PROJECT MANUAL

STEELE PLASTICS BUILDING EXPANSION

1280 Sturgis Road
Conway, AR
August 26, 2026

ARCHITECTS:
SCM ARCHITECTS PLLC
1400 Kirk Road, Suite 220
Little Rock, Arkansas 72223
(501) 224-3055

STRUCTURAL ENGINEERS:
Myers Engineering
2411 Fayetteville Road, Suite B
Van Buren, Arkansas 72956
(479) 474-4412

MECHANICAL AND ELECTRICAL ENGINEERS:
HSA Engineering
1150 Bob Courtway
Conway, AR 72032
(501) 327-5757

CIVIL ENGINEERS:
Joe White & Associates, Inc.
25 Rahling Circle, Suite A-2
Little Rock, Arkansas 72223
(501) 214-9141



DIVISION 00

TABLE OF CONTENTS

DIVISION 0 – CONTRACT DOCUMENTS

00 10 00 – Index of Drawings
00 31 00 – Geotechnical Investigation

DIVISION 1 - GENERAL REQUIREMENTS

01 10 00 – Summary
01 30 00 – Administrative Requirements
01 40 00 – Quality Requirements
01 42 50 – Reference Standards
01 45 33 – Code Required Special Inspections and Procedures
01 50 00 – Temporary Facilities and Controls
01 60 00 – Product Requirements
01 70 00 – Closeout Submittals

DIVISION 2 – EXISTING CONDITIONS

02 20 00 – Site Preparation
02 41 13 – Selective Site Demolition

DIVISION 3 - CONCRETE

03 10 00 – Concrete Forms and Accessories
03 20 00 – Concrete Reinforcement
03 30 00 – Cast-In-Place Concrete
03 35 00 – Concrete Floor Finishing
03 39 00 – Concrete Curing
03 39 50 – Concrete Sealer

DIVISION 4 - MASONRY

None in this Project

DIVISION 5 - METALS

05 50 00 – Metal Fabrications

DIVISION 6 - WOOD AND PLASTIC

06 10 00 – Rough Carpentry
06 20 00 – Finish Carpentry and Custom Millwork

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

07 21 16 – Building Insulation
07 90 00 – Joint Sealers

DIVISION 8 - DOORS AND WINDOWS

08 11 13 – Hollow Metal Doors and Frames
08 31 13 – Interior Access Doors and Panels
08 33 00 – Rolling Overhead Doors
08 71 00 – Door Hardware
08 80 00 – Glazing

DIVISION 9 - FINISHES

09 22 16 – Non-Structural Metal Framing
09 51 13 – Suspended Acoustical Ceilings

09 90 00 – Paints and Coatings

DIVISION 10 - SPECIALTIES

None in this Project

DIVISION 11 - EQUIPMENT

None in this Project

DIVISION 12 - FURNISHINGS

None in this Project

DIVISION 13 - SPECIAL CONSTRUCTION

13 12 10 – Pre-Engineered Metal Building System

DIVISION 14 - CONVEYING SYSTEMS

None in this Project

DIVISION 21 – FIRE SUPPRESSION

- Supplied Under Separate Project / Contract -

DIVISION 22 – PLUMBING

22 01 00 – General Plumbing Provisions
22 05 53 – Identification for Plumbing Piping and Equipment
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 – MECHANICAL

23 01 00 – General HVAC Provisions
23 05 53 – Identification for HVAC Piping and Equipment
23 05 93 – Testing, Adjusting, and Balancing
23 07 13 – Duct Insulation
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 51 23 – Breechings, Chimney, and Stacks for Condensing Appliances
23 55 32 – Fuel Fired Unit Heaters
23 55 34 – Electric Heaters

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 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

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

28 31 06 – Existing Fire Alarm System

DIVISION 31 - EARTHWORK

31 00 00 – Earthwork
31 22 00 – Grading
31 23 16 – Excavation
31 23 17 – Trenching for Site Utilities
31 23 23 – Fill and Backfill
31 25 00 – Erosion and Sediment Control
31 31 16 – Soil Treatment for Termite Control

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 11 23 – Aggregate Base Course
32 13 13 – Portland Cement Concrete Paving

DIVISION 33 – UTILITIES

None in this Project

Steele Plastics Building Expansion
1280 Sturgis Road
Conway, Arkansas

Index of Drawings

Dwg.#	Drawing Name
GENERAL	
T1.01B	Combined Cover and Index Sheet
CIVIL	
C1.00	Site Plan
C2.00	Erosion Control Plan
C3.00	Grading & Paving Plan
C4.00	Standard Details
LANDSCAPING	
L1.00	Landscape Plan
STRUCTURAL	
S0.1	Structural Notes
S0.2	Structural Notes
S1.1	Foundation Plan
S2.1	Slab Plan
S3.1	Roof Framing Plan
S4.1	Building Sections
ARCHITECTURAL	
A0.01	Site Plan
A0.00	Demolition Plan
A1.01	Floor Plan
A2.00	Partition Types, Millwork Elevations and Details
A2.01	Dimension Plans
A4.01	Reflected Ceiling Plans
A5.01	Roof Plan
A6.01	Building Elevations
A7.01	Building Sections
A7.02	Building Sections
A8.01	Wall Sections and Details
A8.02	Wall Sections and Details
A8.03	Wall Sections and Details
A8.04	Wall Sections and Details
A10.01	Door and Window Schedules, Elevations and Details
MECHANICAL	
M1.1	HVAC Notes, Legend, & Schedules
M2.1	HVAC Plans
PLUMBING	
P1.1	General Notes, Legend & Schedules
P2.1	Plumbing Plan, Risers & Keyed Notes
ELECTRICAL	
E1.1	Electrical Legend, Notes & Details
E2.1	Lighting Plan
E2.2	Power Plan
E3.1	Electrical Details

SECTION 00 31 10

GEOTECHNICAL INVESTIGATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Report of subsurface investigation.

1.02 RELATED SECTIONS

A. Section 01 40 00 - Quality Requirements.

1.03 EXPLANATION

A. This report is included for the contractors information only. No warranties are made or implied as to the accuracy of the information contained therein.

B. The Contractor shall verify all on-site conditions.

MTA ENGINEERS

- Geotechnical Engineering
- Materials Testing • Special Inspections
- Design

mtaengineers.com

GEOTECHNICAL ENGINEERING EXPLORATION

Steele Plastics Addition
Conway, Arkansas

PREPARED FOR:

SCM Architects
1400 Kirk Road, Ste 220
Little Rock, AR 72223

PREPARED BY:

MTA ENGINEERS
8001 National Drive
Little Rock, AR 72209

July 09, 2026

MTA ENGINEERS

Corporate Office:
P.O. Box 23715 • Little Rock, AR 72221 • Ph. 501.753.2526
mtaengineers.com

Geotechnical Engineering • Materials Testing • Special Inspection • Design

Offices in: Little Rock, AR • Springdale, AR • Jonesboro, AR • Hoover, AL

SCM Architects
1400 Kirk Road, Ste 220
Little Rock, AR 72223

July 09, 2026

Sent via email: btalley@scmarchitects.com

Attention: **Britt Talley**

Subject: Report on Geotechnical Engineering Exploration
Proposed Storage Addition for Steele Plastics
Conway, Arkansas

MTA Engineers has completed the authorized Geotechnical Engineering Exploration for the subject project. This work was conducted in accordance with the agreement between MTA Engineers and SCM Architecture, which is detailed in the MTA Engineers Proposal approved on May 27, 2026.

The purpose of our work was to review general surface and subsurface conditions within the project site area and to gather and present data related to the design and construction of the addition to the existing AmerCable Inc building in Conway, Arkansas. This report outlines the exploration procedures employed, presents the data obtained, and offers our recommendations.

MTA Engineers appreciates this opportunity to provide these services and look forward to collaborating with you on future projects. Please do not hesitate to contact us if you have any questions or require further information.

Sincerely,

MTA ENGINEERS

Serge Manzi
Geotechnical Staff Engineer
Office +1 501-753-2526
smanzi@mtaengineers.com

Steve R. Garrett, PhD, P.E.
Senior Geotechnical Engineer
Office +1 501-753-2526
steve@mtaengineers.com

STATE OF ARKANSAS
LICENSED PROFESSIONAL ENGINEER
No. 8019
STEVEN RAY GARRETT

TABLE OF CONTENTS

SECTION

EXECUTIVE SUMMARY 4

INTRODUCTION 7

FIELD EXPLORATION 7

GENERAL SITE AND SUBSURFACE CONDITIONS 8

LABORATORY TESTING 10

ANALYSIS & RECOMMENDATIONS 10

- SITE PREPARATION 10
- STRUCTURAL FILL 11
- BUILDING FOUNDATION 12
- UN-COMPACTED FILL 13
- STUMP/ ORGANIC FINDINGS 13
- SEISMIC CONSIDERATION 13
- CONSTRUCTION PROCEDURES 14

APPENDICES

APPENDIX A: Boring Location Plan

APPENDIX B: Boring Logs

APPENDIX C: Key to Terms and Symbols

APPENDIX D: Laboratory Test Results

APPENDIX E: Seismic Design Criteria

TABLES & FIGURES

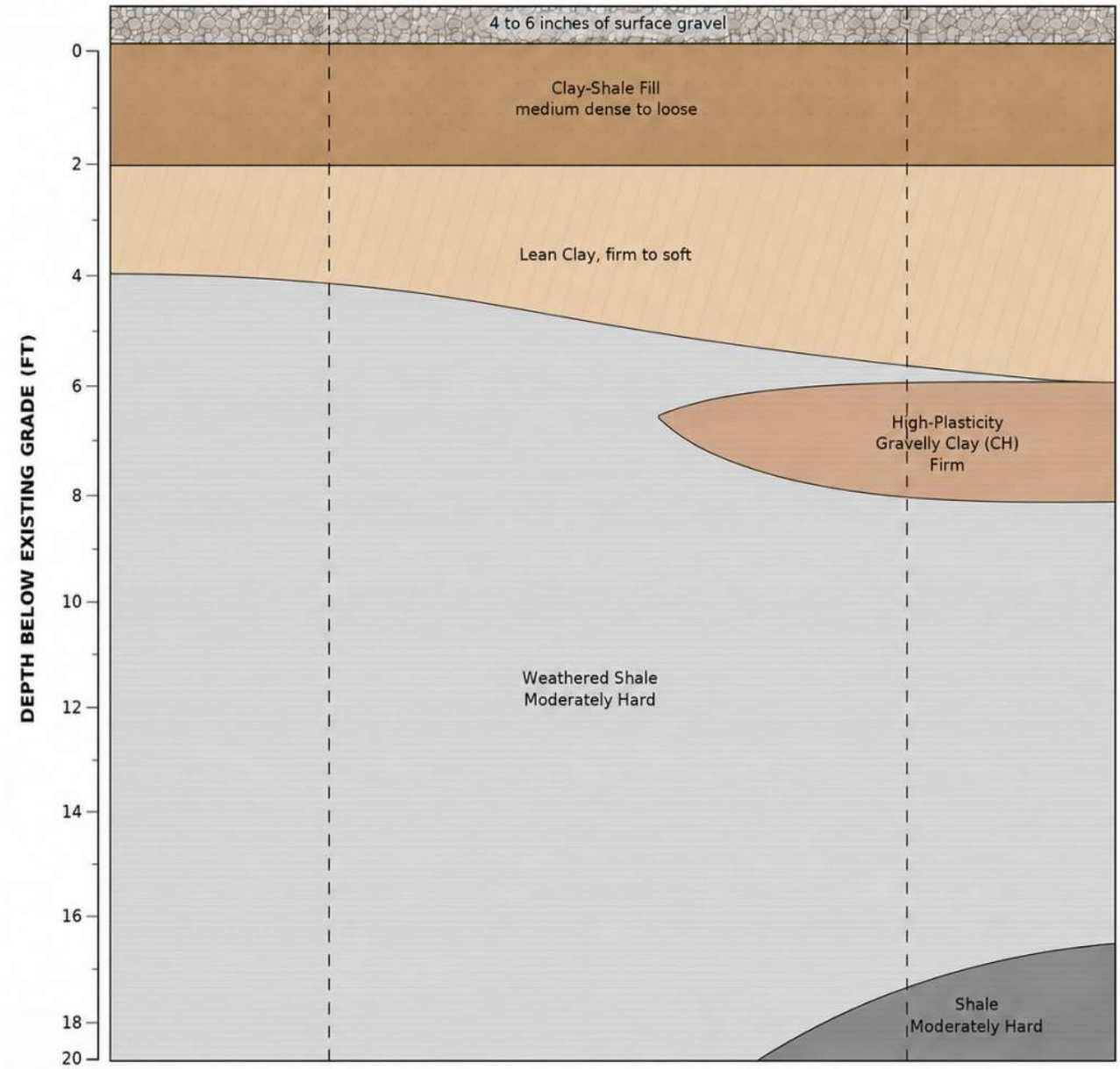
F-1	Generalized Cross-Sectional Soil Profile	4
F-2	Site Investigated	8
T-1	General Strata Classification of Boring Logs	9
T-2	Compaction Requirements	11

EXECUTIVE SUMMARY

This geotechnical exploration was conducted on the west side of the existing Steele Plastic Building located at 1280 Sturgis Road in Conway, Arkansas. The site features a generally level surface with slight downward slope away from the existing building. In general, the native soil consists of loose to medium-dense clay-shale fill near the surface, firm to soft clay and soft to medium-hard weathered shale layers. The likelihood of finding buried organic matter is low. Subsurface conditions were consistent throughout the entire area explored.

Major soil types encountered at each boring may be summarized as follows:

Figure 1. Generalized Cross-Sectional Soil Profile (NTS)



Refer to *Table 1, General Strata Classification of Boring Logs,* for a more detailed overview of the soils encountered on site. It is expected that the new storage will match the existing building's elevation. Before any construction, the site should be cleared of any debris, vegetation, loose gravel not incorporated into the proposed slab section, unsuitable fill, disturbed soil or any deleterious material. The native clay soil at anticipated bearing depth is firm to soft. The existing shale fill is stiff and stable. It is assumed that the final grade will be placed at or above the existing grade.

A granular cap consisting of **6.0** inches of clean crushed stone or gravel (ASTM C-33 #57 or equivalent) should be layered on the prepared subgrade to provide a working surface and uniformity. A Class A impervious moisture barrier with a minimum thickness of **10** mils, specified according to ASTM E-1745, should be provided between the slab and the granular fill due to the potential for perched water to develop during the wetter seasons.

Based on the anticipated bearing load and variable, it is recommended that the storage addition be supported on conventional shallow foundations founded at least **18** inches below the final grade, within the competent or reworked native soil or the compacted structural fill. Footings founded as accounted may be designed with an allowable bearing capacity of **1,500** psf for strip footings and **2,000** psf for spread footings.

The net allowable bearing pressures are based on a safety factor above **2.0** with respect to the anticipated shear strength of the bearing stratum. Total and differential settlement is expected to be less than ½ inch.

SUMMARY

- **Rock/Hard Dig:**
  - Excavatable weathered shale was encountered within **4 .0** to **8.0** feet below existing grades.
  - The use of mini excavators will be limited by depth and the soil's stability.

- **Soils:**
  - The site is graded and covered with surface gravel. Only minor clearing is anticipated.
  - The soil consists of clay-shale fill, firm clay and medium-hard weathered shale.
  - The native soil within the building pad should be exposed and evaluated before pouring concrete.
  - Loose, soft, wet, disturbed or non-uniform soil encountered within **3.0** feet of the bearing surface should be reworked or replaced.
  - Structural fill should be placed according to the requirements discussed further in the report.

- **Foundations/Slabs:**
  - Shallow footings, founded **18** inches below the final grade, may be sized using a bearing capacity of **1,500** psf for continuous and **2,000** psf for individual spread footings.
  - Unsuitable soil within **3.0** feet of the foundation elements should be reworked or replaced.
  - Alternatively, deep foundations may be used if a higher bearing capacity is required.

- **Un-compacted Fill:**
  - The clay-shale fill is loose near the existing building.

- **Stump/Organic Findings:**
  - The likelihood of finding buried organic material is low.

- **Seismic consideration:**
  - Based on ASCE/SE 41-23, a site soil **Class C** may be used for design purposes. Liquefaction potential of the soil in Strata I, II & III is negligible.

- **Miscellaneous:**
  - Drainage will need to be established before the start of any excavation and incorporated throughout the construction.
  - Any utility buried on the property should be located before any excavation.
  - Frequent French drains should be incorporated around improvement to control groundwater.

INTRODUCTION

This exploration was conducted to assess existing subsurface conditions and provide geotechnical design recommendations. The results of this exploration, along with the geotechnical design recommendations for site construction, are presented in this report.

Exploration was accomplished by:

1. Boring **2.0** locations up to **20** feet, to explore subsurface soil and groundwater conditions.
2. Obtaining samples from each stratum, within the accessible areas, using standard geotechnical sampling techniques or standard penetration tests.
3. Performing laboratory tests on various samples to determine pertinent engineering properties of the subsurface strata.
4. Analyzing field and laboratory test data to develop design recommendations.

Note: The scope of this geotechnical exploration did not include an environmental assessment to determine the presence of wetlands and/ or hazardous or toxic materials in the soil or groundwater on or near this site. If there are concerns regarding wetlands or the presence of hazardous/ toxic materials, a qualified environmental assessment consultant should be contacted to perform a site investigation before construction begins.

FIELD EXPLORATION

Subsurface conditions at the site were explored using dry auger methods and a split-spoon sampler, extending up to **20** feet below existing grades at **2.0** boring locations. The approximate locations of these borings are depicted in the Plan of Borings found in Appendix A. Boring logs, which provide descriptions of the soil strata encountered, are included in Appendix B. Laboratory testing results for the various soil types are in Appendix D.

Samples were collected from most locations following Standard Penetration Test (SPT) procedures. The recorded N-Values (blows per foot) are noted in the Blows per foot column on the Boring Logs. All soil samples obtained were placed in moisture-tight containers and transported to our laboratory for further analysis.

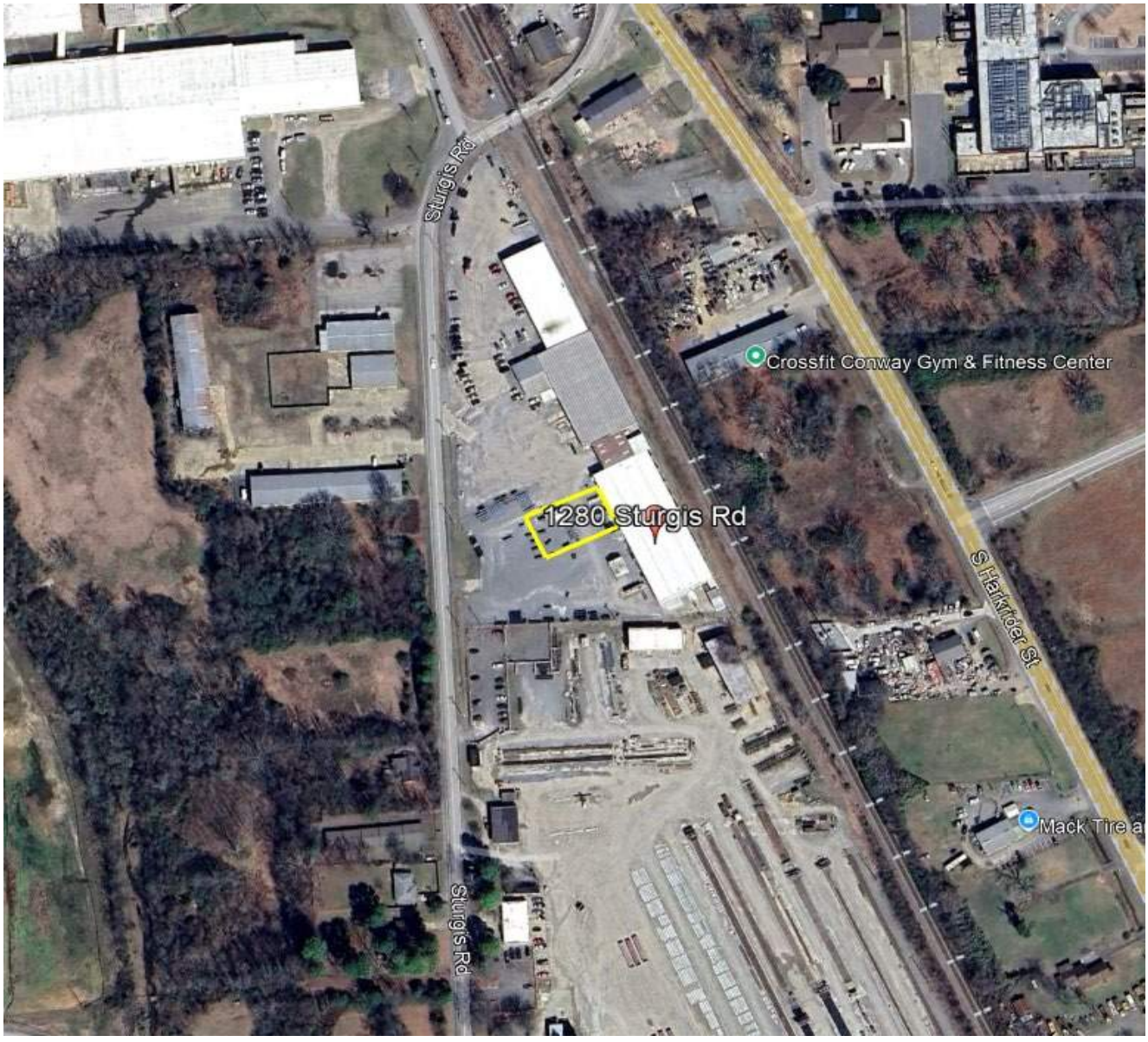
At the laboratory, a visual classification was conducted for each sample, and different soil types were analyzed for specific engineering properties. The dry auger drilling method allowed us to observe perched groundwater conditions. No groundwater was encountered during the sampling process.

GENERAL SITE AND SUBSURFACE CONDITIONS

The geotechnical exploration was conducted on the west side of the existing Steele Plastic Building located at 1280 Sturgis Road in Conway, Arkansas. The site features a generally level surface with a slight downward slope from east to west. The building pad is currently covered with surface gravel. Minimal site preparation is anticipated to remove any vegetation or debris.

In general, the native soil primarily consists of loose to medium-dense clay-shale fill near the surface, firm to soft clay and soft to medium-hard weathered shale layers. An isolated pocket of firm high-plasticity gravelly clay was encountered at one location. The likelihood of finding buried organic matter is low. Subsurface conditions were consistent throughout the entire area explored.

Figure 2. Site Investigated



The stratigraphy encountered in the boring locations is summarized in Table 1. Subsurface conditions were consistent throughout the entire proposed development area. Borings were advanced to a maximum depth of **20** feet within the future development area using dry auger procedures.

For a more detailed description of soils encountered while testing, see the boring log sheets found in *Appendix B: Boring Logs* attached to this report.

Table 1. General Strata Classification of Boring Logs

STRATA	DEPTH *(ft)*	GROUP SYMBOL	SOIL DESCRIPTION	SIGNIFICANT PROPERTIES
4 to 6 inches of Surface Gravel				
STRATUM I	0 to 2	**SC**	• Gray-Tan-Black, Clay-Shale Fill	• Medium-Dense to Loose
STRATUM II (a)	2 to 4 - 6	**CL**	• Brown-Gray-Tan, Lean Clay	• Firm to Soft • Low Shrink Swell Potential
STRATUM II (a)	6 to 8	**CH**	• Red-Tan-Gray, High-Plasticity Gravelly Clay	• Firm • Potentially Expansive
STRATUM III	4 - 8 to 18 - 20	**SHALE**	• Black-Brown-Gray, Weathered Shale	• Soft to Medium-Hard • Moderate Bearing • Aquitard
	18 to 20		• Dark Gray, Shale	
• ***Groundwater:*** *none observed*			• ***Auger Refusal:*** *none achieved*	

During our exploration, we did not encounter any groundwater within the explored depths. There is potential for perched groundwater to develop above the weathered shale layers during wetter seasons. The significant properties and characteristics of the subsurface strata pertinent to design and construction are:

A. The topography of the site and planned building location.
B. The anticipated bearing load.
C. The presence of loose fill and soft clay in the primary grades.
D. The weathered shale encountered at depths.

LABORATORY TESTING

Description of the soils encountered in the borings was prepared in general accordance with applicable ASTM standards. The soil stratification shown on the boring logs represents soil conditions at specific boring locations. There may be some variations that occur between or beyond the boring locations.

The stratification lines on the boring logs indicate approximate boundaries between soil types, but the actual transitions between soil layers in the subsurface of the proposed site may be gradual. Laboratory testing was conducted to verify or evaluate classification, volumetric stability, and to determine water content. The results of all testing are provided in Appendix D, Laboratory Test Summary.

ANALYSIS AND RECOMMENDATIONS

SITE PREPARATION

Before any construction, the building pad area should be cleared of any debris, vegetation, loose gravel not incorporated into the proposed slab section, unsuitable fill, disturbed soil, or any deleterious material. The clay-shale fill or the native clay soil in the primary grades is firm to soft. Final grade should be placed at or above the current grade. If grade is lowered, excavation to remove unstable soil should be expected.

During construction, the native soil within the building pad should be exposed and evaluated to ensure the presence of a minimum of **3.0** feet of suitable soil beneath the foundation elements. Loose, soft, wet, disturbed, or non-uniform soil within the said clearance should be removed and replaced. The building pad should also be proof-rolled using a loaded dump truck or similar pneumatic-tired equipment to evaluate the stability of the current near surface soil. Areas that rut, pump, weave or deflect should be undercut and replaced with approved compacted structural fill.

Excavations should be performed during extended dry weather where practical, using appropriate equipment suitable for the scope of work. Excavation conducted with light-duty equipment will be limited in depth. Positive drainage should always be maintained during excavation to prevent water accumulation. The introduction of excessive moisture into the excavation could significantly reduce the stability and strength of the soil.

No groundwater was observed during the sampling process; however, there is potential for perched groundwater to develop above the weathered shale during wetter periods of the year. Therefore, consideration should be given to install frequent French drains to manage groundwater during these times.

STRUCTURAL FILL

Structural fill should consist of approved materials, free of organic matter and debris. For approval, samples of the proposed fill material should be submitted to MTA ENGINEERS for classification testing. Select fill consisting of low-plasticity soil, such as clayey gravel classifying as GC according to the Unified Soil Classification System, is generally considered suitable. High-plasticity clay soils (soils with a Liquid Limit above **50**) should not be used as fill. Rock fragments that are greater than **6** inches should not be included in engineered fill within the top **4** feet beneath the building.

Placement of approved fill should be done in multiple thin lifts. Each lift should not exceed **8** inches in loose thickness. Compaction of these lifts should be carried out using appropriate equipment to achieve **98%** of the standard Proctor test (ASTM D698) within **± 3%** of the Optimum Moisture Content. Care should be taken to ensure all compaction procedures are properly followed. In undercut areas of saturated soil, a "bridge lift" of select fill may be used. If required, the initial bridge may be placed in a single lift with a thickness of **12** to **18** inches and compacted to a minimum of **90%** of the specified proctor value. The vibration of the bridge lift should be avoided. Additional lifts should be compacted as stated above.

If cohesive soils are to be used, compaction should be performed using a kneading-type vibratory compactor, such as a vibratory sheepsfoot. The material should be broken down sufficiently to provide a dense matrix of particles. The following table should be used for compaction requirements based on the material and location.

Table 2: Compaction Requirements

Material Type and Location	Minimum Compaction *(ASTM D698)*	Allowable Variance in Moisture from Optimum
Structural Fill Beneath Building	**98%**	**-2** to **+3**
Utility Backfill in Building Area	**98%**	**-2** to **+3**
Miscellaneous and Green Areas	**90%**	**-2** to **+3**

BUILDING FOUNDATIONS

All foundations must satisfy two basic and independent design criteria. First, foundations must have an acceptable factor of safety against bearing failure under maximum design loads. Secondly, movement of the foundation due to consolidation, shrinkage, and/or swelling of the supporting strata should not exceed tolerable limits for the structure. Construction factors such as the installation of foundation units, excavation procedures, and surface and groundwater conditions should also be considered.

These factors, coupled with the subsurface conditions, were influential in the development of the following recommendations. In view of the anticipated foundation loading and subsurface conditions encountered, it is recommended that the proposed structures be supported on a foundation system designed in accordance with the following recommendations.

FOUNDATIONS/ SLABS

Conventional Shallow Foundations

Based on the nature of the existing soil and the anticipated loading, it is recommended that all new structures be supported on traditional shallow footings. All footings should be supported at least **18** inches beneath the final exterior grade, within the competent native soil and the properly compacted structural fill. In addition, to minimize the potential for localized shear failure within the soil, a minimum footing width of **24** inches is recommended.

Traditional shallow footings founded as recommended may be designed using a net allowable end bearing pressure of **1,500** psf for strip footings and **2,000** psf for individual spread footings. Care should be taken to ensure that no unsuitable soft or expansive soil is encountered within **3.0** feet of any bearing surface. The building pads should be prepared as recommended in the *Site Preparation* section of this report. The net allowable end bearing pressures are based on a factor of safety over **3.0** with respect to the anticipated shear strength of the bearing stratum. Total and differential settlement is anticipated to be less than ½ inch. If possible, the entirety of each proposed building should be founded on uniform soils to reduce the risk of differential settlement.

Slab-on-grade type construction is considered appropriate for the floor slab. We recommend that the slab be supported on **6.0** inches of clean crushed stone or gravel (ASTM C-33 #57 or equivalent) on prepared subgrade. A Class A impervious moisture barrier with a minimum thickness of **10** mils, specified according to ASTM E-1745, should be provided between the slab and the granular fill due to the potential for perched water to develop during the wetter seasons.

Deep Foundations

Alternatively, the building addition may be supported on drilled piers founded at least **6.0** feet beneath the current grade and **24** inches within the native weathered shale. Straight shafts, designed as recommended, may be sized using a net allowable end bearing pressure of **4,500** psf. A skin friction of **300** psf may be added for increased bearing at depths greater than **6.0** feet. The net allowable end bearing capacity is based on a factor of safety over **2.0** with respect to the anticipated shear strength of the bearing stratum.

Perched groundwater and loose soil are anticipated during excavation; therefore, appropriate casing should be available and utilized as needed to maintain hole stability. All accumulated water should be pumped out before the concrete is placed. Piers should be immediately filled with concrete after drilling. Any pier left open overnight should be re-drilled and cleaned as necessary prior to concrete placement.

Differential movement between the proposed addition and the existing building should be anticipated in design. The connection between the addition and the existing building should be detailed to accommodate limited relative movement and to reduce the potential for distress at slabs, walls, roof framing, and utility connections.

UNCOMPACTED FILL

No uncompacted or loose fill was encountered on the property during our exploration.

STUMP/ ORGANIC FINDINGS

The likelihood of finding buried organic material is very low.

SEISMIC CONSIDERATION

Based on ASCE/SE 41-23, a site soil **Class C** may be used for design purposes. Liquefaction potential of the soil in Strata I, II & III is negligible. Additional design information on Seismic Consideration is attached as Appendix E.

CONSTRUCTION PROCEDURES

The potential exists for increased perched groundwater to develop during wetter seasons. Therefore, excavation and any other site grading should be performed during drier periods to reduce the possibility of changes in conditions.

Subsurface conditions significantly at variance with those encountered within the borings should be brought to the attention of the engineer, and work should be delayed pending evaluation and/or preparation of additional recommendations, if warranted.

♦ ♦ ♦ ♦

The following illustrations are attached to complete this report:

Appendix A: Plan of Excavation
Appendix B: Boring Logs
Appendix C: Key to Terms and Symbols
Appendix D: Laboratory Test Results
Appendix E: Seismic Design Criteria

♦ ♦ ♦ ♦

Appendix A:
Boring Location Plan


Sturgis Rd
Premier Windows
ffany's House of Havoc
Sturgis Rd
Sturgis Rd
B-1
B-2
Steele
Plastics
Google Maps

Appendix B:
Boring Logs

MTA ENGINEERS a division of MATERIALS TESTING OF ARKANSAS
www.mtaengineers.com

Boring Log Report

BORING NO. B-1
PAGE 1 OF 1

JOB NO. GEO26-128
JOB NAME: STEELE PLASTICS
COORDINATES: NORTH: _____ EAST: _____
STATION: _____
LOCATION: CONWAY, AR

DATE: 2026/06/15
TYPE OF DRILLING: DRY AUGER
EQUIPMENT: GEOPROBE 7822-DT
LOGGED BY: C.S.
DRILLED BY: S.S.

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: EXISTING GRADE	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	PLASTIC LIMIT	PERCENT PASSING #200	NO. OF BLOWS PER 6-IN.	N-Value
			M.DENSE 6" SURFACE GRAVEL **GRAY-BLACK, CLAY-SHALE FILL**	**FILL**	20	17.4	37	17	91.2	10 18-10	28
			FIRM **BROWN-TAN, LEAN CLAY**	**CL**						4 4-5	9
5			SOFT							5 7-23	30
			M.HARD							50+	50+
10			**BLACK-BROWN-GRAY, WEATHERED SHALE**	**SHALE**							
15											
20											
			Boring Terminated								
25											
30											

COMPLETION DEPTH: 20 WATER DEPTH> INITIAL: AFTER 24 HOURS:

REMARKS:

P.O. Box 23715 • Little Rock, AR 72221
Ph. 501.753.2526 • Fax 501.753.5747

505 Sanders Ave. • Springdale, AR 72764
Ph. 479.756.0061 • Fax 479.756.9254

101 S. Church St. • Jonesboro, AR 72401
Ph. 870.530.8380 • Fax 870.972.0237

MTA ENGINEERS a division of MATERIALS TESTING OF ARKANSAS
www.mtaengineers.com

Boring Log Report

BORING NO. B-2
PAGE 1 OF 1

JOB NO. GEO26-128
JOB NAME: STEELE PLASTICS
COORDINATES: NORTH: _____ EAST: _____
STATION: _____
LOCATION: CONWAY, AR

DATE: 2026/06/15
TYPE OF DRILLING: DRY AUGER
EQUIPMENT: GEOPROBE 7822-DT
LOGGED BY: C.S.
DRILLED BY: S.S.

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: EXISTING GRADE	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	PLASTIC LIMIT	PERCENT PASSING #200	NO. OF BLOWS PER 6-IN.	N-Value
			LOOSE 4" SURFACE GRAVEL **TAN-GRAY-BLACK, CLAY-SHALE FILL**	**FILL**						6 4-5	9
			FIRM **BROWN-TAN, LEAN CLAY**	**CL**						4 4-5	9
5			SOFT **GRAY-TAN, LEAN CLAY**		19	18.6	34	15	94.8	3 1-4	5
			FIRM **RED-TAN-GRAY, HIG-PLASTICITY GRAVELLY CLAY**	**CH**	23	18.1	52	29	61.4	2 2-5	7
10			M.HARD **BLACK-TAN-GRAY, WEATHERED SHALE**	**SHALE**						5 22-31	50+
15			M.HARD							11 23-36	50+
20			M.HARD **DARK GRAY, SHALE**							50+	50+
25			Boring Terminated								
30											

COMPLETION DEPTH: 20 WATER DEPTH> INITIAL: AFTER 24 HOURS:

REMARKS:

P.O. Box 23715 • Little Rock, AR 72221
Ph. 501.753.2526 • Fax 501.753.5747

505 Sanders Ave. • Springdale, AR 72764
Ph. 479.756.0061 • Fax 479.756.9254

101 S. Church St. • Jonesboro, AR 72401
Ph. 870.530.8380 • Fax 870.972.0237

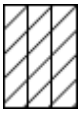
Appendix C:
Key to Terms

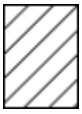
MTA ENGINEERS
P.O. Box 23715 • Little Rock, AR 72221, Ph. 501.753.2526

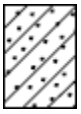
TERMS AND SYMBOLS USED ON BORING LOGS

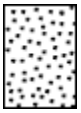
SOIL TYPES

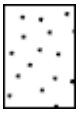

CLAY (CH)

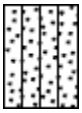

SILTY CLAY (CL)


CLAY (CL)

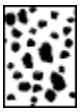

SANDY CLAY (CL)

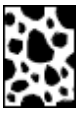

WELL-GRADED SAND (SW)

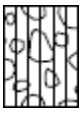

POORLY-GRADED SAND (SP)


SILTY SAND (SM)


CLAYEY SAND (SC)

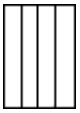

WELL-GRADED GRAVEL (GW)

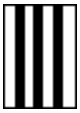

POORLY-GRADED GRAVEL (GP)

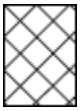

SILTY GRAVEL (GM)


SANDY SILT (ML)

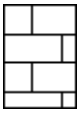

CLAYEY GRAVEL (GC)


SILT (ML)

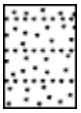

SILT (MH)

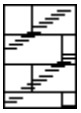

FILL MATERIAL

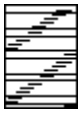
ROCK TYPES

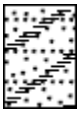

LIMESTONE


SHALE


SANDSTONE


WEATHERED LIMESTONE


WEATHERED SHALE


WEATHERED SANDSTONE

SAMPLER TYPE


SHELBY TUBE SAMPLE


SPLIT SPOON SAMPLE


AUGER SAMPLE


NO RECOVERY

MTA ENGINEERS
P.O. Box 23715 • Little Rock, AR 72221, Ph. 501.753.2526

SOIL GRAIN SIZE

U.S. STANDARD SIEVE								
12"	3"	3/4"	4	10	40	200		
BOULDERS	**COBBLES**	**GRAVEL**		**SAND**			**SILT**	**CLAY**
		COARSE	**FINE**	**COARSE**	**MEDIUM**	**FINE**		
304	76.2	19.1	4.75	2	0.42	0.074	0.002	
SOIL GRAIN SIZE IN MILIMETERS								

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on No 200 sieve): Includes (1) clean gravels and sands, and (2) silty clayey gravels and sands condition is rated according to relative density, as determined by laboratory tests.

DESCRIPTIVE TERMS	N VALUE	RELATIVE DENSITY
VERY LOOSE	0-4	0 – 15 %
LOOSE	4-10	15 – 35 %
MEDIUM DENSE	10-30	35 – 65 %
DENSE	30-50	65 – 85 %
VERY DENSE	50 and above	85 – 100 %

FINE GRAINED SOILS (major portion passing No 200 sieve): include (1) inorganic and organic silt and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer reading or by unconfined compression tests.

DESCRIPTIVE TERMS	N VALUE	UNCONFINED COMPRESSIVE STRENGTH TON / SQ. FT.
VERY SOFT	0-3	less than 0.25
SOFT	3-6	0.25 - 0.50
FIRM	6-12	0.50 - 1.00
STIFF	13-20	1.00 - 2.00
VERY STIFF	20-50	2.00- 4.00
HARD	50 and above	4.00 and higher

NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above because of planes of weakness or cracks in the soil. The consistency rating of such soils are based on penetrometer readings

TERMS CHARACTERIZING MOISTURE CONTENT

DRY: No water evident in sample; fines less than plastic limit.
MOIST: Sample feels damp; fines near the plastic limit.
VERY MOIST: Water visible on sample; fines greater than plastic limit and less than liquid limit.
WET: Sample bears free water; fines greater than liquid limit.

