

Sutton's Landing, LLLP

205 Pike Street, Covington, Kentucky 41011

**Sutton's Landing
AA Highway
Maysville, Kentucky 41065**

April 15, 2023

Architect:

REB Architects, PLLC
103 Windhaven Drive, Suite 101
Nicholasville, Kentucky 40356
859.523.1500 FAX 859.523.1514



THIS PAGE INTENTIONALLY BLANK

INTRODUCTORY INFORMATION

00 01 00	INTRODUCTORY INFORMATION
00 01 07	Project Manual Seals Page
00 01 10	Table of Contents
00 01 15	List of Drawing Sheets

THIS PAGE IS INTENTIONALLY BLANK

Project Manual for Sutton's Landing Maysville, Kentucky

April 15, 2023



Emily Byrge, Principal Architect

April 15, 2023

Date

REB Architects, PLLC
103 Windhaven Drive, Suite 101
Nicholasville, Kentucky 40356
859.523.1500 FAX 859.523.1514



THIS PAGE INTENTIONALLY BLANK

TABLE OF CONTENTS**DIVISION 00 – BIDDING AND CONTRACTING REQUIREMENTS****INTRODUCTORY INFORMATION****00 01 00 INTRODUCTORY INFORMATION**

00 01 07	Project Manual Seals Page
00 01 10	Table of Contents
00 01 15	List of Drawings

PROCUREMENT REQUIREMENTS**00 03 00 AVAILABLE INFORMATION**

00 31 32	Geotechnical Report
----------	---------------------

CONTRACTING REQUIREMENTS**00 52 00 CONTRACT FORMS**

00 52 13	Form of Contract
----------	------------------

00 65 00 CLOSEOUT FORMS

00 65 10	Insulation Certificate Letter
00 65 36	Builders Warranty

00 70 00 CONDITIONS OF THE CONTRACT

00 72 16	General Conditions
00 73 32	Prohibition of Segregated Facilities
00 73 33	Equal Employment Opportunity Executive Order 11246
00 73 37	Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity for Construction

00 90 00 PRECONTRACT REVISIONS

00 91 13	Addenda Form
00 93 19	Clarification Notice Form

DIVISION 01 – GENERAL REQUIREMENTS**01 11 00 SUMMARY OF THE WORK**

01 11 13	Work in Contract
----------	------------------

01 26 00 CONTRACT MODIFICATION AND PROCEDURES

01 26 19	Clarification Notice
01 26 33	Minor Changes in the Work
01 26 63	Change Orders

01 29 00 PAYMENT PROCEDURES

	01 29 76	Progress Payment Procedures
01 31 00		PROJECT MANAGEMENT AND COORDINATION
	01 31 13	Project Coordination
01 32 00		CONSTRUCTION PROGRESS DOCUMENTATION
	01 32 16	Construction Timeline Progress Schedule
01 33 00		SUBMITTAL PROCEDURES
	01 33 23	Submittal Procedures
01 41 00		REGULATORY REQUIREMENTS
	01 41 13	Regulatory Requirements
01 42 00		REFERENCES
	01 42 13	References
01 45 00		QUALITY CONTROL
	01 45 33	Special Inspections
01 54 00		CONSTRUCTION AIDS
	01 54 12	Temporary Facilities, Controls, and Construction Aids
01 58 00		PROJECT IDENTIFICATION
	01 58 13	Project Identification
01 62 00		PRODUCT OPTIONS
	01 62 10	Product Options
01 71 00		EXAMINATION AND PREPARATION
	01 71 23	Field Engineering
01 73 00		EXECUTION
	01 73 19	Installation
01 74 00		CLEANING AND WASTE MANAGEMENT
	01 74 13	Cleaning
01 78 00		CLOSEOUT SUBMITTALS
	01 78 10	Closeout Submittals and Procedures

