers.
- G. A consistent color code for fire alarm system conductors throughout the installation.
- H. Wiring within sub panels shall be arranged and routed to allow accessibility to equipment for adjustment and maintenance.
- I. All open cable is to be plenum rated.

### 3.4 DEVICES

- A. Relays and other devices to be mounted in auxiliary panels are to be securely fastened to avoid false indications and failures due to shock or vibration.
- B. Wiring within panels shall be arranged and routed to allow accessibility to equipment for adjustment and maintenance.
- C. All devices and appliances shall be mounted to or in an approved electrical box.

### 3.5 CERTIFICATE OF COMPLIANCE

- A. Complete and submit to the Project Engineer in accordance with NFPA 72, most current edition adopted by the Authority Having Jurisdiction.

### 3.6 FIELD QUALITY CONTROL

- A. Testing, general
  - 1. All Alarm Initiating Devices shall be observed and logged for correct zone and sensitivity. These devices and their bases shall be tagged with adhesive tags located in an area not visible when installed, showing the initials of the installing technician and date.
  - 2. Wiring runs shall be tested for continuity, short circuits and grounds before system is energized. Resistance, current and voltage readings shall be made as work progresses.

28 31 04-19

3. The acceptance inspector shall be notified before the start of the required tests.  
All items found at variance with the drawings or this specification during testing or inspection by the acceptance inspector shall be corrected.
4. Test reports shall be delivered to the acceptance inspector as completed.

### 3.7 ACCEPTANCE TESTING

- A. A program matrix shall be prepared by the installing contractor referencing each alarm input to every output function affected as a result of an alarm condition on that input.
- B. The installing contractor prior to the ATP shall prepare a complete listing of all device labels for alphanumeric annunciator displays.
- C. The acceptance inspector shall use the system record drawings in combination with the documents specified in this specification during the testing procedure to verify operation as programmed. In conducting the ATP, the acceptance inspector shall request demonstration of any or all input and output functions. The items tested shall include but not be limited to the following:
  1. System wiring shall be tested to demonstrate correct system response and correct subsequent system operation in the event of:
    - a. Open, shorted and grounded signal line circuits.
    - b. Open, shorted and grounded notification, releasing circuits.
    - c. Primary power or battery disconnected.
  2. System notification appliances shall be demonstrated as follows:
    - a. All alarm notification appliances actuate as programmed
    - b. Audibility and visibility at required levels.
    - c. Voice Intelligibility testing.
  3. System indications shall be demonstrated as follows:
    - a. Correct message display for each alarm input at the control display.
    - b. Correct annunciator light for each alarm input at each annunciator and graphic display as shown on the drawings.

28 31 04-20

- c. Correct history logging for all system activity.
4. System off-site reporting functions shall be demonstrated as follows:
  - a. Correct zone transmitted for each alarm input
  - b. Trouble signals received for disconnect
5. Secondary power capabilities shall be demonstrated as follows:
  - a. System primary power shall be disconnected for a period of time as specified herein. At the end of that period, an alarm condition shall be created and the system shall perform as specified for a period as specified.
  - b. System primary power shall be restored for forty-eight hours and system-charging current shall be normal trickle charge for a fully charged battery bank.
  - c. System battery voltages and charging currents shall be checked at the fire alarm control panel.

### 3.8 DOCUMENTATION

- A. System documentation shall be furnished to the Owner and Authority Having Jurisdiction and shall include, but not be limited to, the following:
  1. System record drawings and wiring details including one set of reproducible drawings, and a CD ROM with copies of the record drawings in PDF format.
  2. System operation, installation and maintenance manuals.
  3. System matrix showing interaction of all input signals with output commands.
  4. Documentation of system voltage, current and resistance readings taken during the installation, testing and ATP phases of the system installation.
  5. System program showing system functions, controls and labeling of equipment and devices.
  6. Documentation of voice evacuation intelligibility test, and demonstration.