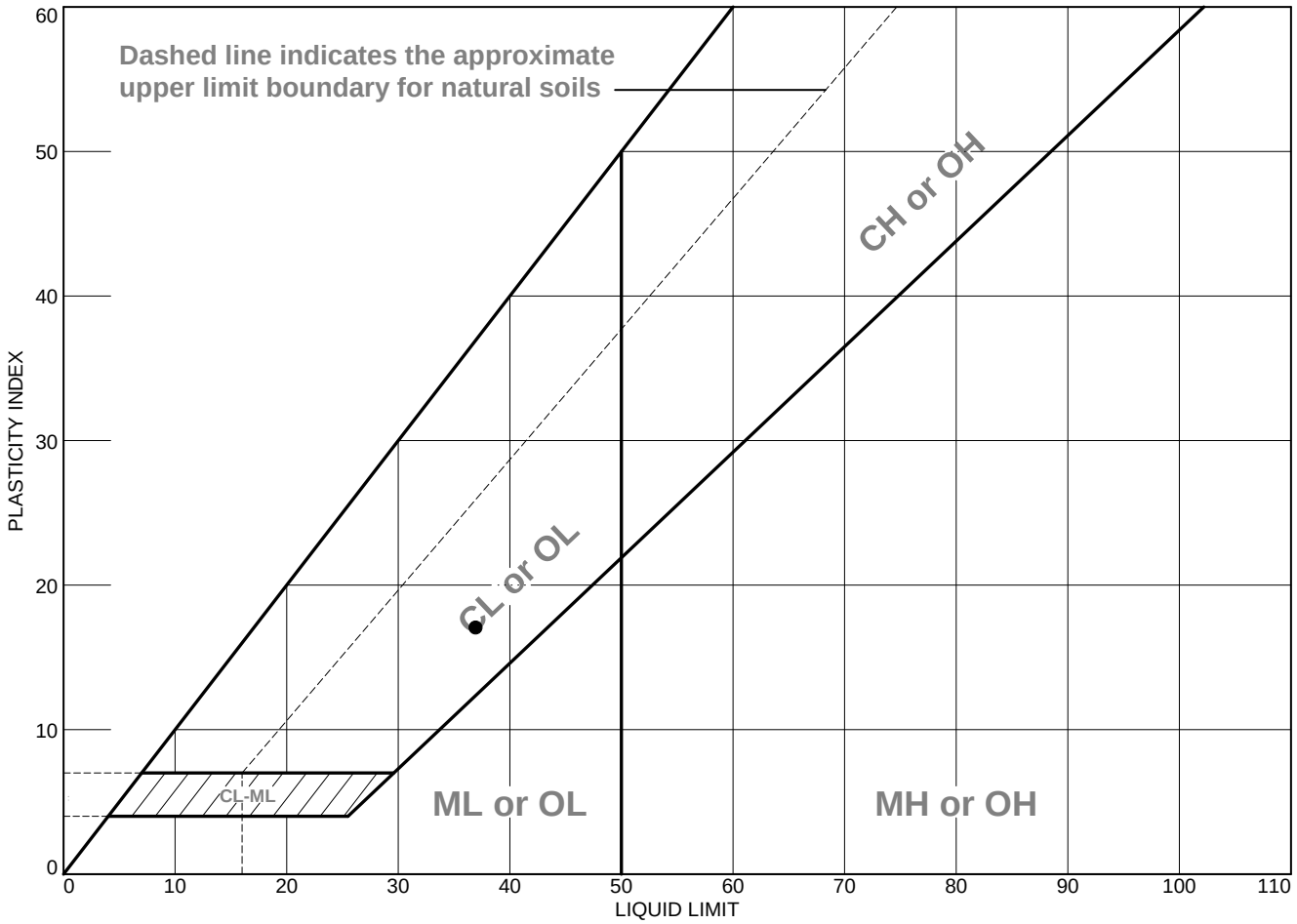
TERMS CHARACTERIZING SOIL STRUCTURE

SLICKENSIDED: Having inclined planes of weakness that are slick and glassy in appearance.
FISSURED: Containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.
LAMINATED: Composed of thin layer of varying color and texture.
INTERBEDDED: Composed of alternate layers of different soil types
CALCAREOUS: Containing appreciable quantities of calcium carbonate.
WELL GRADED: Having wide range in grain sizes and substantial amounts of all intermediate particle size.
POORLY GRADED: Predominantly of one grain size, or having a range of sizes with some intermediate size missing

Terms used in this report for describing soils according to their texture or grain size distribution are in accordance with UNIFIED SOIL CLASSIFICATION SYSTEM as described in technical Memorandum No 3-357, Waterways Experiment Station, March 1953

Appendix D:
Laboratory Test Summary

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	LEAN CLAY	37	20	17	96.6	91.2	CL

Project No. GEO26-128 **Client:** SCM ARCHITECTS

Project: STEELE PLASTICS

●**Source of Sample:** B-1 **Depth:** 2

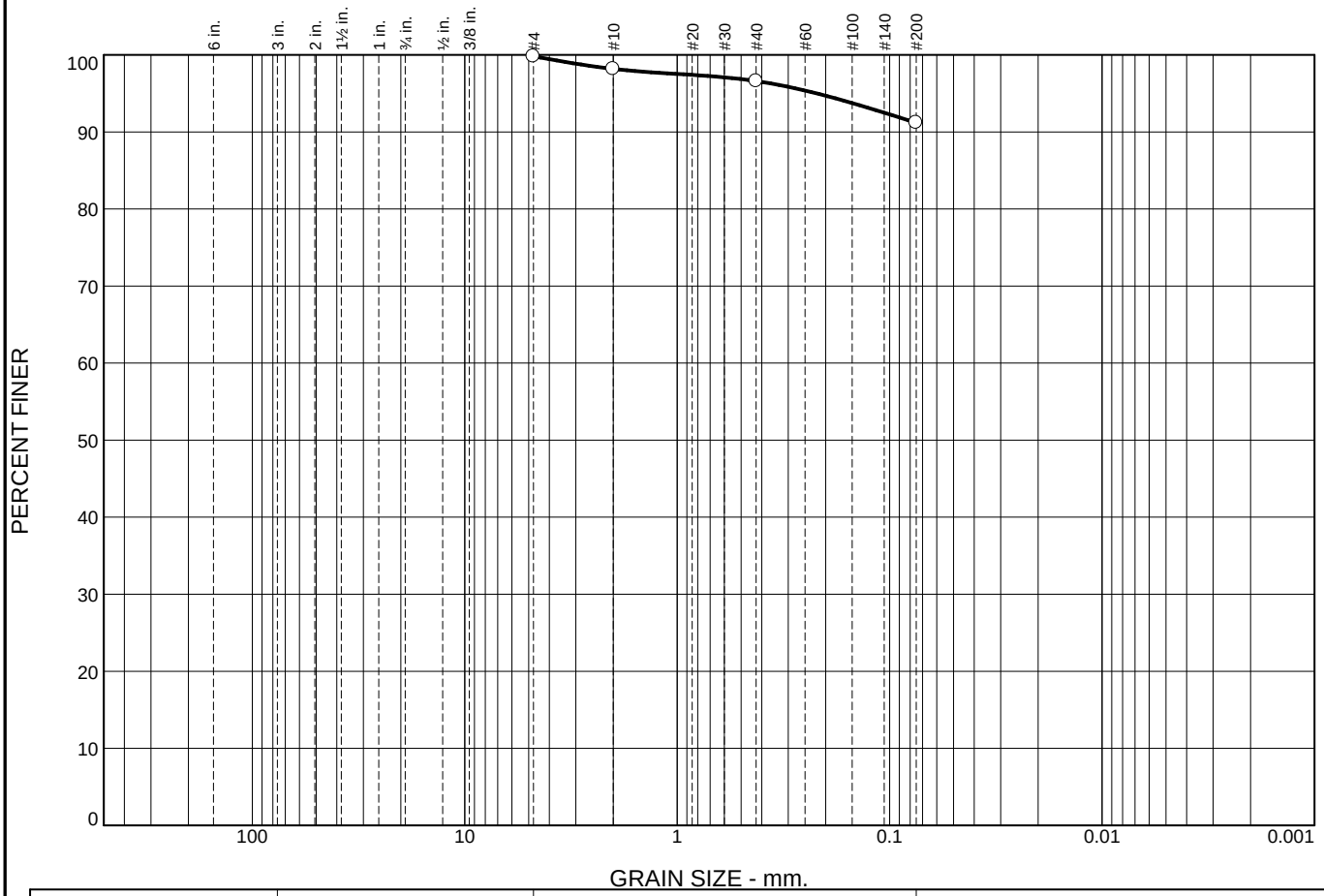
Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○				1.6	1.6	5.4	91.2	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	37	20								

Material Description	USCS	AASHTO
○ LEAN CLAY	CL	A-6(16)

Project No. GEO26-128 **Client:** SCM ARCHITECTS
Project: STEELE PLASTICS

○ **Source of Sample:** B-1 **Depth:** 2

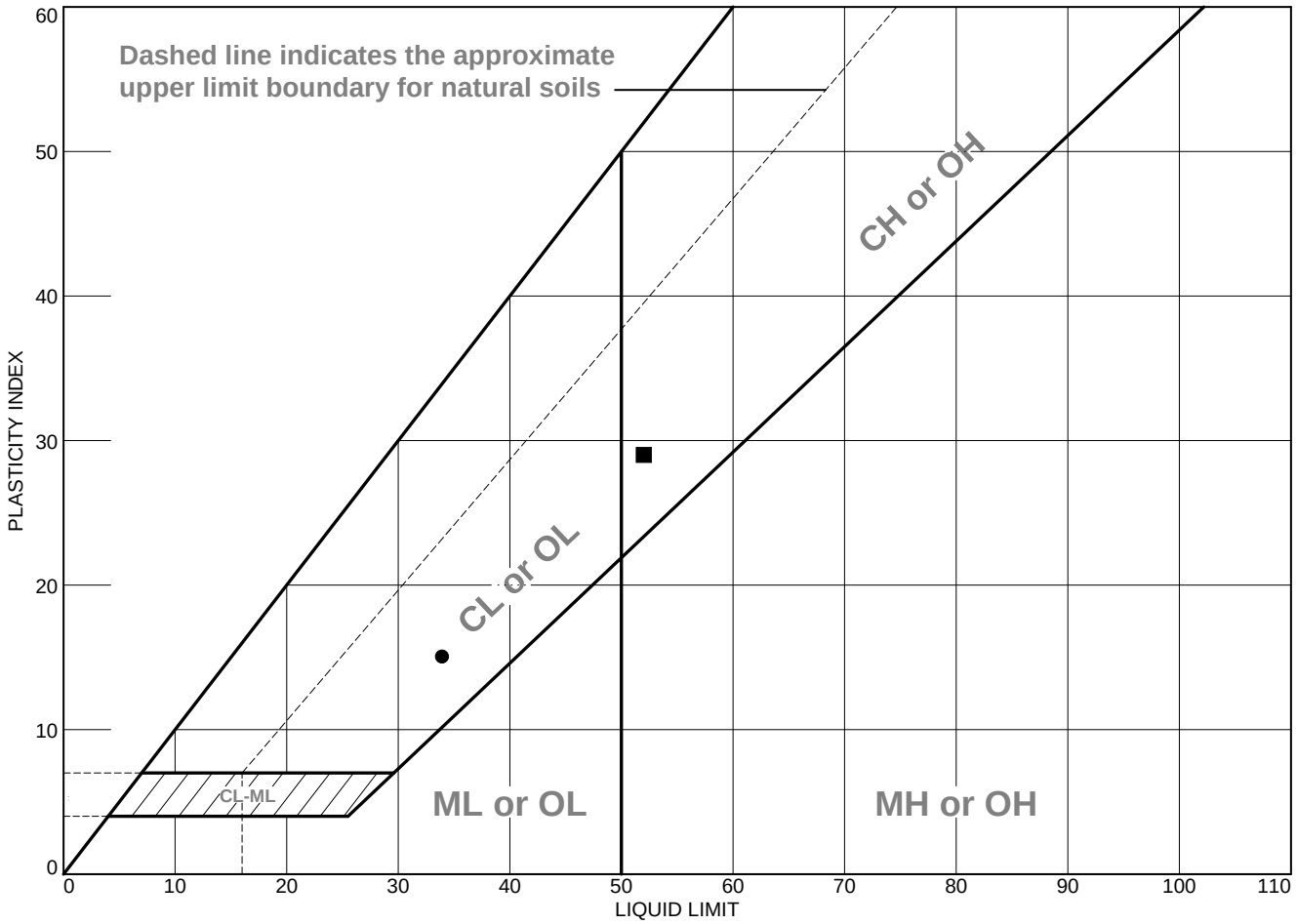
Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	LEAN CLAY	34	19	15	98.9	94.8	CL
■	FAT CLAY W/ TRACE GRAVEL	52	23	29	63.7	61.4	CH

Project No. GEO26-128 **Client:** SCM ARCHITECTS

Project: STEELE PLASTICS

●**Source of Sample:** B-2 **Depth:** 4

■**Source of Sample:** B-2 **Depth:** 6

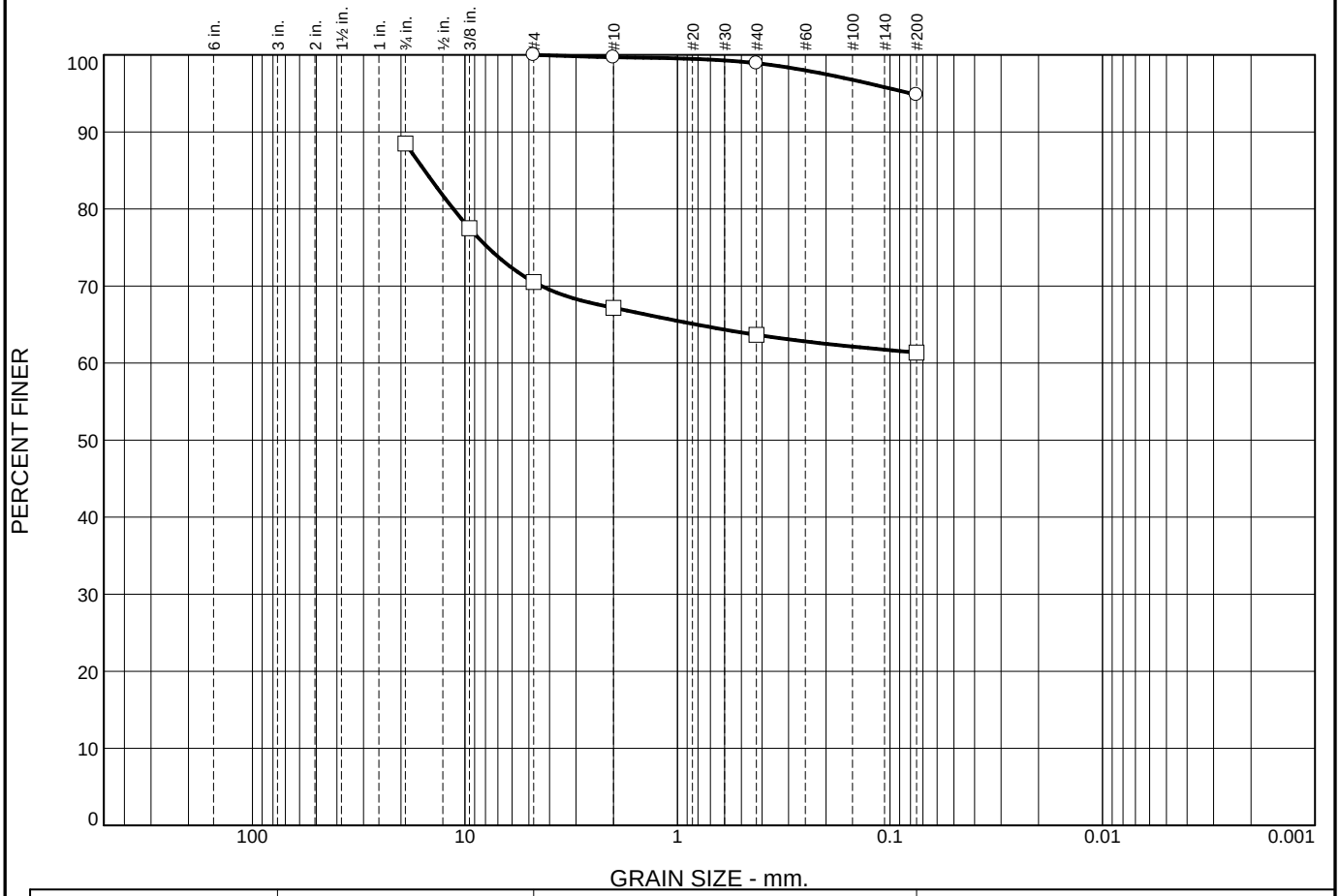
Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.3	0.8	4.1	94.8	
□			18.0	3.3	3.5	2.3	61.4	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	34	19								
□	52	23	15.4940							

Material Description	USCS	AASHTO
○ LEAN CLAY	CL	A-6(14)
□ FAT CLAY W/ TRACE GRAVEL	CH	A-7-6(16)

Project No. GEO26-128 **Client:** SCM ARCHITECTS
Project: STEELE PLASTICS

○ **Source of Sample:** B-2 **Depth:** 4
□ **Source of Sample:** B-2 **Depth:** 6

Remarks:

Materials Testing of Arkansas

Little Rock, AR

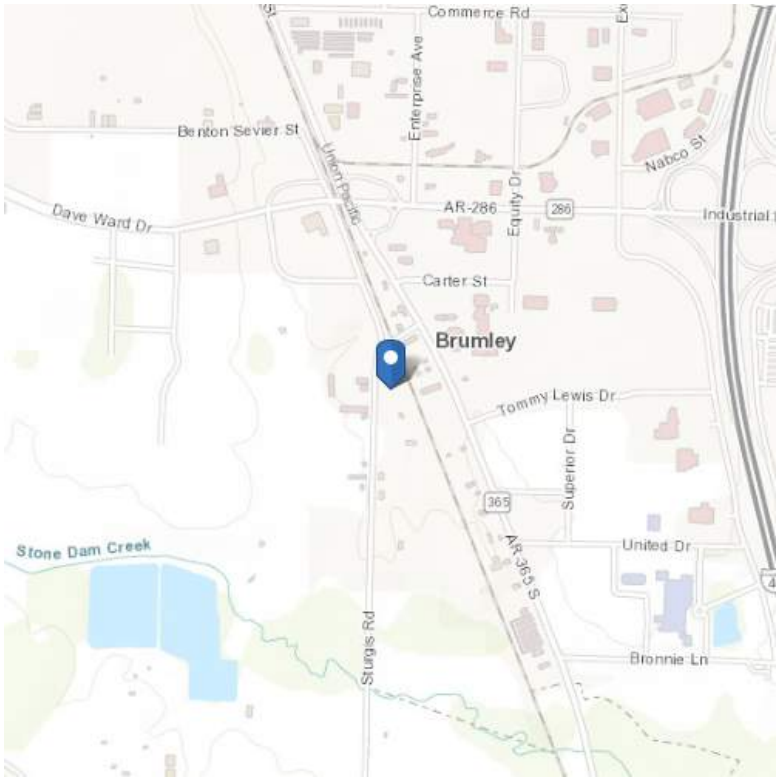
Figure

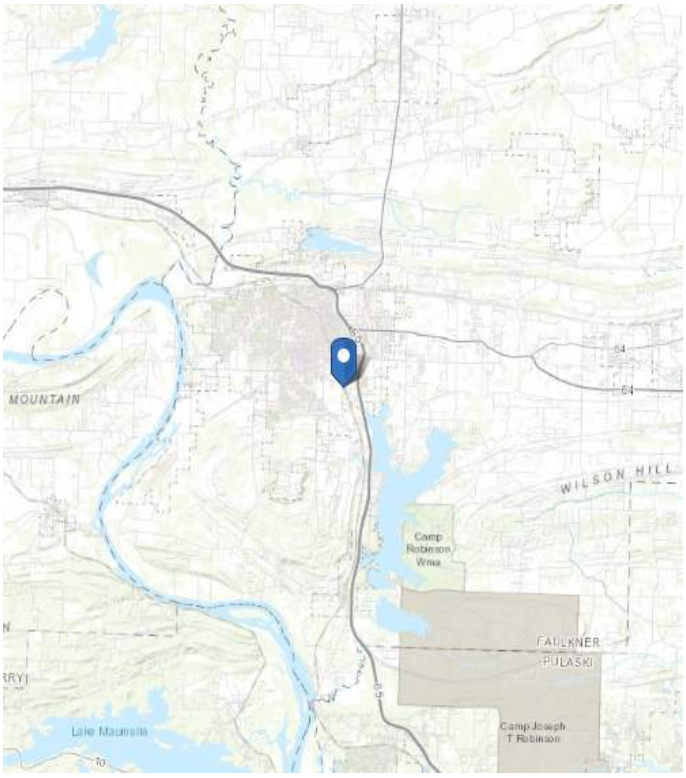
Appendix E:
Seismic Design Criteria

ASCE Hazards Report

Address:
Steele Plastics Inc. -
1280 Sturgis Rd
Conway, AR

Standard:	ASCE/SEI 41-23	**Latitude:**	35.061994
Risk Category:	NaN	**Longitude:**	-92.428332
Soil Class:	C - Very Dense Soil and Soft Rock	**Elevation:**	288.21715829119023 ft (NAVD 88)





Seismic

Site Soil Class: C - Very Dense Soil and Soft Rock

Hazard Level BSE-2N:

S_{XS} :	0.6	S_{X1} :	0.23

Hazard Level BSE-1N:

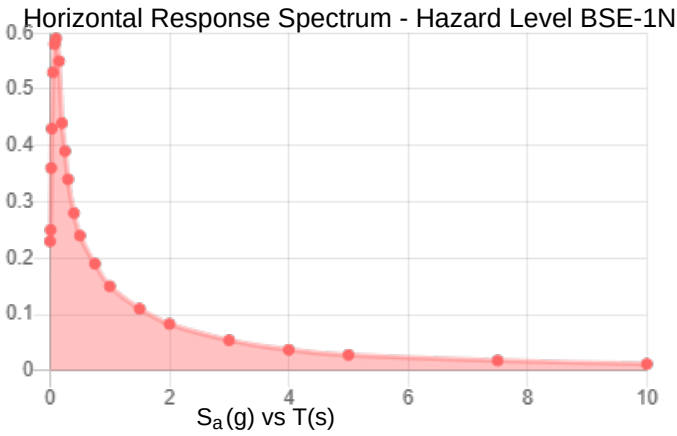
S_{XS} :	0.4	S_{X1} :	0.15

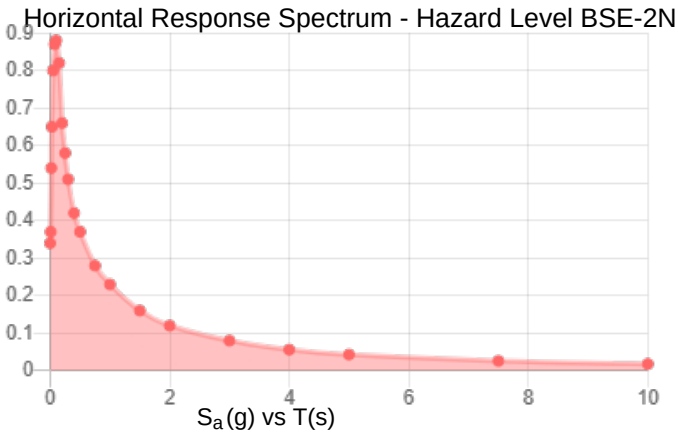
Hazard Level BSE-2E:

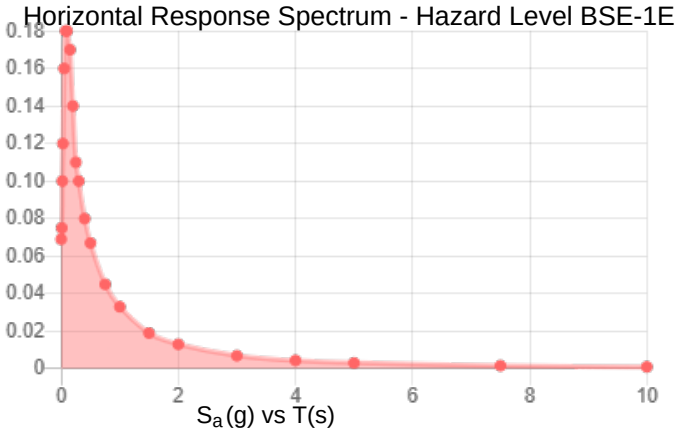
S_{XS} :	0.41	S_{X1} :	0.14

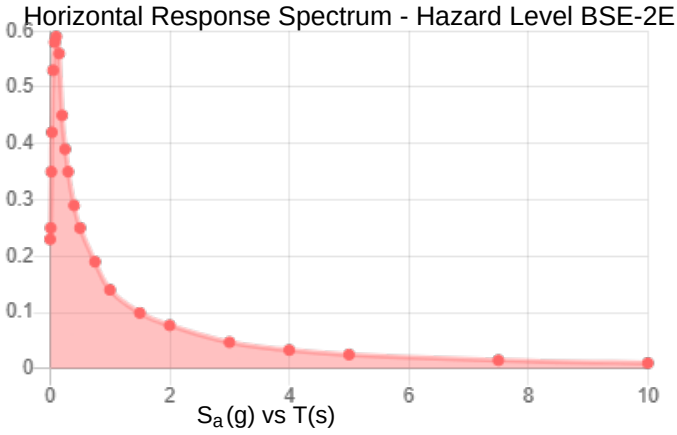
Hazard Level BSE-1E:

S_{XS} :	0.13	S_{X1} :	0.033









The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE Hazard Tool.

DIVISION 01

SECTION 01 10 00

SUMMARY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General Project Information.

B. Scope of Work.

C. Work by Others.

D. Contractor use of site and premises.

E. Work Sequence.

1.02 GENERAL PROJECT INFORMATION

A. Owner: Steele Plastics

B. Project Name: Steele Plastics Building Expansion.

C. Address: 1280 Sturgis Road, Conway, Arkansas 72034.

D. Architect: SCM Architects PLLC.

E. The Project consists of the construction of an approximately 7,200 square foot PEMB frame addition along with minor alterations to an existing break room.

1.03 SCOPE OF WORK

A. Contractor shall provide all work, supervision, labor, materials, transportation, scaffolding, clean up and any other services necessary to perform the construction of this project, complete in every detail, within the limits shown on the construction documents.

1.04 WORK BY OTHERS

A. The Contractor shall thoroughly familiarize himself with all work to be performed by others, its interface with this Contract, its affect on the scheduling of this Contract and its impact on the Contractors use of the site.

B. The Owner will have separate vendors provide and install a sprinkler system throughout the addition. Contractor to coordinate work and schedule with Owner's vendor(s).

1.05 CONTRACTOR USE OF SITE AND PREMISES

A. Contractor shall secure and otherwise restrict access to this site as required.

B. Provide access to and from site as required by law.

1. Do not obstruct roadways, sidewalks, or other public ways without permit.

C. Clean Up During Construction: During the process of work, keep the project clear of all rubbish. Keep all public streets adjacent to the project free of dirt, gravel, concrete and other materials transported to and from the project.

D. Drainage: Prevent mud and debris from getting into the existing storm sewer system and or streets during the period of construction. Contractor is responsible for cleaning any permanent piping or drainage structures in place that may become clogged. Under no conditions shall such water used in flushing concrete or other cement mixes be deposited in or about sanitary sewer lines or storm sewer lines.

E. Rubbish containers: Suitable containers with covers are to be provided for all refuse from meals eaten on the job site and such containers shall be removed from the job site at least once in every 72 hour period. One of these containers is to be placed beside each drinking water facility to receive discarded paper cups. All bottles, cans, paper and garbage of every description are to be constantly picked up and placed in the covered containers. All workmen are to be advised of the contents of this paragraph and nothing short of their full cooperation is

considered reasonable.

1.06 WORK SEQUENCE

A. Construct work in sequence to accommodate the work of others. During the construction period, coordinate construction schedule and operations with the Owner's Representative and Architect.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preconstruction meeting.

B. Progress meetings.

C. Submittals for review, information, and project closeout.

D. Number of copies of submittals.

E. Submittal procedures.

1.02 RELATED SECTIONS

A. Section 01 10 00 - Summary: Scope of Work

B. Section 01 70 00 - Closeout Submittals: Project record documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Contractor shall schedule a meeting after Notice to Proceed.

B. Attendance Required:

1. Owner’s Representative.
2. SCM Architects PLLC
3. General Contractor.
4. Major Subcontractors.

C. Agenda:

1. Distribution of Contract Documents.
2. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
3. Designation of personnel representing the Contractor, Subcontractors, Owner and Architect.
4. Procedures and processing of field decisions, submittals, substitutions, Applications for Payments, Proposal Request, Change Orders, and Contract closeout procedures.
5. Scheduling.

D. General Contractor will record minutes and distribute copies to participants.

3.02 PROGRESS MEETINGS

A. The General Contractor will schedule and administer meetings throughout progress of the Work at bi-weekly intervals or as agreed upon by Owner, Architect and Contractor.

B. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner’s Representative, Architect, and subcontractors as appropriate to agenda topics for each meeting.

C. Agenda:

1. Review minutes of previous meetings.
2. Review of Work progress.

3. Field observations, issues, and decisions.
4. Identification of issues 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. Other business relating to Work.

D. General Contractor will record minutes and distribute copies to participants.

3.03 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
1. Product data.
2. Shop drawings.
3. Samples for selection.
4. Samples for verification.

B. Submit to the Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed only for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 70 00 - CLOSEOUT SUBMITTALS.

3.04 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
1. Design data.
2. Certificates.
3. Test reports.
4. Inspection reports.
5. Manufacturer's instructions.
6. Manufacturer's field reports.

3.05 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit the following at project closeout:
1. Project record documents.
2. Operation and maintenance data.
3. Warranties.
4. Bonds.
5. Product Information.

3.06 NUMBER OF COPIES OF SUBMITTALS

A. Documents for Review:

1. Electronic Submittals: Electronic submittals are to be used for this project. See below for requirements.

B. Documents for Project Closeout: Provide an electronic copy of all reviewed submittals for project closeout.

C. Samples: Submit the number specified in individual specification sections; two of which will be retained by the Architect.

1. After review, produce duplicates as necessary.
2. Retained samples will not be returned to the Contractor unless specifically requested.
3. Select samples may be used by the Architect for color and finish presentations to the Owner.

3.07 SUBMITTAL PROCEDURES

A. Electronic Submittals: Electronic submittals are to be used for this project.

1. Submit complete submittals. Incomplete submittals will not be accepted or reviewed.
2. Any submittals requiring a color / finish selection must have physical copies / samples delivered to SCM for review.
3. Transmit each submittal with an approved submittal transmittal form. Sequentially number the transmittal form. Revised submittals to have the original number with a sequential alphabetic suffix.
4. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and corresponding specification number on ALL of the individual submittals. Specification section number to be included in the file name as well as inside the electronic document.
4. Separate all submittals by specification section / number.
5. Place the Project Name along with the submittal name and specification number in the subject line of the e-mail.
6. Place the Project Name in the subject line of all e-mail correspondence for this project.
7. Apply Contractors' 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, to each submittal.
8. Schedule submittals to expedite the Project, and coordinate submission of related items.
9. For each submittal for review, allow 15 days.
10. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
11. When revised for resubmission, identify all changes made since previous submission.
12. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
13. Submittals not requested will not be recognized or processed.

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. References and standards.

B. Quality assurance submittals.

C. Field samples

D. Control of installation.

E. Tolerances.

F. Testing and inspection services.

G. Manufacturers' field services.

1.02 RELATED SECTIONS

A. Section 01 30 00 - Administrative Requirements: Submittal procedures.

B. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.03 SUBMITTALS

A. Testing Agency Qualifications:

1. Prior to start of Work, submit agency name, address, and telephone number, and names of full-time registered Engineer and responsible officer.

B. Test Reports: After each test/inspection, promptly submit two copies of each report to the Architect.

1. Include:

a. Date issued.

b. Project title and number.

c. Name of inspector.

d. Date and time of sampling or inspection.

e. Identification of product and specifications section.

f. Location in the Project.

g. Type of test/inspection.

h. Date of test/inspection.

i. Results of test/inspection.

j. Conformance with Contract Documents.

k. When requested by the Architect, provide interpretation of results.

2. Test reports are submitted for the Architect’s knowledge as contract administrator or for the Owner, for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

C. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to the Architect, in quantities specified for Product Data.

1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

2. Certificates may be recent or previous test results on material or product but must be acceptable to the Architect.

D. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

E. Erection Drawings: Submit drawings for the Architect's benefit as contract administrator or for the Owner's Representative.

1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.04 REFERENCES AND STANDARDS - See Section 01 42 50

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

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 before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 TESTING AND INSPECTION AGENCIES

A. Contractor to employ and pay for services of an independent firm to perform inspection and testing.

B. The independent firm will perform inspections, tests and other services specified in the individual specification sections and as required by the Architect or owner.

C. Reports will be submitted directly from the independent testing firm to the Architect and respective engineers. These reports are to indicate observations and results of tests and indicating compliance or non-compliance with the contract documents.

D. Contractor is to cooperate with the independent firm; furnish samples, design mixes, equipment, tools, storage and assistance as requested.

1. Notify architect and independent firm 24 hours prior to expected time for operations requiring services.

2. Contractor to make arrangements with independent firm and pay for additional samples and tests required by contract documents or by architect or owner.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the architect or owner. Contractor to pay the cost of re-testing.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and

workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from the Architect 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. Have Work performed 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, and disfigurement.

3.02 FIELD SAMPLES

A. Install field samples at the site as required by individual specifications Sections for review.

B. When samples are accepted by the Architect and Owner’s Representative, they shall represent the quality level required for the actual Work.

C. Where field sample is specified in individual Sections to be removed, clear area after work represented by field sample has been accepted by Architect and Owner’s Representative.

3.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from the Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

A. See individual specification sections for testing required.

B. Testing Agency Duties:

1. Provide qualified personnel at site. Cooperate with the Architect and the Contractor in performance of services.
2. Perform specified sampling and testing of products in accordance with specified standards.
3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
4. Promptly notify the Architect and the Contractor of observed irregularities or non-conformance of Work or products.
5. Perform additional tests and inspections required by the Architect.
6. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:

1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the Work.
3. Agency may not assume any duties of the Contractor.
4. Agency has no authority to stop the Work.

D. Contractor’s Responsibilities:

1. Deliver to agency at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
2. Cooperate with laboratory personnel, and provide access to the Work.
3. Provide incidental labor and facilities:
    a. To provide access to Work to be tested/inspected.
    b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    c. To facilitate tests/inspections.
    d. To provide storage and curing of test samples.
4. Notify the Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by the Contractor beyond specified requirements.
6. Arrange with Owner’s Representatives agency and pay for additional samples, tests, and inspections required by the Contractor beyond specified requirements.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by the Architect. Payment for re-testing will be charged to the Contractor by deducting testing charges from the Contract Price.

3.05 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 and as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT

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

B. If, in the opinion of the Architect, it is not practical to remove and replace the Work, the Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 42 50

REFERENCE STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements relating to referenced standards.

B. Reference standards full title and edition date.

1.02 QUALITY ASSURANCE

A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard of date of issue specified in this section, except where a specific date is established by applicable code.

C. Obtain copies of standards when required by the Contract Documents.

D. Maintain a copy at the 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 before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

END OF SECTION

SECTION 01 45 33

CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Code-required special inspections.

B. Testing services incidental to special inspections.

C. Submittals.

D. Manufacturers' field services.

E. Fabricators' field services.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittal procedures.

B. Section 01 40 00 - Quality Requirements.

1.03 DEFINITIONS

A. Code or Building Code: Arkansas Fire Prevention Code, Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements and specifically, Chapter 17 - Special Inspections and Tests.

B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.

C. Special Inspection:

1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved Contract Documents and the referenced standards.
2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

1.04 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.

B. AISC 360 - Specification for Structural Steel Buildings.

C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.

D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

E. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.

F. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete.

G. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

H. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

I. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing.

J. AWS D1.1/D1.1M - Structural Welding Code - Steel.

K. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:
   1. Submit agency name, address, and telephone number, names of full-time registered Engineer and responsible officer.

C. Testing Agency Qualifications: Prior to the start of work, the Testing Agency is required to:
   1. Submit agency name, address, and telephone number, and names of full-time registered Engineer and responsible officer.

D. Special Inspection Reports: After each special inspection, Special Inspector is required to promptly submit at least two copies of report; one to Engineer and one to the AHJ.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of Special Inspector.
      d. Date and time of special inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of special inspection.
      h. Date of special inspection.
      i. Results of special inspection.
      j. Compliance with Contract Documents.
   2. Final Special Inspection Report: Document special inspections and correction of discrepancies. Final report shall be signed and sealed by the supervising Engineer.

E. Test Reports: After each test or inspection, promptly submit at least two copies of report; one to Engineer and one to AHJ.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test or inspection.
      h. Date of test or inspection.
      i. Results of test or inspection.
      j. Compliance with Contract Documents.

1.06 SPECIAL INSPECTION AGENCY

A. Owner will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.
   1. The Special Inspector shall qualified individual under the direct supervision of a Professional Engineer registered in the State of Jurisdiction.

B. The Special Inspection Agency may employ and pay for services of an independent testing agency to perform testing and sampling associated with special inspections and required by the building code.

C. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.07 TESTING AND INSPECTION AGENCIES

A. Owner may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.

B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.08 QUALITY ASSURANCE

A. Special Inspection Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.

B. Testing Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
   1. Continuous Special Inspection: Special Inspection Agency is required to be present in the area where the work is being performed and observe the work at all times the work is in progress.
   2. Periodic Special Inspection: Special Inspection Agency is required to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

3.02 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

A. Special Inspection Agency shall:
   1. Verify samples submitted by Contractor comply with the referenced standards and the approved Contract Documents.
   2. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
   3. Perform specified sampling and testing of products in accordance with specified reference standards.
   4. Ascertain compliance of materials and products with requirements of Contract Documents.
   5. Promptly notify Engineer and Contractor of observed irregularities or non-compliance of work or products.
   6. Perform additional tests and inspections required by Engineer.
   7. Attend preconstruction meetings and progress meetings.
   8. Submit reports of all tests or inspections specified. Reports shall indicate that work inspected or tested was or was not completed in conformance to approved construction documents. Discrepancies shall be brought to the immediate attention of the contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Registered Professional in Responsible Charge prior to completion of that phase of the work.

B. Limits on Special Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the work.

C. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Engineer.

D. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.03 TESTING AGENCY DUTIES AND RESPONSIBILITIES

A. Testing Agency Duties:
   1. Test samples submitted by Contractor.

2. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
3. Perform specified sampling and testing of products in accordance with specified standards.
4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
5. Promptly notify Engineer and Contractor of observed irregularities or non-compliance of work or products.
6. Perform additional tests and inspections required by Engineer.
7. Attend preconstruction meetings and progress meetings.
8. Submit reports of all tests or inspections specified. Reports shall indicate that work inspected or tested was or was not completed in conformance to approved construction documents. Discrepancies shall be brought to the immediate attention of the contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Registered Professional in Responsible Charge prior to completion of that phase of the work.