DIVISION 02 – EXISTING CONDITIONS

02 40 00 DEMOLITION & STRUCTURE MOVING

DIVISION 03 – CONCRETE**03 11 00 CONCRETE FORMING**

03 11 13 Cast-in Place Concrete Formwork

03 15 00 CONCRETE ACCESSORIES

03 15 10 Concrete Joints

03 15 13 Concrete Accessories

03 24 00 FIBROUS REINFORCING

03 24 10 Concrete Reinforcing

03 30 00 CAST IN PLACE CONCRETE

03 30 53 Cast-in Place Concrete

03 39 00 CONCRETE CURING

03 39 23 Concrete Curing

03 61 00 CEMENTITIOUS GROUTING

03 61 13 Non-Metallic (NS) Grout

DIVISION 04 - MASONRY**04 05 00 COMMON WORK RESULTS FOR MASONRY**

04 05 13 Masonry Mortar

04 05 16 Masonry Grout

04 05 19 Masonry Anchorage

04 05 20 Continuous Joint Reinforcing

04 05 23 Masonry Accessories

04 21 00 CLAY UNIT MASONRY

04 21 13 Brick Masonry

04 21 14 Masonry Veneer Installation

DIVISION 05- METALS**05 05 00 COMMON WORK RESULTS FOR METALS**

05 05 10 Common Work Results for Metals

05 05 13 Coatings for Metals

05 05 23 Metal Fastening

05 12 00 STRUCTURAL STEEL FRAMING

05 12 23 Structural Steel

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

06 05 00	COMMON WORK RESULTS FOR WOOD, PLASTICS, AND COMPOSITES
06 05 23	Wood Plastic and Adhesive Fasteners
06 05 74	Preservative Treatment
06 10 00	ROUGH CARPENTRY
06 10 00	Rough Carpentry
06 11 00	WOOD FRAMING
06 11 20	Wood Framing
06 16 00	SHEATHING
06 16 10	Wood Panel Sheathing
06 17 00	SHOP FABRICATED STRUCTURAL WOOD
06 17 53	Shop Fabricated Wood Trusses
06 20 00	FINISH CARPENTRY
06 20 10	Finish Carpentry
06 22 00	MILLWORK
06 22 13	Wood Trim
06 40 00	ARCHITECTURAL WOODWORK
06 40 10	General Architectural Woodwork Requirements
06 41 00	ARCHITECTURAL WOOD CASEWORK
06 41 13	Wood Cabinets
06 44 00	ARCHITECTURAL WOOD CASEWORK
06 44 43	Polyester Resin Stone Composite Columns
06 48 00	WOOD FRAMES
06 48 16	Interior Wood Door Frames
06 61 00	SIMULATED STONE FABRICATION
06 61 16	Solid Surfacing Fabrications

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

07 11 00	DAMP-PROOFING
07 11 13	Asphalt Saturated Building Paper
07 21 00	THERMAL INSULATION
07 21 13	Board Insulation
07 21 16	Blanket Insulation
07 21 26	Loose Fill Blown Insulation
07 26 00	VAPOR RETARDERS

	07 26 16	Below-Grade Vapor Retarder
07 27 00		AIR BARRIERS
	07 27 19	Air Infiltration Barrier
07 31 00		SHINGLES AND SHAKES
	07 31 13	Architectural Fiberglass Reinforced Shingles
07 46 00		SIDING
	07 46 16	Manufactured Aluminum Fascia
	07 46 33	Vinyl Siding & Soffits
07 60 00		FLASHING AND SHEET METAL
	07 60 10	Sheet Metal Flashing & Trim
07 65 00		FLEXIBLE FLASHING
	07 65 26	Self Adhering Flexible Sheet Flashing
07 71 00		ROOF SPECIALTIES
	07 71 23	Gutters & Downspouts
07 72 00		ROOF ACCESSORIES
	07 72 10	Roof Accessories
	07 72 23	Gravity Ventilators
07 84 00		FIRESTOPPING
	07 84 13	Penetration Firestopping
07 92 00		JOINT SEALANTS
	07 92 13	Elastomeric Joint Sealants

DIVISION 08 - OPENINGS

08 11 00		METAL DOORS & FRAMES
	08 11 15	Packaged Steel Doors & Frames
08 14 00		WOOD DOORS
	08 14 24	Molded Panel Interior Doors
08 31 00		ACCESS DOORS AND PANELS
	08 31 16	Access Panels and Frames
08 53 00		PLASTIC WINDOWS
	08 53 13	Vinyl Hung Windows
08 71 00		HARDWARE
	08 71 10	Door Hardware
08 91 00		LOUVERS

08 91 19 Metal Wall Louvers

DIVISION 09 – FINISHES**09 20 00 PLASTER AND GYPSUM WALLBOARD**

09 29 50 Gypsum Wallboard

09 30 00 TILING

09 30 13 Ceramic Tiling

09 60 00 FLOORING09 65 19 Vinyl Composition Tile
09 65 19 Resilient Plank Flooring**09 74 00 WALL COVERINGS**

09 74 20 Special Wall Surfacing (Fiber Reinforced Plastic Panels)

09 81 00 ACOUSTIC INSULATION

09 81 16 Acoustic Blanket Insulation

09 90 00 PAINTING REQUIREMENTS

09 90 01 General Painting Requirements

09 91 00 PAINTING09 91 13 Interior Painting
09 91 15 Exterior Painting**DIVISION 10 – SPECIALTIES****10 14 00 SIGNAGE**10 14 16 Interior Signs
10 14 26 Post and Panel Signage**10 28 00 TOILET, BATH, AND LAUNDRY ACCESSORIES**