28 31 04-21

### 3.9 SERVICES

- A. The Contractor shall warrant the entire system against mechanical and electrical defects for a period described in the contract general conditions. This period shall begin upon completed certification and test of the system or upon first beneficial use of the system, whichever is earlier.
- B. The fire alarm system subcontractor or manufacturer shall offer for the Owner's consideration at the time of system submittal a priced inspection, maintenance, testing and repair contract in full compliance with the requirements of NFPA 72.
- C. The Owner shall have the option of renewing at the price quoted for single or multiple years up to five years.
- D. The Contractor performing the contract services shall be qualified and listed to maintain ongoing certification of the completed system to the UL for specific installed system listing.
- E. The installation contractor shall furnish training as follows for a minimum of four employees of the system user:
  - 1. Training in the receipt, handling and acknowledgement of alarms.
  - 2. Training in the system operation including manual control of output functions from the system control panel.
  - 3. Training in the testing of the system including logging of detector sensitivity, field test of devices and response to common troubles.
  - 4. The total training requirement shall be a minimum of two hours, but shall be sufficient to cover all items specified.

END OF SECTION

28 31 04-22

## SECTION 31 31 16

### TERMITE CONTROL

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Soil treatment below slabs on grade for subterranean insects.
- B. Soil treatment at foundation perimeter, for subterranean insects.

##### 1.2 REFERENCES

- A. Environmental Protection Agency (EPA)
  - 1. EPA - Federal Insecticide, Fungicide and Rodenticide Act.

##### 1.3 QUALITY ASSURANCE

- A. Materials: Provide certification that toxicants conform to requirements of authority having jurisdiction.
- B. Material Packaging: Manufacturer's labels and seals identifying content.

##### 1.4 REGULATORY REQUIREMENTS

- A. Conform to applicable requirements for application licensing and authority to use toxicant chemicals.

##### 1.5 SUBMITTALS

- A. Product Data: Submit through General Contractor to Architect.
  - 1. Indicate toxicants to be used, composition by percentage, dilution schedule, and intended application rate.
  - 2. Submit manufacturer's application instructions.

##### 1.6 PROJECT RECORD DOCUMENTS:

- A. Accurately record moisture content of soil before treatment, date and rate of application, areas of application, diary of meter readings and corresponding soil coverage.

##### 1.7 WARRANTY

- A. Provide five year warranty for material and installation. Cost for the five year warranty period will be included with the warranty.

- B. Warranty: Cover against invasion or propagation of subterranean termites, damage to building or building contents caused by termites; repairs to building or building contents so caused.
- C. Inspect work annually and report in writing to Architect.
- D. Owner reserves right to renew warranty for an additional five years.
- E. Warranty period will not begin until date of Substantial Completion.
- F. If termite treatment contract exists for existing building, coordinate contract of new addition with existing termite treatment contractor so as not to void existing warranty.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Toxicant Chemical: Water based emulsion, uniform composition, synthetic dye to permit visual identification of treated soil.
- B. Approved chemicals.
  - 1. Bifenthrin - Trade name Baseline, 1% emulsion.
  - 2. Cypermethrin - Pyrethroid, trade name Demon TC, 1%.
  - 3. Imidacloprid - Trade name Premise 75, .05% to .1%.
  - 4. Cyano - Trade name Tirbute, .5% to 1%.
  - 5. Other chemicals may be used as approved by appropriate regulatory agencies.
- C. All instructions on the manufacturers label shall be closely followed and all state and federal laws strictly obeyed.

### 2.2 MIX DILUTION

- A. Dilute and mix toxicant chemical to manufacturer's instructions.

## PART 3 EXECUTION

### 3.1 INSPECTION

- A. Verify the soil surfaces are unfrozen, sufficiently dry to absorb toxicant, ready to receive treatment.
- B. Beginning of application means acceptance of soil condition.