B. Limits on Testing or Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the work.

C. On instructions by Engineer, perform re-testing required because of non-compliance with specified requirements, using the same agency.

D. Contractor will pay for re-testing required because of non-compliance with specified requirements.

3.04 DEVIATION LOG

A. The Special Inspector shall maintain a deviation log itemizing the following:
1. Deviation number.
2. Inspection or test report number.
3. Service
4. Service date.
5. Description/Comments.
6. How resolved
7. Date resolved
8. Status of the deviation

B. The Special Inspector shall distribute the deviation log when it is updated.

3.05 CONTRACTOR DUTIES AND RESPONSIBILITIES

A. Contractor Responsibilities, General:
1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
2. Cooperate with agency and laboratory personnel; provide access to approved documents at project site, to the work, to manufacturers' facilities, and to fabricators' facilities.
3. Provide incidental labor and facilities:
a. To provide access to work to be tested or inspected.
b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
c. To facilitate tests or inspections.
d. To provide storage and curing of test samples.
4. Notify Engineer, Special Inspection Agency, and Testing Agency 48 hours prior to expected time for operations requiring testing or inspection services.
5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

DEVIATION NOTICE No. _____

SPECIAL INSPECTION DEVIATION NOTICE

(Completed by Special Inspector)

PROJECT NAME / ADDRESS:		
INSPECTION TYPE(S) COVERAGE ☐ CONTINUOUS ☐ PERIODIC		
AREA INSPECTED	TYPE OF INSPECTION	
APPLICABLE DRAWING SHEET NUMBER(S) AND/OR SPECIFICATION SECTION:		
NOTICE DELIVERED TO: O CONTRACTOR O ENGINEER/ARCHITECT O OWNER	DATE:	TIME:
MAKE THE FOLLOWING CORRECTIONS AND SECURE INSPECTION APPROVAL PRIOR TO PROCEEDING WITH THIS PHASE OF THE WORK.		
PRINTED FULL NAME		
NOTE BY "SPECIAL INSPECTOR" OR PROVIDE NAME OF TESTING AGENCY		
SIGNED:	DATE:	
CERTIFICATION:	NUMBER:	
DATE RE-INSPECTED AND APPROVED AND SIGNATURE OF SPECIAL INSPECTOR:		

One copy of this report to remain at job site with the contractor for review upon request.

MINIMUM SPECIAL INSPECTOR QUALIFICATIONS				
Category of Testing and Inspection	**Minimum Qualifications (refer to key at end of Table)**			
	Shop Inspection	**Field Testing /Inspection**	**Review Submittals**	**Review Testing, Certification, & Lab Reports**
1704.2.5 Inspection of Fabricators				
Pre-cast concrete	A, C, E			
Structural steel construction	C, F, G			
Wood construction	A, N			
Cold formed metal construction	A, N			
1705.2 Steel Construction				
Welding	C, F, G	C, F, G	A	A
High strength bolting, inspection of steel frame joint details		A, C	A	A
1705.2.2, 1705.2.3 and 1705.2.4 Steel Construction other than Structural Steel				
Welding	C, F, G	C, F, G	A	A
Screw attachment, bolting, anchoring, and other fastening		A, C	A	A
Cold-formed Steel Deck		C, F, G	A	A
Open-Web Steel Joist and Joist Girders		C, F, G	A	A
Cold-formed Steel Trusses spanning ≥ 60ft		A, C	A	A
1705.3 Concrete Construction				
Reinforcing placement, cast-in-place bolts, concrete and shotcrete placement and curing operations		A, C, H		
Pre-stressing steel installation		A, C, D, E		
Erection of pre-cast concrete members		A, C, H, O		
Concrete field testing		A, C, H, I, J		
Review certified mill reports and design mixes			A	
Verify use of required design mix		A, C, H, I, J		
Pre-stressed (pre-tensioned) concrete force application	A, C, E			
Post-tensioned concrete force application		A, C, D, H		
Review of in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs		A, C, D		
Reinforcing steel weldability, reinforcing welding, weld filler material		C, F, G		
Inspection of post-installed anchors in hardened concrete		A, C, Q		
1705.4 Masonry				
Review f'_m prior to construction			A	
Mortar joint construction, grout protection and placement, materials proportion, type/size/location of reinforcement, structural elements, anchorage, and connectors		A, C, K		
Sampling/testing of grout/mortar specimens		A, C, K		
Observe preparation of masonry prisms for testing of compressive strength of masonry, f'_m		A, C, K		
Inspection of welding of reinforcing steel		C, F, G		

(Table continued on next page)

MINIMUM SPECIAL INSPECTOR QUALIFICATIONS *(continued)*				
Category of Testing and Inspection	**Minimum Qualifications (refer to key at end of Table)**			
	Shop Inspection	**Field Testing /Inspection**	**Review Submittals**	**Review Testing, Certification, & Lab Reports**
1705.5 Wood Construction				
Observe structural panel sheathing, size of framing members, fastener diameter and length, number of fastener lines, and spacing of fastener lines and fasteners for compliance with approved construction documents for the project		A, N		
Metal-plate-connected wood trusses: verify temporary and permanent truss bracing is installed per approved truss submittal package		A, N		
1705.6 Soils				
Observe site preparation, fill placement and testing of compaction for compliance with the construction documents for the project		A, C, I, P		
Observe and test bearing materials below shallow foundations for ability to achieve design bearing capacity		A, L		
Review compaction testing for compliance with the construction documents for the project				A
1705.7, 1705.8 & 1705.9, 1705.10 Driven Deep, Cast-in-place Deep, and Helical Pile Foundations				
Observe installation		A, L, I		
Observe load tests		A, I		
1705.12 Special Inspection for Wind Resistance				
Structural wood		A, N		
Cold-Formed steel light-frame construction		A, N		
Inspect roof cladding		A, B, N		
Inspect wall cladding		A, B, N		
1705.13 Special Inspection for Seismic Resistance				
1705.13.1 Structural Steel				
Inspection of structural steel in the seismic force-resisting systems		A, C		
1705.13.2 Structural Wood				
Inspection of structural wood in the seismic force-resisting systems		A, N		
1705.13.3 Cold-Formed Steel Light-Frame Construction				
Inspection of cold-formed steel light-frame construction in the seismic force-resisting systems		A, N		

(Table continued on next page)

MINIMUM SPECIAL INSPECTOR QUALIFICATIONS *(continued)*

KEY:

A. Professional Engineer (PE), registered in the project's jurisdiction, competent in the specific task area or graduate of accredited engineering/engineering technology program under the direct supervision of a PE.
B. Registered Architect (RA), registered in the project's jurisdiction, competent in the specific task area or graduate of accredited architecture/architecture technology program under the direction of a RA.
C. International Code Council (ICC) Special Inspector Certification specific to the particular material and testing methodology applicable to each Category of Testing and Inspection listed in the table.
D. Post-tensioning Institute (PTI) Certification, Level 2.
E. Pre-stressed Concrete Institute (PCI) Plant Quality Personnel Certification – Level III.
F. American Welding Society (AWS) Certified Welding Inspector (CWI) or AWS Certified Associate Welding Inspector working under the direct on-site supervision of a CWI.
G. American Society for Nondestructive Testing (ASNT) Level II certification, or a Level III certification if previously certified as a Level II in the particular material and testing methodology applicable to each Category of Testing and Inspection listed in the table.
H. American Concrete Institute (ACI) Concrete Construction Special Inspector.
I. National Institute for Certification in Engineering Technologies (NICET) Level II or higher certification specific to the particular material and testing methodology applicable to each Category of Testing and Inspection listed in the table.
J. ACI Concrete Field Testing Technician with Grade 1 certification or Center for Training Transportation Professionals (CTTP) Certified Concrete Field Testing Technician.
K. American Concrete Institute (ACI) Masonry Field Testing Technician
L. NICET Certified Engineering Technologist (CT) competent in the specific task area.
M. Association of the Wall and Ceiling Industry (AWCI) EIFS Inspector Certification.
N. International Code Council (ICC) Commercial Building Inspector Certification.
O. Pre-stressed Concrete Institute (PCI) Certified Field Auditor
P. Center for Training Transportation Professionals (CTTP) Certified Soil Testing Technician.
Q. American Concrete Institute (ACI) Post-Installed Concrete Anchor Installation Inspector.

Notes:

1. *The Special Inspector shall meet one of the minimum qualifications listed for the applicable Category of Testing and Inspection.*
2. *Materials testing shall be done by an Approved Testing Agency meeting the requirements of the Building Code Section 1703 and ASTM E 32*9.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities.

B. Temporary telephone service.

C. Temporary sanitary facilities.

D. Temporary Controls: Barriers, enclosures, and fencing.

E. Security requirements.

F. Vehicular access and parking.

G. Waste removal facilities and services.

H. Field offices.

1.02 TEMPORARY UTILITIES

A. Provide all electrical power, lighting, water, heating, cooling, and ventilation required for construction purposes.

1.03 TEMPORARY WATER SERVICES

A. Contractor may use Owner's existing water lines and service to access suitable water service required for construction operation.

B. Owner will pay cost of water used. Exercise measures to conserve water. Use trigger-operated nozzles for water hoses to avoid waste of water.

1.04 TEMPORARY ELECTRICAL SERVICES

A. Contractor to connect to existing electrical service to access electricity required for construction.

B. The Owner shall pay the cost of energy used. Exercise measures to conserve energy.

C. Contractor shall furnish extension cords and temporary power locations as required for construction operations.

1.05 TEMPORARY LIGHTING

A. Contractor shall provide and maintain temporary lighting required for construction operations.

1.06 TEMPORARY HEAT

A. Provide and pay for heat devices and heat if required to maintain specified conditions for construction operations.

1.07 TELEPHONE AND EMAIL SERVICE

A. Provide, maintain, and pay for telephone and email service to field office at time of project mobilization.

1.08 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Use of existing restroom facilities located in existing buildings is not permitted.

C. Maintain daily in clean and sanitary condition.

1.09 BARRIERS

A. It shall be the sole responsibility of the contractor to determine and provide all required safety precautions, procedures and facilities to at all times protect the public, construction workers and others who may be on the project site from all hazards created by construction activities.

B. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage caused by construction operations.

C. Provide barricades required to protect the public from damage or injury by construction operations.

D. Provide barricades and or signage to protect vehicular traffic, stored materials, site, structures and other workers from damage or injury by construction operations.

E. The contractor shall be responsible for determining the type, size, extent and design of all barriers, barricades and signage required to assure the safety of all persons and property at the project site at all times.

F. Provide barricades, signage and all protective measures necessary to protect construction personnel and the public from overhead and underground utilities. Contractor is responsible for notifying utility companies whenever work will be done near any utilities and coordinating with the utility companies to shut down utilities if necessary to protect workers and the public during construction activities.

1.10 FENCING

A. Construction: Contractor's option.

1.11 SECURITY

A. Provide security and facilities to protect the work and construction operations from unauthorized entry, vandalism, or theft.

1.12 PROTECTION FOR INSTALLED PRODUCTS

A. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.

B. Provide protective coverings at walls, projections, jambs, sills and soffits of openings.

C. Protect finished floors, stairs and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

D. 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.

E. Prohibit traffic through landscaped areas.

1.13 VEHICULAR ACCESS AND PARKING

A. Coordinate access and haul routes with governing authorities.

B. Provide and maintain access to fire hydrants, free of obstructions.

C. Areas of on-site drives and parking to be constructed for this project may be used for construction traffic, storage and staging.

D. Provide temporary curb cuts and parking areas to accommodate construction vehicles.

1.14 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

1.15 FIELD OFFICE

A. Office: Weather tight, with lighting, power, phone service, internet service, heating and cooling equipment, and equipped with sturdy furniture, drawing rack and drawing layout table.

1.16 PROGRESS CLEANING

A. Clean Up During Construction: During the process of work, keep the project sites clear of all rubbish. Keep all campus streets adjacent to the project free of dirt, gravel, concrete and other materials transported to and from the project.

B. Rubbish Containers: Suitable containers with covers shall be provided for all refuse from meals eaten on the job site and such containers shall be emptied at least once in every 72 hour period. One container is to be placed beside each drinking water facility to receive discarded paper cups. All bottles, cans, paper and garbage of every description are to be continually picked up and placed in the covered containers. All workmen are to be advised of the contents of this paragraph and nothing short of their full cooperation is considered reasonable.

C. Contractor shall remove waste materials, debris and rubbish from site and dispose off-site in accordance with all applicable codes and ordinances.

1.17 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

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

D. Restore existing facilities used during construction to original condition.

E. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Transportation, handling, storage and protection.

C. Product option requirements.

D. Substitution limitations and procedures.

E. Spare parts, extra materials and maintenance materials.

1.02 RELATED SECTIONS

A. Section 01 40 00 - Quality Requirements: Product quality monitoring.

1.03 SUBMITTALS

A. Electronic Submittals: Electronic submittals are to be used for this project. Reference Section 01 30 00 Administrative Requirements for electronic submittal procedures required by SCM Architects.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project.

D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

E. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

2.02 PRODUCT OPTIONS

A. It is the intent of these contract documents (drawings and specifications) to establish a standard of quality for all materials and components included in the project. In many cases, particularly relative to Division 9, the products and materials are specified by naming only one product and manufacturer reflect the Owner’s chosen standard and have been previously installed in other projects beyond the scope of this contract. Any request for substitution to these standard finishes must be submitted to the Architect in written form no later than seven (7) working days prior to the Bid Date for consideration. In most cases, the initially specified product will govern. The Architect and/or Owner will be the sole judge as to the acceptability of any requested substitution to a specified product or material. Aesthetics alone, in the evaluation of the Architect and/or Owner, will be sufficient grounds to reject any substitution request. It shall be the responsibility of the contractor to change or replace (at no cost to the owner) materials or products, submitted or installed without such approval if they do not meet the aforementioned requirements. Products accepted for substitution will be listed in an addendum to be issued before the Bid Date.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra products of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

A. Document each submittal which includes a proposed substitution with complete data substantiating compliance of proposed substitution with Contract Documents.

B. A request for substitution constitutes a representation that the submitter:

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 the Owner.
4. Waives claims for additional costs or time extension which may subsequently become apparent.

C. Substitution Submittal Procedure:

1. Submit request for substitution for consideration. Limit each request to one proposed substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
3. SCM Architects will notify the general contractor in writing of decision to accept or reject request.

3.02 TRANSPORTATION AND HANDLING

A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

B. Transport and handle products in accordance with manufacturer's instructions.

C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

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. Prevent contact with material that may cause corrosion, discoloration, or staining.

I. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

J. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 70 00

CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.02 RELATED SECTIONS

A. Conditions of the Contract: Performance bond and labor and material payment bonds, warranty, and correction of work.

B. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

C. Individual Product Sections: Specific requirements for operation and maintenance data.

D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to the Architect.

B. Operation and Maintenance Data:

1. Submit a copy of preliminary draft or proposed formats and outlines of contents before start of Work. The Architect will review draft and return with comments.

2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within 30 days after completion.

3. Submit a copy of completed documents 10 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect's comments. Revise content of all document sets as required prior to final submission.

4. Submit an electronic set of revised final documents in final form within 30 days after final inspection.

C. Warranties and Bonds:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.

2. Submit documents within 30 days after Date of Substantial Completion.

3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 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 the 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.

3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured depths of foundations in relation to finish main floor datum.

2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

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.

3.02 OPERATION AND MAINTENANCE DATA

A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:

1. Product data, with catalog number, size, composition, and color and texture designations.

2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional information as specified in individual product specification sections.

E. Provide a listing in Table of Contents for design data.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:

1. Description of unit or system, and component parts.
2. Identify function, normal operating characteristics, and limiting conditions.
3. Include performance curves, with engineering data and tests.
4. Complete nomenclature and model number of replaceable parts.

B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

E. Provide servicing and lubrication schedule, and list of lubricants required.

F. Include manufacturer's printed operation and maintenance instructions.

G. Include sequence of operation by controls manufacturer.

H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

I. Provide control diagrams by controls manufacturer as installed.

J. Provide Contractors' coordination drawings, with color coded piping diagrams as installed.

K. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

L. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

M. Include test and balancing reports.

N. Additional Requirements: As specified in individual product specification sections.

3.05 OPERATION AND MAINTENANCE MANUALS

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

B. Prepare data in the form of an electronic instructional manual.

C. Cover: Identify each file with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

D. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

E. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. 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 special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

3. Part 3: Project documents and certificates, including the following:

a. Shop drawings and product data.

b. Air and water balance reports.

c. Certificates.

d. Copies of warranties and bonds.

F. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work. Except for items put into use with the Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Manual: Bind original, signed documents in commercial quality 8-1/2 x 11 inch three D side ring binders with durable plastic covers. Submit electronic copies with the other electronic closeout documents.

F. Cover: Identify binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

DIVISION 02

SECTION 02 20 00

SITE PREPARATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Clearing of vegetation.

C. Removal of debris.

D. Abandonment and removal of existing utilities and utility structures.

1.02 RELATED SECTIONS

A. Section 00 31 10 - Geotechnical Investigation: Soil conditions and requirements for undercut and backfill.

B. Section 01 10 00 - Summary: Contractor's use of site and premises, sequencing, and staging requirements.

C. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, protection of existing trees, and waste removal.

D. Section 31 23 16 - Excavation: Removal of unsuitable material.

E. Section 31 23 23 - Fill and Backfill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

F. Section 31 22 00 - Grading: Topsoil removal.

1.03 REFERENCES

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

1.04 PROJECT CONDITIONS

A. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fill Material: As specified in Section 31 22 00 – Grading

PART 3 - EXECUTION

3.01 EXISTING UTILITIES

A. Coordinate work with utility companies; notify all utility companies before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without a permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt utilities without at least 7 days prior written notification to any adjacent properties that may be affected.

E. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

F. Unused underground piping may be abandoned in place, provided it is completely drained and capped; remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.02 VEGETATION

A. Scope: Remove trees, shrubs, brush, and stumps in areas to be excavated, filled, covered by building structure, paving, lawns, and planting beds.

B. Install protective fences and other protection measures in accordance with Section 01 50 00 Temporary Facilities and Project Controls to prevent inadvertent damage to trees and vegetation on adjacent properties.

C. Vegetation Removed: Do not bury, landfill, or leave on site.
   1. Fill holes left by removal of stumps and roots, using suitable fill material, with top surface neat in appearance and smooth enough not to constitute a hazard to pedestrians.

3.03 EXISTING BUILT ELEMENTS

A. Scope:
   1. Remove existing paving, curbs, sidewalks, drainage structures, etc. as required to accomplish new work.
   2. Remove all other paving and curbs as indicated on drawings.
   3. Remove other items indicated, for salvage, relocation, and recycling.
   4. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside within one year after completion.

B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Use of explosives is permitted.
   4. Provide, erect, and maintain temporary barriers and security devices.
   5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   7. Do not close or obstruct roadways or sidewalks without a permit.

C. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.04 DEBRIS

A. Remove all debris from site.

3.05 WASTE REMOVAL

A. Remove from site all materials not to be reused on site; do not burn or bury.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 02 41 13

SELECTIVE SITE DEMOLITION

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes removal of paving, pipes and utilities, and other site items as required by the project drawings.

1.2 SUBMITTALS

A. Obtain necessary permits required for demolition and submit copies to the Owner before beginning site demolition work.

1.3 PROTECTION

A. Protection of Existing Work: Before beginning cutting or other site demolition work, carefully survey the existing work and examine the project drawings and specifications to determine the extent of the work. Take necessary precautions to ensure against damage to existing work to remain in place, to be reused, or to remain the property of the Owner. Repair or replace damage to work at no additional cost to the Owner. Carefully coordinate the work of this section with other work and construct and maintain shoring, bracing and supports, as required. Ensure that structural elements are not overloaded. Increase structural support of add new supports, as required as a result of cutting, removal, or demolition of work performed.

B. Benchmarks, Property Markers, and Iron Pins: The Contractor shall maintain all benchmarks, monuments, property markers, iron pins and other reference points during site clearing operations. In the event any of the above mentioned are disturbed or destroyed during any construction activities, the Contractor shall replace them as directed by the Owner at the Contractor's expense.

C. Existing Utilities:

1. Follow rules and regulations of the authorities having jurisdiction for the respective utilities in execution of the work under this section.
2. Active Utilities Shown on Project Drawings: Protect from damage and remove or relocate only as indicated or specified. Take special precautions not to damage utility lines, manholes, or other structures. Correct any damage to utilities or structures to original or better condition at no additional cost to the Owner.
3. Active Utilities Not Shown on Project Drawings: When any functioning underground utilities are uncovered during the work that are not shown on the project drawings, promptly notify the Owner in writing. Protect or relocate in accordance with written instructions of the Owner. The Contractor shall exercise caution during all phases of the work, as all utilities may not be shown on the Project Drawings. A utilities' omission form the Project Drawings will not relieve the Contractor of their responsibility to correct any damage to said utility at no additional cost to the Owner.

4. Inactive and Abandoned Utilities: Remove, plug, or cap in the absence of specific requirements. Plug or cap utility lines at least five feet outside of new building walls or as required by local regulations.

D. Adjacent Properties: Protect adjacent properties during site demolition operations. Site demolition shall be limited to Owner's property. The Contractor shall also protect existing structures on adjacent properties; including but not limited to fences, utility lines, manholes, catch basins, valve boxes, poles, guys and other appurtenances. Damage done to structures on adjacent properties shall be the Contractor's responsibility to repair, at no additional cost to the Owner.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION

3.1 DEMOLITION

A. Utilities: Remove or abandon in place existing utilities as indicated on the project drawings. Disconnect utility services, with related meters and equipment, employing appropriate utility company. When utility lines are encountered that are not indicated on the project drawings, notify the Owner.

B. Driveways, pavements and similar obstructions permitted to be removed shall be cut in straight lines or removed to the nearest construction joint if located within five feet of the edge of the excavation. In no case shall the joint or line of cut be less than one foot outside the edge of excavation.

3.2 DISPOSAL OF MATERIALS

A. Dispose of demolished materials off the project site unless otherwise notified by the Owner. Transport materials in a manner that will prevent spillage on streets and adjacent areas. Dispose of materials in a manner acceptable to the regulatory agency having jurisdiction.

3.3 BACKFILLING AND COMPACTION

A. Backfill holes and depressions resulting from site demolition in the manner described in Section 31 23 23 Fill and Backfill.

END OF SECTION 02 41 13

DIVISION 03

SECTION 03 10 00

CONCRETE FORMS AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.

B. Openings for other work.

C. Form accessories.

D. Form stripping.

1.02 RELATED SECTIONS

A. Section 03 20 00 - Concrete Reinforcement.

B. Section 03 30 00 - Cast-in-Place Concrete.

C. Section 03 35 00 – Concrete Floor Finishing.

D. Section 03 39 00 – Concrete Curing.

E. Section 03 39 50 – Concrete Sealer.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.

B. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary; American Concrete Institute International.

C. ACI 347R - Guide to Formwork for Concrete; American Concrete Institute International.

D. ASME A17.1 - Safety Code for Elevators and Escalators; The American Society of Mechanical Engineers.

E. PS 1 - Construction and Industrial Plywood; National Institute of Standards and Technology (Department of Commerce).

1.04 DESIGN REQUIREMENTS

A. Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 347R, ACI 301, and ACI 318.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for design, fabrication, erection and removal of formwork.

1.07 COORDINATION

A. Coordinate this Section with other Sections of work which require attachment of components of formwork.

B. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement, request instructions from Architect/Engineer before proceeding.

PART 2 PRODUCTS

2.01 WOOD FORM MATERIALS

A. Form Materials: At the discretion of the Contractor to produce the required shape, line and dimension of finished concrete.

2.02 PREFABRICATED FORMS

A. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

B. Pan Type: Steel, of size and profile indicated.

2.03 FORMWORK ACCESSORIES

A. Form Ties: Removable type, galvanized metal, fixed length, free of defects that could leave holes larger than 1 inch in concrete surface.

B. Form Release Agent: Colorless mineral oil that will not stain concrete or absorb moisture.

C. Corners: Chamfered, wood strip type; 1 x 1 inch size; maximum possible lengths.

D. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.03 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

D. Align joints and make watertight. Keep form joints to a minimum.

E. Obtain approval before framing openings in structural members that are not indicated on drawings.

F. Provide chamfer strips on external corners of beams, joists, columns, and all exposed concrete.

G. Coordinate this section with other sections of work that require attachment of components to formwork.

H. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Architect before proceeding.

3.04 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where items are embedded in or passing through concrete work.

B. Locate and set in place items that will be cast directly into concrete.

C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

D. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.

E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.06 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.07 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 301.

3.08 FIELD QUALITY CONTROL

A. Independent testing agency will perform field quality control tests, as specified in Section 01 40 00.

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

3.09 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Supports and accessories for steel reinforcement.

1.02 RELATED SECTIONS

A. Section 03 10 00 - Concrete Forms and Accessories.

B. Section 03 30 00 - Cast-in-Place Concrete.

C. Section 03 35 00 – Concrete Floor Finishing.

D. Section 03 39 00 – Concrete Curing.

E. Section 03 39 50 – Concrete Sealer.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.

B. ACI 318 - Building Code Requirements For Reinforced Concrete and Commentary; American Concrete Institute International.

C. ACI SP-66 - ACI Detailing Manual; American Concrete Institute International.

D. ASTM A 82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

E. ASTM A 184/A 184M - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement.

F. ASTM A 185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

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

H. ASTM A 706/A 706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

I. ASTM A 775/A 775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.

J. ASTM A 996/A 996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.

K. ASTM D 3963/D 3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy Coated Reinforcing Steel Bars.

L. AWS D1.4 - Structural Welding Code - Reinforcing Steel; American Welding Society.

M. CRSI (DA4) - Manual of Standard Practice; Concrete Reinforcing Steel Institute.

N. CRSI (P1) - Placing Reinforcing Bars; Concrete Reinforcing Steel Institute.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with CRSI (DA4), CRSI (P1), ACI 301, ACI SP-66, ACI 318, and ASTM A 184/A 184M.

1.06 COORDINATION

A. Coordinate with placement of formwork, formed openings and other Work.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A 615/A 615M Grade 60; deformed billet steel bars, unfinished.

B. Welded Steel Wire Fabric: ASTM A 1064, plain type in flat sheets; unfinished.

2.02 REINFORCEMENT ACCESSORIES

A. Tie Wire: Annealed, minimum 16 gage.

B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

C. Provide stainless steel or plastic components for placement within 1-1/2 inches of weathering surfaces.

2.03 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice, ACI SP-66 - ACI Detailing Manual, and ACI 318.

B. Locate reinforcing splices not indicated on drawings at point of minimum stress.

PART 3 EXECUTION

3.01 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

B. Do not displace or damage vapor barrier.

C. Accommodate placement of formed openings.

D. Maintain concrete cover around reinforcing as follows:

1. Beams:1 1/2 inch
2. Supported Slabs and Joists: 3/4 inch.
3. Column Ties: 1 1/2 inch.
4. Walls (exposed to weather or backfill): 2 inch.
5. Footings and Concrete Formed Against Earth: 3 inch.
6. Slabs on Fill: 2 inch.

E. Conform to ACI 318 code for concrete cover over reinforcement.

3.02 FIELD QUALITY CONTROL

A. Independent testing agency, as specified in Section 01 40 00, will inspect installed reinforcement for conformance to contract documents before concrete placement.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete for footings and foundations.

B. Concrete for slabs on grade.

C. Joint devices associated with concrete work.

D. Control, expansion and contraction joint devices associated with concrete work.

1.02 RELATED SECTIONS

A. Section 01 40 00 – Quality Requirements: Testing program.

B. Section 03 10 00 – Concrete Forms and Accessories: Forms and accessories for formwork.

C. Section 03 20 00 – Concrete Reinforcement.

D. Section 03 35 00 – Concrete Floor Finishing.

E. Section 03 39 00 – Concrete Curing.

F. Section 03 39 50 – Concrete Sealer.

G Section 07 90 00 – Joint Sealers.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International.

B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.

C. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International.

D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International.

E. ACI 305R - Hot Weather Concreting; American Concrete Institute International.

F. ACI 306R - Cold Weather Concreting; American Concrete Institute International.

G. ACI 308 - Standard Practice for Curing Concrete; American Concrete Institute International.

H. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary; American Concrete Institute International.

I. ASTM C 33 - Standard Specification for Concrete Aggregates.

J. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

K. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete.

L. ASTM C 143/C 143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.

M. ASTM C 150 - Standard Specification for Portland Cement.

N. ASTM C 171 - Standard Specification for Sheet Materials for Curing Concrete.

O. ASTM C 173/C 173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

P. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete.

Q. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete.

R. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

S. ASTM C 685/C 685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.

T. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

U. ASTM D 994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

V. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

W. ASTM E 1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

C. Submit proposed mix design of each class of concrete to independent testing agency and Architect/Engineer for review and receive approval prior to commencement of Work.

D. Independent testing agency shall submit results of concrete test results to Contractor and Architect/Engineer immediately following each test.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

B. Acquire cement from same source and aggregate from same source for entire project.

C. Follow recommendations of ACI 305R when concreting during hot weather.

D. Follow recommendations of ACI 306R when concreting during cold weather.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base temperature is less than 40 degrees F., or when surface is wet or frozen.

PART 2 PRODUCTS

2.01 FORMWORK

A. Comply with requirements of Section 03 10 00.

2.02 REINFORCEMENT

A. Comply with requirements of Section 03 20 00.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C 150, Type I - Normal Portland type.

B. Fine and Coarse Aggregates: ASTM C 33.

C. Fly Ash: ASTM C 618, Class C.

D. Water: Clean and not detrimental to concrete.

2.04 ADMIXTURES

A. Air Entrainment Admixture: ASTM C 260.

B. Chemical Admixtures: ASTM C 494/C 494M, only if approved in writing by the Architect/ Engineer.

1. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

2.05 CONCRETE ACCESSORIES

A. Vapor Barrier and Installation Accessories for Installation Under All Interior Concrete Slabs on Grade:

1. Strength: ASTM E1745 Class A.
2. Thickness: 15 mils minimum
3. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1.
3. Basis of Design: Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834; www.stegoindustries.com
4. Accessories:
    a. Seams:
        i. Seam tape equal to: Stego Tape by Stego Industries
    b. Sealing Penetrations of Vapor Barrier:
        i. Mastic equal to: Stego Mastic by Stego Industries
        ii. Seam tape equal to: Stego Tape by Stego Industries
    c. Perimeter / Edge Seal:
        i. Termination bar equal to: Stego Term Bar by Stego Industries
        ii. Sealant tape equal to: Stego Tack Tape (double-sided sealant tape) by Stego Industries
    d. Substitutions: In accordance with 01 60 00 Product Requirements.

B. Non-Shrink Grout: ASTM C 1107; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.

1. Minimum Compressive Strength at 48 Hours: 2,400 psi.
2. Minimum Compressive Strength at 28 Days: 7,000 psi.

2.06 JOINT DEVICES AND MATERIALS

A. Joint Filler: Non-extruding, resilient asphalt impregnated fiberboard or felt, complying with ASTM D 1751, 1/4 inch thick and full depth of slab less 1/2 inch.

B. Joint Filler: Compressible asphalt mastic with felt facers, complying with ASTM D 994, 1/4 inch thick and 4 inches deep.

C. Construction Joint Devices: Integral galvanized steel; formed to tongue and groove profile, knockout holes spaced at 6 inches, ribbed steel spikes with tongue to fit top screed edge.

2.07 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.

1. For trial mixtures method, employ independent testing agency acceptable to the Architect for preparing and reporting proposed mix designs.

C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer. Comply with Structural Drawings.

D. Concrete mix designs: Comply with Structural Drawings for concrete strength requirements, mix designs and proportioning.

F. Use acceleration admixtures in cold weather only when approved in writing by Architect/Engineer. Use of admixtures will not relax cold weather placement requirements.

G. Use set retarding admixtures during hot weather only when approved in writing by Architect/Engineer.

H. Add air entraining agent to normal weight concrete mix for work exposed to exterior.

I. Air entrainment: Comply with Structural Drawings.

2.08 MIXING

A. Transit Mixers: Comply with ASTM C 94/C 94M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

A. Verify that forms are clean and free of rust before applying release agent.

B. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

C. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

D. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

E. Install vapor barrier under interior slabs on grade. Lap joints minimum 6 inches and seal watertight by taping edges and ends or as required by manufacturer.

3.03 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Notify Architect/Engineer not less than 36 hours prior to commencement of placement operations.

D. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

E. Install vapor barrier under interior slabs on grade. Lap joints minimum 6 inches and seal watertight.

F. Repair vapor barrier damaged during placement of concrete reinforcing. Repair with vapor barrier material; lap over damaged areas minimum 12 inches and seal watertight.

G. Separate slabs on grade from vertical surfaces with joint filler.

H. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

I. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface. Conform to Section 07 90 00 for finish joint sealer requirements.

J. Install joint devices in accordance with manufacturer's instructions.

K. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

L. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

M. Place concrete continuously between predetermined expansion, control, and construction

joints.

N. Do not interrupt successive placement; do not permit cold joints to occur.

O. Saw cut joints on same day as placement of concrete. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.

P. Screed floors level, maintaining surface flatness of maximum 1/8 inch in 10 ft.

3.04 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:

1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.

D. Concrete Slabs: Finish to requirements of Section 03 35 00.

3.05 CURING AND PROTECTION

A. Comply with requirements of Section 03 39 00.

B. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

C. Comply with requirements of ACI 308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

D. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

1. Normal concrete: Not less than 7 days.

2. High early strength concrete: Not less than 4 days.

3.06 FIELD QUALITY CONTROL

A. Independent testing agency will perform field quality control tests, as specified in Section 01 40 00.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

D. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

E. Compressive Strength Tests: ASTM C 39/C 39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 50 cu yd or less of each class of concrete placed.

F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C 143/C 143M.

3.07 PATCHING

A. Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.

B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.

C. Patch imperfections in accordance with ACI 301.

3.08 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to the Architect and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by the Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of the Architect for each individual area.

END OF SECTION

SECTION 03 35 00

CONCRETE FLOOR FINISHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finishing slabs on grade.

1.02 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete: Prepared concrete floors ready to receive finish.

B. Section 03 39 00 - Concrete Curing.

C. Section 03 39 50 – Concrete Sealer.

D. Section 07 90 00 - Joint Sealers.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.

B. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International.

C. ASTM E 1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on sealer, including information on compatibility of different products and limitations.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301 and ACI 302.1R.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.07 PROJECT CONDITIONS

A. Coordinate the work with concrete floor placement and concrete floor curing.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Temporary Lighting: Minimum 200 W (or equivalent) light source, placed 8 feet above the floor surface, for each 425 sq ft of floor being finished.

B. Temporary Heat: Ambient temperature of 50 degrees F minimum.

C. Ventilation: Sufficient to prevent injurious gases from temporary heat or other sources affecting concrete.

PART 2 PRODUCTS

2.01 Not Used

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that floor surfaces are acceptable to receive the work of this section.

3.02 FLOOR FINISHING

A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.1R.

B. Steel trowel surfaces that will receive all finishes.

C. Troweled Finish: Apply troweled finish to all interior monolithic slab surfaces. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/8" in 10' when tested with a 10' straightedge. Grind smooth surface defects which would telegraph through applied floor covering system.

3.03 FLOOR SURFACE TREATMENT

A. Apply sealer to scheduled floor surfaces in accordance with manufacturer's instructions.

3.04 TOLERANCES

A. Measure flatness of slabs in accordance with ACI 302.1R and to achieve the following tolerances:

1. Maximum Variation of Surface Flatness For Exposed Concrete Floors: 1/8 inch in 10 ft.

B. Correct the slab surface if tolerances are less than specified.

C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

END OF SECTION

SECTION 03 39 00

CONCRETE CURING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Initial and final curing of horizontal concrete surfaces.

1.02 RELATED SECTIONS

A. Section 03 30 00 – Cast-in-Place Concrete.

B. Section 03 35 00 – Concrete Floor Finishing.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.

B. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International.

C. ACI 308 - Standard Practice for Curing Concrete; American Concrete Institute International.

D. ASTM C 171 - Standard Specification for Sheet Materials for Curing Concrete.

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

F. ASTM D 2103 - Standard Specification for Polyethylene Film and Sheeting.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on curing compounds, including compatibility of different products and limitations.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301 and ACI 302.1R.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver curing materials in manufacturer's sealed packaging, including application instructions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Membrane Curing Compound: ASTM C 309 Type 1 - Clear or translucent, Class A.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to be cured.

3.02 EXECUTION - HORIZONTAL SURFACES

A. Cure floor surfaces in accordance with ACI 308 by the following method.

1. Curing Compound: Apply membrane curing compound in accordance with manufacturer’s instructions in 2 coats with second coat at right angles to first.

3.03 PROTECTION OF FINISHED WORK

A. Do not permit traffic over uncured concrete surface.

B. When using curing compound, do not permit traffic over unprotected floor surface until curing compound has dried completely.

END OF SECTION

SECTION 03 39 50

CONCRETE SEALER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Application of clear, water-based acrylic sealer on exposed, cast-in-place concrete floor slabs as identified below.

1.02 RELATED SECTIONS

A. Section 03 30 00 – Cast-in-Place Concrete: Concrete floor slabs.

B. Section 03 35 00 – Concrete Floor Finishing.

C. Section 03 39 00 – Concrete Curing.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. ACI 309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

B. ASTM C 1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

C. AASHTO M 148 – Liquid Membrane Forming Compounds for Curing Concrete.

D. USDA – United States Department of Agriculture.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Submit manufacturer's product data and application instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Store materials in a clean, dry area in accordance with manufacturer's written instructions.

C. Keep product from freezing.

D. Avoid direct contact with this product as it may cause mild-to-moderate irritation of the eyes and/or skin.

E. Protect materials during handling and application to prevent damage or contamination.

F. Do not mix any compound containing solvent.

G. Do not mix or agitate aggressively as foaming can occur.

1.06 ENVIRONMENTAL CONDITIONS

A. Do not apply product when air, surface, or material temperatures are expected to fall below 40 deg F within four hours of expected application.

B. Do not apply to frozen concrete.

C. Do not use on dense or porous surfaces.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. W.R. Meadows, Inc., PO Box 338, Hampshire, Illinois 60140-0338. (800) 342-5976. (847) 683-4500. Fax (847) 683-4544. Website: www.wrmeadows.com

B. Substitutions: In accordance with Section 01 30 00 – Administrative Requirements.

2.02 MATERIALS

A. Performance Based Specification: Water-based acrylic curing and sealing compound shall be a non-yellowing, clear, acrylic curing and sealing compound meeting the following requirements:

1. ASTM C 309, Type 1, Class B.
2. AASHTO M 148, Type 1, Class B.
3. ASTM C 1315, Class A, Section 6.4.1 – non-yellowing.
4. ASTM C 1315, Section 6.6 – exceed 50 MPa (70 psi) adhesion requirements.