10 28 13 Toilet Accessories

10 44 00 FIRE PROTECTION SPECIALTIES

10 44 13 Fire Extinguisher Cabinets

10 55 00 MAIL DELIVERY BOXES

10 55 13 Mail Delivery Boxes

10 56 00 STORAGE ASSEMBLIES

10 56 23 Wire Storage Shelving

DIVISION 11 - EQUIPMENT**11 31 00 RESIDENTIAL EQUIPMENT**

11 31 10 Appliances

DIVISION 12 - FURNISHINGS**12 21 00 WINDOW BLINDS**

12 21 13 Horizontal Louver Blinds

DIVISION 22 - PLUMBING**22 05 00 COMMON WORK RESULTS FOR PLUMBING**22 05 10 Common Work Results for Plumbing
22 05 29 Hangers and Supports**22 07 00 PLUMBING INSULATION**

22 07 19 Plumbing Piping Insulation

22 11 00 FACILITY WATER DISTRIBUTION22 11 13 Facility Water Distribution Piping
22 11 16 Domestic Water Piping System**22 13 00 FACILITY SANITARY SEWAGE**

22 13 13 Exterior Facility Sanitary Sewers

22 33 00 ELECTRIC DOMESTIC WATER HEATER

22 33 33 Electric Hot Water Heaters

22 42 00 COMMERCIAL PLUMBING FIXTURES

22 42 10 Plumbing Fixtures

**DIVISION 23 – HEATING, VENTILATING, AND AIR-
CONDITIONING (HVAC)****23 05 00 COMMON WORK RESULTS FOR HVAC**23 05 10 Common Work Results for HVAC
23 05 11 General Duct Requirements
23 07 13 Duct Insulation**23 07 00 HVAC INSULATION**

23 07 19 HVAC Piping Insulation

23 21 00 HYDRONIC PIPING AND PUMPS

	23 21 10	Condensate Drain Piping Systems
23 23 00		REFRIGERANT PIPING SYSTEMS
	23 23 10	Refrigerant Piping Systems
23 31 00		HVAC DUCTS AND CASINGS
	23 31 13	Metal Ducts
	23 31 16	Non-Metal Ducts
23 33 00		AIR DUCT ACCESSORIES
	23 33 10	Duct Accessories
	23 33 13	Fire Dampers
23 34 00		HVAC FANS
	23 34 10	Exhaust Fans
23 37 00		AIR OUTLETS AND INLETS
	23 37 13	Diffusers, Registers, and Grilles
23 41 00		PARTICULATE AIR INFILTRATION
	23 41 13	Air Filters
23 54 00		FURNACES
	23 54 10	Air Handling Units
23 81 00		DECENTRALIZED HVAC EQUIPMENT
	23 81 43	Air Source Heat Pump

DIVISION 26 – ELECTRICAL

26 05 00		COMMON WORK RESULTS FOR ELECTRICAL
	26 05 15	Common Work Results for Electrical
	26 05 19	Conductors and Cables
	26 05 26	Grounding and Bonding for Electrical Systems
	26 05 33	Raceway and Conduit
	26 05 34	Boxes
26 24 00		SWITCHBOARDS AND PANELBOARD
	26 24 16	Panelboards
26 27 00		LOW-VOLTAGE DISTRIBUTION EQUIPMENT
	26 27 10	Electrical Utility Services
	26 27 26	Wiring Devices
	26 27 27	Wiring Connections
26 28 00		LOW-VOLTAGE CIRCUIT PROTECTIVE DEVICES
	26 28 16	Enclosed Switches and Circuit Breakers
26 51 00		INTERIOR LIGHTING
	26 51 13	Interior Lighting Fixtures, Lamps, and Ballasts

26 52 00	EMERGENCY LIGHTING
26 52 10	Emergency and Exit Lighting
26 56 00	EXTERIOR LIGHTING
26 56 16	Exterior Lighting

DIVISION 27 - COMMUNICATION

27 05 00	COMMON WORK RESULTS FOR COMMUNICATIONS
27 05 10	Telephone Systems
27 05 14	Cable TV Premises Distribution System

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

28 31 00	FIRE DETECTION AND ALARM
28 31 10	Fire Detection and Alarm System

DIVISION 31 – EARTHWORK

31 00 00	EARTHWORK
31 00 10	General Site Work Requirements
31 05 00	COMMON WORK RESULTS FOR EARTHWORK
31 05 10	Earthwork
31 11 00	CLEARING AND GRUBBING
31 11 10	Site Clearing
31 20 00	EARTH MOVING
31 20 10	Earth Moving
31 22 00	GRADING
31 22 13	Rough Grading
31 22 16	Fine Grading
31 22 20	Excavation and Fill
31 25 00	EROSION AND SEDIMENTATION CONTROLS
31 25 10	Erosion & Sedimentation Control
31 31 00	SOIL TREATMENT
31 31 16	Termite Control
31 31 19	Vegetation Control