### 3.2 APPLICATION

- A. Apply toxicant within 12 hours before installation of vapor barrier under slab-on-grade or finish grading outside foundation walls. If rain occurs after initial treatment and before installation of vapor barrier, re-application of termite treatment will be required.
- B. Apply toxicant to soil at the following rates, using metered applicator:
  - 1. Under floor slabs-on-grade: One gallon per 10 sq. ft.
  - 2. Both sides of exterior foundation wall: Note-Treat exterior side of foundation walls and/or turn-down slab edges prior to topsoil placement.
    - a. Concrete: Four gallons per 10 lineal feet, to depth of one foot.
    - b. Masonry: Four gallons per 10 lineal feet for each foot of foundation depth.
  - 3. Two gallons per lineal foot at foundation penetrations.
- C. Apply as a coarse spray to ensure uniform distribution.
- D. Coordinate soil treatment at foundation perimeter with finish grading and landscaping work to avoid disturbance of treated soil. Retreat disturbed treated soil.

### 3.3 RE-TREATMENT

- A. If inspection identifies the presence of termites, retreat soil and retest.
- G. Use same toxicant as for original treatment.

### 3.4 TREATMENT CONFORMATION

- A. Colored Dye to be added to treatment mix for visual inspection.
- B. Keep application tickets on site for Architect's review. If long distance observation is made by Architect by viewing photos sent by email, forward treatment tickets to Architect for confirmation.

END OF SECTION



## SECTION 32 11 16

### CRUSHED STONE BASE COURSE

#### PART 1 GENERAL

##### 1.1 SCOPE

- A. This Section covers the materials for crushed stone base course to be used as a base material for concrete paving.
- B. This material may also be used for embedment for water and sewer utility lines.

##### 1.2 RELATED WORK

- A. Section 32 13 13: Portland Cement Concrete paving

##### 1.3 QUALITY ASSURANCE

- A. The moisture density relations of material shall be determined in the laboratory in accordance with AASHTO T-180.
- B. Compacted base shall be tested for depth and any deficiencies corrected by scarifying, placing additional material, mixing, reshaping, and re-compacting to the specified density, as directed.

##### 1.4 PUBLIC WORK

- A. Comply with the City of Rogers, AR, standard specifications for Public Street Construction. If conflict should be found between this section and the City Standards for Public Street Construction, City Standards shall be the priority.

#### PART 2 PRODUCTS

##### 2.1 MATERIALS

- A. Crushed stone base course shall consist of crusher run stone or a mixture of crushed stone and natural fines uniformly mixed and so proportioned as to meet all the requirements hereinafter specified, with the further provision that a mixture of crushed stone and natural fines shall contain not less than 95 percent crusher produced material.
- B. Stone shall be hard and durable with a percent of wear by the Los Angeles Test (AASHTO T96) not greater than 45.
- C. Shale and slate shall not be used for crushed stone base course.

- D. The material furnished shall not contain more than 5 percent by weight of shale, slate and other deleterious matter.

## PART 3 - EXECUTION

### 3.1 BASE COURSE

- A. The base course material shall be placed on the completed and approved subgrade, that has been bladed to substantially conform to the grade and cross section shown on the Drawings.
- B. The sub-grade shall be prepared as specified and shall be free from an excess or deficiency of moisture at the time of placing the base course.
- C. The subgrade shall also comply, where applicable, with the requirements of other items that may be contained in the contract that provide for the construction, reconstruction or shaping of the subgrade or the reconstruction of the existing base course.
- D. Base course material shall not be placed on a frozen subgrade.
- E. The crushed stone shall be placed on the subgrade or previous base course layer in lifts not to exceed 4" and spread uniformly to such depth and lines that when compacted it will have the thickness as follows:
  - 1. Concrete Paving Areas: 6" base course
- F. The spreading shall be done the same day that the material is hauled, and shall be performed in such a manner that no segregation of coarse and fine particles nor nests or hard areas caused by dumping the crushed stone on the subgrade will exist.
- G. To insure proper mixing, the crushed stone shall be bladed across the roadbed before being spread. Care must be taken to prevent mixing of subgrade or shoulder material with the base course material in the blading and spreading operation
- H. The crushed stone shall be substantially maintained at optimum moisture during the mixing, spreading, and compacting operations, water being added or the material aerated as may be necessary.
- I. The specified grade and section shall be maintained by blading throughout the compaction operation.
- J. The material in each course shall be compacted to a density, as determined by AASHTO T 238, Method B, of not less than 95% of the maximum laboratory density determined in the laboratory by AASHTO T 180, Method D. The aggregate shall be compacted across the full width of application.
- K. The crushed stone shall be compacted across the full width of application.