B. Basis-of-Design: VOCOMP-20 acrylic curing and sealing compound by W.R. Meadows.

C. Water: Clean, potable, not detrimental to concrete.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive curing and sealing compound. Notify architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.02 SURFACE PREPARATION

A. Protect adjacent surfaces not designated to receive curing and sealing compound.

B. Clean and prepare surfaces to receive curing and sealing compound in accordance with manufacturer's instructions.

C. Ensure concrete surface is clean and dry, with all stains, oil, grease, dust, and dirt removed.

D. Concrete surface water should be dissipated when used on new concrete.

E. Concrete surfaces should not be marred by walking workers.

3.03 APPLICATION

A. Apply sealing compound in accordance with manufacturer's instructions.

B. Ensure product is mixed for optimum performance. Avoid aggressive mixing as foaming may occur.

C. Use an industrial sprayer with a 5916 tip that produces a flow rate of 1/10 of one gallon per minute under 0.276 MPa (40 psi) of pressure.

D. Spray on in a fine, fog pattern, without spurts and dribbles, to form a thin, continuous film.

E. Alternatively apply using a lint-free roller or lamb's wool roller.

F. Avoid puddling in low areas.

3.04 PROTECTION OF FINISHED WORK

A. Restrict foot traffic for 12 hours.

3.05 SCHEDULE

A. Install at locations indicated to have "Sealed Concrete" on the finish schedule in the Drawings. **DO NOT INSTALL AT LOCATIONS TO RECEIVE A FLOOR FINISH**.

END OF SECTION

DIVISION 05

SECTION 05 50 00

METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel and miscellaneous metal items.

1.02 RELATED SECTIONS

A. Section 09 90 00 - Paints and Coatings: Paint finish.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. Conform to the requirements of the Structural Drawings.

B. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements.

C. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel.

D. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

E. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

F. ASTM A 283/A 283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

G. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

H. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

I. ASTM A 325M - Standard Specification for High-Strength Bolts for Structural Steel Joints (Metric).

J. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

K. ASTM A 501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

L. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society.

M. AWS D1.1 - Structural Welding Code - Steel; American Welding Society.

N. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings.

O. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A 36/A 36M.

B. Steel Tubing: ASTM A 500, Grade B cold-formed structural tubing.

C. Plates: ASTM A 36 / A36/M.

D. Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.

E. Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, galvanized to ASTM A 153/A 153M where connecting galvanized components.

F. Welding Materials: AWS D1.1; type required for materials being welded.

G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

A. Fit and shop assemble items in largest practical sections for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by continuous welds.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

A. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking; prime paint finish.

B. Lintels: As detailed; Zinc rich prime paint finish.

2.04 FINISHES - STEEL

A. Prime paint all steel items.

1. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. All steel lintels and steel exposed to the exterior shall be hot dipped galvanized prior to shop priming with zinc rich primer.

C. Prepare surfaces to be primed in accordance with SSPC-SP2.

D. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

E. Prime Painting: One coat.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Verify that field measurements are as indicated on drawings and shop drawings.

C. Clean and strip primed steel items to bare metal where site welding is required.

D. Supply setting templates to the appropriate entities for steel items required to be cast into concrete.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until

completion of erection and installation of permanent attachments.

C. Obtain approval prior to site cutting or making adjustments not scheduled.

3.04 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

DIVISION 06

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Telephone and electrical panel boards.

B. Concealed wood blocking for support of cabinets, and other items requiring attachment to walls.

C. Preservative Treatment of Wood

D. Fire-Retardant-Treated Wood.

1.02 RELATED SECTIONS

A. Section 06 20 00 - Finish Carpentry and Custom Millwork: Wood blocking for cabinets and trim.

B. Section 09 22 16- Non Load Bearing Metal Stud Framing System: Wood blocking in metal stud construction.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. Comply with the requirements of the Structural Drawings.

B. ANSI A208.1 - American National Standard for Particleboard.

C. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

D. AWPA C2 - Lumber, Timber, Bridge Ties and Mine Ties -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association.

E. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood-Preservers' Association.

F. PS 1 - Construction and Industrial Plywood; National Institute of Standards and Technology (Department of Commerce).

G. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce).

H. SPIB (GR) - Grading Rules; Southern Pine Inspection Bureau, Inc.

1.04 QUALITY ASSURANCE

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

1. Acceptable Lumber Inspection Agencies: Any agency with rules approved by American Lumber Standards Committee.

B. Plywood: Comply with PS 1.

C. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

PART 2 PRODUCTS

2.01 DIMENSION LUMBER

A. Grading Agency: Southern Pine Inspection Bureau, Inc. (SPIB) or Western Wood Products Association (WWPA).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry or MC19.

D. Miscellaneous Blocking, Furring, and Nailers:

1. Lumber: S4S, No. 2 or Standard Grade.

2.02 CONSTRUCTION PANELS

A. Miscellaneous Panels:

1. Concealed Plywood: PS 1, C-C Plugged, exterior grade.
2. Exposed Plywood: PS 1, A-D, interior grade.

2.03 ACCESSORIES

A. Fasteners and Anchors:

1. Fasteners: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and treated wood locations, unfinished steel elsewhere.
2. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.

2.04 FACTORY WOOD TREATMENT

A. Treated Lumber: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

B. Preservative Pressure Treatment of Lumber Above Grade: AWPA Use Category UC3B, Commodity Specification A using MCQ (Micronized Copper Quaternary) waterborne copper based suspension preservative to 0.15 lb/cu ft retention.

1. Kiln dry lumber after treatment (KDAT) to maximum moisture content of 19 percent.
2. Use factory treated lumber in contact with masonry or concrete, including framing members and wood blocking in contact with foundation walls, existing and/ or new masonry walls and concrete.
3. Use factory treated lumber in contact with roofing, flashing or waterproofing
4. Use factory treated lumber where wood is used less than 18-inches above grade.

C. Approved Manufacturers:

1. Osmose: MICRO PRO/ SMART SENSE
2. Great Southern Wood Preserving: YELLAWOOD

2.05 FIRE RETARTANT TREATED LUMBER AND PANELS

A. General Product Information

1. Treatment shall be equal to Pyro-Guard as manufactured by Hoover Treated Wood Products, Inc.
2. Fire-retardant-treated lumber and panels to have a flame spread rating of 25 or less (Class A) when tested in accordance with ASTM E84, “Standard Test Method for Surface Burning Characteristics of Building Materials.” Pyro-Guard fire-retardant-treated wood to show no evidence of significant progressive combustion when the test is extended for an additional 20-minute period. In addition, the flame front does not progress more than 10 ½ feet beyond the centerline of the burners at any time during the test. The flame spread and smoke developed index for each species and product are classified by Underwriters Laboratories, Inc. (UL).
3. Fire-retardant-treated wood to be manufactured under the independent third-party inspection of Underwriters Laboratories Inc. (UL). Follow-Up Service and each piece shall bear the UL classified mark indicating the extended 30 minute ASTM E84 test.
4. Fire-retardant-treated wood shall be kiln dried after treatment (KDAT). The kiln drying process to be monitored by Underwriters Laboratories, Inc. (UL) and the UL mark shall appear on the label.
5. Fire-retardant-treated wood shall be produced in accordance with UL Evaluation Report ER7002-01, latest version.

B. Fire-Retardant Treatment

1. Fire Retardant Treatment: Chemically treated and pressure impregnated, having flame spread of 25 or less when tested in accordance with ASTM E 84 and showing no evidence of significant progressive combustion when test is continued for an additional 20 minute period, Interior type.
2. Fire-retardant-treated lumber and panels to be interior “Type A” fire-retardant with individual surface burning characteristics for the species and products listed under UL Certifications.
3. Structural performance of fire-retardant-treated wood to be tested in accordance with ASTM D5664 for lumber and ASTM D5516 for plywood. Evaluation of plywood data is in accordance with ASTM D6305. Evaluation of lumber data to be in accordance with ASTM D6841. Resulting design value and span rating adjustments are published in UL ER7002-01, including evaluation of high temperature (HT) strength testing for roof applications.
4. Fire-retardant-treated wood to be kiln dried after treatment (KDAT) to maximum moisture content of 19% for lumber and 15% for plywood.
5. Fire-retardant-treated wood is not to contain VOCs, urea formaldehyde or formaldehyde, halogens, sulfates, chlorides, or ammonium phosphate.
6. Plywood treated with Pyro-Guard shall be manufactured under US Product Standards – PS 1 or PS 2. Panels shall have a minimum bond durability of Exposure 1.
7. Grade marked lumber treated with Pyro-Guard shall be in accordance with PS 20.

PART 3 EXECUTION

3.01 INSTALLATION

A. Set members level and plumb, in correct position.

B. Place horizontal members with crown side up.

C. Construct curb members of single pieces to the greatest extent possible.

D. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.

E. Coordinate curb installation with installation of decking and support of deck openings.

F. Provide miscellaneous members as indicated or as required to support finishes, fixtures, specialty items, and trim.

3.02 INSTALLATION OF CONSTRUCTION PANELS

A. Install telephone and electrical panel back boards made of plywood or other acceptable structural panels at locations indicated.

END OF SECTION

SECTION 06 20 00

FINISH CARPENTRY AND CUSTOM MILLWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Custom millwork, cabinets and countertops.

B. Plastic Laminate.

C. Hardware and attachment accessories.

D. Solid Polymer Fabrications (Solid Surfacing)

1.02 RELATED SECTIONS

A. Section 06 10 00 – Rough Carpentry.

B. Section 09 90 00 – Paints and Coatings: Painting and finishing of finish carpentry items.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. AWI - Quality Standards.

B. BHMA A156.9 - Cabinet Hardware.

C. FS MMM-A-130 - Adhesive, Contact.

D. HPMA (Hardwood Plywood Manufacturer's Association) HP - American Standard for Hardwood and Decorative Plywood.

E. NEMA (National Electric Manufacturers Association) LD3 - High Pressure Decorative Laminates.

F. NHLA (National Hardwood Lumber Association).

G. PS 20 - American Softwood Lumber Standard.

1.04 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, accessories and assembly details.

C. Provide product data for finish hardware and one sample of each type of finish hardware specified for cabinets.

D. Provide Product data on Plastic Laminate material, color samples and manufacturer’s installation instructions.

E. Provide sample of each different cabinet style, showing quality of construction, drawer hardware, pulls, cabinet hinges and finishes for approval before start of work.

1.05 QUALITY ASSURANCE

A. Cabinet Material and Fabrication Standards: Custom grade for clear and laminated plastic finish as indicated, in accordance with the latest edition of the Architectural Woodwork Institute Quality Standards Illustrated for Custom Quallity, conforming to the following sections except where modified elsewhere in this section.

1. Section 100 - Lumber.
2. Section 200 - Panel Products.
3. Section 300 - Standing and Running Trim.
4. Section 400 - Architectural Cabinets.

1.06 QUALIFICATIONS

A. Fabricator: Company specializing in fabricating the products specified in this section with minimum ten years experience and a member of the Architectural Woodwork Institute.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle products in accordance with manufacturer's instructions.

B. Protect work from moisture damage.

1.08 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.09 COORDINATION

A. Coordinate the work with plumbing and electrical rough-in, installation of associated and adjacent components, and Owner supplied items.

PART 2 PRODUCTS

2.01 COMPONENTS

A. Solid Wood for Opaque Finish: NHLA graded in accordance with AWI Architectural Woodwork Institute Quality Standards Illustrated, Custom: average moisture content of 6%; species and grade as follows:

1. Solid Wood for Opaque Finish: Plain Sawn Birch, Maple or Poplar.
2. Solid Wood for Semi-exposed Members: Same as exposed members. See drawings for locations.
3. Solid Wood for Concealed Members: Douglas Fir or Southern Pine.

B. Exposed Solid Wood for Opaque Finish: Plain Sawn Birch, Maple or Poplar.

2.02 SHEET MATERIALS

A. Exposed Veneer Plywood for Opaque Finish: Natural Birch or Maple Veneer Plywood, Plain Sliced, HPVA Grade AA. Contractor may substutute High Grade Medium Density Fiber Board for plywood.

B. Exposed Plywood for Laminated Plastic Finish: Douglas Fir or Birch. Use plywood bonded with exterior glue. Contractor may substutute High Grade Medium Density Fiber Board for plywood.

C. Concealed Plywood: Douglas Fir or Southern Pine.

D. Hardboard: AHA A135.4; Pressed wood fiber with resin binder, Class 1 – Tempered, ¼" thick, smooth two sides (S2S); use for drawer bottoms and other components indicated on the drawings. Contractor may substutute ¼-inch thick plywood for hardboard.

2.03 PLASTIC LAMINATE MATERIALS

A. Standard Decorative Laminate: NEMA LD3-2005, standard general purpose grade for horizontal and vertical work.

1. Surfaces at Custom Millwork indicated to receive Plastic Laminate:

   Manufacturers: Wilsonart and Formica

2. Finishes to be selected by Owner

2.04 ADHESIVE

A. Adhesive: Complying with CS 35, Type I.

2.05 FASTENERS

A. Fasteners and Anchors: Screws (F.S. FF-S-111), nails (F.S. FF-N-105), anchors and expansion bolts of material, type and finish required for each use for secure anchorage.

2.06 HARDWARE

A. Standard Cabinet Doors:

1 pr.	hinges:	Blum “Clip”, Half and full overlay, 110° opening
1		pull: 4” wire pull **(Final selection by Owner / Architect)**
1	lock:	Equal to Hafele 235.12.241 (where indicated)

B. Standard Cabinet Drawers:

1	pr.	Drawer slides, KV 8400 (length as required)
1	pull	4” wire pull **(Final selection by Owner / Architect)**
1	lock:	Equal to Hafele 235.14.221 (where indicated)

C. Miscellaneous Hardware:

Wiring Grommets: Hafele TG Series, 2-3/8” dia O.D., ABS plastic. Provide grommets for countertop equipment as directed by Owner and Architect.

Shelving Supports (For Custom Millwork): Knape & Vogt Model No. 331 or 332 for 1/4” or 5mm hole respectively. Holes to be drilled at 1 1/2” O.C..

Adjustable Magnetic Catches: Stanley CD41 or approved equal

Silencer Pads

2.07 SOLID SURFACE

A. Solid Polymer Surfacing: Corian **(Or as selected by Owner)** Provide allowance for material and installation.

1. Thickness: ½” thick
2. Finishes to be selected by Owner.

B. Material: Homogeneous filled acrylic, not coated, laminated or of composite Construction, meeting ANSI Z124.3 & .6, Type Six, and Federal Specification WW-P-541 E/GEN.

C. Accessory Products:

1. Panel Adhesive: Manufacturers standard neoprene based panel adhesive meeting ANSI A136.1-1967, UL Listed.
2. Joint Adhesive: Manufacturers standard two-part adhesive kit to create inconspicuous, non-porous joint with chemical bond. Color to match solid surface material.
3. Sealant: Manufacturer's standard mildew-resistant, FDA/UL recognized silicone sealant in color matching or clear formulations.

D. Fabrication:

1. For warranty coverage; Fabricator /Installer shall be approved by solid polymer manufacturer.
2. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and solid polymer manufacturer requirements.

3. Form joints between components using manufacturer's standard joint adhesive. Joints shall be inconspicuous in appearance and without voids. Attach 2" (50mm) wide reinforcing strip of solid polymer material under each joint.

4. Provide holes and cut outs for electrical accessories as indicated on the drawings.

5. Rout and finish component edges to a smooth, uniform finish. Rout all cutouts, then sand all edges smooth. Repair or reject defective or inaccurate work.

2.08 FABRICATION

A. Fabricate to AWI Custom standards.

B. Shop assemble work for delivery to site, permitting passage through building openings.

C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

D. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with waterproof glue. Locate counter butt joints minimum 2 feet from sink cut-outs.

E. Apply laminate backing sheet to reverse face of high pressure decorative laminate finished panes.

F. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.

G. Cap exposed plastic laminate finish edges with material of same finish and pattern.

H. Shop prepare and identify components for book match grain matching during site erection.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

A. Install work in accordance with AWI Custom Quality Standard.

B. Install plastic laminate and solid surfacing materials according to the respective manufacturer’s recommendations.

C. Set and secure materials and components in place, plumb and level.

D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch.

E. Anchor woodwork to anchors or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork, and matching final finishes where transparent finish is specified.

F. Cabinets: Install without distortion so that doors and drawers will fit openings properly and be accurately aligned. Adjust hardware to center doors and drawers in openings and provide unencumbered operation. Complete the installation of hardware and accessory items. Maintain veneer sequence matching of cabinets.

G. Countertops: Anchor securely to base units and other support systems.

H. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners, and comply with referenced standard for joinery.

3.03 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations after first coat of finish. Sand work smooth.

3.04 SOLID SURFACE INSTALLATION

A. Install components plumb and level, in accordance with approved shop drawings and manufacturer's installation details. Blocking and substrates to be designed and installed by installer and approved by the manufacturer.

B. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work. Keep components and hands clean when making joints.

C. Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Components shall be clean on date of substantial completion.

D. Protect surfaces from damage until date of substantial completion. Repair or replace damaged work that cannot be repaired to architect's and owner's satisfaction.

3.04 ERECTION TOLERANCES

A. Maximum Variation from True Position: 1/8 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

3.05 SCHEDULE

A. Refer to drawings for locations of all plastic laminate and solid surface products.

END OF SECTION

DIVISION 07

SECTION 07 21 16

BUILDING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sound batt insulation in interior wall construction.

1.02 RELATED SECTIONS

A. Section 05 40 00 – Cold Forming Metal Framing: Supporting construction for batt and board insulation.

B. Section 09 22 16 – Non Load Bearing Metal Stud Framing System: Supporting construction for batt insulation.

C. Section 13 12 10 – Pre-Engineered Metal Building System: PEMB insulation.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. ASTM C 552 - Standard Specification for Cellular Glass Thermal Insulation.

B. ASTM C 665 – Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

C. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

D. ASTM C 1136 – Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.

E. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

F. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.

G. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association.

H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.

1.04 SUBMITTALS

A. See Section 01 30 00 – Submittals and Substitutions, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing product systems specified in this section with minimum five years documented experience.

B. Installer Qualifications: Company specializing in performing work of this section.

C. Insulation system components to include a ten-year limited material warranty.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer’s unopened packaging until ready for installation.

B. Store products indoors and protect from moisture, construction traffic, and damage.

1.07 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Batt Insulation:

1. Owens Corning Fiberglass
2. JohnsManville Fiberglass
3. Certainteed Fiberglass
4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 BATT INSULATION MATERIALS

A. Sound Batt Insulation: ASTM C 665; preformed glass fiber batt; conforming to the following:

1. Thicknesses: 3 1/2 inch
2. Thermal Resistance: R of 13
3. Facing: Unfaced
4. Surface Burning Characteristics for concealed installation: When batt insulation is installed fully concealed, it shall have a flame spread/smoke developed index of 25/450, when tested in accordance with ASTM E 84.
5. Surface Burning Characteristics for exposed installation: When batt insulation is installed exposed, it shall have a flame spread/smoke developed index of 25/450, when tested in accordance with ASTM E 84.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify that building structure, including all bracing and any concealed building systems are completed and approved prior to installing liner system and insulation in the structure.

C. Correct any unsatisfactory conditions before proceeding.

D. If conditions are the responsibility of another installer, notify Architect of unsatisfactory conditions preparation before proceeding.

3.02 SOUND BATT INSTALLATION

A. Install insulation in accordance with manufacturer's instructions.

B. Install in interior wall spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities.

3.03 PROTECTION OF FINISHED WORK

A. Do not permit installed insulation systems to be damaged prior to its concealment.

END OF SECTION

SECTION 07 90 00

JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preparing substrate surfaces.

B. Sealant and joint backing.

1.02 RELATED SECTIONS

A. Section 08 11 13 – Hollow Metal Doors and Frames: Sealants for door frame perimeter.

B. Section 13 12 10 – Pre-Engineered Metal Building System: Sealants required in conjunction with metal building system and associated flashing.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. ASTM C790 - Use of Latex Sealing Compounds.

B. ASTM C834 - Latex Sealing Compounds.

C. ASTM C920 - Elastomeric Joint Sealants.

D. SWRI (Sealant, Waterproofing and Restoration Institute) - Sealant and Caulking Guide Specification.

1.04 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations and color availability for each proposed product.

C. Samples: Submit two samples illustrating sealant colors for selection.

D. Manufacturer's Installation Instructions: Indicate special procedures, surface preparation, perimeter conditions requiring special attention and limitations.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with each sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum ten years documented experience.

B. Applicator: Company specializing in performing the work of this section with minimum five years documented experience and approved by the manufacturer of each product proposed.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not proceed with installations of sealants under adverse weather conditions, or when temperatures are above or below manufacturer's recommended limitations for installation. Proceed with the work only when forecasted weather conditions are favorable for proper cure and development of high early bond strength.

1.08 COORDINATION

A. Coordinate the work with all sections referencing this section.

1.09 JOB CONDITIONS

A. Examine joint surfaces, backing, and anchorage of units forming sealant rabbet. Do not proceed with work until unsatisfactory conditions have been corrected.

PART 2 PRODUCTS

2.01 MATERIALS – GENERAL

A. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by testing and field experience.

2.02 SILICONE BUILDING SEALANT at Prefinished Aluminum

A. Provide manufacturer's standard chemically curing, silicone sealant which complies with ASTM C 920 requirements, including those for Type, Grade, Class, and Uses. Provide colors to match adjacent surfaces. A custom color may be required.

1. One-Component Silicone Sealant: ASTM C920, Type S, Grade NS, Class 25. Dow Corning “795” or approved equal for EIFS to EIFS. Dow Corning “795” is to be used as perimeter seals around penetrations. Color to match adjacent materials at wall control joints.

2.03 SILICONE BUILDING SEALANT (Exterior vertical expansion and control joint applications.) **Masonry Control Joints.**

A. Provide manufacturer’s standard chemically curing, elastomeric sealant which complies with ASTM C920 requirements, including those for Type, Grade Class, and Uses.

1. One - Part, Medium - Modulus, Silicone Perimeters Sealant: Type S, Grade NS, Class 25. Dow Corning “795” or approved equal. Color to match mortar color. Sand joints to match mortar joints.

2.04 SILICONE BUILDING SEALANT at all Metal to Metal and Glass to Metal Joints and Perimeter Seals Around Penetrations

A. Provide manufacturer's standard chemically curing, silicone sealant which complies with ASTM C 920 requirements, including those for Type, Grade, Class, and Uses. Provide colors to match adjacent surfaces.

1. One-Component Silicone Sealant: ASTM Specification: C920, Type S, Grade NS, Class 25. Dow Corning “791”, “795” or approved equal.

2.05 INTERIOR WET AREAS JOINT SEALERS at sinks, toilets, etc.

A. Provide manufacturer's standard chemically curing, silicone sealant which complies with ASTM C 920 requirements, including those for Type, Grade, Class, and Uses. Provide colors to match adjacent surfaces.

1. One-Component Mildew Resistant Silicone Sealant: ASTM Specification: C920, Federal Specification TT-S-001543, Class A. Dow Corning “786” or approved equal.

2.06 CONCRETE PAVEMENT AND SIDEWALK JOINT SEALERS

A. Non-priming, pourable, self-leveling urethane. Acceptable sealants are Sonneborn “Sonolastic Paving Joint Sealant”; Mameco “Vulken 45”; Woodmont Products “Chem-Calk 550”; Tremco “THC 900” or Pecora “NR-200 Urexpan”.

2.07. ACOUSTICAL SEALANT FOR INTERIOR LOCATIONS:

A. Butyl or acrylic sealant; ASTM C 920, Grade NS, Class 12-1/2, Uses M and A; single component, solvent release curing, non-skinning.

2.08 ACCESSORIES

A. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

B. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

C. Joint Backing: ASTM D1056; round, closed cell non-gassing backer rod (Dual Rod or Sof-Rod); oversized 30 to 50 percent larger than joint width.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces and joint openings are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

C. Verify that surfaces to receive sealants have not been painted.

3.02 PREPARATION

A. Remove loose materials and foreign matter which might impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions.

D. Protect elements surrounding the work of this section from damage or disfiguration.

3.03 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 to achieve a neck dimension no greater than one half the joint width.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

3.04 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION OF FINISHED WORK

A. Protect finished installation under provisions of Section 01 50 00.

B. Protect sealants until cured.

END OF SECTION

DIVISION 08

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Standard hollow metal doors and frames

1.02 RELATED SECTIONS

A. Section 08 14 16 – Architectural Wood Doors: Flush wood doors.

B. Section 08 71 00 – Door Hardware

C. Section 08 80 00 – Glazing: Glass view panels in hollow metal doors.

D. Section 09 90 00 – Paints and Coatings: Field painting hollow metal doors and frames.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.

C. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.

D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.

E. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.

F. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

G. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

H. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

I. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.

J. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.

K. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.

L. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, and finishes.

B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.

C. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.

5. Details of anchorages, joints, field splices, and connections.

6. Details of accessories.

7. Details of moldings, removable stops, and glazing.

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.

B. Quality Standard: In addition to requirements specified, comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.07 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.08 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.09 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Steelcraft

2. Curries Company.

B. Provide steel doors and frames from a single manufacturer.

2.02 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.03 HOLLOW METAL DOORS

A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.

B. Construct exterior/interior doors to these designs and gages:

1. Exterior Doors: Zinc-Iron Alloy-Coated galvannealed steel, ASTM A 653, Class A60, 16 gage, with closed tops.

   a. Include galvannealed components and internal reinforcements with galvannealed doors.

   b. Close tops of exterior swing-out doors to eliminate moisture penetration. Galvannealed steel top caps are permitted.

2. Interior Doors: Cold-rolled steel, A 1008, 18 gage cold rolled or galvannealed steel.

   a. Include galvannealed components and internal reinforcements with galvannealed doors.

3. Factory prime painted doors indicated on door schedule as hollow metal or steel.

4. Hardware Reinforcements:

   a. Hinge reinforcements for full mortise hinges: minimum 7 gage [0.180" (4.7mm)].

   b. Lock reinforcements: minimum 16 gage [0.053" (1.3mm)].

   c. Closer reinforcements: minimum 14 gage [0.067" (1.7mm)], 20” long.

   d. Galvannealed doors: include galvannealed hardware reinforcements.

   e. Projection welded hinge and lock reinforcements to the edge of the door.

   f. Provided adequate reinforcements for other hardware as required.

6. Glass moldings and stops (both labeled and non-labeled doors):

   a. Fabricate glass trim from 24 gage [.6mm] steel conforming to:

      1) Interior openings ASTM designation A 366 cold rolled steel.

      2) Exterior openings ASTM designation A 924 Zinc-Iron Alloy-Coated galvannealed steel with a zinc coating of 0.06 ounces per square foot (A60) for exterior openings.

   b. Install trim into the door as a four sided welded assembly with mitered, reinforced and welded corners.

   c. Trim: identical on both sides of the door.

   d. Exposed fasteners are not permitted. Labeled and non-labeled doors: use the same trim.

   e. Acceptable mounting methods:

      1) Fit into a formed area of the door face, not extending beyond the door face, and interlocking into the recessed area.

      2) Cap the cutout not extend more than 1/16” [1.6mm] from the door face.

C. Full Flush Type Doors Construction

1. ANSI-A250.4 criteria and tested to 5,000,000 operating cycles.

2. Approved door core constructions:

b. **Polystyrene**: Reinforced, stiffened, sound deadened and insulated with a rigid polystyrene core bonded to the inside faces of both panels with contact adhesive. Fill voids around the perimeter of the door with honeycomb. Equal to products:

1) Steelcraft: L with polystyrene option

2) Curries: 707D

3. Vertical edge seams: Provide doors with continuous vertical mechanical inter-locking joints at lock and hinge edges with visible edge seams, or a one piece full height 14 gage channel. Apply a continuous bead of structural epoxy in the internal vertical connection.

a. Filled Vertical Edges (F): Continuous vertical mechanical interlocking joint with internal epoxy seal; edge seams epoxy filled and ground smooth.

1) Steelcraft: LF edge option

2) Curries: N edge option

4. Bevel hinge and lock door edges 1/8 inch (3 mm) in 2 inches (50 mm). Square edges on hinge and/or lock stiles are not acceptable.

5. Reinforce top and bottom of doors with galvannealed 14 gage, welded to both panels.

2.04 HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Construct exterior and metal door frames to these profiles, designs and gages:

1. Exterior Frames: Zinc-Iron Alloy-Coated galvannealed steel, ASTM A 653, Class A60, or 14 gage Zinc-Iron Alloy-Coated galvannealed steel.

a. Equal to products:

1) Steelcraft: F

2) Curries: M

2. Interior Frames in stud wall construction: 16 gage cold rolled frames.

a. Equal to products:

1) Steelcraft: F

2) Curries: M

3. Include galvannealed components and internal reinforcements with galvannealed frames.

2.05 FRAME ANCHORS

A. Jamb Anchors:

1. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.

2. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.

B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.

C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.06 ACCESSORIES

A. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.07 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where

practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.

C. Hollow Metal Frames:

1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.

4. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.

5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.

6. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Three anchors per jamb up to 60 inches high.

2) Four anchors per jamb from 60 to 90 inches high.

3) Five anchors per jamb from 90 to 96 inches high.

4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.

5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.

7. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in door hardware schedule.

D. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and furnished templates.

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.

2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.

3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

2.08 STEEL FINISHES

A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. General Contractor to verify the accuracy of dimensions given to the hollow metal door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.

C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."

D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated.

1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.

b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.

c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.

d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Steel Doors: Install in accordance with NFPA 80, current edition, unless specified otherwise.

3.04 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

END OF SECTION

SECTION 08 31 13

INTERIOR ACESS PANELS AND FRAMES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Interior fire rated wall access panel.
2. Related hardware and attachments.

B. Related Sections:

1. Section 09 90 00 – Paints and Coatings.

1.02 SYSTEM DESCRIPTION

A. Design Requirements:

1. Verification: Provide access panels into spaces as located on drawings.

1.03 SUBMITTALS

A. Comply with Section 01 30 00 – Administrative Procedures.

B. Shop Drawings:

1. Door and panel units: Show types, elevations, thickness of metals, full size profiles of door members.
2. Hardware: Show materials, finishes, locations of fasteners, types of fasteners, locations and types of operating hardware, and details of installation.
3. General: Show connections of units and hardware to other Work. Include schedules showing location of each type and size of door and panel units.

C. Product Data: Manufacturer’s technical data for each type of access door and panel assembly, including setting drawings, templates, fire-resistive characteristics, finish requirements, and details of anchorage devices.

1. Include complete schedule, types, locations, construction details, finishes, latching or locking provisions, and other pertinent data.

D. Manufacturer's Installation Instructions: Indicate installation requirements and rough-in dimensions.

1.04 QUALITY ASSURANCE

A. Comply with Section 01 40 00 - Quality Requirements.

B. Single Source Responsibility: Obtain access door and panel units, and frames for entire Project from one source and one single manufacturer.

C. Size Variations: Obtain Architect’s acceptance and approval of manufacturer’s standard size units that may vary slightly from sizes indicated on Drawings.

D. Coordination: Provide inserts and anchoring devices that will be built into other Work for installation of access door assemblies. Coordinate delivery with other Work to avoid delay.

1.05 DELIVERY, STORAGE AND HANDLING

A. Comply with Section 01 60 00 – Product Requirements.

B. Comply with package and shipper manufacturer’s recommendations.

C. Store per manufacturer’s instructions.

1. Store in dry area out of direct sunlight.

1.06 WARRANTY

A. Provide manufacturer's written warranty per Section 01 70 00 - Closeout Submittals.

B. Warrants all access panels to be free from manufacturing defects in materials and workmanship for a period of one (1) year from the date of final acceptance. Should a product fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design:
Nystrom Building Products
9300 73rd Ave. N
Minneapolis, MN 55428
Phone: 800-547-2635
Web: www.nystrom.com

B. Substitutions: Comply with Section 01 60 00 – Product Requirements.

C. Specifications and Drawings are based on manufacturer's proprietary literature from Nystrom Building Products. Other manufacturers shall comply with minimum levels of material, color selection, and detailing indicated in Specifications or on Drawings. Architect will be sole judge of appropriateness of substitutions.

2.02 ACCESS PANELS

A. Fire-Rated, Uninsulated Access Door with Exposed Flanges Equal to Model UT by Nystrom.

1. Description: Door face flush with frame with exposed flange, self-closing door, and continuous piano hinge. Customer provided Gypsum board to achieve fire rating.
2. Size: 36” x 36” – FIELD VERIFY EXISTING OPENING PRIOR TO ORDERING
3. Fire-Resistance Rating: 1-1/2 hours for walls.
4. Hinge: Continuous piano type.
5. Latching/Locking mechanism: Knurled-knob operated.
6. Finish: White Powder Primer Coat

2.03 FABRICATION

A. Manufacture each access panel assembly as an integral unit ready for installation.

B. Welded construction: Furnish with a sufficient quantity of 1/4 inch mounting holes to secure access panels to types of supports indicated.

C. Furnish number of latches required to hold door in flush, smooth plane when closed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings for door and frame are correctly sized and located.

3.02 PREPARATION

A. Advise installers of work relating to access panel installation including rough opening dimensions, locations of supports, and anchoring methods. Coordinate delivery with other work to avoid delay.

3.03 INSTALLATION

A. Install access door and frame units per manufacturer's written instructions.

B. Install frames plumb and level in opening. Secure rigidly in place.

C. Position units to provide convenient access to concealed Work requiring access.

3.04 ADJUST AND CLEAN

A. Adjust panel after installation for proper operation.

B. Remove and replace panels or frames that are warped, bowed, or damaged.

END OF SECTION

SECTION 08 33 00

ROLLING OVERHEAD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electric motor operated overhead rolling doors.

B. Products that may be supplied, but not installed under this section: Control Station

1.02 RELATED SECTIONS

A. Section 05 50 00 – Metal Fabrications.

B. Section 06 10 00 – Rough Carpentry.

C. Section 07 90 00 – Joint Sealers.

D. Division 26 Electrical – Electrical wiring and conduit, fuses, disconnect switches, connection of operator to power supply, and installation of control station and wiring.

1.03 REFERENCES

A. ASTM A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM A 666 – Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

C. ASTM A 924 – Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

D. ASTM B221 – Standard Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

E. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Element.

F. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

G. NFRC 102 - Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems.

H. ANSI/DASMA 108 – American National Standards Institute Standard Method For Testing Sectional Garage Doors And Rolling Doors: Determination Of Structural Performance Under Uniform Static Air Pressure Difference.

I. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

J. NEMA MG 1 - Motors and Generators.

1.04 DESIGN / PERFORMANCE REQUIREMENTS

A. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

C. Design Requirements:

1. Wind Loading for Doors On Openings To Exterior:

    a. Exterior facing doors to withstand up to 25 PSF test or ultimate wind load.

2. Cycle Life:

a. Standard construction for normal use of up to 20 cycles per day maximum, and a life cycle expectancy of up to 50,000.

1.05 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Component construction, anchorage method, and hardware.

2. Preparation instructions and recommendations.

3. Storage and handling requirements and recommendations.

4. Installation methods indicating special procedures, perimeter conditions requiring special attention, and finishing instructions.

C. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.

D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns..

E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

F. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.06 QUALTIY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the production of specified products.

B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation in a dry, warm, ventilated, weathertight location and per manufacturer's written instructions.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

1.08 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.09 COORDINATION

A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

1.10 WARRANTY

A. Standard Warranty: Two years from date of shipment against defects in material and workmanship.

B. Maintenance: Submit for owner's consideration and acceptance of a maintenance service agreement for installed products.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Basis of Design Manufacturer: Cornell, 24 Elmwood Avenue, Mountain Top, PA 18707. Tel. Toll Free: (800) 233-8366.

B. Approved Equal

2.02 PRODUCT INFORMATION

A. Model: ESD10

2.03 MATERIALS

A. Curtain:

1. Slats:

a. Galvanized Steel: No. 5F (prefinished with GalvaNex Coating System), Grade 40 steel, ASTM A 653 galvanized steel zinc coating. Gauge as required to meet performance requirement: minimum 20 gauge for 18' & 20' wide openings and minimum 22 gauge for 12' wide openings.

2. Finish:

a. GalvaNex Coating System (Stock Color):

1) GalvaNex - ASTM A 653 galvanized base coating treated with dual process rinsing agents in preparation for chemical bonding baked-on base coat and a baked-on polyester enamel finish coat. Color to be selected by Owner and Architect from manufacturer's standard finishes.

B. Endlocks: Alternate slats each secured with a minimum of two ¼" (6.35 mm) rivets. Fabricate interlocking sections with high strength galvanized cast iron endlocks/windlocks as required to meet specified wind load.

C. Bottom Bar:

1. Configuration:

a. Extruded Aluminum: Extruded aluminum alloy 6063-T5.

2. Finish:

a. Aluminum: Mill

D. Guides:

1. Fabrication:

a. Powder Coat:

1) Zirconium pre-treatment followed by baked-on polyester powder coat, minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better..

a) Color to be selected by Owner and Architect from manufacturer's standard finishes.

E. Counterbalance Shaft Assembly:

1. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot (2.5 mm per meter) of width

2. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs. (110 N). Provide wheel for applying and adjusting spring torque.

3. Finish:

a. Corrosion Inhibitive: Zirconium treatment followed by a corrosion inhibitive baked-on zinc enriched gray polyester powder coat; minimum 2.5 mils (0.065 mm) cured film thickness.

F. Brackets: Fabricate from minimum 3/16 inch (5 mm) steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures

1. Finish:

a. Powder Coat:

1) Zirconium pre-treatment followed by baked-on polyester powder coat, minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better.

a) Color to be selected by Owner and Architect from manufacturer's standard finishes.

G. Hood: Minimum 24 gauge galvanized steel with reinforced top and bottom edges. Provide intermediate support brackets as required.

1. Finish:

a. GalvaNex™ Coating System (Stock Color):

1) ASTM A 653 galvanized base coating treated with dual process rinsing agents in preparation for chemical bonding baked-on base coat and a baked-on polyester enamel finish coat. Color to be selected by Owner and Architect from manufacturer's standard finishes.

H. Weatherstripping / Seals:

1. Bottom Bar (all doors): Replaceable, bulb-style, compressible EDPM gasket extending into guides.

2. Guides (exterior facing doors)**:** Vinyl strip sealing against fascia side of curtain.

3. Lintel Seal (exterior facing doors)**:** Nylon brush seal fitted at door header to impede air flow.

2.04 OPERATION

A. Motor-Continuous Use – Model SGH (Super Duty Gear Head) Operator:

1. The operator must not extend above or below the door coil when mounted front-of-coil.

2. cULus listed (to comply with UL requirements in The United States and Canada).

3. Totally Enclosed Fan Cooled gear head operators rated (1/2) to (3/4) hp as recommended by door manufacture for size and type of door. Verify exact electrical requirements with the actual equipment furnished.

4. Provide complete with electric motor and factory pre-wired motor control terminals, maintenance free solenoid actuated brake, emergency manual chain hoist and control station.

5. Motor shall be high starting torque, industrial type, with overload protection.

6. Primary speed reduction shall be heavy-duty gears running in grease or oil bath with mechanical braking to hold the door in any position.