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 05 00 COMMON WORK RESULTS FOR EXTERIOR IMPROVEMENTS

32 05 10 General Landscaping Requirements
 32 05 33 General Planting Requirements
 32 05 35 Lawn Maintenance

32 11 00 BASE COURSES

32 11 23 Granular Base

32 12 00 ASPHALT PAVING

32 12 16 Asphalt Paving

32 13 00 RIGID PAVING

32 13 13 Cast-in-Place Concrete Site Elements
 32 13 14 Concrete Paving
 32 13 73 Concrete Paving Joint Sealants

32 17 00 PAVING SPECIALTIES

32 17 13 Parking Bumpers
 32 17 23 Pavement Marking

32 31 00 FENCES AND GATES

32 31 29 Wood Fence

32 91 00 PLANTING PREPARATION

32 91 13 Soil Preparation
 32 91 20 Plant Maintenance

32 92 00 TURF AND GRASSES

32 92 10 Lawn and Grasses
 32 92 23 Lawn Sodding

32 93 00 PLANTS

32 93 10 Plants

DIVISION 33-UTILITIES

33 11 00 WATER UTILITY DISTRIBUTION PIPING

33 11 19 Water Distribution

33 31 00 SANITARY SEWAGE PIPING

33 31 13 Sanitary Sewage Systems

33 41 00 STORM UTILITY WATER DRAINS

33 41 10 Storm Utility Drainage Piping

33 46 00 SUBDRAINAGE

33 46 16 Subdrainage

00 01 15**LIST OF DRAWINGS****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Work included in but not limited to this section
 - 1. List of Drawings

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of this Project Manual
 - 1. Construction Drawings

1.3 LIST OF DRAWINGS

A.	Cover Sheet	
B.	G100	General Information
C.	G101	General Information – ADA Requirements
D.	G102	Bldg Envelope - Air Barrier/Air Sealing/Insulation Details
E.	G103	Bldg Envelope - Air Barrier/Air Sealing/Insulation Details
F.	G104	Wall Types/UL Listings
G.	G105	Code Requirements
H.	G106	Code Requirements
I.	C	Civil Cover
J.	C0.0	Existing Conditions
K.	C1.0	Site Plan
L.	C2.0	Grading Plan
M.	C2.1	Drainage Plan
N.	C2.2	ESC Plan
O.	C3.0	Utilities Plan
P.	C4.0	Offsite Improvements – Road
Q.	C4.1	Offsite Improvements - Water
R.	C5.0	Details
S.	C5.1	Details
T.	C5.2	Details
U.	C5.3	Details
V.	C5.4	Notes
W.	L-100	Landscaping Plan
X.	L-101	Site Lighting Plan
Y.	A100	Building Plans – Type I & I.A
Z.	A101	Building Plans – Type II & III
AA.	A102	Clubhouse Building Plan – Details
BB.	A103	Clubhouse Interior Elevations and Details
CC.	A104	Unit Type “A” – 1BR Accessible Plan
DD.	A105	Unit Type “A.1” – 1BR Fair Housing/Typical
EE.	A106	Unit Type “B” – 2BR Accessible
FF.	A107	Unit Type “B.1” – 2BR Fair Housing/Typical
GG.	A108	Unit Type “C” – 3BR Accessible
HH.	A109	Unit Type “C.1” – 3BR Fair Housing/Typical
II.	A110	Building Roof Plans
JJ.	A111	Building Roof Plans & Details
KK.	A200	Elevations: Buildings I & II
LL.	A201	Elevations: Buildings III & Clubhouse