- L. The compacted base course shall be tested for depth and any deficiencies corrected by scarifying, placing additional material, mixing, reshaping, and re-compacting to the specified density, as required by the Architect.

END OF SECTION

32 11 16-3



## SECTION 32 13 13

### PORTLAND CEMENT CONCRETE PAVING

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Related Sections:
  - Section 32 11 16: Crushed Stone Base Course
  - Section 03 11 00: Concrete Form Work
  - Section 03 21 00: Concrete Reinforcement
  - Section 03 30 00: Cast-in-Place Concrete
  - Section 07 92 00: Joint Sealant

##### 1.2 PROJECT CONDITIONS

- A. Traffic Control:
  - Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Utilize flagmen, barricades, warning signs, and warning lights as required.

##### 1.3 PUBLIC WORK

- A. Comply with the City of Rogers, AR, standard specifications for Public Street and Entry Drive Construction. If conflict should be found between this section and the City Standards for Public Street Construction, City Standards shall be the priority.

#### PART 2 PRODUCTS

##### 2.1 MATERIALS

- A. Forms:
  - 1. Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.
  - 2. Use flexible spring steel forms or laminated boards to form radius bends as required.
  - 3. Form Release Agent: Coat forms with non-staining type coating that will not discolor or deface surface of concrete.
- B. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A 185. Furnish in flat sheets, not rolls.
- C. Reinforcing Bars: Deform steel bars, ASTM A 615, Grade 40.

- D. Concrete Materials: Comply with requirements of applicable Division 3 sections for concrete materials, admixtures, bonding materials, curing materials, and others as required.
- E. Joint Fillers: Resilient pre-molded bituminous impregnated fiberboard units complying with ASTM D 1751 FS HH-F-341, Type II, Class A; or AASHTO M 153, Type I.
- F. Curing Compound: FS TT-C-800, with a minimum of 17% solids content.

## 2.2 MIXING

- A. Concrete Mix, Design and Testing: Comply with requirements of applicable Section 03 30 00 for concrete mix design, sampling and testing, and quality control.
- B. Design mix to produce normal weight concrete consisting of portland cement, aggregate, water-reducing or high-range water-reducing admixture (super-plasticizer), air-entraining admixture and water to produce following properties:
- C. Compressive Strength: 3,000 psi, minimum at 28 days.
- D. Slump Range: 8" for concrete containing HRWR admixture(super- plasticizer); 3"-5" for other concrete.
- E. Air Content: 5% to 7%.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Surface Preparation: Remove loose material from compacted base material surface immediately before placing concrete.
- B. Proof-roll prepared base material surface to check for unstable areas. The paving work shall begin after the unsuitable areas have been corrected and are ready to receive paving. Compaction testing for the base material shall be completed prior to the placement of the paving.

### 3.2 CONCRETE INSTALLATION

- A. Form Construction:
  1. Set forms to required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.
  2. Check completed form work for grade and alignment to following tolerances:
  3. Top of forms not more than 1/8" in 10'-0".
  4. Vertical face on longitudinal axis, not more than 1/4" in 10'-0".



5. Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.
6. Reinforcement: Locate, place, and support reinforcement as specified in Division 3 sections.

B. Concrete Placement:

1. Paving thicknesses are as follows:
  - a. 6" concrete.
2. Comply with requirements of Section 03 30 00 for mixing and placing concrete.
3. Do not place concrete until base material and forms have been checked for line and grade. Moisten base material if required to provide uniform dampened condition at time concrete is placed. Concrete shall be placed around manholes or other structures until they are at the required finish elevation and alignment.
4. Place concrete using methods which prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement or side forms. consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.
5. Deposit and spread concrete in continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hours, place construction joint.