7. The emergency manual chain hoist assembly is automatically disengaged when motor is energized.

8. A disconnect chain shall not be required to engage or release the manual chain hoist.

9. Operator drive and door driven sprockets shall be provided with minimum #50 roller chain.

10. Operator shall be capable of driving the door at a speed of up to 9" per second or as recommended for door size.

11. Fully adjustable, driven linear screw type cam limit switch mechanism shall synchronize the operator with the door.

12. The motor shall be removable without affecting the limit switch settings.

13. The electrical contractor shall mount the control stations and supply the appropriate disconnect switch, all conduit and wiring per the overhead door wiring instructions.

B. Control Stations:

1. Surface mounted: "Open/Close/Stop" push buttons; NEMA 1.

2. Remote Controls: Provide remote control receiver with two remote push button controls per door.

C. Control Operation:

1. Momentary Contact to Close: Fail-safe, UL325-2010 Compliant Entrapment Protection for Motor Operation.

a. SafetyGard UL325 Light Curtain with Dynamic Sequential Blanking: Provide monitored, non-contact light curtain consisting of a transmitter and a receiver to be mounted to the guide assembly of the door in the provided mounting channel, projecting a thru beam across the width of the door for the 6’ height of the light curtain. Interruption of beam before door fully closes shall cause door to immediately stop downward travel and reverse direction to the fully opened position.

2.05 ACCESSORIES

A. Locking:

1. None on doors – locking is obtained through motor operator gearing and secured positioning of control station on interior side of building.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until openings have been properly prepared.

B. Verify wall openings and substrates are ready to receive work and opening dimensions and tolerances are within specified limits and in accordance with approved shop drawings.

C. Verify electric power is available and of correct characteristics.

D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

A. Clean adjacent surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install door unit assembly in accordance with approved shop drawings and the manufacturer's printed instructions.

B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.

C. Anchor assembly to wall construction and building framing without distortion or stress.

D. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

E. Fit and align assembly including hardware, level and plumb, to provide smooth operation.

F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 90 00.

G. Install perimeter trim and closures.

H. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.04 CLEANING AND ADJUSTING

A. Adjust work under provisions of Section 01 70 00.

B. Test for proper operation and adjust as necessary to provide proper operation, free from warp, twist, binding or distortion.

C. Adjust hardware and operating assemblies for smooth operation and noiseless operation.

D. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.

E. Remove temporary labels and visible markings.

F. Touch-up, repair or replace damaged products prior to Substantial Completion.

G. Remove surplus materials and debris from the site.

3.05 PROTECTION

A. Protect finished Work under provisions of Section 01 70 00.

B. Protect installed products until completion of project.

C. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

3.06 DEMONSTRATION

A. Demonstrate proper operation to Owner’s Representative.

B. Instruct Owner’s Representative in maintenance procedures.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for hollow metal doors.

B. Thresholds.

C. Weatherstripping, seals and door gaskets.

1.02 RELATED SECTIONS

A. Section 08 11 13 – Hollow Metal Doors and Frames.

1.03 SCOPE

A. The finish hardware supplier shall furnish all necessary items for completion for this project, as specified in paragraph 3.05, hardware sets, or as necessary to complete this building excepting the items specifically excluded.

1.04 WORK NOT INCLUDED

A. Window hardware

B. Toilet partition hardware.

C. Aluminum door hardware (except cylinders).

D. All glass entrances hardware (except cylinders).

E. Cabinet and millwork hardware.

F. Card access system.

1.04 **REFERENCES** (Comply with the version year adopted by the Authority Having Jurisdiction)

A. ADAAG – Americans with Disabilities Act Accessibility Guidelines for Making Buildings and Facilities Accessible to and usable by Physically Handicapped People.

B. ADA – Americans with Disabilities Act.

1.05 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Hardware Schedule: submit one electronic copy of the typewritten hardware schedule to the Architect through the General Contractor. Each schedule shall contain the door index listing of the openings on the project and the hardware for said openings. Each item of hardware listed is to be clearly identified by manufacturer, manufacturer's number and finish. Indicate locations and mounting heights of each type of hardware. Include manufacturer's product data and picture reference for each item to be furnished under this section.

C. Submit manufacturer's parts list, templates, and installation instructions. The hardware supplier shall forward template information to all related trades within ten (10) days after receipt of approved hardware schedules.

1.06 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Section 01 30 00.

B. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1.07 QUALIFICATIONS

A. Manufacturers: Companies specializing in manufacturing the products specified in this section with a minimum of 10 years documented experience.

B. Hardware Supplier: Company specializing in supplying commercial door hardware with five years documented experience and approved by manufacturer of the products to be furnished under this section.

C. Hardware Supplier Personnel: Employ Architectural Hardware Consultant (AHC) to assist in the work of this section.

1.08 QUALITY ASSURANCE

A. The Architect retains the authority to approve or reject any schedule based upon his knowledge of the supplier's experience and capabilities, the general quality of the products submitted and compliance with the specifications.

B. If requested, the supplier shall provide working samples of any items he proposed to substitute. Samples will be returned to the jobsite for installation.

C. The hardware supplier shall forward template information to all related trades within ten (10) days after receipt of approved hardware schedules. Template submission shall be made in accordance with the latest standards as published by The Door and Hardware Institute.

D. The supplier shall forward wiring diagrams to all affected trades within ten (10) days after receipt of approved hardware schedule.

E. The hardware supplier shall prepare a packet containing a complete up to date copy of the hardware schedule, two copies of any installation and or maintenance instructions for items provided on the project and two sets of installation and adjustment tools, including dogging keys and emergency keys for any hardware requiring these tools. The maintenance package is to be delivered to the general contractor with the key control system and the master keys.

1.09 COORDINATION

A. Coordinate the work with other directly affected sections involving manufacturer of fabrication of internal reinforcement for door hardware.

1.10 MAINTENANCE MATERIALS

A. Provide special wrenches and tools applicable to each different or special hardware component.

B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

1.11 DELIVERY, STORAGE AND HANDLING

A. All items of hardware shall be clearly marked with door number, key, symbol, and heading number to correspond with the approved hardware schedule.

B. The General Contractor will be responsible for providing a dry, clean, locked room of adequate size for storage of hardware.

1.12 WARRANTY

A. The hardware supplier shall guarantee that all materials furnished under this division will be free from defects and blemishes for a period of one (1) year from date of acceptance. The supplier shall repair or replace at his expense, including labor, when instructed to do so by the Architect and/or Owner any item of finish hardware which may prove to be defective within said period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Product numbers listed in the following specifications are taken from the catalogs of manufacturers listed as follows:

(YA) Yale
(SA) Sargent
(RO) Rockwood
(MK) McKinney
(P) Pemko
(V) Von Duprin
(HE) HES

2.02 FINISH

A. The finishes in general for the facility shall be Satin Chrome (BHMA 626 / 632). Bring any discrepancies and questions to the attention of the Architect.

B. Door closures shall be painted aluminum.

C. Thresholds and weather-stripping shall be mill finish aluminum.

2.03 FASTENERS

A. Where sex nut bolts are specified in paragraph 3.05, furnish sex bolts sized to the thickness of the door.

B. Wood screws are to be threaded to the head.

C. Material for fasteners shall be ferrous or non-ferrous matching the product being applied.

D. Length of fasteners shall be sufficient to afford adequate thread engagement.

2.04 KEYING

A. Coordinate all keying requirements with Owner and Contractor.

B. The supplier shall prepare a recommended keying schedule and include it in the hardware schedule for approval. Following approval, the supplier shall establish a meeting with the Owner or Owner's Representative to review and gain approval of the final keying system. Confirmation of the meeting and attendees shall be given to the General Contractor in writing and final copies of the hardware schedule containing keying revisions shall be submitted to the General Contractor for his files and field use.

PART 3 EXECUTION

3.01 INSPECTION

A. Condition of opening size shall be verified by the general contractor as to door frames being plumbed and of correct tolerances to receive door and hardware.

3.02 INSTALLATION

A. The installer shall be competent and have knowledge of hardware.

B. Mounting heights for all hardware shall be recommended by The Door and Hardware Institute.

3.03 ADJUSTING

A. The installer is to make adjustments as necessary to insure proper of all hardware items.

B. Door opening force: In accordance with the Americans with Disabilities Act (ADA), adjust all door hardware to that the maximum force required for pushing or pulling open a door shall be as follows:

1. Fire doors shall have the minimum opening force allowable by the appropriate administrative authority.
2. Exterior hinged doors: 8.5 LBF (SBS)
3. Interior hinged doors: 5.0 LBF
4. Sliding or folding doors: 5.0 LBF

These forces do not apply to the force required to retract latch bolts or disengage other devices that may hold the door in a closed position.

C. Door Closers: If door is equipped with a closer, then the sweep period of the closer shall be adjusted so that from an open position to 70°, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

D. The installer shall check the door closer adjustments after testing and balancing of the HVAC system and make any corrections as required. In addition, the door closers are to be checked six months after the date of final completion and adjusted as necessary.

E. The general contractor shall be responsible for final adjustments on all items of finish hardware. He shall replace or repair any items of hardware until Owner accepts the project as complete.

3.04 PROTECTION

A. The general contractor is responsible for protection of all items of hardware until Owner accepts the project as complete.

3.05 HARDWARE SETS

A. The following is a general listing of the minimum hardware requirements. Any item of hardware normally required by good practice, or as to meet State and Local codes, shall be furnished even though it may not be specifically mentioned.

HW-01
Each to have:

(MK)	3	Butts	TA2314 4.5 x 4.5 NRP	(630)
(SA)	1	Exit Device (Classroom)	16-8813 x ET-L	(630/626)
(YA)	1	Closer	UNI3501	(689)
(PE)	1	Threshold	2005AT x opening width	Mill
(PE)	1	Door Bottom	210AV	Mill
(PE)	1	Set Gasketing	S88GR x perimeter	Gray
(PE)	1	Rain Drip	346C (4” ODW)	CAA
(RO)	1	Kick Plate	K1050 (DW – 2”)	(630)
(RO)	1	Floor Stop	470	(626)
(RO)	3	Silencers	608-RKW	Gray

HW-02
Each to have:

(MK)	3	Butts	TA2314 4.5 x 4.5	(630)
(SA)	1	Lock (Office)	10XG05-G-L	(626)
(YA)	1	Closer	3501 x arm to suit	(689)
(RO)	1	Kick Plate	K1050 (DW – 2”)	(630)
(RO)	1	Floor Stop	470	(626)
(RO)	3	Silencers	608-RKW	Gray

END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass and glazing for installation in hollow metal doors and frames.

B. Glazing accessories.

1.02 RELATED SECTIONS

A. Section 07 90 00 – Joint Sealers: Sealant and back-up material.

B. Section 08 11 13 – Hollow Metal Doors and Frames: Glazing in hollow metal doors and frames.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test.

C. ASTM C 864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

D. ASTM C 1036 - Standard Specification for Flat Glass.

E. ASTM C 1048 - Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass.

F. ASTM C 1172 - Standard Specification for Laminated Architectural Flat Glass.

G. ASTM E 773 - Standard Test Method for Accelerated Weathering of Sealed Insulating Glass Units.

H. ASTM E 774 - Standard Specification for the Classification of the Durability of Sealed Insulating Glass Units.

I. ASTM E 1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.

J. GANA (GM) - GANA Glazing Manual; Glass Association of North America.

K. GANA (SM) - FGMA Sealant Manual; Glass Association of North America.

L. SIGMA TM-3000 and TB-3001 - Recommended Practices for Vertical and Basic Field Glazing of Organically Sealed Insulating Glass Units; Sealed Insulating Glass Manufacturing Association.

1.04 PERFORMANCE REQUIREMENTS

A. Glass and glazing materials of this Section shall provide continuity of building enclosure.

B. Select type and thickness of exterior glass to withstand dead loads and positive and negative wind loads acting normal to plane of glass as calculated in accordance with the most current version of the Arkansas Fire Prevention Code.

1. Use procedures specified in ASTM E-1300 to determine glass type and thickness.

2. Limit glass deflection to l/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.

3. Thicknesses listed are minimums.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience.

C. Locate safety glazing in accordance with AFPC Vol. II, Section 2406.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on Shop Drawings.

1.09 COORDINATION

A. Coordinate the Work with glazing frames, wall openings, and perimeter air and vapor seal to adjacent Work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers:

1. Vitro Architectural Glass: www.vitroglazings.com.com is specified.

Equal products and color matches from the following manufacturers are acceptable:

2. Guardian Industries Corporation: www.guardian.com.

3. Pilkington Building Products North America: www.pilkington.com.

B. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 GLASS MATERIALS

A. Clear Float Glass (Type FG-A): Clear, annealed.

1. Comply with ASTM C 1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select). Locate in interior applications only where allowed by code. 1/4 inch thick minimum.

B. Laminated Safety Glass (Type FG-B): Clear; fully tempered with horizontal tempering.

1. Laminated with 0.030 inch thick plastic interlayer; comply with ASTM C 1172

2. Comply with ASTM C 1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select) and ASTM C 1048.

3. Comply with 16 CFR 1201 test requirements for Category II.

C. Tempered Glass (Type FG-B): ASTM C1048, HS heat strengthened, FT fully tempered conforming to ANSI Z97.1; 1/4" thick minimum. Locate as required by code.

2.03 GLAZING ACCESSORIES

A. Manufacturers:

1. Norton Performance Plastics Corp.

2. Pecora Corporation: www.pecora.com.

3. Saint-Gobain Performance Plastics: www.plastics.saint-gobain.com.

4. Tremco, Inc: www.tremcosealants.com.

5. Substitutions: Refer to Section 01 60 00 - Product Requirements.

B. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

C. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness, ASTM C 864 Option I. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

D. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness, ASTM C 864 Option I. Minimum 3-inch-long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.

E. Glazing Tape: Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent, designed for compression of 25 percent to effect an air barrier and vapor retarder seal.

F. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C 864 Option I; black color.

2.03 FIRE RATED GLAZING

A. Basis of Design Manufacturer: FireLite as manufactured by Nippon Electric Glass Company, Ltd. And distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065. Phone: 800.426.0279 E-mail: tgp.sales@allegion.com Website: http://www.fireglass.com

B. Performance Requirements

1. Fire-rated glass ceramic clear and wireless glazing material listed for use in non-impact safety-rated locations such as transoms and borrowed lites with fire rating requirements ranging from 20 to 90 minutes with required hose stream test.

2. Passes positive pressure test standards UL 10C.

C. Materials – Glass:

1. Properties

a. Thickness: 3/16 inch [5 mm].

b. Weight: 2.56 lbs/ft2 or 12.5 kg/m2

c. Approximate Visible Transmission: 88 percent.

d. Approximate Visible Reflection: 9 percent.

e. Hardness (Vicker's Scale): 700.

f. Fire-rating: 45 minutes.

g. Impact Safety Resistance: None.

h. Positive Pressure Test: UL 10C; passes.

i. Surface Finish: Standard Grade

j. Positive Pressure Test: UL 10C; passes.

2. Labeling: Permanently label each piece of fire glass with the manufacturer's logo, UL logo and fire rating in sizes up to 3,325 sq. in. (as approved by the local authority having jurisdiction)

D. Glazing Compound for Fire-Rated Glazing Materials

1. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing

tape supplied by manufacturer.

2. Glazing Compound: DAP 33 putty.

3. Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable. Acceptable Products:

   a. Dow Corning 795 - Dow Corning Corp.

   b. Silglaze-II 2800 - General Electric Co.

   c. Spectrem 2 - Tremco Inc.

4. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.

5. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

E. Fabrication:

1. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing. Notify Architect of conditions that would adversely affect installation. Do not proceed with installation until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Install sealant in accordance with manufacturer's instructions.

3.03 CLEANING

A. Clean glass promptly after installation in accordance with manufacturer’s instructions.

B. Remove glazing materials from finish surfaces.

C. Remove labels from glass surface after Work is complete.

D. Clean glass and adjacent surfaces. Do not use harsh cleaning materials or methods that would damage glass.

3.04 PROTECTION OF FINISHED WORK

A. Protect installed glass from damage during construction.

B. Protect installed glass from contact with contaminating substances resulting from construction operations.

C. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in other

ways during construction period, including natural causes, accidents, and vandalism.

3.05 SCHEDULE

A. Exterior glazing in hollow metal entry doors: ¼" clear, uncoated, laminated safety glass.

B. Interior glazing in hollow metal window frames: ¼" clear, uncoated, (float, tempered or safety glass) as required by code.

C. Interior glazing in fire-rated hollow metal doors and frames: 3/16", 45 min Fire-Lite glazing.

END OF SECTION

DIVISION 09

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non load bearing cold formed metal stud wall and miscellaneous framing at interior locations.

B. Framing accessories.

1.02 RELATED SECTIONS

A. Section 05 50 00 – Metal Fabrications: Metal fabrications attached to stud framing.

B. Section 06 10 00 – Rough Carpentry: Rough wood blocking within stud framing.

C. Section 07 21 16 – Building Insulation: Insulation within framing members.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. ASTM A123/A123M – Standard Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members.

D. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

E. ASTM C1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases.

1.04 PERFORMANCE REQUIREMENTS

A. Contractor is responsible for design, fabrication and erection of steel stud framing to meet the requirements of the current Arkansas Fire Prevention Code.

B. Compute all structural properties in accordance with AISI “Specifications for the Design of Cold Formed Steel Structural Members, latest edition.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria and limitations.

C. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.

D. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention, and connection details.

E. Manufacturer’s Data: Submit copies of manufacturer’s specifications and installation instructions for each type of steel stud and accessories, including other data as may be required to show compliance with these specifications.

1.06 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the types of products specified in this section, and with minimum ten years of documented experience.

B. Installer: Company specializing in performing the work of this section with minimum five years of experience.

1.07 SYSTEM DESCRIPTION

A. Design Requirements: The supplier of metal framing components shall provide connections to the building structure in accordance with the ML/SFA Lightweight Steel Framing Systems Manual.

1. Connections shall conform to the design loads required by the Arkansas Fire Prevention Code.

2. Connections shall be based upon information shown on the drawings and specified herein.

B. Qualification of Field Welding: Qualify welding process and welding operators in accordance with AWS “Standard Qualification Procedure.”

1.08 COORDINATION

A. Coordinate with the placement of components within the stud framing system.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Notify manufacturer of damaged materials received prior to installation.

C. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI S202.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, in accordance with ASTM E90 and classified in accordance with ASTM E413 by an independent testing agency.

2.02 MANUFACTURERS

A. Metal Framing:

1. Clark Dietrich: www.clarkdietrich.com.

2. Marino-Ware: www.marinoware.com.

3. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 FRAMING SYSTEMS

A. Framing Members, General: Comply with AISI S220 for conditions indicated.

1. Steel Sheet Components: Comply with AISI S220 requirements for metal unless otherwise indicated.

2. Protective Coating: Comply with AISI S220; ASTM A653/A653M, G40 (Z120); or coating with equivalent corrosion resistance. Galvannealed products are unacceptable.

a. Coating to demonstrate equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction.

B. Studs and Track: AISI S220.

1. Minimum Base-Steel Thickness: As required by performance requirements for horizontal deflection.

2. Flange Size: 1-1/4 inches (32 mm).

3. Depth: As indicated on Drawings and as required by project conditions.

2.02 FRAMING MATERIALS

A. Non Load-Bearing Framing System Components: ASTM C 645; galvanized sheet steel, of size

and properties necessary to comply with ASTM C 754 for the spacing indicated, with maximum deflection for wall framing of L/240 at 5 psf for all framing that does not serve as backup for masonry veneer.

1. Studs: C shaped with knurled faces.
2. Runners: U shaped, sized to match studs.
3. Furring: Hat-shaped sections, minimum depth as indicated on drawings.
4. Resilient Channels: "Z" shaped sections designed to limit sound transmission.

B. System components shall be sized as follows:

1. Metal studs for interior walls are 1-5/8”, 2-1/2”, 3-5/8" or 6".
    a. Interior studs shall be 22 gauge min. for walls less than 12'-0" unbraced length.
    b. Interior studs shall be 20 gauge min. for walls over 12'-0" and less than 16'-0" unbraced length.
    c. Interior studs shall be 18 gauge min. for walls over 16'-0" unbraced length.
    d. Minimum size for studs, furring channels and accessories shall be 22 guage.

C. Tracks and Runners: Same material and thickness as studs, bent leg retainer.

D. Curved Tracks and Runners for interior radiused walls and soffits: ClarkDietrich Contour Track, 20 gauge.

E. Fasteners: ASTM C 1002 self-piercing tapping screws.

F. Anchorage Devices: Power actuated.

G. Thermal and Acoustic Insulation: As specified in Section 07 21 16.

H. Acoustic Sealant: As specified in Section 07 90 00.

I. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic.

2.03 FABRICATION

A. Fabricate assemblies of framed sections to sizes and profiles required; with framing members fitted, reinforced, bridged and braced in accordance with design requirements.

2.04 FINISHES

A. Studs: Galvanize to G60 coating class.

B. Tracks and Headers: Galvanize to G60 coating class.

C. Accessories: Same finish as framing members.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Verify that rough-in utilities are in proper location.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION - GENERAL

A. Installation Standard: ASTM C754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Coordinate erection of studs with requirements of door frames, window frames, and masonry; install supports and attachments.

E. Brace stud framing system rigid. Install bracing at terminations in assemblies.

F. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

G. Align and secure top and bottom runners at 24 inches o.c. minimum with power driven fasteners.

H. Install studs vertically at 16 inches o.c., or as indicated on drawings to accommodate design requirements.

I. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.

J. Align stud web openings horizontally.

K. Secure studs to tracks using screw fastening method at both flanges.

L. Stud splicing not allowed.

M. Fabricate corners using a minimum of three studs.

N. Double stud at wall openings, door and window jambs, not more than 2 inches from each side of openings.

3.02 INSTALLATION OF FRAMING SYSTEMS

A. Install framing system components in accordance with spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.

2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.

    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

5. Curved Partitions:

    a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.

b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches (152.4 mm) o.c.

D. Direct Furring:

1. Screw to wood framing.

2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

E. Z-Shaped Furring Members:

1. Erect insulation, specified in Section 07 21 16 Building Insulation, vertically and hold in place with Z-shaped furring members.

2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches (305 mm) from corner and cut insulation to fit.

F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.03 FIELD QUALITY CONTROL

A. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 ft. (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

SECTION 09 51 13

SUSPENDED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.02 RELATED SECTIONS

A. Division 26 Electrical - Lighting System: Light fixtures in ceiling system.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. ASTM C 635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

B. ASTM C 636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

C. ASTM E 580 - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint.

D. ASTM E 1264 - Standard Classification for Acoustical Ceiling Products.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on suspension system components.

C. Samples: Submit two samples 6 x 6 inch in size illustrating material and finish of acoustical units.

1.05 QUALITY ASSURANCE

A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.

B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after interior acoustical unit installation.

1.07 PROJECT CONDITIONS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Install acoustical units after interior wet work is dry.

1.08 EXTRA MATERIALS

A. See Section 01 60 00 - Product Requirements, for additional provisions.

B. Provide 48 sq ft of each type of acoustical unit to owner for use in maintenance of project.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

A. Manufacturers:

1. Armstrong World Industries, Inc: www.armstrong.com.

2. Substitutions: See Section 01600 - Product Requirements.

B. Acoustical Units: Type SAT-1: Ceramaguard (607); with the following characteristics:

1. Size: 24 x 24 inches.
2. Thickness: 5/8 inches.
3. Composition: Ceramic and Mineral Fiber Composite.
4. Class A (UL Labeled) per ASTM E 1264
5. Edge: 15/16” Square Lay-in.
6. Surface Color: White.

2.02 SUSPENSION SYSTEM

A. Manufacturers:

1. Armstrong World Industries, Inc: www.armstrong.com.
2. Substitutions: See Section 01 60 00 - Product Requirements.

B. Suspension Systems - General: ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, and perimeter moldings as required.

C. Exposed Steel Suspension System at SAT-1: Formed steel, commercial quality cold rolled with galvanized coating; intermediate-duty. Equal to Prelude XL 15/16”.

1. Profile: Tee; 15/16 inch wide face.
2. Construction: Double web.
3. Finish: White painted.

2.03 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Perimeter Moldings: Same material and finish as grid.

1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

C. Edge Moldings: 6-inch Axiom Classic Trim at ceiling grid clouds

D. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C 636, ASTM E 580, and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Locate system on room axis according to reflected plan.

D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

I. Do not eccentrically load system or induce rotation of runners.

J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.

1. Use longest practical lengths.

2. Overlap and rivet corners.

3.03 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install units after above-ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units: Cut to fit irregular grid and perimeter edge trim. Paint exposed, cut end to match face.

3.04 ERECTION TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

END OF SECTION

SECTION 09 90 00

PAINTS AND COATINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation and field application of paints and coatings.

1.02 RELATED SECTIONS

A. Section 05 50 00 – Metal Fabrications.

B. Section 06 20 00 – Finish Carpentry and Custom Millwork.

C Section 08 11 13 – Hollow Metal Doors and Frames.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.

B. NACE (National Assoc. of Corrosion Engineers) - Industrial Maintenance Painting.

C. NPCA (National Paint and Coatings Association) - Guide to U.S. Government Paint Specifications.

D. PDCA (Painting and Decorating Contractors of America) - Painting - Architectural Specifications Manual.

E. SSPC (Steel Structures Painting Council) - Steel Structures Painting Manual.

1.04 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Product Data: Provide data on all finishing products with finish schedule showing finish products to be used on each type of surface and number of coats.

C. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum ten years documented experience.

B. Applicator: Company specializing in performing the work of this section with minimum five years documented experience.

1.06 FIELD SAMPLES

A. Provide field samples of each finish requested by the Owner.

B. Provide field samples of sufficient size to demonstrate the final appearance of each finish.

C. Accepted sample may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products in accordance with manufacturer's recommendations.

B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

C. Container label to include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

D. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

1.09 EXTRA MATERIALS

A. See Section 01 60 00 – Product Requirements, for additional provisions.

B. Provide 1 gallon of each paint color to owner for future use.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints, enamels, stains, varnishes, and admixtures of first line quality as manufactured by Sherwin Williams, Benjamin Moore, or Pittsburgh.

2.02 FINISHES

A. Refer to schedule at end of section for surface finish schedule.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Verify that shop applied primer is compatible with subsequent cover materials.

3.02 PREPARATION

A. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

B. Surfaces: Correct defects and clean surfaces which affect work of this section.

C. Marks: Seal with shellac those which may bleed through surface finishes.

D. Impervious Surfaces: Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

E. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

F. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

G. Interior Wood Items to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

H. Interior Wood Items to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

I. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.

J. Metal Frames and Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry.

C. Apply each coat to uniform finish.

D. Apply each coat of paint slightly darker than preceding coat.

E. Sand wood surfaces lightly between coats to achieve required finish.

F. Allow applied coat to dry before next coat is applied.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles prior to applying next coat.

H. Where clear finishes are required, tint fillers to match wood. Work fillers into grain before set. Wipe excess from surface.

3.04 CLEANING

A. Clean work under provisions of 01 70 00.

B. Collect waste material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.05 SCHEDULE – PAINT AND STAIN SYSTEMS

A. Steel / Ferrous Metal:

1. Primer: Rust Inhibitive Primer
2. Two (2) Coats: Oil-Based Alkyd Enamel Semi-Gloss

B. Wood - Interior Stained:

1. First Coat: Transparent Oil-Based Wood Stain.
2. Second Coat: Sanding Sealer
3. Finish Coat(s): Polyurethane – Satin Finish

C. Wood - Interior Painted:

1. Primer: Interior Oil-Based Primer
2. Two (2) Coats: Interior Alkyd Semi-Gloss

D. Gypsum Board Walls - Eggshell:

1. Primer: High Build Interior Latex Primer
2. Two (2) Coats: Interior Latex - Eggshell Finish

E. Gypsum Board Walls – Semi-Gloss:

1. Primer: High Build Interior Latex Primer
2. Two (2) Coats: Interior Latex – Semi-Gloss Finish

F. Gypsum Board Ceilings - Flat:

1. Primer: High Build Interior Latex Primer
2. Two (2) Coats: Interior Latex – Flat Finish

G. Exposed Structure / Decking:

1. First and Second Coats: Waterborne Acrylic Dryfall Flat

3.06 SCHEDULE – SURFACES <u>NOT</u> TO BE PAINTED / FINISHED

A. Items fully factory-finished, unless specifically noted.

B. Fire rating labels, equipment serial numbers and capacity labels.

C. Stainless steel items.

D. Low voltage, data or communications systems cabling/wiring such as Fire Alarm cable or Data/I.T cable.

E. Exposed metal building insulation.

- ALL COLORS TO BE SELECTED BY THE OWNER -

END OF SECTION

DIVISION 13

SECTION 13 12 10

PRE-ENGINEERED METAL BUILDING SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pre-engineered, shop-fabricated structural steel building frame including anchor bolts and all structural connections.

B. Purlins, girts and all associated structural framing members.

C. Temporary and permanent bracing designed, supplied and installed by building manufacturer.

D. Roof and wall insulation.

E. Pre-finished standing seam metal roof panels, wall panels, soffits, flashing, trim, gutters and downspouts.

1.02 RELATED SECTIONS

A. Section 03 30 00 – Cast-In-Place Concrete: Concrete foundations and floor slabs.

B. Section 05 40 00 – Cold Formed Metal Framing: Metal studs serving as backup for metal wall panels.

C. Section 05 50 00 – Metal Fabrications: Steel fabrications for associated construction to be supported by metal building structure.

D. Section 06 10 00 – Rough Carpentry: Wood blocking attached to metal building components.

E. Section 07 90 00 – Joint Sealers: Sealants for joints between stud walls and metal building components.

F. Section 09 22 16 – Non-Structural Metal Framing: Metal stud framing and furring braced and supported by metal building system.

G. Section 09 51 13 – Suspended Acoustical Ceilings: Lay-in ceiling attached to metal building components.

H. Section 09 90 00 – Paints and Coatings: Site finishing of exposed metal building structure.

I. Division 22 – Plumbing: Pipe attached to and supported by metal building components.

J. Division 23 – Mechanical: Mechanical units attached to and supported by metal building components.

K. Division 26 – Electrical: Electrical gear, conduit, devices and lighting attached to and supported by metal building components.

1.03 REFERENCES (Comply with the version year adopted by the Authority Having Jurisdiction)

A. AISC S335 - Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design; American Institute of Steel Construction, Inc.

B. AISC S342L - Load and Resistance Factor Design Specification for Structural Steel Buildings; American Institute of Steel Construction, Inc., with Supplement No.1.

C. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel.

D. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

E. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.

F. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

G. ASTM A 325M - Standard Specification for High-Strength Bolts for Structural Steel Joints (Metric).

H. ASTM A 490 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.

I. ASTM A 490M - Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric).

J. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

K. ASTM A 501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

L. ASTM A 529/A 529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.

M. ASTM A 572/A 572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.

N. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

O. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

P. ASTM A 992/A 992M - Standard Specification for Structural Steel Shapes.

Q. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

R. ASTM C 991 - Standard Specification for Flexible Glass Fiber Insulation for Metal Buildings.

S. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

T. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

U. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society.

V. AWS D1.1 - Structural Welding Code - Steel; American Welding Society.

W. MBMA (LR) - Low Rise Building Systems Manual; Metal Building Manufacturers Association.

X. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings.

Y. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Underwriters Laboratories Inc.

1.04 DESIGN REQUIREMENTS

A. Design members to withstand dead load, applicable snow load, and design loads due to pressure and suction of wind calculated in accordance with the latest adopted version of the Arkansas Fire Prevention Code.

B. Design members to withstand live load, positive and negative wind loads in accordance with latest adopted version of the Arkansas Fire Prevention Code.

C. Design metal building system and all components in accordance with UL 580 Uplift Class 90.

D. Conform to all structural requirements indicated on the drawings.

E. Permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

F. **By submitting a bid on this project, metal building supplier confirms that the metal building structure to be provided will conform to all aspects of the construction documents, including both drawings and specifications. If steel member sizes, locations**

or configurations will require any changes to these construction documents, such changes must be approved in writing by the architect / engineer prior to the bid.

G. Metal Building System shall include all framing and bracing required for wind and seismic loading, bracing and support of metal stud exterior wall construction, bracing and support of metal stud interior walls and furr downs, ceilings, mechanical, plumbing and electrical components and all other items attached to or supported by the metal building structure.

H. For structural steel members, comply with AISC "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings" for design requirements and allowable stresses.

I. For light gauge steel members, comply with AISI "Specification for the Design of Cold-Formed Steel Structural Members" and "Design of Light Gauge Steel Diaphragms" for design requirements and allowable stresses.

J. Design primary and secondary members and covering for applicable loads and combination of loads in accordance with Metal Building Manufacturer's Association (MBMA) "Design Practices Manual", and with the latest adopted version of the Arkansas Fire Prevention Code.

K. For welded connections, comply with AWS "Standard Code for Arc and Gas Welding in Building Construction".

L. Metal building designer and fabricator shall size all gutters and downspouts in accordance with SMACNA requirements for the 5-minute intensity based on the 100 year storm for the specific location of the project.

1.05 SUBMITTALS

A. See Section 01 33 00 - Submittals and Substitutions, for submittal procedures.

B. Product Data: Provide data on profiles, component dimensions, finishes & fasteners.

C. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections; wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, installation; framing anchor bolt settings, sizes, and locations from datum, foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.

D. Samples: Submit two samples of pre-finished metal for each color selected, 6 x 6 inch in size, illustrating color and texture of finish.

E. Manufacturer's Instructions: Indicate preparation requirements, anchor bolt placement.

F. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.

G. Warranty: Submit a copy of the manufacturer’s standard Single Source 20 year Weathertightness Warranty.

H. Project Record Documents: Record actual locations of concealed components and utilities.

1.06 QUALITY ASSURANCE

A. Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of Arkansas.

1. Conform to the latest adopted version of the Arkansas Fire Prevention Code and Arkansas Act 1100 for submission of design calculations as required for acquiring permits.

B. Perform work in accordance with AISC "Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design".

C. Perform welding in accordance with AWS D1.1.

D. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum ten years documented experience.

E. Erector Qualifications: Company specializing in performing the work of this section with minimum five years' experience.

1.07 WARRANTY

A. See Section 01 70 00 - Closeout Submittals, for additional warranty requirements.

B. Metal building supplier shall correct defective materials and workmanship for all metal building components except the roof within a five-year period after Date of Substantial Completion.

C. Metal building system manufacturer, upon final acceptance of this project, shall furnish a Single Source Weathertightness Warranty covering all standing seam metal roofing (including penetrations) and flashings against leakage, rupture, structural failure, perforation and deterioration for a period of 20 years.

D. Warranty shall cover paint finish, including touch-up paint, against cracking, checking, blistering, peeling, flaking, chipping, chalking and fading for a period of 20 years.

E. Warranty shall cover defects caused by installation as well as manufacture.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Pre-Engineered Buildings:

1. Varco Pruden: www.varcopruden.com
2. MBCI: www.mbci.com.
3. Ceco Building Systems: www.cecobuildings.com
4. Pinnacle Structures: www.pinnaclestructures.com

B. Substitutions: See Section 01 33 00 - Submittals and Substitutions.

C. All metal building components are to be from the same approved manufacturer.

2.02 PRE-ENGINEERED BUILDING

A. Primary Framing: Rigid frame of rafter beams and columns, canopy beams, and wind bracing.

B. Secondary Framing: Purlins, girts, eave struts and other items detailed.

C. Roof System: Preformed metal panels oriented parallel to slope, with sub-girt framing/anchorage assembly and insulation, and accessory components.

D. Roof Slopes: As indicated on drawings

2.03 MATERIALS - FRAMING

A. Structural Steel Members: ASTM A 572/A 572M, Grade 50.

B. Structural Tubing: ASTM A 500, Grade B cold-formed.

C. Plate or Bar Stock: ASTM A 529/A 529M, Grade 50.

D. Anchor Bolts: ASTM A 307 or A 325, unprimed.

E. Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1.

F. Welding Materials: Type required for materials being welded.

G. Primer: SSPC-Paint 20, zinc rich.

H. Grout: ASTM C 1107, Non-shrink type, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents, capable of developing minimum compressive strength of 2400 psi in two days and 7000 psi in 28 days.

2.04 STRUCTURAL FRAMING COMPONENTS

A. Rigid Frames:

1. Hot rolled structural steel. Factory welded and shop painted built-up "I" shape or open web rigid frame consisting of uniform beams and columns. Furnish complete with attachment plates, bearing plates, and splice members. Factory drilled for bolted field assembly.

2. Length of span and spacing of frames as indicated except slight variations acceptable to metal building manufacturer's standard.

B. End Wall Condition: Metal building manufacturer to engineer endwall frames to brace and support exterior wall construction. Coordinate with architect prior to changing any column locations.

C. Wind Bracing: Adjustable, threaded steel rods, 1/2" diameter minimum; ASTM A 36 or A 572, Grade D. Metal building manufacturer to brace metal frame and engineer type, size and spacing of connections and reinforcing as required to work with door, window and louver locations as indicated on plan to resist loads imposed by wind and seismic forces in accordance with all applicable codes and ordinances. Metal Building design shall coordinate wind bracing locations with doors, windows and other architectural considerations.

D. Wind bracing in the roof plane shall be designed by the metal building manufacturer.

E. Secondary Framing:

1. Purlins, eave struts, flange and sag bracing; minimum rolled formed sections. Shop painted. Sized by metal building manufacturer.

2. Base channel, sill angle, (except columns and beams), purlin spacers; minimum 14 gauge cold formed steel, galvanized.

F. Bolts: ASTM A 307 or A 325 as necessary for design loads and connection details. Shop painted, except provide zinc- or cadmium-plated units when in direct contact with panels.

G. Fabrication: Shop fabricate to indicated size and section, complete with base plates, bearing plates, and other plates as required for erection, welded in place, and with required holes for anchoring or connections shop drilled or punched to template dimensions. Shop connections power riveted, bolted, or welded. Field connections bolted.

H. Shop Painting: Clean surfaces to be primed of loose mill scale, rust dirt, oil, grease, and other matter precluding paint bond. Follow procedures of SSPC-SP3 for power tool cleaning, SSPC-SP7 for brush-off blast cleaning, and SSPC-Spi for solvent cleaning.

1. Prime structural steel primary and secondary framing members with manufacturer's standard rust-inhibitive primer having over 50% rust-inhibitive pigment.

2. Prime galvanized members, after phosphoric acid pretreatment, with zinc dust oxide primer.

2.05 MATERIALS - ROOF PANELS, WALL PANELS, FLASHING, TRIM, GUTTERS AND DOWNSPOUTS

A. Provide pre-finished standing seam roof and wall panels formed as indicted. Provide ridges, flashings, closers, fillers, metal expansion joints, trim, and other sheet-metal accessories, factory formed of same material and finish as roofing.

B. Pre-Finished Roof Panels: Standing seam roofing shall be manufacturer's standard trapezoidal leg standing seam metal roof panels conforming to the following:

1. U.L. 90 rated 24 gauge steel conforming to ASTM A446 with Premium fluorocarbon coating of Kynar 500 or Hylar 5000 resin.

2. 24" wide, with mechanically seamed standing seams, 3" high, and minor corrugations between each of the standing seams for the entire length of the panel. (Manufacturer's standard mechanically seamed standing seam profile.)