MM.	A300	Wall Sections
NN.	A301	Wall/Porch Sections & Details
OO.	A302	Clubhouse – Porch Sections
PP.	A303	Clubhouse – Porch Sections
QQ.	A304	Porch Sections
RR.	A400	Door & Window Details
SS.	A401	Door & Window Details
TT.	A500	Building Exterior and Interior Details
UU.	S-0.1	Structural Notes
VV.	S-1.0	Foundation Plans
WW.	S-1.1	Foundation Plans
XX.	S-1.2	Foundation Plan
YY.	S-1.3	Structural Wall Plans
ZZ.	S-1.4	Structural Wall Plans
AAA.	S-1.5	Structural Wall Plan
BBB.	S-2.0	Roof Framing Plans
CCC.	S-2.1	Roof Framing Plans
DDD.	S-2.2	Roof Framing Plan
EEE.	S-3.0	Structural Details
FFF.	S-3.1	Structural Details
GGG.	M-0.1	Mechanical Notes and Details
HHH.	M-0.2	HVAC Schedules
III.	M-1.0	Building Type I & I.A – HVAC Plans
JJJ.	M-1.1	Building Type II & III – HVAC Plans
KKK.	M-1.2	HVAC Unit Plans
LLL.	M-1.3	Clubhouse Building – HVAC Plans
MMM.	P-0.1	Plumbing Notes and Details
NNN.	P-1.0	Building Type I & I.A – Plumbing Plans
OOO.	P-1.1	Building Type II & III – Plumbing Plans
PPP.	P-1.2	Unit Water Plan
QQQ.	P-1.3	Unit DWV Plan
RRR.	P-1.4	Clubhouse Building – Water Plan
SSS.	P-1.5	Clubhouse Building – DWV Plan
TTT.	P-1.6	Unit Plans DWV Riser Diagrams
UUU.	P-1.7	Clubhouse DWV Riser Diagrams
VVV.	E-0.1	Electrical Details, Notes & Schedules
WWW.	E-0.2	Panel Schedules
XXX.	E-0.3	Panel Schedules
YYY.	E-1.0	Building Type I & I.A – Electrical Plans
ZZZ.	E-1.1	Building Type II & III - Electrical Plans
AAAA.	E-1.2	Unit Lighting Plans
BBBB.	E-1.3	Unit Power Plans
CCCC.	E-1.4	Clubhouse Building – Lighting Plan
DDDD.	E-1.5	Clubhouse Building – Power Plan
EEEE.	E-1.6	Meter Center Electrical Riser Diagram

END OF SECTION

00 31 32

GEOTECHNICAL REPORT

PART ONE - GENERAL

1.1 DESCRIPTION

- A. Includes but not limited to:
 - 1. Report of Geotechnical Exploration by Consulting Services Inc. dated March 1, 2023, available upon request.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

FORM OF CONTRACT

1. The Contract for this Project is the "Standard form of Agreement Between the Owner and Contractor", AIA Document A101, 2017 Edition, a copy of which may be reviewed at the Architect's office or obtained from the Lynn Imaging.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

00 65 10

INSULATION CERTIFICATE LETTER

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Work included in but not limited to this section (description)
 - 1. Administrative requirements for Insulation Certification Letter.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
- B. Section 01 78 10 Closeout Submittals & Procedures

1.3 REFERENCES

- A. None

1.4 SUBMITTALS

- A. See Section 01 33 23 Submittal Procedures for requirements.
- B. General Contractor is to submit a letter on the Company's letterhead which list each type of building insulation used in the Project and its "R" factor value.
 - 1. Letter is to contain;
 - a. Date
 - b. Project Name
 - c. Project Number
 - d. Project Description of Work
 - e. List of Insulation & "R" factor values
 - f. Addressed to Owner

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION – Not Used

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

00 65 36**BUILDERS WARRANTY****PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Work included in but not limited to this section (description)
 - 1. Administrative requirements for General Contractors Warranty Letter.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
- B. Section 01 78 10 Closeout Submittals & Procedures

1.3 REFERENCES

- A. None

1.4 SUBMITTALS

- A. See Section 01 33 23 Submittal Procedures for requirements.
- B. General Contractor is to submit a letter on the Company's letterhead which states the General Contractor Warrants all Work installed in the Contract.
 - 1. Letter is to contain;
 - a. Date
 - b. Project Name
 - c. Project Number
 - d. Project Description of Work
 - e. Statement of Warranty
 - f. Addressed to Owner
 - 2. This statement does not negate the responsibility of any Manufacturers, Suppliers or Sub-Contractors Warranties. Include this letter with Closeout Submittals

PART 2 PRODUCTS – Not Used**PART 3 EXECUTION – Not Used****END OF SECTION**

THIS PAGE IS INTENTIONALLY BLANK

GENERAL CONDITIONS

1. The General Conditions for this project are the “General Conditions of the Contract for Construction”, AIA Document A201, 2017 Edition, a copy of which may be reviewed at the Architect’s office or obtained from the Lynn Imaging.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

52.222-21 PROHIBITION OF SEGREGATED FACILITIES

As prescribed in [22.810\(a\)\(1\)](#), insert the following clause:

Prohibition of Segregated Facilities (Feb 1999)

(a) "Segregated facilities," as used in this clause, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex or national origin because of written or oral policies or employee custom. The term does not include separate or single-user rest rooms or necessary dressing or sleeping areas provided to assure privacy between sexes.

(b) The contractor agrees that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor agrees that a breach of this clause is a violation of the Equal Opportunity clause in the contract.

(c) The Contractor shall include this clause in every subcontract and purchase order that is subject to the Equal Opportunity clause of this contract.

(End of clause)

As prescribed in [22.810\(a\)\(2\)](#), insert the following provision:

Previous Contracts and Compliance Reports (Feb 1999)

The offeror represents that --

(a) It * has, * has not participated in a previous contract or subcontract subject to the Equal Opportunity clause of this solicitation;

(b) It * has, * has not filed all required compliance reports; and

(c) Representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained before subcontract awards.