### 3.3 JOINT CONSTRUCTION

- A. Provide joints as shown on drawings and as specified, but in no case exceed requirements of ACI 302.1R and 316R code requirements.
- B. Construction expansion, weakened-plan (contraction), and construction joints true-to-line with face perpendicular to surface of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
- C. Weakened-Plan (Contraction) Joints: Provide weakened-plane(contraction) joints, sectioning concrete into areas at 15'-0" o.c. maximum each way. Construct weakened-plane joints for depth equal to at least 1/4 concrete thickness, as follows:
- D. Tooled Joints: Form weakened-plane joints in fresh concrete by grooving top portion with recommended cutting tool and finishing edges with jointer.
- E. Sawed Joints: Form weakened-plane joints using powered saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints into hardened concrete as soon as surface will not be torn, abraded, or otherwise damaged by cutting action.
- F. Construction Joints:
  1. Place concrete joints at end of placements and at locations where placement operations are stopped for period of more than 1/2 hour, except where such placements terminate at expansion joints.
  2. Construct joints using standard metal keyway-section forms.

G. Expansion Joints:

1. Provide pre-molded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks, and other fixed objects.
2. Locate expansion joints at 60'-0" o.c. maximum for each pavement lane.

H. Joint Fillers:

1. Extend joint fillers full-width and depth of joint, and not less than 1/2" or more than 1" below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface.
2. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace of clip joint filler sections together.

I. Joint Sealants:

1. Exterior pavement joint sealants shall composed of a non-priming, pourable, self-leveling type of a coal tar modified polyurethane, or a polyurethane, sealant suitable for use in pavements and sidewalks.

### 3.4 CONCRETE FINISHING

- A. After striking-off and consolidating concrete, smooth surface by screeding and floating. Adjust floating to compact surface and produce uniform texture.
- B. After floating, test surface for trueness with 10'-0" straightedge. Distribute concrete as required to remove surface irregularities and re-float repaired areas to provide continuous smooth finish.
- C. Work edges of slabs, back top edge of gutter, and formed joints with an edging tool, and round to 1/2" radius. Eliminate tool marks on concrete surface.
- D. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
  1. Broom finish by drawing fine-hair broom across concrete surface perpendicular to line of traffic. Repeat operation if required to provide fine line texture. Inclined Slab Surfaces: Provide coarse, non-slip finish by scoring surface with stiff-bristled broom perpendicular to line traffic.
- F. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed.
- G. Protect and cure finished concrete paving using acceptable moist-curing methods.

### 3.5 CLEANING AND ADJUSTING

- A. Repair or replace broken or defective concrete, as directed.

- B. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials.
- C. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.

### 3.6 TESTING AND SAMPLING:

- A. Slump Tests: A minimum of two slump tests shall be made each day concrete is placed with one test being made at the time test cylinders are made. Slump tests are to be made in accordance with "Method of Test for Slump of Portland Cement Concrete" (ASTM C-143-78). Where slump exceeds five inches (5") or the average 28 day strength of the three test specimens falls below the strength specified (3000 p.s.i.) for the class of concrete tested, or below proportional minimum 7 day strengths, (2,400 psi) the proportions, water content or temperature conditions shall be changed to secure the required properties, and, at the discretion of the Architect, portions of the structure containing such concrete shall be removed and replaced, or reinforced as necessary.
- B. Strength Tests: Compression strength test shall be performed in accordance with "Method of Test for Compressive Strength of Molded Concrete Cylinders" (ASTM C39-81). Samples for concrete cylinders shall be made in accordance with "Method of Sampling Fresh Concrete" (ASTM C172-82), and test cylinders shall be prepared and laboratory cured in accordance with "Method of Making and Curing Concrete Compression and Flexure Test in the Field" (ASTM C31-69).
- C. Cylinders: Three cylinders from the same batch shall be made for each 50 cubic yards or fraction thereof placed, but not less than three cylinders for each day of concrete operations shall be made. Location of batch as to placement on the subject shall be noted, and cylinders so designated. No tests shall be required for sidewalks. One cylinder shall be tested at 7 days and two at 28 days.
- D. A minimum of 9 cylinders shall be tested for each class of concrete used on the project and the average of any three consecutive strength tests at 28 days shall be equal to or greater than the specified strength. Result of any individual strength test shall not be less than 500 p.s.i. of required fc.
- E. Contractor shall bear expense of all testing by a recognized licensed engineer.