3. Roofing panels shall be mechanically seamed utilizing an electrically powered seaming device to provide a double fold lock joint. Hand-crimp or snap seams are not allowed.

5. Concealed clips shall be seamed into the panel side lap at each purlin for attachment of

the roof panels to the building structure.

6. Flashings and roof jacks shall be supplied by the roofing manufacturer and shall be included in the weathertightness warranty.
7. Color: To be selected by Architect from full range of manufacturer's standard colors.

C. Exterior Corrugated Wall Panel: Equal to PBR, exposed fastener wall panels as manufactured by MBCI conforming to the following:

1. Base Metal: 24 ga. Galvalume Plus to ASTM A653.
2. Panel Width: 36" cover width.
3. Corrugation Height: 1.25".
4. Finish: Fluoropolymer two-coat system.
5. Color: To be selected from manufacturer's full range of colors.
6. Installation: vertical.

D. Interior Flush Liner Panel: Equal to Artisan Series, concealed fastener liner panels as manufactured by MBCI conforming to the following:

1. Base Metal: 24 ga. Coated thickness, with smooth surface.
2. Panel Width: 12" cover width.
3. Corrugation Height: 1".
4. Finish: Fluoropolymer two-coat system.
5. Color: To be selected from manufacturer's full range of colors.
6. Installation: vertical.

E. Interior Corrugated Liner Panel: Equal to PBR, exposed fastener wall panels as manufactured by MBCI conforming to the following:

1. Base Metal: 24 ga. Coated thickness, with smooth surface.
2. Panel Width: 36" cover width.
3. Corrugation Height: 1.25".
4. Finish: Fluoropolymer two-coat system.
5. Color: To be selected from manufacturer's full range of colors.
6. Installation: vertical.

F. Pre-Finished Metal Flashing and Trim: Factory formed pre-finished metal trim and flashing conforming to the following:

1. 24 gauge steel conforming to ASTM A446 with G90 galvanized coating conforming to ASTM A525 and fluorocarbon coating of Kynar 500 or Hylar 5000 resin.
2. Color: To be selected by Architect from full range of manufacturer's standard colors

G. Pre-Finished Metal Gutters: Fabricated from 24 gauge steel conforming to ASTM A446 with G90 galvanized coating conforming to ASTM A525 and fluorocarbon coating of Kynar 500 or Hylar 5000 resin. Form in sections not less than 10 feet in length, complete with end pieces, outlet tubes and other special pieces that may be required. Join sections with riveted and soldered or sealed joints. Fabricate, attach and anchor gutters to guard against ice and snow damage. Conform to SMACNA Architectural Sheet Metal Manual for sizing, manufacturer's standard profile.

1. Gutter straps: Fabricated from same material as gutters. Conform to SMACNA Architectural Sheet Metal Manual, Figure 1-14A.
2. Install gutter supports paced at 36" O.C. maximum.

3. Color to be selected by Owner / Architect.

H. Pre-Finished Metal Downspouts: Fabricated from 24 gauge steel conforming to ASTM A446 with G90 galvanized coating conforming to ASTM A525 and fluorocarbon coating of Kynar 500 or Hylar 5000 resin. Conform to SMACNA Architectural Sheet Metal Manual for sizing, manufacturer's standard profile.

1. Downspout straps: Fabricated from same material as downspouts. Conform to SMACNA Architectural Sheet Metal Manual, Figure 1-35B.
2. Install straps at top, bottom, and 5' 0" O.C. intermediately between, designed to securely hold downspouts not less than 1" away from walls. Locate downspouts as indicated on drawings.
3. Color to be selected by Owner / Architect.

I. Fasteners: Manufacturer's standard system of self-tapping screws, bolts, and nuts, self-locking rivets, self-locking bolts, end-welded studs, and other suitable fasteners designed to withstand design loads.

1. Provide metal-backed neoprene washers under heads of fasteners bearing on weather side of metal building system.
2. Use aluminum or stainless steel fasteners for exterior application and galvanized or cadmium plated fasteners for interior applications.
3. Locate and space fastenings for true vertical and horizontal alignment. Use proper type fastening tools to obtain controlled uniform compression for positive seal without rupture of neoprene washer.
4. Provide fasteners with heads matching color of roofing and trim sheets by means of factory applied coating.

J. Flexible Closure Strips: Closed-cell, expanded cellular rubber, self-extinguishing, cut or pre-molded to match corrugation configuration of roofing and siding sheets. Provide where indicated and necessary to ensure weather tight construction.

K. Sealing Tape: 100% solids, pressure sensitive polyisobutylene compound tape with release paper backing. Not less than 1/2" wide and 1/8" thick, non-sag, nontoxic, nonstaining and permanently elastic.

L. Joint Sealant: Silicone, polyurethane or polysulfide, as recommended by building manufacturer, meeting requirements specified in Section 07 90 00.

2.06 METAL BUILDING INSULATION

A. Metal Building Insulation: ASTM C991, Type I, or NAIMA 202 or ASTM C991, Type II, glass-fiber-blanket insulation; 0.5 lb/cu.ft density; 2-inch wide, continuous, vapor-tight edge tabs, suitable for exposed applications at walls and roof; and with a flame-spread index of 25 or less. Metal building insulation shall be NAIMA (North America Insulation Manufacturer's Association) 202-96 Certified Metal Building Insulation with the NAIMA 202-96 imprint on the surface of the insulation.

B. Roof Insulation: Insulation shall be installed to achieve a total roof R value of 19. Insulation shall be fiberglass blanket type with reinforced vinyl vapor barrier facing at first layer (exposed), suitable for exposed applications at roofs of Pre-Engineered Buildings; second layers as required shall be fiberglass blanket type unfaced installed per Pre-Engineered building manufacturer's instructions to achieve R value. Provide thermal spacers at purlins to maintain R value.

C. Vapor barrier facing shall be with a vinyl film (3.2 mil thickness) or a vinyl reinforced polyester (VRP) film (3 mil approximate thickness), and shall have an Underwriters Laboratories flame spread rating of 25 or less and a smoke developed rating of 50 or less. Water vapor transmission value is 1.00 perms for vinyl film facing and .02 perms for VRP facing. Width shall be 6" wider than the fiberglass blanket so as to provide a 3-inch tab projecting beyond each side of the fiberglass blanket. Vinyl reinforced polyester facing shall be used when air

temperatures of 30 degrees F or below are anticipated during shipment or erection.

D. Blanket type insulation shall be installed on roof and walls between exterior panels and secondary framing members (purlins and girts). Tabs on facing material shall be lapped, folded, and stapled at side joints to provide continuity of the vapor barrier.

E. Insulating materials when concealed as installed shall have a flame spread rating of not more than 75 and a smoke developed rating of not more than 450. (AFPC V2 719.2.1). 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 (AFPC V2 719.3).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position.

3.02 ERECTION - FRAMING

A. Erect framing in accordance with AISC Specification for Structural Steel Buildings.

B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.

C. Set column base plates with non-shrink grout to achieve full plate bearing.

D. Do not field cut or alter structural members without approval.

E. Framing: Erect structural framing true to line, level and plumb, rigid and secure. Level base plates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use a non-shrinking grout to obtain uniform bearing and to maintain a level base line elevation. Moist cure grout for not less than 7 days after placement.

F. Purlins And Girts: Provide rake or gable purlins with tight fitting closure channels and fascias. Locate and space wall girts to suit door, window and louver arrangements and heights. Secure purlins and girts to structural framing and hold rigidly to a straight line by sag rods.

H. Framed Openings: Provide shapes of proper design and size to reinforce opening and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work and by the Owner. Securely attach to building structural frame.

I. Coordination with other building elements: Coordinate erection of metal building with installation of items directly supported by Metal Building System.

J. After erection, prime welds, abrasions, and surfaces not shop primed.

3.03 ERECTION - WALL AND ROOF PANELS

A. Install in accordance with manufacturer's instructions.

B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

C. Fasten cladding system to structural supports, aligned level and plumb.

D. Locate end laps over supports. End laps minimum 2 inches. Place side laps over bearing.

E. Provide expansion joints where indicated.

F. Use concealed fasteners.

G. Install roof panels true to lines and avoid "panel creep". Protect factory finishes from damage.

H. Provide weather seal where required for weathertightness; flash and seal roof panels at eaves and rake with rubber, neoprene, or other closures to exclude weather.

I. Roof panel side laps shall be continuously sealed and mechanically seamed.

J. Install sealant and gaskets to prevent weather penetration.

3.04 ERECTION - GUTTERS AND DOWNSPOUTS

A. Rigidly support and secure components. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.

B. Install gutters and downspouts, hangers and supports, insulation spacer blocks, trim, flashing, and other sheet metal accessories in accordance with manufacturer's recommendations and details for positive anchorage to building and weathertight mounting. Flash penetrations for positive weathertightness.

END OF SECTION

DIVISION 22

SECTION 22 01 00
GENERAL PLUMBING PROVISIONS

PART 1 GENERAL

1.01 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.

1.02 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, 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 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 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.

1.03 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. ConwayCity Building Code and Ordinances, latest accepted edition.
2. 2021 Arkansas State Mechanical Code .
3. 2018 Arkansas State Plumbing Code .
4. 2014 ArkansasEnergy Code .
5. IBC - International Building Code,latest accepted edition .
6. IFC - International Fire Code; latest accepted edition.
7. 2018 Arkansas Fuel Gas Code;latest accepted edition .
8. IGC - International Gas Code;latest accepted edition .
9. IPC - International Plumbing Code; latest accepted edition.
10. 2021 IMC - International Mechanical Code .
11. Energy Code for New Building Construction Supplement and Amendments 2014
12. IECC - International Energy Conservation Code; latest accepted edition.
13. AMCA - Air Moving & Conditioning Association.
14. ASA - American Standards Association.
15. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.
16. ASME - American Society of Mechanical Engineers.
17. ASTM - American Society of Testing Materials.
18. AWWA - American Water Works Association.
19. NBS - National Bureau of Standards.
20. NEMA - National Electrical Manufacturers Association.
21. NFPA - National Fire Protection Association.

22. SMACNA - Sheet Metal & Air Conditioning Contractors' National Association.

23. UL - Underwriters' Laboratories, Inc.

24. AGA - American Gas Association.

25. OSHA - Occupational Safety and Hazard Association.

26. AABC - Associated Air Balance Councils.

27. 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 Owner.

G. Mechanical Contractor shall provide and install, where applicable, seismic restraints for all piping and duct systems per the latest accepted Building Code.

1.04 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.

1.05 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.

1.06 INSPECTION OF PREMISES

A. Before submitting a bid, visit the site of the proposed job and determine the conditions relating to this work.

1.07 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.

1.08 EXISTING BUILDING AND EXISTING MECHANICAL EQUIPMENT

A. Visit the existing building and become thoroughly acquainted with the existing 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.

1.09 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

2.01 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 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.

2.02 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 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.

2.03 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, or electronic submittals as detailed below. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data and submit under one cover with an index sheet in front.

1. If Electronic files are submitted, a complete set of the schedule of materials and equipment proposed for the installation shall be included. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data. All information shall be submitted electronically in "pdf" format, and shall be separated into electronic "pdf" files according to the corresponding specification section (i.e. "22 10 06 - Plumbing Specialties.pdf"). Unless incomplete submittals are authorized by the project engineer, all Division 22 submittals shall be electronically sent at one time. Without authorization, incomplete submittals shall be rejected.

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. Plumbing fixtures and floor drains.

2. Water balance certification.

3. Piping materials including valves.

4. Piping insulation materials.

5. Complete mechanical equipment electrical data and wiring details.

2.04 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 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.

2.05 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.

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

3.01 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.

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.

3.02 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.

3.03 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.

3.04 CUTTING AND PATCHING

A. The General Contractor shall be responsible for all required Building 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. The General Contractor shall cut, patch, repair and/or replace pavements, sidewalks, roads and curbs as required to permit the installation of the plumbing work and pay all expenses incurred for this work.

C. 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 Standard Mechanical Code.

D. 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 in accordance with NFPA 101 by the plumbing contractor.

E. All fire stopping assemblies must be UL approved assemblies.

3.05 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 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.

3.06 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.

3.07 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.

E. Submit TAB reports on approved forms. Final TAB report submittals shall include all required rebalances if any are required.

F. Submit to the Engineer as soon as practical, electronic closeout documents as detailed below.

1. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data and submit under one cover with an index sheet in front.All information shall be submitted electronically in "pdf" format, and shall be separated into electronic "pdf" files.

3.08 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.

3.09 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 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 wiring 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 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 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", unless due to structural restraints the access door can be reduced to a minimum of 18" x18", Milcor type appropriate for the construction involved.

3.16 FINALLY

A. It is the intention that this specification shall provide a complete installation except as herein before specifically accepted. 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

SECTION 22 05 53
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Stencils.

D. Pipe markers.

E. Ceiling tacks.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.

B. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.

C. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

1.03 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. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number. Valve locations with tag numbers shall also be indicated on "as-built" drawings.

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

2.01 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

A. Pipe Markers: 3/4 inch diameter and higher.

2.02 IDENTIFICATION APPLICATIONS

A. Instrumentation: Tags.

B. Piping: Pipe markers.

C. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.03 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 piece with up to three lines of text.

1. Letter Color: White.

2. Letter Height: 1/4 inch.

3. Background Color: Black.

4. Plastic: Conform to ASTM D709.

2.04 TAGS

A. Manufacturers:

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. Flexible: Vinyl with engraved black letters on light contrasting background color with up to three lines of text. Minimum tag size 1-1/2 inch in diameter.

C. Metal: Brass, 19 gauge 1-1/2 inch in diameter with smooth edges, blank, smooth edges, and corrosion-resistant ball chain. Up to three lines of text.

D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame. Valve tag chart should should indicate valve size, valve model and valve location. Valve locations with tag numbers shall also be indicated on "as-built" drawings.

2.05 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.

C. Stencil Paint: Semi-gloss enamel, colors conforming to ASME A13.1.

2.06 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. Flexible Marker: Factory fabricated, semi-rigid, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid conveyed.

D. Flexible Tape Marker: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.

E. Underground Flexible Marker: Bright-colored continuously printed ribbon tape, minimum 6 inches wide by 4 mil, 0.004 inch thick, manufactured for direct burial service.

F. Identification Scheme, ASME A13.1:

1. Primary: External Pipe Diameter, Uninsulated or Insulated.

a. 0.7 to 1.3 inches: Use 8 inch field-length with 1/2 inch text height.

b. 1.4 to 2.4 inches: Use 8 inch field-length with 0.7 inch text height.

c. 2.5 to 6.7 inches: Use 12 inch field-length with 1.3 inch text height.

d. 6.8 to 10 inches: Use 24 inch field-length with 2-1/2 inch text height.

e. Over 10 inches: Use 32 inch field-length with 3-1/2 inch text height.

G. Color code as follows:

1. Potable, Cooling, Boiler, Feed, Other Water: Green with white letters.

2. Fire Quenching Fluids: Red with white letters.

3. Combustible Fluids: Brown with white letters.

4. Toxic and Corrosive Fluids: Orange with white letter.

5. Flammable Fluids. Yellow with white letter.

2.07 CEILING TACKS

A. Manufacturers:

1. Marking Services Incorporated.

2. Seton.

3. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Description: Steel with 3/4 inch diameter color coded head.

C. Description: ANSI/ASME 13.1 Standard. Self-adhesive, acrylic ceiling markers valve tags, 3/4 inch diameter. Ceiling markers to indicate the location of valves, pipes, and dampers positioned on ceiling tiles hidden from plain sight.

D. Color code as follows:

1. Plumbing Equipment: Yellow.

2. Plumbing Valves: Green.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive identification products.

3.02 INSTALLATION

A. Install flexible nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags in clear view and align with axis of piping

C. Install plastic pipe markers in accordance with manufacturer's instructions.

D. Install plastic tape pipe marker 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. Apply ASME A13.1 Pipe Marking Rules:

1. Place pipe marker adjacent to changes in direction.

2. Place pipe marker adjacent each valve port and flange end.

3. Place pipe marker at both sides of floor and wall penetrations.

4. Place pipe marker every 25 to 50 feet interval of straight run.

G. Install metallic detection tape located approximately 12 inches above pipe, where in ground utility lines are buried outside building footprint. Tape shall be continuous and be marked, indicating utility type (ie. water, sewer, gas, electric, etc).

H. 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.

I. Locate ceiling tacks to locate valves above lay-in panel ceilings. Locate in corner of panel closest to equipment.

J. Identify all piping on this project as described, except piping which is concealed and/or not accessible. Identify piping concealed by ceiling tiles, floor tiles and, crawl spaces. Piping outside, on roof, above grade, and within parking structures shall also be identified. Only piping located within walls or inaccessible areas need not be identified. Install pipe markers on long straight runs every 20 feet. Install pipe markers above and below every floor penetration and on either side of every wall penetration and, insure there is at least one marker per pipe in every room. Install pipe markers at every valve, branch and, any change in piping direction. Install pipe markers so they are visible for a normal standing position.

K. Abandoned Piped

1. Per ANSI/ASME A13.1 standards, abandoned pipe should be identified. Recommend color scheme is safety white background with black letters.

2. Black border should be added to the identification.

3. Abandoned pipe protected from corrison by the addition of pressure fluid or contains residual hazadous material, legend should include that.

END OF SECTION

SECTION 22 07 19
PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flexible elastomeric cellular insulation.

B. Piping insulation.

C. Jackets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 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 2024).

D. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2024).

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; 2026.

H. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2023).

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

J. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

K. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.

1.04 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.

1.05 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.

1.06 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.

1.07 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.

PART 2 PRODUCTS

2.01 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.

2.02 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:

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.

2.03 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.

2.04 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 ; rigid molded, asbestos free, gold color.

1. 'K' value: ASTM C177 and C518; 0.40 at 300 degrees F, when tested in accordance with ASTM C177 or C518.

C. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

D. Insulating Cement:

1. ASTM C449/C449M.

2.05 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.

1. Air dried, contact adhesive, compatible with insulation.

2.06 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.

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

3.01 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.

3.02 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, 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.

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: Finish with PVC jacket and fitting covers.

J. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.

K. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

L. 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.

M. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.03 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).

B. Cooling Systems:

1. Condensate Drains from Cooling Coils: 1/2 inch thickness; cellular insulation.

2. Refrigerant Suction: 3/4 inch thickness; cellular insulation.

3. Refrigerant Hot Gas: 3/4 inch thickness; cellular insulation.

END OF SECTION

SECTION 22 10 05
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, valves, and connections for piping systems.

1. Sanitary sewer.
2. Domestic water.
3. Gas.
4. Flanges, unions, and couplings.
5. Valves.
6. Flow controls.
7. Strainers.

1.02 RELATED REQUIREMENTS

A. Section 22 01 00 - General Plumbing Provisions.

B. Section 22 05 53 - Identification for Plumbing Piping and Equipment.

C. Section 22 07 19 - Piping Insulation.

1.03 REFERENCE STANDARDS

A. ANSI Z21.22 - American National Standard for Relief Valves for Hot Water Supply Systems; 2015 (Reaffirmed 2025).

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 B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.

E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.

F. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2024.

G. ASME B31.9 - Building Services Piping; 2025.

H. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2025, with Errata.

I. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.

J. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2026.

K. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2026.

L. ASTM B32 - Standard Specification for Solder Metal; 2020.

M. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2025.

N. ASTM B68/B68M - Standard Specification for Seamless Copper Tube, Bright Annealed; 2025.

O. ASTM B75/B75M - Standard Specification for Seamless Copper Tube; 2026.

P. ASTM C4 - Standard Specification for Clay Drain Tile and Perforated Clay Drain Tile; 2004 (Reapproved 2023).

Q. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe; 2020 (Reapproved 2025).

R. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2026.

S. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; latest accepted edition.

T. ASTM D2513 - Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings; 2026a.

U. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020 (Reapproved 2024).

V. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2025.

W. ASTM D2680 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping; 2020 (Reapproved 2025).

X. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing; 2026.

Y. ASTM D2846/D2846M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems; 2024.

Z. 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 (Reapproved 2024).

AA. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2024, with Editorial Revision (2025).

BB. ASTM D3517 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe; 2024.

CC. ASTM F437 - Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80; 2024.

DD. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).

EE. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2018.

FF. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2021.

GG. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2023.

HH. AWWA C901 - Polyethylene (PE) Pressure Pipe, Tubing, and Fittings, 3/4 In. (19 mm) Through 3 In. (76 mm), for Water Service; 2025.

II. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2021.

JJ. 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.

KK. MSS SP-67 - Butterfly Valves; 2022.

LL. MSS SP-78 - Gray Iron Plug Valves, Flanged and Threaded Ends; 2026.

MM. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .

NN. NFPA 54 - National Fuel Gas Code; National Fire Protection Association; 2012.

1.04 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. Welders' Certificates: Submit certification of welders' compliance with ASME BPVC-IX.

D. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.

E. Project Record Documents: Record actual locations of valves.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with applicable codes.

B. Perform Work in accordance with the State ofArkansas, city of Conway standards.

C. Valves: Manufacturer's name and pressure rating marked on valve body.

D. Welding Materials and Procedures: Conform to ASME (BPV IX) .

E. Welder Qualifications: Certified in accordance with ASME (BPV IX).

F. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 REGULATORY REQUIREMENTS

A. Perform Work in accordance with State of Arkansas, and city of Conway plumbing code.

B. Conform to city of Conway, 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.

1.07 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.

1.08 FIELD CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 SANITARY SEWER PIPING, BURIED BEYOND 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74 service weight.

1. Fittings: Cast iron.

2. Joint Seals: ASTM C 564 neoprene gaskets.

B. PVC Pipe: ASTM D2665 or ASTM D3034.

1. Fittings: PVC.

2. Joints: Pipe sizes 4 inches or less: Solvent welded, with ASTM D 2564 solvent cement.

3. Joints: Pipe sizes greater than 4 inch: Push-on, using ASTM F477 elastomeric gaskets.

2.02 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74 service weight.

1. Fittings: Cast iron.

2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C 564 neoprene gaskets.

B. Cast Iron Pipe: CISPI 301, hubless.

1. Fittings: Cast iron.

2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.

C. PVC Pipe: ASTM D2665 or ASTM D3034.

1. Fittings: PVC.

2. Joints: Pipe sizes 4 inch and smaller: Solvent welded, with ASTM D 2564 solvent cement.

3. Joints: Pipe sizes greater than 4 inch: Push-on, using ASTM F477 elastomeric gaskets.

2.03 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.

2.04 WATER PIPING, BURIED BEYOND 5 FEET OF BUILDING

A. Copper Pipe: ASTM B42, hard drawn.

1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.

2. Joints: ASTM B 32, alloy Sn95 solder.

B. PVC SDR 21: pipe shall be manufactured from a Type I, Grade I Polyvinyl Chloride (PVC) compound with a Cell Classification of 12454 per ASTM D1784.

1. Fittings: PVC.

2. Joints: Solvent welded, with ASTM D 2564 solvent cement.

2.05 WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Copper Pipe: ASTM B42, hard drawn Type "K".

1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.

2. Joints: AWS A5.8M/A5.8, BCuP copper/silver braze.

2.06 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 or mechanical press-fit couplings.

2.07 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.

2.08 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.

1. Fittings: ASTM A 234/A 234M, forged steel welding type.

2. Joints: ASME B31.1, welded.

3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

2.09 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. Joints: NFPA 54, threaded or welded to ASME B31.1.

2.10 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:

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 luggs 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).

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.

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.

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.

2.11 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.

2.12 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.

2.13 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.

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.

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.

2.14 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.

2.15 GLOBE 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, 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.

2.16 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.

2.17 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: MSS SP-78, 250 psi CWP, cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged or grooved ends. Provide lever operator with set screw.

2.18 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.

2.19 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 psi.

2.20 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.

2.21 RELIEF VALVES

A. 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.

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.

2.22 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:

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

3.01 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 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.

3.03 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. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. 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.

H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.

I. Establish elevations of buried piping outside the building to ensure not less than 3 ft of cover.

J. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.

K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

L. Provide support for utility meters in accordance with requirements of utility companies.

M. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.

N. Install bell and spigot pipe with bell end upstream.

O. Install valves with stems upright or horizontal, not inverted.

P. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.

Q. Install water piping to ASME B31.9.

R. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

S. Sleeve pipes passing through partitions, walls and floors.

T. 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.

U. Pipe Hangers and Supports:

1. Install in accordance with ASME B31.9.

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 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.

V. 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.

3.04 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 ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

E. Install ball 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 ball valves in natural gas systems for shut-off service.

H. Provide flow controls in water recirculating systems where indicated.

3.05 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.

3.06 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.

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.

3.07 SERVICE CONNECTIONS

A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

B. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves, pressure reducing valve, and sand strainer.

C. Connections to existing manholes shall be made at the locations shown on the plans. An opening shall be cut in the wall of the manhole and shall be of sufficient size to permit installation of the pipe at the designated elevation. The invert of the existing manhole shall be removed and a new invert constructed. The end of the pipe shall be flush with the inside wall of the manhole and shall be sealed in the wall with mortar to provide a water tight joint.

D. Connection of dissimilar pipe materials shall be made with the specified adapter couplings.

E. 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.

F. Contractor shall connect to existing gas service in accordance with the requirements of local gas service official and all applicable municipal and state regulations. All gas piping shall conform to and be tested in accordance with the local gas company and the Standard Gas Code. Gas piping shall have cathodic protection and all piping subject to natural gas pressure over 15 ounces must be welded. Any charge made by the gas company for placing the valves, piping, and connection to service main shall be borne by this contractor. See plans for extent of piping.

G. 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.

H. 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, unless contractor wishes to weld all joints. Welded rod shall be of same material as piping. No. 22 bronze welding will be permitted.

I. 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.

J. 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.

K. For corrosion protection, all underground and exposed exterior steel pipe and fittings must be coated and wrapped.

L. 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.

M. 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.

N. The pressure regulator at the building shall be sized, and approved by gas service official.

O. 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.

P. 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.

Q. 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.

R. Provide a listed shut off valve immediately ahead of and immediately behind each medium pressure regulator.

S. Underground gas piping shall be installed in a separate ditch.

3.08 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.

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

SECTION 22 10 06
PLUMBING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cleanouts.

B. Water hammer arrestors.

C. Thermostatic mixing valves.

1.02 RELATED REQUIREMENTS

A. Section 22 10 05 - Plumbing Piping.

B. Section 22 40 00 - Plumbing Fixtures.

1.03 REFERENCE STANDARDS

A. ASME A112.6.3 - Floor Drains; 2022.

1.04 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.

E. Project Record Documents: Record actual locations of equipment and cleanouts.

F. Operation Data: Indicate frequency of treatment required for interceptors.

G. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

H. Product Data: Manufacturer’s standard data sheets describing components including materials, dimensions, relationship to adjacent construction, and attachments.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than five years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.01 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 Water Technologies.
7. MIFAB.
8. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Cleanouts at Exterior Surfaced Areas:

1. Round cast nickel bronze access frame and heavy duty, non-skid cover.

C. Cleanouts at Exterior Unsurfaced Areas:

1. Line type with lacquered cast iron body and round heavy duty, epoxy coated gasketed tractor-type cover.

2.02 WATER HAMMER ARRESTORS

A. Manufacturers:

1. Jay R. Smith Manufacturing Company.
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.

2.03 MIXING VALVES

A. Thermostatic Mixing Valves:

1. Manufacturers:

    a. ESBE.

    b. Leonard Valve Company.

    c. Honeywell Water Controls.

    d. Powers Process Controls.

    e. 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.

4. Cabinet: 16 gage stainless steel, for surface mounting with keyed lock.

B. Pressure Balanced Mixing Valves:

1. Manufacturers:

    a. Delta Faucet Company.

    b. H.G. Specialties.

    c. Powers Process Controls.

    d. Taconova.

    e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

2. Valve: Chrome plated cast brass body, stainless steel cylinder, integral temperature adjustment.

3. Accessories:

    a. Volume control shut-off valve on outlet.

    b. Stem thermometer on outlet.

    c. Strainer stop checks on inlets.

    d. Cabinet: 16 gage stainless steel, for surface mounting with keyed lock.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Encase exterior cleanouts in concrete flush with grade. Refer to plans for detail.

C. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; janitor rooms, flush valves, interior and exterior hose bibbs.

D. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatories,sinks, washing machine outlets and water closets.

E. Install city approved backwater valve on all building sewers at the exterior of the building and prior to connection to the public sewer system.

F. Install components in accordance with manufacture's instructions and approved product data submittals.

END OF SECTION

SECTION 22 10 08
PLUMBING SOLDER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Lead-free plumbing solder.

1.02 RELATED SECTIONS

A. Section 22 10 05 - Plumbing Piping.

B. Section 22 40 00 - Plumbing Fixtures.

1.03 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

2.01 MANUFACTURERS

A. Acceptable Manufacturer: The Harris Products Group

B. Substitutions: See Section 22 01 00 - General Plumbing Provisions for equipment and material substitutions.

C. Provide all plumbing solder from a single manufacturer.

2.02 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.
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

3.01 INSTALLATION

A. Apply plumbing solder in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 22 40 00
PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sinks.

1.02 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.

1.03 REFERENCE STANDARDS

A. Comply with State of Arkansas adopted ADA Accessible Guidelines in regard to accessible or handicapped features.

B. ASME A112.18.1 - Plumbing Supply Fittings; 2024.

C. ASME A112.19.3 - Stainless Steel Plumbing Fixtures; 2022.

D. NSF 61 - Drinking Water System Components - Health Effects; 2025, with Addendum

E. NSF 372 - Drinking Water System Components - Lead Content; 2024.

1.04 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.

E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.

1.06 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.07 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.

1.08 WARRANTY

A. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

PART 2 PRODUCTS

2.01 SINKS

A. Sink Manufacturers:

1. American Standard Inc.
2. Eljer, Inc.
3. Elkay.
4. Kohler Company.
5. Just.
6. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Drop-In Single Compartment Bowl

1. Single bowl, 18 gauge, Type 304 stainless steel, self rimming and undercoated, with ledge back drilled for trim.
2. Drain: 3-1/2 inch chromed brass.
    a. Center drain location.

C. Trim: ASME A112.18.1; chrome plated brass supply with high rise swing spout for multiple bowl sinks and high rise rigid spout for single bowl sinks, water economy aerator with maximum 2.2 gpm flow, indexed lever handles .

1. Acceptable Faucet Manufacturers:
    a. Delta Faucet Company.
    b. Chicago Faucets.

D. Accessories: Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon, quarter turn angle stops with loose key, flexible supplies.

PART 3 EXECUTION

3.01 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.

3.02 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Provide chrome plated rigid supplies to fixtures with quarter-turn loose key angle stops, reducers, and escutcheons.

C. Install components level and plumb.

D. Install a check valve in the hot and cold water supply at every service sink

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.05 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING

A. Clean plumbing fixtures and equipment.

3.07 PROTECTION

A. Protect installed products from damage due to subsequent construction operations.

B. Repair or replace damaged products before Date of Substantial Completion.

3.08 SCHEDULES

A. Fixture Heights: Install fixtures to heights above finished floor as indicated.

B. Minimum fixture rough-in sizes or as required for particular fixtures.

1. 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.

END OF SECTION

DIVISION 23

SECTION 23 01 00
GENERAL HVAC PROVISIONS

PART 1 GENERAL

1.01 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. Mechanical Contractor shall furnish and install roof-mounted air handler and exhaust fan bases and shall be the manufacturer's base.

D. 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.

E. 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.

1.02 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, 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.

1.03 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. Conway City Building Code and Ordinances, latest accepted edtion.
2. 2021 Arkansas State Mechanical Code.
3. 2018 Arkansas State Plumbing Code.
4. 2014 Arkansas Energy Code.
5. IBC - International Building Code; latest accepted edition.
6. IFC - International Fire Code; latest accepted edition.
7. 2018 Arkansas Fuel Gas Code ; latest accepted edition .
8. IGC - International Gas Code; latest accepted edition .
9. 2021 IMC - International Mechanical Code; latest accepted edition.
10. IPC - International Plumbing Code; latest accepted edition.
11. Energy Code for New Building Construction Supplement and Amendments 2014
12. IECC - International Energy Conservation Code; latest accepted edition.
13. AMCA - Air Moving & Conditioning Association.
14. ASA - American Standards Association.
15. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.
16. ASME - American Society of Mechanical Engineers.
17. ASTM - American Society of Testing Materials.
18. AWWA - American Water Works Association.
19. NBS - National Bureau of Standards.
20. NEMA - National Electrical Manufacturers Association.
21. NFPA - National Fire Protection Association.

22. SMACNA - Sheet Metal & Air Conditioning Contractors' National Association.

23. UL - Underwriters' Laboratories, Inc.

24. AGA - American Gas Association.

25. OSHA - Occupational Safety and Hazard Association.

26. AABC - Associated Air Balance Councils

27. 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 Owner.

1.04 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.

1.05 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.

1.06 INSPECTION OF PREMISES

A. Before submitting a bid, visit the site of the proposed job and determine the conditions relating to this work.

1.07 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.

1.08 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

2.01 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 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.

2.02 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.

2.03 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, or electronic submittals as detailed below. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data and submit under one cover with an index sheet in front.

1. If Electronic files are submitted, a complete set of the schedule of materials and equipment proposed for the installation shall be included. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data. All information shall be submitted electronically in "pdf" format, and shall be separated into electronic "pdf" files according to the corresponding specification section (i.e. "23 40 00 - Air Cleaning Devices.pdf"). Unless incomplete submittals are authorized by the project engineer, all Division 23 submittals shall be electronically sent at one time. Without authorization, incomplete submittals shall be rejected.

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. Unit Heaters.

2. Furnace Units.

3. Condensing Units.

4. Filters.

5. Wall Louvers.

6. Exhaust Fans.

7. Grilles and Registers.

8. Starters.

9. Air Balance Certification.

10. Ductwork Materials Including Duct Accessories.

11. Duct Insulation Materials.

12. Complete Mechanical Equipment Electrical Data and Wiring Details.

2.04 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.

2.05 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.

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

3.01 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 Contractor, Mechanical Contractor, and Electrical Contractor 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.

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.

3.02 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.

3.03 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.

3.04 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.

3.05 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.

E. Submit TAB reports on approved forms. Final TAB report submittals shall include all required rebalances if any are required.

3.06 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. Spend not less than five (5) days in such formal instruction and additional time as directed by the Engineer to fully prepare the Owner to operate and maintain the mechanical equipment.

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. Return Fan/Relief Fan.

2. Split System AC or Heat Pumps.

3. Spot Unit Heaters.

3.07 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.

3.08 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.

3.09 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.

3.10 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 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 wiring 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 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.

3.11 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 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.

3.12 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", unless due to structural restraints the access door can be reduced to a minimum of 18" x18", Milcor type appropriate for the construction involved.

3.13 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.

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.

3.14 FINALLY

A. It is the intention that this specification shall provide a complete installation except as herein before specifically accepted. 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

SECTION 23 05 53
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Stencils.

D. Pipe markers.

E. Ceiling tacks.

1.02 REFERENCE STANDARDS

1.03 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. Valve locations with tag numbers shall also be indicated on "as-built" drawings.

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

2.01 IDENTIFICATION APPLICATIONS

A. Air Handling Units: Nameplates.

B. Dampers: Ceiling tacks, where located above lay-in ceiling.

C. Ductwork: Stencilled painting.

D. Instrumentation: Tags.

E. Relays: Tags.

F. Small-sized Equipment: Tags.

G. Thermostats: Nameplates.

H. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.02 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.

2.03 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. Valve tag chart should should indicate valve size, valve model and valve location. Valve locations with tag numbers shall also be indicated on "as-built" drawings.

2.04 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.

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.

2.05 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. Toxic and Corrosive Fluids: Orange with black letters.

2.06 CEILING TACKS

A. Manufacturers:

1. Marking Services Incorporated.

2. Seton.

3. Substitutions: See Section 23 01 00 - General HVAC Provisions.

B. Description: Steel with 3/4 inch diameter color coded head.

C. Description: ANSI/ASME 13.1 Standard. Self-adhesive, acrylic ceiling markers valve tags, 3/4 inch diameter. Ceiling markers to indicate the location of valves, pipes, and dampers positioned on ceiling tiles hidden from plain sight.

D. Color code as follows:

1. Yellow - HVAC equipment.

2. Blue - Heating/cooling valves.

PART 3 EXECUTION

3.01 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.

3.02 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 ductwork with stencilled painting. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

F. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Measurement of final operating condition of HVAC systems.

1.02 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.

1.03 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.

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:

    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. Field Logs: Submit at least once a week to Construction Manager and Engineer. Field logs should be submitted with weekly progress reports and include a record of all discrepancies and issues encountered during the period covered.

E. 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.

F. Progress Reports.

G. 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 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.

j. Report date.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 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; upon completion submit AABC National Performance Guaranty.

b. NEBB, National Environmental Balancing Bureau: www.nebb.org.

c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: 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.

3.02 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.

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.

3.03 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.

3.04 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.

3.05 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.

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.

3.06 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.

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).

3.07 SCOPE

A. Test, adjust, and balance the following:

1. Forced Air Furnaces.
2. Air Cooled Refrigerant Condensers
3. Fans.
4. Air Filters.
5. Air Inlets and Outlets.

3.08 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

C. Combustion Equipment:

1. Model number

2. Serial number
3. Firing rate
4. Overfire draft
5. Gas meter timing dial size
6. Gas meter time per revolution
7. Gas pressure at meter outlet
8. Gas flow rate
9. Heat input
10. Burner manifold gas pressure
11. Percent carbon monoxide (CO)
12. Percent carbon dioxide (CO2)
13. Percent oxygen (O2)
14. Percent excess air
15. Flue gas temperature at outlet
16. Ambient temperature
17. Net stack temperature
18. Percent stack loss
19. Percent combustion efficiency
20. Heat output

D. Air Cooled Condensers:

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. Air Moving Equipment:

1. Location
2. Manufacturer
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

F. 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

11. Actual mixed air temperature
12. Design outside/return air ratio
13. Actual outside/return air ratio

G. 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

H. 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
8. Duct static pressure
9. Air temperature
10. Air correction factor

I. Duct Leak Tests:

1. Description of ductwork under test
2. Duct design operating pressure
3. Duct design test static pressure
4. Duct capacity, air flow
5. Maximum allowable leakage duct capacity times leak factor
6. Test apparatus
    a. Blower
    b. Orifice, tube size
    c. Orifice size
    d. Calibrated
7. Test static pressure
8. Test orifice differential pressure
9. Leakage

J. Flow Measuring Stations:
1. Identification/number
2. Location
3. Size
4. Manufacturer
5. Model number
6. Serial number
7. Design Flow rate
8. Design pressure drop
9. Actual/final pressure drop
10. Actual/final flow rate
11. Station calibrated setting

K. 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

SECTION 23 07 13
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

B. Duct Liner.

C. Insulation jackets.

D. Adhesive, tie wires, tape

1.02 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.

1.03 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; 2024.

D. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2025.

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; 2026a.

G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

H. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

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.

1.04 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.

1.05 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.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled 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.

1.07 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

2.01 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.

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.

2.02 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.
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.

2.03 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.

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.

2.04 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.

2.05 DUCT LINER

A. Manufacturers:

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: 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.

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.