THIS PAGE IS INTENTIONALLY BLANK

EQUAL EMPLOYMENT OPPORTUNITY EXECUTIVE ORDER 11246

SOURCE: The provisions of Executive Order 11246 of Sept. 24, 1965, appear at 30 FR 12319, 12935, 3 CFR, 1964-1965 Comp., p.339, unless otherwise noted. Under and by virtue of the authority vested in me as President of the United States by the Constitution and statutes of the United States, it is ordered as follows:

Part I - Nondiscrimination in Government Employment
[Part I superseded by EO 11478 of Aug. 8, 1969, 34 FR 12985, 3 CFR, 1966-1970 Comp., p. 803]

Part II - Nondiscrimination in Employment by Government Contractors and Subcontractors.

Subpart A - Duties of the Secretary of Labor

SEC. 201. (a) The Secretary of Labor shall be responsible for the administration and enforcement of Parts II and III of this Order. The Secretary shall adopt such rules and regulations and issue such orders as are deemed necessary and appropriate to achieve the purposes of Parts II and III of this Order.
[Sec. 201 amended by EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230]

Subpart B - Contractors' Agreements

SEC. 202. (a) Except in contracts exempted in accordance with Section 204 of this Order, all Government contracting agencies shall include in every Government contract hereafter entered into the following provisions: During the performance of this contract, the contractor agrees as follows:

- (1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.
- (2) The contractor will, in all solicitations or advancements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.
- (3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

- (4) The contractor will comply with all provisions of Executive Order No. 11246 of Sept. 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- (5) The contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- (6) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of Sept. 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- (7) The contractor will include the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the contractor may request the United States to enter into such litigation to protect the interests of the United States."
- [Sec. 202 amended by EO 11375 of Oct. 13, 1967, 32 FR 14303, 3 CFR, 1966-1970 Comp., p. 684, EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230]*

- SEC. 203. (a) Each contractor having a contract containing the provisions prescribed in Section 202 shall file, and shall cause each of his subcontractors to file, Compliance Reports with the contracting agency or the Secretary of Labor as may be directed. Compliance Reports shall be filed within such times and shall contain such information as to the practices, policies, programs, and employment statistics of the contractor and each subcontractor, and shall be in such form, as the Secretary of Labor may prescribe.
- (b) Bidders or prospective contractors or subcontractors may be required to state whether they have participated in any previous contract subject to the provisions of this Order, or any preceding similar Executive order, and in that event to submit, on behalf of themselves and their proposed subcontractors, Compliance Reports prior to or as an initial part of their bid or negotiation of a contract.

- (c) Whenever the contractor or subcontractor has a collective bargaining agreement or other contract or understanding with a labor union or an agency referring workers or providing or supervising apprenticeship or training for such workers, the Compliance Report shall include such information as to such labor union's or agency's practices and policies affecting compliance as the Secretary of Labor may prescribe: Provided, That to the extent such information is within the exclusive possession of a labor union or an agency referring workers or providing or supervising apprenticeship or training and such labor union or agency shall refuse to furnish such information to the contractor, the contractor shall so certify to the Secretary of Labor as part of its Compliance Report and shall set forth what efforts he has made to obtain such information.
- (d) The Secretary of Labor may direct that any bidder or prospective contractor or subcontractor shall submit, as part of his Compliance Report, a statement in writing, signed by an authorized officer or agent on behalf of any labor union or any agency referring workers or providing or supervising apprenticeship or other training, with which the bidder or prospective contractor deals, with supporting information, to the effect that the signer's practices and policies do not discriminate on the grounds of race, color, religion, sex or national origin, and that the signer either will affirmatively cooperate in the implementation of the policy and provisions of this Order or that it consents and agrees that recruitment, employment, and the terms and conditions of employment under the proposed contract shall be in accordance with the purposes and provisions of the order. In the event that the union, or the agency shall refuse to execute such a statement, the Compliance Report shall so certify and set forth what efforts have been made to secure such a statement and such additional factual material as the Secretary of Labor may require.
- [Sec. 203 amended by EO 11375 of Oct. 13, 1967, 32 FR 14303, 3 CFR, 1966-1970 Comp., p. 684; EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230]*