END OF SECTION

32 13 13-5



## SECTION 32 31 13

### CHAIN LINK FENCES AND GATES

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
1. Fence framework, fabric, and accessories.
  2. Excavation and anchorages for post bases.
  3. Manual gates and related hardware.

##### 1.2 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00.
- B. Product Data: Include descriptive literature and installation instructions.

#### PART 2 PRODUCTS

##### 2.1 MANUFACTURERS

- A. Subject to compliance with specifications, use products of one of the following:
1. American Fence and Supply Company, Georgetown, TX Phone 512-930-4000
  2. Wheatland Tube, 700 South Dock Street, Sharon, PA 16146 phone: 800.257.8182
  3. Richard's Fence Company, 1600 Firestone Parkway, Akron, OH 44301  
Phone (800) 624-5520
  4. Approved alternate manufacturer.

##### 2.2 MATERIALS

- A. Framework:
1. End, Corner, and Pull Posts: Galvanized steel, Schedule 40; minimum sizes and weights as follows:
    - a. Up to 6 foot fabric height: 2.375 inch outside diameter pipe, 3.65 lbs/lin ft or 3.5 x 3.5 inch roll formed section, 4.85 lbs/lin ft.
    - b. Over 6 foot fabric height: 2.875 inch outside diameter pipe, 5.79 lbs/lin ft; or 3.5 x 3.5 inch roll formed section, 4.85 lbs/lin ft. .
  2. Line Posts: Galvanized steel, Schedule 40; minimum sizes and weights as follows:
    - a. Up to 6 foot fabric height: 1.90 inch outside diameter pipe, 2.70 lbs/lin ft; or 1.875 x 1.625 inch C-section, 2.78 lbs/lin ft.
    - b. 6 foot to 8 foot fabric height: 2.375 inch outside diameter pipe, 3.65 lbs/lin ft; or 2/25 x 1.875 inch H-section, 2.64 lbs/lin ft.
    - c. Over 8 foot fabric height: 2.875 inch outside diameter pipe, 5.79 lbs/lin ft; or 2.25 x 1.70 H-section, 3.26 lbs/lin ft.

3. Gate Posts: Galvanized steel; for single gate or one leaf of double gate, as follows:
  - a. Up to 6 foot height; 2.875 inch outside diameter pipe, 5.79 lbs/lin ft; or 3.5 x 3.5 roll formed section, 4.85 lbs/lin ft.
  - b. 6 foot to 13 foot height: 4 inch outside diameter pipe, 9.11 lbs/lin ft.
4. Top Rail and Intermediate Rails: Galvanized steel, manufacturer's longest lengths.
  - a. Typical: 1.66 inch outside diameter pipe, 2.27 lbs lin ft; or 1.625 x 1.25 inch roll formed section, 1.35 lbs/lin ft.
  - b. Couplings: Expansion type, approximately 6 inches long.
  - c. Attaching Devices: Means of attaching top rail securely to each gate, corner, pull, and end post.

B. Accessories:

1. Sleeves: Galvanized steel pipe not less than 6 inches long and with inside diameter not less than 1/2 inch greater than outside diameter of pipe. Provide steel plate closure welded to bottom of sleeves of width and length not less than 1 inch greater than outside diameter of sleeve.
2. Tension Wire: 7 gage galvanized steel, coated coil spring wire, located at bottom of fence fabric.
3. Wire Ties: 11 gage galvanized steel. Aluminum ties are not acceptable.
4. Post brace assembly: Manufacturer's standard adjustable brace at end and gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same materials as top rail for brace, and truss to line posts with 0.375 inch diameter rod and adjustable tightener.
5. Post tops: Galvanized steel, weathertight closure cap for tubular posts, one cap for each post. Furnish cap with openings to permit passage of top rail.
6. Stretcher bars: Galvanized steel, one piece lengths equal to full height of fabric; with minimum cross section of 3/16 x 3/4 inch. Provide one stretcher bar for each gate and end post, and two for each corner and pull post.
7. Stretcher bar bands: Manufacturer's standard.
8. Gate cross-bracing: 3/8 inch diameter galvanized steel adjustable length truss rods.