2.06 MATERIALS

A. External Insulation

1. Ductwork Located below Unvented Roof Insulation or in Unconditioned Space:

a. Concealed Round Ducts : Flexible glass fiber insulation, minimum installed R-value of R-3.5, with factory applied reinforced aluminum foil vapor barrier for systems conveying air at less than room temperature.

B. Internal Insulation

1. Ductwork Located below Unvented Roof Insulation or in Unconditioned Space:

a. Rectangular Ducts and Plenum Ducts: 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-3.5. 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.

PART 3 EXECUTION

3.01 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.

3.02 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. External Duct Insulation Application:

1. Secure insulation with vapor barrier with staples and seal jacket joints with vapor barrier adhesive or tape to match jacket.

2. 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.

3. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive or tape to match jacket.

4. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

F. 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.

3.03 SCHEDULES

A. Exhaust Ducts: Externally wrap with 2-inch thick flexible glass fiber insulation.

B. Outside Air Intake Ducts:

1. Round: Externally insulate with 2-inch thick flexible glass fiber insulation.

2. Rectangular: Internally insulate with 1-inch thick semi-rigid duct liner with adhesive and welded mechanical fasteners.

C. Plenums: Internally insulate with 1-inch thick semi-rigid duct liner with adhesive and welded mechanical fasteners.

D. Concealed Supply Ducts:

1. Round Ducts Duct: Externally insulate with 2-inch thick flexible glass fiber insulation.

2. Rectangular: Internally insulate with 1-inch thick semi-rigid duct liner, with adhesive and welded mechanical fasteners.

E. Concealed Return Air Ducts and Plenums:

1. Round: Externally insulate with 2-inch thick flexible glass fiber insulation.

2. Rectangular: Internally insulate with 1-inch thick semi-rigid duct liner, with adhesive and welded mechanical fasteners.

3. Plenums: Internally insulate with 1-inch thick semi-rigid duct liner with adhesive and welded mechanical fasteners.

END OF SECTION

SECTION 23 31 00
DUCTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.

B. Duct cleaning.

1.02 RELATED REQUIREMENTS

A. Section 23 07 13 - Duct Insulation: External insulation and duct liner.

B. Section 23 33 00 - Duct Accessories.

C. Section 23 33 30 - Air Duct Sealants.

D. Section 23 37 00 - Air Outlets and Inlets.

E. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.

1.03 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 A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2026.

D. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2025b.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2025a.

F. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2025.

G. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

H. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

J. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2018, with Editorial Revision (2020).

K. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry; 2018, with Editorial Revision (2020).

L. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2017, with Editorial Revision (2020).

M. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

N. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.

O. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012, 2nd Edition.

P. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

Q. SMACNA (RIDC) - Rectangular Industrial Duct Construction Standards; 2024.

R. SMACNA (ROUND) - Round Industrial Duct Construction Standards; 2013.

S. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.

T. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 DEFINITIONS

A. Duct Sizes: Duct sizes indicated on drawings are inside clear dimensions.

B. Low Pressure: Static pressure in duct less than 1" WG and velocities less than 2000 fpm (10 meters/second).

C. Medium Pressure: Static pressure between 1 and 6 inches WG and velocities between 1500 and 3000 fpm.

1.05 SUBMITTALS

A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.

B. Product Data: Provide data for duct materials, duct liner, and duct connections.

C. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for all systems.

D. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual.

E. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

F. Confirm ductwork has been fabricated and installed in accordance with recommendations and SMACNA standards.

1.06 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.

1.07 REGULATORY REQUIREMENTS

A. Construct ductwork to NFPA 90A, NFPA 90B, and NFPA 96, standards.

1.08 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.

PART 2 PRODUCTS

2.01 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.

B. Aluminum for Ducts: ASTM B209 (ASTM B209M); aluminum sheet, alloy 3003-H14.
Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.

C. Stainless Steel for Ducts: ASTM A 240/A 240M, Type 316.

D. 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. VOC Content: Not more than 250 g/L, excluding water.

3. Surface Burning Characteristics: Flame spread of zero, smoke developed of zero, when tested in accordance with ASTM E84.

4. For Use With Flexible Ducts: UL labeled.

5. Products:

a. 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.

b. Substitutions: See Section 23 01 00 - General HVAC Provisions.

E. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

F. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:

1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.

2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.

3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.

4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.

5. Other Types: As required.

2.02 DUCT ASSEMBLIES

A. All Ducts: Galvanized steel, unless otherwise indicated.

B. Low Pressure Supply (Heating Systems): 1 inch w.g. pressure class, galvanized steel.

C. Medium and High Pressure Supply: 3 inch w.g. pressure class, galvanized steel.

D. Return and Relief: 1 inch w.g. pressure class, galvanized steel.

E. General Exhaust: 1 inch w.g. pressure class, galvanized steel.

F. Outside Air Intake: 1 inch w.g. pressure class, galvanized steel.

G. Combustion Air: 1 inch w.g. pressure class, galvanized steel.

2.03 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 duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Joints shall be minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.

G. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.

H. Lap metal duct in direction of air flow. Hammer down edges and slips to leave smooth duct interior.

I. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide duct transition to louver area. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

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. 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.

2.04 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:

a. Hart & Cooley.

b. Flex Master.

c. Substitutions: See Section 23 01 00 - General HVAC Provisions.

PART 3 EXECUTION

3.01 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. Comply with safety standards NFPA 90A and NFPA 90B.

D. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

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. Flexible Ducts: Connect to metal ducts with draw bands.

G. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

H. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

I. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

J. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.

K. Use double nuts and lock washers on threaded rod supports.

L. Connect diffusers or light troffer boots to low pressure ducts with 5 feet maximum length of flexible duct held in place with strap or clamp.

M. Connect flexible ducts to metal ducts per manufacturer's recommendations.

N. At exterior wall louvers, seal duct to louver frame and install blank-out panels.

O. Louver Fit-out:

1. Provide blank-out panels sealing available area of wall-mounted exterior-faced louver when connected ductwork is smaller than actual louver free area, and duct outlet is smaller than the louver frame.

2. Use the same duct material painted black on the exterior side, then seal louver frame and duct.

P. Duct Insulation: Provide duct insulation in compliance with Section 23 07 13.

Q. All round and rectangular duct installed in exposed areas shall be paint lock duct.

3.02 CLEANING

A. If determined by the Architect and/or Engineer, that during construction the duct systems were not adequately protected and dirt/debris was allowed to enter the installed ductwork, then it will be required by the HVAC contractor for the duct system to be cleaned. If required, clean duct systems with high power 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.

END OF SECTION

SECTION 23 33 00
DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air turning devices/extractors.

B. Backdraft dampers - metal.

C. Duct access doors.

D. Duct test holes.

E. Flexible duct connections.

F. Volume control dampers.

1.02 RELATED REQUIREMENTS

A. Section 23 31 00 - Ducts.

B. Division 26 - Electrical: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

C. UL 33 - Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.

1.04 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.

1.05 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.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

A. Manufacturers:

1. Krueger.
2. PCI Industries, Inc; Pottorff Brand.
3. Ruskin Company.
4. Titus.
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.

2.02 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.

2.03 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.

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.

2.04 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.

2.05 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

B. 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.

2.06 VOLUME CONTROL DAMPERS

A. Manufacturers:

1. Louvers & Dampers, Inc.

2. Nailor Industries Inc.

3. Ruskin Company.

4. Greenheck Fan Company.

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.

2.07 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.

4. Elongation Before Break: 325 percent, minimum.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.02 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. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

F. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.

G. 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.

H. 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

SECTION 23 33 30
AIR DUCT SEALANTS

PART 1 GENERAL

1.01 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.

1.02 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.

1.03 REFERENCES

A. ASTM D 1668 - Standard Specification for Glass Fabrics (Woven and Treated) for Roofing and Waterproofing; 1995.

B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2005.

C. ASTM E 96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials; 2005.

D. UL 181A - Closure Systems for Use with Rigid Air Ducts and Air Connectors; Underwriters Laboratories Inc.; 2005.

E. UL 181B - Closure Systems for Use with Flexible Air Ducts and Air Connectors; Underwriters Laboratories Inc.; 2005.

1.04 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.

1.05 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.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not apply below 35 degrees F. or above 120 degrees F.

B. Avoid high humidity.

PART 2 PRODUCTS

2.01 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.

2.02 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.

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.

C. Reinforcing Membrane: RCD "Glasscoat" inorganic woven fiberglass reinforcing membrane; conforming to irregular surfaces for sealing and coating thermal insulation, air ducts, return air plenums, equipment, vessels, pipes, and fittings.

1. ASTM D 1668, Type III.
2. Nominal Dry Weight: 1.2 to 2.0 ounces per square yard.
3. Saturated Weight: 1.6 to 2.6 ounces per square yard.
4. Nominal Thread Count: 10 by 20.
5. Breaking Strength, Saturated: 75 warp, 75 fill minimum.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive air duct sealants.

B. Notify Architect of conditions that would adversely affect application of sealants. Do not proceed with application until unsatisfactory conditions are corrected.

3.02 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.

3.03 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

1.01 SECTION INCLUDES

A. Wall exhausters.

1.02 RELATED REQUIREMENTS

A. Section 23 31 00 - HVAC Ducts and Casings.

B. Section 23 33 00 - Duct Accessories: Backdraft dampers.

C. Division 26 - Electrical: Equipment Wiring.

1.03 REFERENCE STANDARDS

A. 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.

B. AMCA 300 - Reverberation Room Methods of Sound Testing of Fans; 2024.

C. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2022.

D. NEMA MG 00001 - Motors and Generators; 2024.

E. UL 705 - Power Ventilators; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.

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.

1.05 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.

1.06 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

2.01 MANUFACTURERS

A. Acme.

B. Captive Aire.

C. Greenheck.

D. Loren Cook Company.

E. Twin Cities Blower.

F. Pennbarry.

G. Substitutions: See Section 23 01 00 - General HVAC Provisions.

2.02 POWER VENTILATORS - GENERAL

A. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.

B. Sound Ratings: AMCA 301, tested to AMCA 300, and bearing AMCA Certified Sound Rating Seal.

C. Fabrication: Conform to AMCA 99.

D. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.

E. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.03 WALL EXHAUSTERS

A. Performance Ratings:

1. Refer to fan schedule on plan sheet for fan performance.

B. Fan Unit: V-belt or direct driven with spun aluminum housing; resiliently mounted motor; 1/2 inch mesh, 0.062 inch thick aluminum wire bird screen.

C. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor and solid state speed controller.

D. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked.

E. Sheaves: For V-belt drives, provide 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.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install backdraft dampers on outlet to wall exhausters.

3.02 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

SECTION 23 37 00
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sqaure ceiling diffusers.

B. Registers/grilles.

1. Ceiling-mounted, egg crate exhaust and return register/grilles.

C. Louvers:

1. Stationary.

a. Air measuring station louvers.

b. Combination louvers.

1.02 REFERENCE STANDARDS

A. AHRI 880 (I-P) - Performance Rating of Air Terminals; 2017 (Reaffirmed 2023).

B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2023.

C. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Air Inlets; 2023.

1.03 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.

1.04 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

B. Test and rate louver performance in accordance with AMCA 500-L.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Air Devices, Inc.

B. Carnes Company HVAC.

C. Air Concepts.

D. Krueger.

E. Nailor.

F. Price Industries.

G. Ruskin.

H. Titus.

I. Tuttle-Bailey.

J. Substitutions: See Section 23 01 00 - General HVAC Provisions.

2.02 SQAURE CEILING DIFFUSERS

A. Type: Provide high performance 3-cone diffuser diffuser to discharge air in 360 degree pattern .

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 drawings.

E. See Air Distribution Schedule on drawings for details and accessories.

2.03 CEILING RETURN REGISTERS/GRILLES

A. Type: Streamlined blades, 1/2 inch minimum depth, 1/2 inch maximum spacing, with blades set at 35 degrees deflection, 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. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans, where indicated on plans.

F. See Air Distribution Schedule on drawings for details and accessories.

2.04 LOUVERS

A. Manufacturers:

1. Greenheck.

2. Ruskins.

3. Pottorff.

4. Substitutions: See Sections 23 01 00 - General HVAC Provisions.

B. Type: 6 inch deep with blades on 45 degree slope , heavy channel frame, 1/4 inch square mesh screen over exhaust and 1/4 inch square mesh screen over intake.

C. Type: Combination louver/dampers, drainable type with drain gutters in each blade and downspouts in jambs and mullions. 6 inch deep with blades on 37 degree slope. 1/4 inch square mesh screen over exhaust and 1/4 inch square mesh screen over intake.

D. Color: As shown on the drawings.

E. Fabrication: 12 gage thick extruded aluminum, welded assembly, with finish as indicated on Air Distribution Schedule.

F. Mounting: Furnish with exterior flat flange for installation.

2.05 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

3.01 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.

3.02 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

SECTION 23 51 23
BREECHINGS, CHIMNEY, AND STACKS FOR CONDENSING APPLIANCES

PART 1- GENERAL

1.01 SUMMARY

A. Section Includes:

1. Venting for the removal of products of combustion for Category II, III, IV gas burning appliances

1.02 REFERENCES

A. Underwriters Laboratories (UL):

1. UL1738

B. National Fire Protection Association (NFPA):

1. NFPA 54 - National Fuel Gas Code

1.03 QUALITY ASSURANCE

A. Comply with NFPA 54

B. Must install duct in accordance to manufacturer's listings and installation instructions.

C. Components coming in contact with the products of combustion shall carry the appropriate UL or cUL listing, mark or label.

1.04 WARRANTY

A. Condensing Appliance vent listed to UL1738 shall have a limited lifetime warranty to begin at the date of installation. Any portion of the vent repaired or replaced under warranty shall be warranted for the remainder of the original warranty period.

PART 2- PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Metal Fab, Inc.

B. Substitutions: See Section 23 01 00 - General HVAC Provisions.

2.02 LISTED VENTING FOR CONDENSING APPLIANCES

A. The condensing appliance vent shall be double-wall for use with Category II natural draft appliances and Category III or IV positive pressure appliances.

B. Maximum temperature shall not exceed 550° F (288° C).

C. Vent shall be listed for an internal static pressure of 6” w.g. and tested to 15” w.g. for diameters 6-36 inches and 10” w.g. for diameters 3-5.

D. Vent shall be constructed of a material tested to UL1738, .015 thickness for 3”-12” diameters, .024 thickness for 14” to 24” diameters, and .035 thickness for 26” to 36” diameters.

E. Outer casing shall be constructed of aluminized steel of .018 thickness for 3”to 12” diameters, .024 thickness for 14” to 24” diameters, and .035 thickness for 26” to 36” diameters.

F. Condensing appliances may be vented with schedule 40 PVC if approved by equipment manufacturer.

PART 3-EXECUTION

3.01 STORAGE AND CONSTRUCTION

A. Protect materials from accidental damage.

B. All supports, roof or wall penetrations, terminations, appliance connectors and drain fittings required to install the vent system shall be included.

C. Joint assembly utilizes flanged mating surfaces with a factory supplied gaskets for diameters 6” through 24”, for diameters 26” to 36” P070 sealant will be used on the flange surface. Flanges are joined with a vee band secured by tightening draw bolts. Diameters 3-5 inch utilize a snap-lock, gasketed connection.

D. Where exposed to weather, the outer closure band shall be sealed to prevent moisture from entering the space between the walls.

E. All parts exposed to the weather shall be protected by one (1) coat of corrosion and heat resistant base primer and one (1) coat of heat resistant paint unless constructed of 430, 304 or 316 stainless steel.

F. Vent shall terminate in accordance with installation instructions and local codes.

G. Installation shall conform to manufacturers installation instructions.

END OF SECTION

SECTION 23 55 32
FUEL FIRED UNIT HEATERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Gas fired unit heaters.

1.02 RELATED REQUIREMENTS

A. Section 22 10 05 - Plumbing Piping.

B. Section 23 51 23 - Breechings, Chimneys, and Stacks and stacks for Condensing Appliances.

C. Section 23 31 00 - Ducts.

D. Division 26 - Electrical: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. ASHRAE Std 103 - Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers; 2022, with Errata (2025).

B. NFPA 54 - National Fuel Gas Code; 2024.

C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

D. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.

E. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances; 2024.

1.04 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.

F. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner s name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.

1.06 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

B. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

PART 2 PRODUCTS

2.01 UNIT HEATER MANUFACTURERS

A. Modine Manufacturing Company.

B. Sterling HVAC/Mestek Technology, Inc.

C. Reznor/Thomas & Betts Corporation.

D. Substitutions: See Section 23 01 00 - General HVAC Provisions.

2.02 GAS FIRED UNIT HEATERS

A. Unit Heaters: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heat exchanger, burner, controls, and accessories:

1. Heating: Natural gas fired.

2. Discharge Louvers: Individually adjustable horizontal louvers to match cabinet finish.

B. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors, glass fiber insulation and reflective liner.

C. Supply Fan: Propeller type with direct drive .

D. Heat Exchanger: 4 pass serpentine style steel welded construction.

E. Gas Burner:

1. Atmospheric type with adjustable combustion air supply,

2. Gas valve provides 100 percent safety gas shut-off; 24 volt combining pressure regulation, safety pilot, manual set (On-Off), pilot filtration, automatic electric valve.

3. Electronic pilot ignition, with hot surface igniter.

4. Non-corrosive combustion air blower with permanently lubricated motor.

5. Combination combustion air and vent system.

F. Gas Burner Safety Controls:

1. Thermocouple sensor: Prevents opening of gas valve until pilot flame is proven and stops gas flow on ignition failure.

2. Flame rollout switch: Installed on burner box and prevents operation.

3. Vent safety shutoff sensor: Temperature sensor installed on draft hood and prevents operation, manual reset.

4. Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on excessive bonnet temperature, automatic resets.

G. Operating Controls

1. Supply Fan Control: Energize from bonnet temperature independent of burner controls, with adjustable timed off delay and fixed timed on delay, with manual switch for continuous fan operation.

H. Performance:

1. Ratings: Energy Efficiency Rating (EER)/Coefficient of Performance (COP) not less than requirements of ASHRAE Std 90.1; seasonal efficiency to ASHRAE Std 103, or as indicated on the plans.

2. Refer to Unit Heater Schedule. Gas heating capacities are sea level ratings.

2.03 ROOM THERMOSTATS

A. Manufacturers:

1. Honeywell.

2. Johnson Controls, Inc.

3. Siemens Building Technologies, Inc.

4. Substitutions: See Section 23 01 00 - General HVAC Provisions.

B. Adjustable Room Thermostat: High voltage, to control burner operation, and to maintain temperature setting.

PART 3 EXECUTION

3.01 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.

C. Verify that proper fuel supply is available for connection.

3.02 INSTALLATION

A. Install in accordance with NFPA 90A and NFPA 90B.

B. Install gas fired units in accordance with NFPA 54 and applicable codes.

C. Provide vent connections in accordance with NFPA 211. Refer to Section 23 51 23.

D. Install unit heaters with vibration isolation.

E. Provide connection to electrical power systems; refer to Division 26.

3.03 SCHEDULES

A. Fuel Fired Unit Heaters

1. Refer to plan Schedule.

END OF SECTION

SECTION 23 55 34
ELECTRIC HEATERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electric recessed ceiling mount heaters

1.02 RELATED REQUIREMENTS

A. Division 26 - Electrical.

1.03 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.

1.04 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.

F. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner s name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.07 WARRANTY

A. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

PART 2 PRODUCTS

2.01 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.

2.02 ELECTRIC RECESSED CEILING MOUNT HEATERS

A. Contractor shall supply and install heavy duty ceiling mounted forced air electric heater, wattage indicated on the plans. The heater shall be so designed to provide an even distribution of heated air to the space to be heated by drawing return air in the periphery of the heater, across and through the element and be discharged from the center section of the heater by means of an electric motor and axial flow fan blade.

B. Heater shall be recessed type and mounted flush with the finished ceiling. The return grille assembly shall be constructed of a one piece heavy gauge steel with 1/4” slots for return air and concentric rings for uniform air discharge. Grille assembly shall be attached to chassis by tamper-resistant (allenhead) machine screws. All parts of enclosures shall be heavy gauge steel, zinc coated both sides and finished in neutral off white powder coat paint

C. Encosure shall be constructed of 1/6 x 3/8' rounded edges horizontal steel louvers which shall be spaced for maximum openig of 5/16". Louvres shall be welded at every intersection to evenly spaced 1/8" diamter vertical member. Discharge grille to have concentric rings for uniform air discharge. Grille assembly shall be attached to chasis by tamper-resistant (allen head) machine screws. All parts of enclosure shall be heavy guage steel Zinc coated both ides and finishd in neutral off white colored powder coat finished.

D. Motor shall be permanently lubricated, unit bearing, totally enclosed, with impedance protection. Motors shall operate at no more than 1300 RPM and shall be same voltage as the heater.

E. Heatr shall have rating of 600 CFM at 1,000 F.P.M. with a maximum temperature rise of degree Fahrenheit and 63.9 dB soung level.

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 Nickle Chromium alloy resistant wire completed embedded in and surrounded by magnesium oxide, enclosed and wedged into corrosion resistant steel sheaths. Elements shall have 2” cold conductor pins extending into 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. Heaters shall be ETL listed.

H. Accessories:

1. Factory installed controls

a. Disconnect.

b. Low voltage transformer and control relay.

2.03 ROOM THERMOSTATS

A. Manufacturers:

1. Honeywell.

2. Johnson Controls, Inc.

3. Siemens Building Technologies, Inc.

4. Substitutions: See Section 15010 - General Provisions.

B. Adjustable Room Thermostat: Low voltage, to control burner operation, and supply fan to maintain temperature setting.

PART 3 EXECUTION

3.01 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.

3.02 INSTALLATION

A. Install in accordance with NFPA 90A and NFPA 90B.

B. Provide connection to electrical power systems.

3.03 SCHEDULES

A. Electrical Unit Heaters

1. Refer to plan Schedule.

END OF SECTION

DIVISION 26

SECTION 26 00 10
GENERAL ELECTRICAL PROVISIONS

PART 1 GENERAL

1.01 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.

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.

1.02 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.

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.

1.03 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.

1.04 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.

1.05 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

2.01 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. Molded Case Circuit Breakers.
5. Fuses.
6. Conduit.
7. Wiring Devices.
8. Fusible and Non-Fusible Switches.
9. Fire Alarm Systems and Equipment.
10. Conduit Supports and Fittings.
11. Panelboards.

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.

2.02 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.

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 preceding 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.

2.03 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.

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.

2.04 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 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.

2.05 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

3.01 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 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".

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.

3.02 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:

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.

3.03 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.

3.04 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.

3.05 SYSTEM VOLTAGES

A. System voltage is 120/240 volts, three-phase, four-wire.

3.06 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 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 within thirty (30) days after the awarding of the Contract a complete brochure of shop drawings and descriptive data of all material and equipment, or electronic files.

1. Separate submittals are allowed for lighting, switchboards, fire alarm, and intercom.

2. All other Specification sections are to be combined into one miscellaneous submittal.

3. All submittals shall be transmitted in one package.

D. 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.

E. 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.

F. 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.

G. 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.

H. 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 Contractor of responsibility in the event the material cannot be installed as shown on the drawings.

I. 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.

J. 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.

K. 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.

3.07 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.

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.

3.08 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.

3.09 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.

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

SECTION 26 05 19
WIRES AND CABLES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Wires and cables.

1.02 RELATED WORK

A. Section 26 05 53: Identification.

PART 2 PRODUCTS

2.01 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.

PART 3 EXECUTION

3.01 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: 120/240V (phases) color as required by NEC, (neutral) white, (ground) green. Hi-leg phase conductors (if present) shall be marked per NEC.

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.

3.02 MARKING

A. Identify circuits using wire markers at the following locations:

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

SECTION 26 05 26
GROUNDING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Power system grounding.

1.02 RELATED WORK

A. Section 26 05 19: Wires and Cables.

B. Section 26 05 34: Conduit.

1.03 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

2.01 GROUNDING

A. Provide copper grounding conductors for grounding connections sized according to NEC.

PART 3 EXECUTION

3.01 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.

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.

END OF SECTION

SECTION 26 05 29
SUPPORTING DEVICES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Conduit supports.

PART 2 PRODUCTS

2.01 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 of 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.

2.02 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.

2.03 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.

PART 3 EXECUTION

3.01 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.

END OF SECTION

SECTION 26 05 34
CONDUIT

PART 1 GENERAL

1.01 WORK INCLUDED

A. Conduit and couplings.

B. Flexible conduit.

1.02 RELATED WORK

A. Section 26 05 53: Identification.

PART 2 PRODUCTS

2.01 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.

2.02 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.

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 wals.

G. Conduit on the roof is rigid aluminum.

2.03 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

3.01 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 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.

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.

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.

END OF SECTION

SECTION 26 05 37
OUTLET AND PULL BOXES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Outlet boxes.

B. Pull and junction boxes.

1.02 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

2.01 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.

PART 3 EXECUTION

3.01 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. Low Voltage Data/Voice Outlets: 18" or as directed.

5. Other Outlets: As directed or indicated.

6. Over Counters: 6" above countertop, horizontal at windows or where indicated.

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

SECTION 26 05 53
IDENTIFICATION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide and install identification markers.

1.02 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

2.01 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

3.01 INSTALLATION

A. General: Equip the following items with nameplates:

1. All motors, motor starters, motor control center, push-button stations, control panels, time switches.

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

SECTION 26 05 73
OVERCURRENT PROTECTIVE DEVICES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Fuses.

B. Molded-case circuit breakers.

1.02 RELATED WORK

A. Section 26 24 16: Panelboards.

B. Section 26 28 18: Motor and Circuit Disconnects.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Fuses:

1. Bussman.

2. Littlefuse.

B. Breakers and Relays:

1. Eaton.

2. General Electric.

3. Siemens.

4. Square D.

2.02 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.

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 enegy-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.

2.03 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

3.01 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.

3.02 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

SECTION 26 24 16
PANELBOARDS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Branch circuit panelboards.

1.02 REGULATORY REQUIREMENTS

A. Construct panelboards to UL standards and provide UL labels.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Eaton.

B. ABB/General Electric.

C. Siemens.

D. Square D.

2.02 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.

2.03 120/240 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".

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 sub panels provide units equal to 80 kA per mode.

2. 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.

PART 3 EXECUTION

3.01 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.

E. Arc flash warning labels are to be equal to Brady # 121130 ot Y972346.

END OF SECTION

SECTION 26 27 26
WALL SWITCHES, RECEPTACLES, AND PLATE COVERS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Wall switches.

B. Receptacles.

C. Plate covers.

1.02 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

2.01 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.

2.02 WALL SWITCHES

A. Acceptable Devices

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. Two-pole switches used to control two loads, like lights and exhaust fans in restrooms, must be "rated" for that duty.

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. Two-pole switches used to control two loads, like lights and exhaust fans in restrooms, must be "rated" for that duty.

4. Provide metal barrier between gangs in boxes, where adjacent switches have a potential in excess of 300V between conductors.

2.03 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.

4. Special Outlets: See Plans.

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. Exterior receptacles are to be "GFI" and rated as "weather resistant".

C. Devices: Receptacles in Industrial applications shall be extra heavy duty.

1. Duplex Receptacle: Type 5362, or equal.

2. Duplex Receptacle, Weather Resistant: Type 5362WR, or equal.

3. Single Receptacle, Weather Resistant: Type 5361WR, or equal.

2.04 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.

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

3.01 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

1.01 WORK INCLUDED

A. Provide and install motor and circuit disconnects.

1.02 REGULATORY REQUIREMENTS

A. Conform to National Electrical Code and to applicable inspection authority.

1.03 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

2.01 ACCEPTABLE MANUFACTURERS

A. Eaton.

B. General Electric.

C. Hubbell.

D. Leviton.

E. Square D.

2.02 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.

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.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install motor and circuit disconnect as recommended by manufacturer and as required by Code.

END OF SECTION

SECTION 26 51 00
INTERIOR BUILDING LIGHTING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Installation of luminaires, supports and accessories.

B. Emergency lighting units.

C. Exit signs.

D. Lamps.

E. Drivers and accessories.

1.02 RELATED WORK

A. Section 26 05 19: Wires and Cables.

B. Section 26 05 29: Supporting Devices.

1.03 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.

1.04 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. Installation manuals are required.

1.05 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, 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

2.01 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. 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

2.02 LAMPS

A. 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.

2.03 DRIVERS

A. LED Drivers

1. LED drivers shall be electic-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 strobling or flicker across their full drimming 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

3.01 INSTALLATION

A. Install lamps in accordance with manufacturer's instructions.

B. No "Daisy Chaining" of fixtures is allowed.

C. Install fixtures securely, in a neat and workmanlike manner.

D. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.

E. Support all luminaires independent of ceiling framing, directly from building structure by rod hangers and inserts or suspension wire, two per fixture.

F. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.

G. Install recessed luminaires to permit removal from below.

H. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

I. Install clips to secure recessed grid-supported luminaires in place.

J. Install wall mounted luminaires, emergency lighting units, and exit signs at height as scheduled.

K. Manufactured wiring systems are approved. Provide submittals per Specifications.

3.02 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.

3.03 ALIGNMENT

A. Aim and adjust luminaires.

B. Align luminaires, clean diffusers and replace burned out lamps prior to final acceptance.

3.04 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.

3.05 FINALLY

A. Remove dirt and debris from enclosures.

B. Clean photometric control surfaces as recommended by manufacturer.

C. Clean finishes and touch up damage.

END OF SECTION

SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Installation of luminaires, supports and accessories.

1.02 RELATED WORK

A. Section 26 05 19: Wires and Cables.

B. Section 26 51 00: Interior Building Lighting.

1.03 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.

1.04 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.

1.05 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 indicated.

PART 2 PRODUCTS

2.01 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 replacment 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

3.01 INSTALLATION

A. Install fixtures securely on poles and pole bases as shown on the plans.

3.02 FINALLY

A. Remove dirt and debris from enclosures.

B. Clean photometric control surfaces as recommended by manufacturer.

C. Clean finishes and touch up damage.

END OF SECTION

DIVISION 27

SECTION 27 10 05
CONDUIT FOR TELEPHONE/DATA AND TV RACEWAY SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

A. Telephone/Data and TV raceway system.

1.02 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.

1.03 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.

PART 2 PRODUCTS

2.01 MATERIALS

A. Conduit: Refer to Section 26 05 34.

B. Outlet and Pull Boxes: Refer to Section 26 05 37.

PART 3 EXECUTION

3.01 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 stainless steel 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 and shall be painted blue.

D. All device plates are to be stainless steel.

END OF SECTION

DIVISION 28

SECTION 28 31 06
EXISTING FIRE ALARM SYSTEM

PART 1 GENERAL

1.01 SCOPE AND RELATED DOCUMENTS

A. The work covered by this section of the specifications includes the furnishing of all labor, equipment, materials, and performance of all operations in connection with the installation of the Fire Alarm System as shown on the drawings and as herein specified.

B. The requirements of the conditions of the Contract, Supplementary Conditions and General Requirements, apply to the work specified in this section.

C. The complete installation is to conform to the applicable sections of NFPA-72, Local Code Requirements and National Electrical Code with particular attention to Article 760 and all other applicable regulatory requirements.

D. This Contractor is to modify the system design as necessary to be Code compliant and compliant with the local Authority Having Jurisdiction.

E. The work covered by this section of the specifications is to be coordinated with the related work as specified elsewhere under the project specifications.

1.02 REGULATORY REQUIREMENTS

A. The system and all associated operations shall be installed in accordance with the following:

1. Guidelines of the following Building Code: IBC.

2. NFPA 72, National Fire Alarm Code.

3. NFPA 70, National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

4. Other applicable NFPA standards.

5. Local Jurisdictional Adopted Codes and Standards.

6. ADA Accessibility Guidelines.

B. Equipment: All devices, combinations of devices, notification appliances, and equipment, shall be listed for the purpose for which they are used and shall be installed in compliance with applicable codes and standards.

C. Type of System: Field verify existing conditions.

1.03 SYSTEM DESCRIPTION

A. Fire Alarm System:

1. Provide all devices and wiring necessary to connect to the existing control panel.

1.04 QUALIFICATIONS

A. Installer: The installation organization shall be a company specializing in the installation of detection and alarm systems. This organization shall have a minimum of 10 years experience with installation of fire detection and alarm systems. The fire alarm system shall be installed by NICET certified installers, one employee being Nicet Level III or greater.

1.05 SUBMITTALS

A. Submit manufacturer product data sheets for all proposed devices and equipment.

B. Provide wiring diagrams, equipment ratings, dimensions, and finishes for all proposed devices and equipment.

C. If submittals, upon review by the Owner and/or the Owners Representative, are found not to conform with the performance, type and quality of products as well as all other requirements of these specifications, the Contractor shall be required to resubmit. The Contractor shall be responsible for the Owner's extra expenses for subsequent review(s) of rejected submittals. Such extra fees shall be deducted from payments by the Owner to the Contractor. Approval of the submittals by the Owner shall, in no case, relieve the Contractor of the responsibility to meet the requirements of this specification.

1.06 PROJECT RECORD (AS-BUILT) DRAWINGS

A. The Contractor shall provide and maintain on the site an up-to-date record set of approved shop drawings.

B. Record drawings shall include location of end-of-line device locations.

C. Upon completion of the work, and final acceptance by the local authority, the Contractor shall submit record drawings to the Owner and the Engineer.

1.07 OPERATION AND MAINTENANCE DATA

A. Submit Manufacturer data sheets for all equipment installed.

B. Include operating, installation, and routine maintenance instructions.

C. Include Manufacturer's letter stating the date of installation on which the system is operational.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Same as or compatible with existing equipment.

2.02 MANUAL PULL STATIONS

A. Description: Double-action type, red LEXAN or metal finished in red, with molded, raised-letter operating instructions of contrasting color. Station will mechanically latch upon operation and remain so until manually reset by opening with a key common with the control units.

B. Protective Shield: Provide a tamperproof, clear LEXAN shield and red frame that easily fit over manual pull stations. When shield is lifted to gain access to the station, a battery powered piercing warning horn shall be activated. The horn shall be silenced by lowering and realigning the shield. The horn shall provide 85dB at 10 feet and shall be powered by a 9 VDC battery.

2.03 SMOKE DETECTORS

A. General: Comply with UL 268, "Smoke Detectors for Fire Protective Signaling Systems." Include the following features:

1. Factory Nameplate: Serial number and type identification.

2. Operating Voltage: 24 VDC, nominal.

3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore normal operation.

4. Plug-In Arrangement: Detector and associated electronic components are mounted in a module that connects to a fixed base with a twist-locking plug connection. Base shall provide break-off plastic tab that can be removed to engage the head/base locking mechanism. No special tools shall be required to remove head once it has been locked. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control unit.

5. Environmental Compensation: The detector shall provide a software filtering process that automatically compensates for environmental factors and component aging that affect detector operation.

6. Each detector head shall contain an LED that will flash each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the detector head LED shall be on steady.

7. Each detector base shall contain a magnetically actuated test switch to provide for easy alarm testing at the detector location and for accessing detector status information. Off-normal conditions shall be indicated by specific identifiable detector LED pulse patterns.

B. Smoke Detectors: A maintenance and testing service providing the following shall be included with the base bid:

1. Biannual sensitivity reading and logging for each smoke sensor.

2. Scheduled biannual threshold adjustments to maintain proper sensitivity for each smoke sensor.

3. Threshold adjustment to any smoke sensor that has alarmed the system without the presence of particles of combustion.

4. Scheduled biannual cleaning or replacement of each smoke detector or sensor within the system.

5. Semi-annual functional testing of each smoke detector or sensor using the manufacturer's calibrated test tool.

6. Written documentation of all testing, cleaning, replacing, threshold adjustment, and sensitivity reading for each smoke detector or sensor device within the system.

7. The initial service included in the bid price shall provide the above listed procedures for a period of five years after owner acceptance of the system.

C. Type: Smoke detectors shall be of the photoelectric type. Where acceptable per manufacturer specifications, ionization type detectors may be used.

D. Duct Smoke Detector: Photoelectric type, with sampling tube of design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied.

1. The detector shall provide on-board sensitivity drift compensation and dirt accumulation tracking.

2. A magnetic test function shall initiate an alarm and provide detailed diagnostic information using the detector status LED.

3. The detector shall provide a multi-function status LED indicator that indicates off-normal conditions by specific identifiable detector LED pulse patterns.

4. The duct housing shall provide a supervised relay driver circuit for driving up to 15 relays with a single "Form C" contact rated at 7A@ 28VDC or 10A@ 120VAC or an auxiliary alarm relay with two "Form C" contacts rated at 1A@ 28VDC or ½A@ 120 VAC resistive. This auxiliary relay operates when the detector reaches its alarm threshold. Relay shall be mounted within 3 feet of HVAC control circuit.

5. Duct housing shall provide a relay control trouble indicator yellow LED.

6. Compact duct housing shall have a transparent cover to monitor for the presence of smoke. Cover shall secure to housing by means of four (4) captive fastening screws.

7. Duct housing shall provide two (2) test ports for measuring airflow and for testing. These ports will allow aerosol injection in order to test the activation of the duct smoke detector.

8. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housing front cover.

9. Each duct detector shall have a Remote Test Station with an alarm LED and test switch.

2.04 HEAT DETECTORS

A. Thermal Detector: Combination fixed-temperature and rate-of-rise unit with plug-in base and alarm indication lamp; 135-deg F fixed-temperature setting except as indicated.

B. Thermal detector shall be of the epoxy encapsulated electronic design. It shall be thermistor-based, rate-compensated, self-restoring and shall not be affected by thermal lag.

2.05 MAGNETIC DOOR HOLDERS

A. Description: Units shall be listed to UL 228. Units are equipped for wall or arm mounting as indicated and are complete with matching doorplate. Unit shall operate from a 120VAC, a 24VAC or a 24VDC source, and develops a minimum of 25 lbs. holding force.

B. Material and Finish: Match door hardware.

C. Provide at all fire wall doors. Coordinate with the Architectural Life Safety Plan.

D. Provide type as appropriate for door style and location.

2.06 STANDARD ALARM NOTIFICATION APPLIANCES

A. Horn: Piezoelectric type horn shall be listed to UL 464. The horn shall have a minimum sound pressure level of 85 dBA @ 24VDC. The horn shall mount directly to a standard single gang, double gang or 4" square electrical box, without the use of special adapter or trim rings.

B. Visible/Only: Strobe shall be listed to UL 1971. The V/O shall consist of a xenon flash tube and associated lens/reflector system. The V/O enclosure shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings. V/O appliances shall be provided with different minimum flash intensities of 15cd, 75cd and 110cd. Provide a label inside the strobe lens to indicate the listed candela rating of the specific Visible/Only appliance.

C. Audible/Visible: Combination Audible/Visible (A/V) Notification Appliances shall be listed to UL 1971 and UL 464. The strobe light shall consist of a xenon flash tube and associated lens/reflector system. Provide a label inside the strobe lens to indicate the listed candela rating of the specific strobe. The horn shall have a minimum sound pressure level of 85 dBA @ 24VDC. The audible/visible enclosure shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings.

D. Notification Appliance Circuit provides synchronization of strobes at a rate of 1Hz and operates horns with a Temporal Code Pattern operation. The circuit shall provide the capability to silence the audible signals, while the strobes continue to flash, over a single pair of wires. The capability to synchronize multiple notification appliance circuits shall be provided.