- SEC. 204 (a) The Secretary of Labor may, when the Secretary deems that special circumstances in the national interest so require, exempt a contracting agency from the requirement of including any or all of the provisions of Section 202 of this Order in any specific contract, subcontract, or purchase order.
- (b) The Secretary of Labor may, by rule or regulation, exempt certain classes of contracts, subcontracts, or purchase orders (1) whenever work is to be or has been performed outside the United States and no recruitment of workers within the limits of the United States is involved; (2) for standard commercial supplies or raw materials; (3) involving less than specified amounts of money or specified numbers of workers; or (4) to the extent that they involve subcontracts below a specified tier.
- (c) Section 202 of this Order shall not apply to a Government contractor or subcontractor that is a religious corporation, association, educational institution, or society, with respect to the employment of individuals of a particular religion to perform work connected with the carrying on by such corporation, association, educational institution, or society of its activities. Such contractors and subcontractors are not exempted or excused from complying with the other requirements contained in this Order.
- (d) The Secretary of Labor may also provide, by rule, regulation, or order, for the exemption of facilities of a contractor that are in all respects separate and distinct from activities of the contractor related to the performance of the contract: provided, that such an exemption will not interfere with or impede the effectuation of the purposes of this Order: and provided further, that in the absence of such an exemption all facilities shall be covered by the provisions of this Order."
- [Sec. 204 amended by EO 13279 of Dec. 16, 2002, 67 FR 77141, 3 CFR, 2002 Comp., p. 77141 - 77144]*

Subpart C -**Powers and Duties of the Secretary of Labor and the Contracting Agencies**

SEC. 205. (a) The Secretary of Labor shall be responsible for securing compliance by all Government contractors and subcontractors with this Order and any implementing rules or regulations. All contracting agencies shall comply with the terms of this Order and any implementing rules, regulations, or orders of the Secretary of Labor. Contracting agencies shall cooperate with the Secretary of Labor and shall furnish such information and assistance as the Secretary may require.

[Sec. 205 amended by EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230]

SEC. 206. (a) The Secretary of Labor may investigate the employment practices of any Government contractor or subcontractor to determine whether or not the contractual provisions specified in Section 202 of this Order have been violated. Such investigation shall be conducted in accordance with the procedures established by the Secretary of Labor.

(b) The Secretary of Labor may receive and investigate complaints by employees or prospective employees of a Government contractor or subcontractor which allege discrimination contrary to the contractual provisions specified in Section 202 of this Order.

[Sec. 206 amended by EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230]

SEC. 207. (a) The Secretary of Labor shall use his/her best efforts, directly and through interested Federal, State, and local agencies, contractors, and all other available instrumentalities to cause any labor union engaged in work under Government contracts or any agency referring workers or providing or supervising apprenticeship or training for or in the course of such work to cooperate in the implementation of the purposes of this Order. The Secretary of Labor shall, in appropriate cases, notify the Equal Employment Opportunity Commission, the Department of Justice, or other appropriate Federal agencies whenever it has reason to believe that the practices of any such labor organization or agency violate Title VI or Title VII of the Civil Rights Act of 1964 or other provision of Federal law.

[Sec. 207 amended by EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230]

SEC. 208. (a) The Secretary of Labor, or any agency, officer, or employee in the executive branch of the Government designated by rule, regulation, or order of the Secretary, may hold such hearings, public or private, as the Secretary may deem advisable for compliance, enforcement, or educational purposes.

(b) The Secretary of Labor may hold, or cause to be held, hearings in accordance with Subsection of this Section prior to imposing, ordering, or recommending the imposition of penalties and sanctions under this Order. No order for debarment of any contractor from further Government contracts under Section 209(6) shall be made without affording the contractor an opportunity for a hearing.

Subpart D -**Sanctions and Penalties**

SEC. 209. (a) In accordance with such rules, regulations, or orders as the Secretary of Labor may issue or adopt, the Secretary may:

(1) Publish, or cause to be published, the names of contractors or unions which it has concluded have complied or have failed to comply with the provisions of this Order or of the rules, regulations, and orders of the Secretary of Labor.

- (2) Recommend to the Department of Justice that, in cases in which there is substantial or material violation or the threat of substantial or material violation of the contractual provisions set forth in Section 202 of this Order, appropriate proceedings be brought to enforce those provisions, including the enjoining, within the limitations of applicable law, of organizations, individuals, or groups who prevent directly or indirectly, or seek to prevent directly or indirectly, compliance with the provisions of this Order.
- (3) Recommend to the Equal Employment Opportunity Commission or the Department of Justice that appropriate proceedings be instituted under Title VII of the Civil Rights Act of 1964.
- (4) Recommend to the Department of Justice that criminal proceedings be brought for the furnishing of false information to any contracting agency or to the Secretary of Labor as the case may be.
- (5) After consulting with the contracting agency, direct the contracting agency to cancel, terminate, suspend, or cause to be cancelled, terminated, or suspended, any contract, or any portion or portions thereof, for failure of the contractor or subcontractor to comply with equal employment opportunity provisions of the contract. Contracts may be cancelled, terminated, or suspended absolutely or continuance of contracts may be conditioned upon a program for future compliance approved by the Secretary of Labor.
- (6) Provide that any contracting agency shall refrain from entering into further contracts, or extensions or other modifications of existing contracts, with any noncomplying contractor, until such contractor has satisfied the Secretary of Labor that such contractor has established and will carry out personnel and employment policies in compliance with the provisions of this Order.