C. Gate Hardware:

1. Swinging gate hardware:
  - a. Hinges: Size and material to suit gate size; offset to permit 180 gate opening. Provide 1-1/2 pair of hinges for each leaf over 6'-0" nominal height.
  - b. Latch: Forked type or plunger-bar type to permit operation from both sides of gate, with padlock eye.

- D. Fabric: No. 9 gage (0.148 nominal) galvanized steel wire in 2 inch mesh, with both top and bottom selvages knuckled.
- E. Plastic Slat: Tubular plastic slats designed for use in 2 inch mesh fabric, installed vertically.
  - 1. Colored PVT slats by Patrician Products, Inc., 468 Union Avenue, Westbury, NY 11590 (516)333-3910. Color to match building color.

## 2.3 SETTING MIXES

- A. Concrete: ASTM C94.
- B. Grout: Premixed, factory-packaged, non-staining, non-corrosive grout. See Section 03 30 00. Provide type especially formulated for exterior application.

## 2.4 GATE FABRICATION

- A. Fabricate swing gate perimeter frames of 1.90 inch outside diameter galvanized steel pipe. Provide horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware, and accessories. Space frame members maximum 8'-0" apart.
- B. Assemble gate frames rigidly by welding or with special fittings and rivets. Use same fabric as for fence. Install fabric with stretcher bars at vertical edges. Bars may also be used at top and bottom edges. Attach stretchers to frame at not more than 15 inches on center. Install diagonal cross-bracing on gates as required to ensure frame rigidity without sag or twist.
- C. Attach hardware to provide security against removal or breakage.

## 2.5 FINISH

- A. Galvanize as follows:
  - 1. Fabric: Not less than 1.2 oz zinc/sq ft.
  - 2. Framing: Not less than 1.8 oz zinc/sq ft.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Space line posts 10'-0" on center maximum.
- B. Grade-set Posts:
  - 1. Drill or hand excavate.
  - 2. Excavate each post hole to 12 inch diameter, or not less than four times diameter of post. Excavate approximately 3 inches lower than post bottom; set post bottom not less than 36 inches below finish grade.
  - 3. Hold post in position while placing, consolidating, and finishing concrete.

- C. Sleeve-set Post: Anchor posts in concrete by means of pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with grout, mixed and placed to manufacturer's recommendations.
- D. Top Rails: Run rail continuous through post caps, bending smoothly for curved runs. Provide expansion couplings as recommended by fencing manufacturer.
- E. Center Rails: Provide center rails where indicated. Install in one piece between posts and flush with post on fabric side, using offset fittings where necessary.
- F. Brace Assemblies: Install braces so posts are plumb with rod tension.
- G. Tension Wire: Install tension wires through post cap loops before stretching fabric and tie to each post cap with not less than 6 gage galvanized wire. Fasten fabric to tension wire using 11 gage galvanized steel hog rings spaced 24 inches on center.
- H. Fabric: Leave approximately 2 inches between finish grade and bottom selvage. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on security side of fence, and anchor to framework so fabric remains in tension after pulling force is released.
- I. Stretcher Bars: To secure end, corner, pull, and gate posts, thread through or clamp to fabric 4 inches on center and secure to posts with metal bands spaced 15 inches on center.
- J. Tie Wires:
  - 1. Use U-shaped wire conforming with diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least two full turns. Bend ends of wire to minimize hazards to persons or clothing
  - 2. Tie fabric to line posts with wire ties spaced 12 inches on center. Tie fabric to rails and braces with wire ties spaced 24 inches on center. Manufacturer's standard procedure will be accepted if of equal strength and durability.
- K. Fasteners: Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.
- L. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.
- M. Install plastic slats vertically to manufacturer's instructions.

END OF SECTION