E. Accessories: The contractor shall furnish the necessary accessories.

F. Provide ceiling mounted devices where indicated on the plans.

2.07 FIRE ALARM WIRE AND CABLE

A. All wire and cable shall be in strict compliance with local codes and the provisions of NEC Article 760 for Power-limited Fire Alarm Circuits.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

A. Install system components and all associated devices in accordance with applicable NFPA Standards and manufacturer's recommendations.

B. Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems. Examples of qualified personnel shall include, but not be limited to, the following:

1. Factory trained and certified personnel.

2. National Institute of Certification in Engineering Technologies (NICET) fire alarm level III certified personnel.

3. Personnel licensed or certified by state or local authority.

3.02 EQUIPMENT INSTALLATION

A. Furnish and install a complete Fire Alarm System as described herein and as shown on the plans. Include sufficient manual stations, automatic fire detectors, smoke detectors, audible and visible notification appliances, wiring, terminations, electrical boxes, and all other necessary material for a complete operating system.

B. Device Location-Indicating Lights: Locate in the public space immediately adjacent to the device they monitor.

C. All necessary devices and wiring which are necessary for a complete, acceptable system shall be supplied regardless whether shown on the plans or not.

D. Provide zone cards and all other equipment necessary for expansion.

E. Provide wire guards to protect all devices installed in gymnasiums and areas subject to physical abuse.

3.03 WIRING INSTALLATION

A. System Wiring: Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction and shall be installed in accordance with the appropriate articles from the current approved edition of NFPA 70: National Electric Code (NEC); National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. Contractor shall obtain from the Fire Alarm System Manufacturer written instruction regarding the appropriate wire/cable to be used for this installation. No deviation from the written instruction shall be made by the Contractor without the prior written approval of the Fire Alarm System Manufacturer.

C. Color Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color code for alarm initiating device circuits wiring and a different color code for supervisory circuits. Color-code notification appliance circuits differently from alarm-initiating circuits. Paint fire alarm system junction boxes and covers red.

D. Wire installed in open ceiling areas shall be installed in conduit.

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.

B. Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include, but shall not be limited to, individuals with the following qualifications:

1. Factory trained and certified.

2. National Institute for Certification in Engineering Technologies (NICET) fire alarm certified, NICET Level III minimum.

3. Certified by a state or local authority.

4. Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.

C. Pretesting: Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.

D. Final Test Notice: Provide a 10-day minimum notice in writing when the system is ready for final acceptance testing.

E. Minimum System Tests: Test the system according to the procedures outlined in NFPA 72.

F. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

G. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log.

H. Final Test, Certificate of Completion, and Certificate of Occupancy:

1. Test the system as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy.

3.05 CLEANING AND ADJUSTING

A. Cleaning: Remove paint splatters and other spots, dirt, and debris. Clean unit internally using methods and materials recommended by manufacturer.

B. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels and adjusting controls and sensitivities to suit actual occupied conditions. Provide up to three visits to the site for this purpose.

3.06 TRAINING

A. Provide the services of a factory-authorized service representative to demonstrate the system and train Owner's maintenance personnel as specified below.

1. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of the system. Provide a minimum of eight hours training.

2. Schedule training with the Owner at least seven days in advance.

END OF SECTION

DIVISION 31

SECTION 31 00 00

EARTHWORK

PART 1 - GENERAL

Drawings, Geotechnical Investigation Report, Standard General Conditions of Contract, Special Conditions and Division-1 Specification sections, apply to work of this section.

1.1 DESCRIPTION

A. Staking

B. Excavation

C. Filling

D. Preparation of Raw Subgrade

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Geotechnical Investigation

B. Section 32 91 19 Topsoil

1.3 PROTECTION

A. Protect all reference points, benchmarks and property corner monuments from damage or dislocation. Replace or repair immediately all points damaged, destroyed or dislocated.

B. Sprinkle and dampen all dusty material from the beginning of work to its completion.

C. Protect and maintain all conduits, inlets, sewers, pipes and wires that are to remain.

D. Provide, erect and maintain all lights, barricades, warning signs and guards as necessary for the protection of roads, sidewalks and all adjoining structures.

E. Shore and use sheet piling to prevent caving of earth banks and side walls of trenches as required by OSHA and State Regulations for safety.

F. Cover holes and trenches when work is not in progress. Fence or barricade changes of grade more than 45º and more than three feet in height.

G. Remove shoring, sheet piling and protection as work progresses. Temporary wood shall not be left in concrete or fill.

H. Keep trenches and excavated areas free from water by pumping or draining. Grade to drain surface water away from excavations, distributing discharge to prevent excessive erosion.

I. Protect adjacent lawn or surface areas outside the construction limits from damage. If damaged as a result of building operations or storage of materials, clear off debris and restore it to original grades and condition.

J. Protect finished subgrade from erosion, as directed by the Owner's Representative Engineer, by the use of organic erosion netting or fabric and/or the use of hay bale barricades. All areas of erosion are to be repaired and compacted by the contractor and approved by the Owner's Representative.

1.4 CLASSIFICATION OF EXCAVATION

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

1.5 DEFINITIONS

A. Satisfactory Materials

Materials classified in Unified Soil Classification System as GW, SP, GC, GM, SW, SP, SM, SC, CL and CH.

B. Unsatisfactory Materials

Materials classified in Unified Soil Classification System as Pt, OH, OL, ML and MH.

C. Cohesionless and Cohesive Materials

Cohesive materials include materials classified as GC, SC, ML, CL MH and CH. Cohesionless materials include materials classified in Unified Soil Classification System as GW, GP, SW and GP. Materials classified as GM and SM will be identified as cohesionless only when the fines have a plasticity index of zero. Testing required for classifying materials shall be in accordance with ASTM C136, D422 and D1140.

D. Degree of Compaction

Degree of compaction is a percentage of the maximum density obtained by the test procedure presented in ASTM D698.

E. Topsoil

Topsoil shall be defined as natural, friable surface soil possessing the characteristics of representative soils in the vicinity that produce heavy growth of crops, grass, or other vegetation.

F. Existing Grades

Existing grades shall be defined as grades which are represented by contours on the drawings.

1.6 BLASTING

Blasting will be permitted.

1.7 UTILIZATION OF EXCAVATED MATERIALS

All unsatisfactory materials removed from excavations shall be disposed of onsite as directed by the Geotechnical Engineer. Satisfactory material removed from excavations shall be used, insofar as practicable, in the construction of fills, subgrades, bedding, and for similar purposes. No satisfactory excavated material shall be wasted without specific written authorization. No excavated material shall be disposed of in such a manner as to endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

1.8 FIELD TESTING CONTROL

Field density testing shall be performed by an Independent Testing Laboratory selected by the Contractor and approved by the Owner. Costs of initial testing will be paid by the Contractor. Should the material fail to meet the specified density, material shall be scarified, recompacted and tested until specified densities are obtained. All subsequent testing of material shall be paid for by the Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Approved Excavated Material and Select Fill

Excavated material determined by the testing laboratory to be suitable for use in embankment and backfill shall be used after freeing it of rock larger than 8-inches in greatest dimension for backfill.

B. Clayey sands free of organic materials and having a plasticity index between 4 and 15, a liquid limit of 40 or less and between 20 and 45 percent passing a No. 200 sieve. Submit tests to Engineer as directed, verify that selected fill meets these requirements.

PART 3 - EXECUTION

3.1 GENERAL

A. Construction surveying, staking and layout shall be performed at the Contractor's expense by a surveyor licensed in the State of Arkansas (RPS).

B. The rough grading shall be performed to the lines and elevations indicated on the drawings in accordance with these specifications. Should the Contractor, through negligence or other fault, excavate below the designated lines, he shall replace the excavation with approved materials, in an approved manner and condition, at his own expense. The Owner's Representative shall have complete control over the excavation, moving, placing and disposition of all materials and shall determine the suitability of material to be placed in embankments. All material determined unsuitable shall be disposed of off-site or in waste areas as directed. Topsoil shall not be used in fills or in subgrades but shall be stockpiled, handled, and placed as directed.

C. The Contractor shall inform and satisfy himself as to the character, quantity, and distribution of all material to be excavated.

D. If it is necessary to interrupt existing surface drainage, sewers or underdrainage, conduits, utilities or similar underground structure, or parts thereof, the Contractor shall

be responsible for and shall take all necessary precautions to protect and preserve or provide temporary services. When such facilities are encountered, the Contractor shall notify the Consultants who shall arrange for their removal, if necessary. The Contractor shall, at his own expense, satisfactorily repair all damage to such facilities or structures which may result from any of his operations during the period of the contract.

3.2 STRIPPING OF TOPSOIL

A. As directed by the Owner's Representative, topsoil shall be stripped. Topsoil shall be transported and deposited in stockpiles. Topsoil shall be kept separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 2-inches in diameter, and other materials that would interfere with planting and maintenance operations.

3.3 EXCAVATION

A. The Contractor shall perform excavation of every type of material encountered within the limits of the project to the lines, grades and elevations indicated and as specified herein. Grading shall be in conformity with the drawings and the tolerances specified in Paragraph 3.08 - Finishing. Satisfactory excavated materials shall be transported to and placed in fill within the limits of the work. Unsatisfactory materials encountered within the limits of the work shall be excavated below grade and replaced with satisfactory materials as directed. Unsatisfactory excavated material shall be incorporated into fills onsite as directed. During construction, excavation and fill shall be performed in a manner and sequence that will provide proper drainage at all times.

3.4 BACKFILL

Backfill adjacent to any and all types of structures shall be placed and compacted to at least 95 percent of its maximum dry density in accordance with ASTM D698, at optimum moisture minus 2 point to plus 2 points, in such a manner as to prevent wedging action or eccentric loading upon or against any structure. Ground surface on which backfill is to be placed shall be prepared as specified in Paragraph 3.5 - Preparation of Ground Surface for Fill. Compaction requirements for backfill materials shall also conform to the applicable portion of Paragraphs 3.5 - Preparation of Ground Surface for Fill, 3.6 - Fills, and 3.7 - Raw Subgrade Preparation, below. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel wheeled rollers, vibratory compactors, or other approved equipment well-suited to the material being compacted.

3.5 PREPARATION OF GROUND SURFACE FOR FILL

Ground surface on which fill is to be placed shall be stripped of live, dead or decayed vegetation, rubbish, debris, and other unsatisfactory material; plowed, disked, or otherwise broken up; pulverized; moistened or aerated as necessary; thoroughly mixed; and compacted to at least 95 percent of maximum density at paved areas and a maximum of 90% at turf areas in accordance with ASTM D698, at a moisture content between the optimum moisture value and 5 percent above optimum. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment well-suited to the material being compacted. The prepared ground surface shall be scarified and moistened or aerated as required just prior to placement of fill materials to assure adequate bond between fill and the prepared ground surface.

3.6 FILLS

Earth Fills: Earth fills shall be constructed from satisfactory materials free of organic or frozen material and rocks with any dimension greater than 8 inches. The material shall be placed in successive horizontal layers of loose material not more than 8 inches in depth. Each layer shall be spread uniformly on a soil surface that has been moistened or aerated as necessary and scarified or otherwise broken up in such a manner that the fill will bond with the surface on which it is placed. After spreading, each layer shall be plowed, disked, or otherwise broken up; moistened or aerated as necessary; thoroughly mixed; and compacted to at least 95 percent of its maximum dry density, at moisture contents between optimum and 5 percent above optimum. Compaction requirements for the upper portion of earth fills forming subgrade for pavements shall be identical with those requirements specified in Paragraph 3.7 - Raw Subgrade Preparation. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment well-suited to the material being compacted.

3.7 RAW SUBGRADE PREPARATION

A. Construction

Raw subgrade shall be shaped to line, grade and cross section and compacted as specified. This operation shall include plowing, disking and any moistening or aerating required to contain specified compaction. Soft or otherwise unsatisfactory material shall be removed and replaced with satisfactory excavated material or other approved material as directed. Rock encountered in the cut section shall be excavated to a depth of 6-inches below finished grade for the raw subgrade. Low areas resulting from removal of unsatisfactory material or excavation of rock shall be brought up to required grade with satisfactory materials, and the entire subgrade shall be shaped to line, grade and cross section and compacted as specified.

B. Compaction

Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment well-suited to the material being compacted. Subgrade shall be compacted to at least 95% of its maximum dry density in accordance with ASTM D698, at a moisture content between optimum and 5% above the optimum moisture value, for a minimum depth of 6-inches.

3.8 FINISHING

The surface of all excavations, fills, and raw subgrades shall be finished to a smooth and compact surface in accordance with the lines, grades and cross sections or elevation shown. The degree of finish for all graded areas under buildings shall be within 0.1 foot of the grades and elevations indicated. The degree of finish for all other graded areas shall be within 0.3 foot of the grades and elevations indicated All finish grades will be checked by an Owner's representative in a random manner, as to insure proper grades prior to approval of the work.

3.9 RAW SUBGRADE AND FILL OR EMBANKMENT PROTECTION

During construction, fills and excavations shall be kept shaped and drained. Ditches and drains along raw subgrade shall be maintained in such a manner as to drain effectively at all times. The finished raw subgrade shall not be disturbed by traffic or other operation and shall be protected and maintained by the Contractor in a satisfactory condition.

END OF SECTION

SECTION 31 22 00

GRADING

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Removal and storage of topsoil.

B. Rough grading and excavating the site for site structures, building pads, and paving.

C. Finish grading.

1.02 RELATED SECTIONS

A. Section 00 30 10 - Geotechnical Investigation.

B. Section 02 20 00 - Site Preparation.

C. Section 31 23 16 - Excavation.

D. Section 31 23 23 - Fill and Backfill: Filling and compaction.

E. Section 31 23 17 - Trenching for Site Utilities: Trenching and backfilling for utilities.

1.03 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.04 PROJECT CONDITIONS

A. Protect above- and below-grade utilities that remain.

B. Protect plants, lawns, and other features to remain as a portion of final landscaping.

C. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from grading equipment and vehicular traffic.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Topsoil: Topsoil excavated on-site.
   1. Graded.
   2. Free of roots, rocks larger than 1 inch, subsoil, debris, large weeds and foreign matter.

B. Other Fill Materials: See Section 31 23 23.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify that survey benchmark and intended elevations for the Work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect utilities that remain from damage.

3.03 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

C. Do not remove wet subsoil unless it is subsequently processed to obtain optimum moisture content.

D. See Section 31 23 23 for filling procedures.

E. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key fill material to slope for firm bearing.

F. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

3.04 SOIL REMOVAL

A. Stockpile excavated topsoil on site or incorporate into fill as directed.

B. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion.

3.05 FINISH GRADING

A. Before Finish Grading:
   1. Verify building and trench backfilling have been inspected.
   2. Verify subgrade has been contoured and compacted.

3.06 TOLERANCES

A. Top Surface of Subgrade: Plus, or minus 1/10 foot from required elevation under building.

B. Top Surface of Subgrade: Plus, or minus 3/10 foot except as above.

3.07 FIELD QUALITY CONTROL

A. See Section 31 23 23 for compaction density testing.

3.08 CLEANING AND PROTECTION

A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.

B. Leave site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 31 23 16

EXCAVATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Excavating footings, slabs-on-grade, paving, site structures, and utilities within the building.

B. Trenching for utilities outside the building.

1.02 RELATED SECTIONS

A. Section 00 3110 - Geotechnical Investigation

B. Section 31 23 17 - Trenching for Site Utilities: Excavating for utility trenches outside the building to utility main connections.

C. Section 31 23 23 - Fill and Backfill: Fill materials, filling, and compacting.

D. Section 31 22 00 - Grading: Soil removal from surface of site.

1.03 PROJECT CONDITIONS

A. Verify that survey benchmark and intended elevations for the Work are as indicated.

B. Protect plants, lawns, and other features to remain.

C. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect them from damage.

C. Notify the utility company to remove and relocate utilities.

3.02 EXCAVATING

A. Excavate to accommodate new structures and construction operations in accordance with requirements of the geotechnical investigation and as indicated on Drawings.

B. Notify Architect and geotechnical engineer of unexpected subsurface conditions and discontinue Work in affected area until notified to resume work.

C. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

D. Do not interfere with 45 degree bearing splay of foundations.

E. Cut utility trenches wide enough to allow inspection of installed utilities.

F. Hand trim excavations. Remove loose matter.

G. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section

31 23 23.

H. Grade top perimeter of excavation to prevent surface water from draining into excavation.

I. Remove excavated material that is unsuitable for re-use from site.

J. Stockpile excavated material to be re-used in area designated on site in accordance with Section 32 22 13.

K. Remove excess excavated material from site.

3.03 PROTECTION

A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

END OF SECTION

SECTION 31 23 17

TRENCHING FOR SITE UTILITIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Backfilling and compacting for utilities outside the building to utility main connections.

1.02 RELATED SECTIONS

A. Section 00 3110 - Geotechnical Investigation

B. Section 31 23 16 - Excavation: Building and foundation excavating.

C. Section 31 23 23 - Fill and Backfill: Backfilling at building and foundations.

D. Section 31 22 00 - Grading: Site grading.

1.03 REFERENCES

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials; 2001.

B. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2000a.

C. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2000.

D. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2002.

E. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 1994(R 2001).

F. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2000.

G. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2001.

H. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2001.

1.04 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: 8 inches below finish grade elevations indicated on drawings, unless otherwise indicated.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Compaction Density Test Reports.

1.06 PROJECT CONDITIONS

A. Provide sufficient quantities of fill to meet project schedule and requirements. When necessary, store materials on site in advance of need.

B. Verify that survey benchmarks and intended elevations for the Work are as indicated.

C. Protect plants, lawns, rock outcroppings, and other features to remain.

D. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

PART 2 – PRODUCTS

2.01 FILL MATERIALS

A. General Fill: (to be used in areas not within 5’ of building perimeter):
   1. Graded.
   2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
   3. Conforming to ASTM D 2487 Group Symbol CL.

B. Structural Fill: (to be used under all building areas and 5’ outside of all building areas): Low plasticity sandy clay, clayey sand or clay and gravel blends, SC, SM, or GC. Fill should have a Plasticity Index between 5 and 20.

C. Concrete for Fill (Flowable Fill - utility trenches passing under footings): Compressive strength of 2500 psi in conformance with AHTD Standard Specification for Highway Construction, Section 206.

D. Granular Fill for drainage fill below slabs on grade - Gravel: Angular crushed stone; "C" Ballast, free of shale, clay, friable material and debris, with a minimum of "fines".

E. Sand: Conforming to State of Arkansas Highway Department standard.

F. Topsoil: See Section 32 22 13.

2.02 SOURCE QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from the same source throughout the Work.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect them from damage.

C. Notify the utility company to remove and relocate utilities.

D. See Section 31 20 00 for additional requirements.

3.02 TRENCHING

A. Notify Architect of unexpected subsurface conditions and discontinue work in affected area until

notified to resume work.

B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Cut trenches wide enough to allow inspection of installed utilities.

E. Hand trim excavations. Remove loose matter.

F. Remove excavated material that is unsuitable for re-use from site.

G. Remove excess excavated material from site.

3.03 PREPARATION FOR UTILITY PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.04 BACKFILLING

A. Backfill to contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen, or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.

G. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

H. Correct areas that are over-excavated.
   1. Thrust bearing surfaces: Fill with concrete.
   2. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.

I. Compaction Density Unless Otherwise Specified or Indicated:
   1. Under paving, slabs-on-grade, and similar construction: 97 percent of maximum dry density.

J. Reshape and re-compact fills subjected to vehicular traffic.

3.05 BEDDING AND FILL AT SPECIFIC LOCATIONS

A. Use general fill unless otherwise specified or indicated.

B. Utility Piping, Conduits, and Duct Bank:
   1. Bedding: Use structural fill.
   2. Cover with general fill.
   3. Fill up to subgrade elevation.
   4. Compact in maximum 8 inch lifts to within two percentage points of optimum moisture content to 95 percent of Modified Proctor density.

C. At Pipe Culverts:
   1. Bedding: Use structural fill.
   2. Cover with general fill.

3. Fill up to subgrade elevation.
4. Compact in maximum 8 inch lifts to within two percentage points of optimum moisture content to 95 percent of Modified Proctor density.

D. Top Surface of General Backfilling: Plus, or minus 3 inch from required elevations.

E. Top Surface of Backfilling Building Areas: Plus, or minus 1 inch from required elevations.

3.06 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, ASTM D2922, or ASTM D3017.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 ("standard Proctor"), ASTM D 1557 ("modified Proctor"), or AASHTO T 180.

D. If tests indicate work does not meet specified requirements, remove work, replace, and retest.

3.07 CLEAN-UP

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

SECTION 31 23 23

FILL AND BACKFILL

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Filling, backfilling, and compacting for building volume below grade, footings, slabs-on-grade, paving, site structures, and utilities within the building.

B. Backfilling and compacting for utilities outside the building to utility main connections.

1.02 RELATED SECTIONS

A. Section 02 20 00 - Site Preparation: Site grading.

B. Section 00 30 10 - Geotechnical Investigation.

C. Section 32 14 13 - Cast-in-Place Concrete.

D. Section 31 23 16 - Excavation: Removal and handling of soil to be re-used.

E. Section 31 23 17 - Trenching for Site Utilities: Excavating for utility trenches outside the building to utility main connections.

F. Section 32 13 14 – Integrally Colored Concrete Paving

G. Section 31 22 00 - Grading: Removal and handling of soil to be re-used.

H. Section 31 22 00 - Grading: Site grading.

1.03 REFERENCES

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials; 2001.

B. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2000a.

C. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2000.

D. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2002.

E. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 1994(R 2001).

F. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2000.

G. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2001.

H. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2001.

1.04 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: 6 inches below finish grade elevations indicated on drawings, unless

otherwise indicated.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

C. Compaction Density Test Reports.

1.06 PROJECT CONDITIONS

A. Provide sufficient quantities of fill to meet project schedule and requirements. When necessary, store materials on site in advance of need.

B. Verify that survey benchmarks and intended elevations for the Work are as indicated.

PART 2 – PRODUCTS

2.01 FILL MATERIALS

A. General Fill: (to be used in areas not within 5’ of building perimeter):
   1. Graded.
   2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
   3. Conforming to ASTM D 2487 Group Symbol CL.
   4. All fill material to be placed in a city right-of-way must be approved by the proper municipal department prior to placement.

B. Structural Fill: (to be used under all building areas and 5’ outside of all building areas): Low plasticity sandy clay, clayey sand or clay and gravel blends, SC, SM, or GC. Fill should have a Plasticity Index between 5 and 20.

C. Concrete for Fill (Flowable Fill - utility trenches passing under footings): Compressive strength of 2500 psi in conformance with AHTD Standard Specification for Highway Construction, Section 206.

D. Granular Fill for drainage, fill below slabs on grade - Gravel: Angular crushed stone; "C" Ballast, free of shale, clay, friable material and debris, with a minimum of "fines".

E. Granular Fill for Compacted Base Course - Gravel: Natural washed stone or crushed stone, free of shale, clay, friable material, and debris.
   1. Graded in accordance with ASTM D 2487 Group Symbol CL.

F. Sand: Conforming to State of Arkansas Highway Department standard.

G. Topsoil: See Section 31 22 13.

2.02 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from the same source throughout the Work.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 22 00 for additional requirements.

3.02 PREPARATION

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural fill. Undercut unsuitable foundation or subgrade soils per the geotechnical investigation and replace with suitable fill compacted within two percentage points of optimum moisture content to a minimum of 95 % of the Modified Proctor (ASTM D-1557) as described below, placed in maximum 8” lifts.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen, or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Granular Fill: Place and compact materials in equal continuous layers not exceeding 8 inches compacted depth.

G. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.

H. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

I. Correct areas that are over-excavated.
   1. Load-bearing foundation surfaces and undercut areas within 5’ of building perimeter: Use Structural Fill as described above.
   2. Other areas: Use general fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.

J. Compaction Density Unless Otherwise Specified or Indicated:
   1. Under all building areas and 8’ outside of all building areas: within two percentage points of optimum moisture content to a minimum 95 percent of Modified Proctor (ASTM D 1557).
   2. At other locations: 95 percent of maximum dry density.

K. Reshape and re-compact fills subjected to vehicular traffic.

3.04 FILL AT SPECIFIC LOCATIONS

A. Use general fill for areas not under building or 5’ outside of building perimeter, or paving.

B. Use Structural Fill at all areas under buildings and pavement including the area outside the building perimeter within 6 feet of the building.
   1. Use structural fill.

2. Fill up to subgrade elevations.
3. Maximum depth per lift: 8 inches, compacted.
4. Compact to within two percentage points of optimum moisture content to a minimum 95 percent of Modified Proctor (ASTM D 1557.

C. Over Buried Utility Piping, Conduits, and Duct Bank in Trenches:
1. Bedding: Use structural fill.
2. Cover with general fill.
3. Fill up to subgrade elevation.
4. Compact in maximum 8 inch lifts to 95 percent of maximum dry density.

D. At Lawn Areas:
1. Use general fill.
2. Fill up to subgrade elevations.
3. Compact to 95 percent of maximum dry density.
4. See Section 31 22 00 for topsoil placement.

3.05 TOLERANCES

A. Top Surface of General Filling: Plus, or minus 1 inch from required elevations.

B. Top Surface of Filling under Paved Areas: Plus, or minus 1 inch from required elevations.

3.06 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, ASTM D2922, or ASTM D3017.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 ("standard Proctor"), ASTM D 1557 ("modified Proctor"), or AASHTO T 180.

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests: for Building areas including areas within 10’-0” outside of building perimeter lines, not less than one test for every 500 sq. ft; for parking areas not less than one test per 7500 sq. ft.

3.07 CLEAN-UP

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

SECTION 31 25 00

EROSION AND SEDIMENT CONTROL

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Furnish all labor, equipment and materials needed to complete the Work as shown on the Plans and specified herein.

B. The work performed under this section shall comply with the plan requirements for this project and with the requirements and intent of the NPDES Storm Water Discharge Permit program to the extent that it applies to this project.

1.2 RELATED SECTIONS

A. Section 31 00 00 - EARTHWORK

1.3 QUALITY ASSURANCE

A. Comply with applicable requirements of all governing authorities having jurisdiction. The Specifications and the Plans are not represented as being comprehensive, but rather to convey the intent to provide complete slope protection and erosion control for both the Owner's and adjacent property.

B. Erosion control measures shall be established at the beginning of construction and maintained during the entire length of construction. On-site areas which are subject to severe erosion and off-site areas which are especially vulnerable to damage from erosion and/or sedimentation are to be identified and receive additional erosion control measures as directed by the Owner.

C. All land-disturbing activities shall be planned and conducted to minimize the size of the area to be exposed at any one time and to minimize the time of exposure.

D. Surface water runoff originating upgrade of exposed area shall be controlled to reduce erosion and sediment loss during the period of exposure.

E. When the increase in the peak rates and velocity of storm water runoff resulting from a land-disturbing activity is sufficient to cause accelerated erosion of the receiving ditch or stream, the Contractor shall install measures to control both the velocity and rate of release so as to minimize accelerated erosion and increased sedimentation of the stream as directed by the Owner.

F. All land-disturbing activities shall be planned and conducted so as to minimize off-site sedimentation damage.

G. The Contractor shall be responsible for periodically cleaning out and disposing of all sediment once the storage capacity of the drainage feature or structure receiving the sediment is reduced by one-half. The Contractor shall also be responsible for cleaning out and disposing of all sediment at the time of completion of the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Silt Fence Fabric:

1. MISF1776, Propex 2130, TerraTexSC, or approved equal.

2. Minimum bursting strength: 300 psi.

3. Edges treated to prevent unraveling.

4. Furnished with O-rings or clips to facilitate attachment to woven wire fabric.

B. Wire Fencing: Steel wire fencing (hog wire) with a minimum of 14 gauge wire and a maximum 14 gauge wire and a maximum opening of 6 inches.

C. Posts:

1. Steel, T-section minimum 4 feet 6 inches long, minimum of 1.3 pounds per foot without anchor plate.

2. Anchor plate attached before coating.

3. Fabricate with lugs or other approved means to prevent vertical movement from the wire fencing.

D. Tie Wire: Galvanized in accordance with ASTM A112.

E. Temporary cover for graded areas shall be undamaged, air-dry threshed straw free from weed seeds.

PART 3 - EXECUTION

3.1 CONDITION OF SUBSTRATE:

A. Erosion control measures must be implemented prior to the commencement of any soil disturbing activity.

B. Stabilize fill and grade of areas to receive soil erosion and sediment control in accordance with Section 31 00 00, “EARTHWORK”. Maintain positive drainage to sediment and erosion control devices during and after grading operations.

3.2 SILT FENCE:

A. Install posts on a minimum of 6-foot centers. Minimum embedment of 6”.

B. Minimum height of the silt fence to be 2 feet 6 inches with a 6-inch clearance between the top of the silt fence and the top of the posts.

C. Install the steel posts on a slight angle towards the anticipated runoff surface.

D. Trench in the toe of the silt fence so that the down slope face of the trench is flat and perpendicular to the line of flow.

E. Minimum trench depth: 6 inches.

F. Trench width: 6 inches.

G. Attach wire fence (hog wire) to the posts.

H. Attach the silt fence fabric to the wire fence (hog wire) and secure with a minimum of two wire ties per post.

I. Backfill over the silt fence fabric in the trench.

J. When buildup of soil, silt, or any other material behind the silt fence reaches a height of 6 inches or when the silt fence is no longer functioning efficiently, remove all accumulated material and repair the silt fence as needed.

3.3 DUST CONTROL

A. Dust control of the Contractor's performance of the Work shall be performed by the Contractor by applying water.

B. Dust control shall be provided in the amounts and locations as ordered by the Owner's Representative.

3.4 PROTECTION AND MAINTENANCE:

A. Protect erosion and sediment control devices from damage. Repair and replace dikes, silt fences and other measures when damaged by construction, natural and other physical causes. All soil erosion and sediment control devices shall be repaired or replaced at the expense of the Contractor and shall function as originally intended.

B. Periodically (at least once every 7 days and after each rainfall event) inspect and maintain erosion and sediment control structures, until final stabilization of disturbed ground areas is achieved.

C. All stockpiled soil shall be surrounded by a silt fence to properly control sediment runoff.

D. Inspection services provided by the Owner's Representatives do not relieve the Contractor's responsibility for inspection and maintenance of the erosion control measures.

E. The Contractor is responsible for modifying or providing additional erosion control devices to control erosion from his operations on the site. This may become necessary due to disturbance of additional areas or phasing of the Contractor's operations.

3.5 STAGING AREAS:

At such time when the specific location of the staging areas are determined, silt fences, diversions, or equivalent sediment controls are required for all side slope and down slope boundaries of the staging area and shall be provided by the Contractor. The erosion control plan for each staging area shall be approved by the Owner's Representative and devices shall be in place prior to occupation of the staging areas. All relative material and labor to construct and maintain the staging area erosion control plans shall be subsidiary to the other items of work.

3.6 The Contractor shall be responsible for complying with the Storm Water Pollution Prevention Plan as provided by Owner’s Representative.

END OF SECTION

SECTION 31 31 16

SOIL TREATMENT FOR TERMITE CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Soil treatment for termite control below grade, complete.

1.02 REFERENCES

A. EPA - Environmental Protection Agency - Federal Insecticide, Fungicide and Rodenticide Act.

B. Arkansas State Plant Board Regulations.

1.03 SUBMITTALS

A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.

B. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.

C. Manufacturer's Application Instructions: Indicate caution requirements.

D. Manufacturer's Certificate: Certify that toxicants meet or exceed specified requirements.

E. Warranty: Submit warranty and ensure that forms have been completed in Harding University's name.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing this type of work and:

1. Having minimum of 2 years documented experience.
2. Approved by manufacturer of treatment materials.
3. Licensed in project city.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for requirements for application, and comply with EPA regulations.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of toxicants.

1.06 SEQUENCING

A. Apply toxicant immediately prior to installation of vapor barrier under slabs-on-grade.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide two year installer's warranty against damage to building caused by termites.

1. Include coverage for repairs to building and to contents damaged due to building damage. Repair damage and re-treat at no additional cost to Owner.
2. Inspect annually and report in writing to Owner. Provide annual inspection service for 2 years from Date of Substantial Completion.
3. Provide owner with the option of annual renewal after the initial two-year warranty period.

PART 2 PRODUCTS

2.01 MATERIALS

A. Toxicant Chemical: EPA approved; synthetically color dyed to permit visual identification of treated soil.

B. Diluent: Recommended by toxicant manufacturer.

2.02 MIXES

A. Mix toxicant to manufacturer's instructions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify site conditions prior to application.

B. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.

C. Verify final grading is complete.

3.02 APPLICATION

A. Treat entire area of drainage fill under slab-on-grade immediately prior to installation of vapor barrier.

B. Spray apply toxicant in accordance with manufacturer's instructions.

C. Apply toxicant at following locations:

1. Under Slabs-on-Grade.

2. At Both Sides of Foundation Surface.

D. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.

E. Re-treat disturbed treated soil with same toxicant as original treatment.

F. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

3.03 PROTECTION OF FINISHED WORK

A. Do not permit soil grading over treated work.

B. Retreat areas disturbed by other contractors prior to pouring concrete.

END OF SECTION

DIVISION 32

SECTION 32 11 23

AGGREGATE BASE COURSE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aggregate base course.

1.02 RELATED SECTIONS

A. Section 31 23 17 - Trenching for Site Utilities: Compacted fill over utility trenches under base course.

B. Section 31 23 23 - Fill and Backfill: Compacted fill under base course.

C. Section 32 12 16 - Bituminous Concrete Paving: Binder and finish asphalt courses.

C. Section 31 22 00 - Grading: Preparation of site for base course.

1.03 REFERENCES

A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses; American Association of State Highway and Transportation Officials; 1965 (2000).

B. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials; 2001.

C. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2001.

D. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2000a.

E. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2000.

F. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2002.

G. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2000.

H. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2001.

I. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2001.

J. ASTM D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2000.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Compaction Density Test Reports.

1.05 PROJECT CONDITIONS

A. Provide sufficient quantities of aggregate to meet project schedule and requirements. When necessary, store materials on site in advance of need.

B. When aggregate materials need to be stored on site, locate stockpiles where indicated.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

C. Verify that survey benchmarks and intended elevations for the Work are as indicated.

PART 2 PRODUCTS

2.01 MATERIALS

A. Compacted Aggregate Base Course: AHTD Class 7.

2.02 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and analysis of aggregate materials.

B. Where aggregate materials are specified using ASTM D 2487 classification, test and analyze samples for compliance before delivery to site.

C. Provide materials of each type from the same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.02 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.03 INSTALLATION

A. Under Bituminous or Portland Cement Concrete Paving:
   1. Place Compacted Aggregate Base Course to a total compacted thickness as indicated on Drawings.
   2. Compact within two percentage points of optimum moisture content to 95 % Modified Proctor density.

B. Place aggregate in maximum 4 inch layers and roller compact to specified density.

C. Level and contour surfaces to elevations and gradients indicated.

D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

E. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation From Design Elevation: Within 1/2 inch.

3.05 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.

B. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1557.

C. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 ("standard Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

3.06 CLEAN-UP

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

SECTION 32 13 13

PORTLAND CEMENT CONCRETE PAVING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Concrete sidewalks, integral curbs and gutters, aprons, and dumpster pad.

1.02 RELATED SECTIONS

A. Section 00 30 10 - Geotechnical Investigation

B. Section 32 14 13 - Cast-in-Place Concrete.

C. Section 33 41 00 - Joint Sealers: Sealant for joints.

D. Section 31 2323 - Fill and Backfill: Compacted subbase for paving.

E. Section 31 22 00 - Grading: Preparation of site for paving and base.

1.03 REFERENCES

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 1997).

B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 1999.

C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.

D. ACI 305R - Hot Weather Concreting; American Concrete Institute International; 1999.

E. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 1988.

F. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2001b.

G. ASTM C 33 - Standard Specification for Concrete Aggregates; 2002a.

H. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2001.

I. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete; 2000.

J. ASTM C 150 - Standard Specification for Portland Cement; 2002a.

K. ASTM C 173/C 173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2001.

L. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete; 2001.

M. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 1998a.

N. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete; 1999a.

O. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2003.

P. ASTM C 685/C 685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2001.

Q. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (non-extruding and Resilient Bituminous Types); 1999.

R. ASTM D 1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction; 1984 (Reapproved 1996).

1.04 PERFORMANCE REQUIREMENTS

A. Design paving for parking, light duty commercial vehicles, and residential streets.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Obtain cementitious materials from same source throughout.

C. Follow recommendations of ACI 305R when concreting during hot weather.

D. Follow recommendations of ACI 306R when concreting during cold weather.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 – PRODUCTS

2.01 FORM MATERIALS

A. Form Materials: Conform to ACI 301.

B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D 1751) or sponge rubber or cork (ASTM D 1752).
   1. Thickness: 1/2 inch.

2.02 REINFORCEMENT

A. Reinforcing Steel: ASTM A 615/A 615M Grade 40 (280); deformed billet steel bars; unfinished finish.

B. Dowels: ASTM A 615/A 615M Grade 40 (280); deformed billet steel bars; unfinished finish.

2.03 CONCRETE MATERIALS

A. Concrete Materials: As specified in Section 300.

2.04 ACCESSORIES

A. Curing Compound: ASTM C 309, Type 1, Class A.

B. Joint Sealer: Self leveling type as specified in Section 07 9000.

2.05 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.

C. Concrete Properties:
   1. Compressive Strength, when tested in accordance with ASTM C 39/C 39M at 28 days: as specified on the plans.

2.06 MIXING

A. Transit Mixers: Comply with ASTM C 94/C 94M.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.02 SUBBASE

A. Prepare the subbase in accordance with State of Arkansas Highways standards.

3.03 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Coat surfaces of manhole frames with oil to prevent bond with concrete pavement.

C. Notify Architect a minimum of 36 hours prior to commencement of concrete operations.

3.04 FORMING

A. Place and secure forms to correct location, dimension, profile, and gradient.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

3.05 REINFORCEMENT

A. Place reinforcement as indicated.

B. Place dowels to achieve pavement and curb alignment as detailed.

3.06 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.

3.07 JOINTS

A. Align curb, gutter, and sidewalk joints.

B. Provide scored joints:
   1. At 6 feet intervals or as indicated on the drawings.

C. Provide expansion joints.
   1. At maximum 20 foot intervals or as indicated on the drawings.

3.08 FINISHING

A. Area Paving: Light broom, texture perpendicular to pavement direction.

B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.

C. Curbs and Gutters: Light broom, texture parallel to pavement direction.

3.09 JOINT SEALING

A. See Section 07 9000 for joint sealer requirements.

3.10 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.

B. Maximum Variation from True Position: 1/4 inch.

3.11 FIELD QUALITY CONTROL

A. Independent Testing Agency will perform field quality control tests, as specified in Section 01400.
   1. Provide free access to concrete operations at project site and cooperate with appointed firm.
   2. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
   3. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

B. Compressive Strength Tests: ASTM C 39/C 39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 75 cu yd or less of each class of concrete placed each day.
   1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

3.12 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.

END OF SECTION