- (b) Pursuant to rules and regulations prescribed by the Secretary of Labor, the Secretary shall make reasonable efforts, within a reasonable time limitation, to secure compliance with the contract provisions of this Order by methods of conference, conciliation, mediation, and persuasion before proceedings shall be instituted under subsection (a)(2) of this Section, or before a contract shall be cancelled or terminated in whole or in part under subsection (a)(5) of this Section.

[Sec. 209 amended by EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230]

- SEC. 210. (a) Whenever the Secretary of Labor makes a determination under Section 209, the Secretary shall promptly notify the appropriate agency. The agency shall take the action directed by the Secretary and shall report the results of the action it has taken to the Secretary of Labor within such time as the Secretary shall specify. If the contracting agency fails to take the action directed within thirty days, the Secretary may take the action directly.

[Sec. 210 amended by EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p 230]

- SEC. 211. (a) If the Secretary shall so direct, contracting agencies shall not enter into contracts with any bidder or prospective contractor unless the bidder or prospective contractor has satisfactorily complied with the provisions of this Order or submits a program for compliance acceptable to the Secretary of Labor.

[Sec. 211 amended by EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230]

- SEC. 212. (a) When a contract has been cancelled or terminated under Section 209(a)(5) or a contractor has been debarred from further Government contracts under Section 209(a)(6) of this Order, because of noncompliance with the contract provisions specified in Section 202 of this Order, the Secretary of Labor shall promptly notify the Comptroller General of the United States.

[Sec. 212 amended by EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230]

Subpart E - Certificates of Merit

- SEC. 213. (a) The Secretary of Labor may provide for issuance of a United States Government Certificate of Merit to employers or labor unions, or other agencies which are or may hereafter be engaged in work under Government contracts, if the Secretary is satisfied that the personnel and employment practices of the employer, or that the personnel, training, apprenticeship, membership, grievance and representation, upgrading, and other practices and policies of the labor union or other agency conform to the purposes and provisions of this Order.

- SEC. 214. (a) Any Certificate of Merit may at any time be suspended or revoked by the Secretary of Labor if the holder thereof, in the judgment of the Secretary, has failed to comply with the provisions of this Order.

- SEC. 215. (a) The Secretary of Labor may provide for the exemption of any employer, labor union, or other agency from any reporting requirements imposed under or pursuant to this Order if such employer, labor union, or other agency has been awarded a Certificate of Merit which has not been suspended or revoked.

Part III - Nondiscrimination Provisions in Federally Assisted Construction Contracts

- SEC. 301. (a) Each executive department and agency, which administers a program involving Federal financial assistance shall require as a condition for the approval of any grant, contract, loan, insurance, or guarantee thereunder, which may involve a construction contract, that the applicant for Federal assistance undertake and agree to incorporate, or cause to be incorporated, into all construction contracts paid for in whole or in part with funds obtained from the Federal Government or borrowed on the credit of the Federal Government pursuant to such grant, contract, loan, insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee, the provisions prescribed for Government contracts by Section 202 of this Order or such modification thereof, preserving in substance the contractor's obligations thereunder, as may be approved by the Secretary of Labor, together with such additional provisions as the Secretary deems appropriate to establish and protect the interest of the United States in the enforcement of those obligations. Each such applicant shall also undertake and agree (1) to assist and cooperate actively with the Secretary of Labor in obtaining the compliance of contractors and subcontractors with those contract provisions and with the rules, regulations and relevant orders of the Secretary, (2) to obtain and to furnish to the Secretary of Labor such information as the Secretary may require for the supervision of such compliance, (3) to carry out sanctions and penalties for violation of such obligations imposed upon contractors and subcontractors by the Secretary of Labor pursuant to Part II, Subpart D, of this Order, and (4) to refrain from entering into any contract subject to this Order, or extension or other modification of such a contract with a contractor debarred from Government contracts under Part II, Subpart D, of this Order.

[Sec. 301 amended by EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230]

- SEC. 302. (a) "Construction contract" as used in this Order means any contract for the construction, rehabilitation, alteration, conversion, extension, or repair of buildings, highways, or other improvements to real property.
- (b) The provisions of Part II of this Order shall apply to such construction contracts, and for purposes of such application the administering department or agency shall be considered the contracting agency referred to therein.
- (c) The term "applicant" as used in this Order means an applicant for Federal assistance or, as determined by agency regulation, other program participant, with respect to whom an application for any grant, contract, loan, insurance, or guarantee is not finally acted upon prior to the effective date of this Part, and it includes such an applicant after he/she becomes a recipient of such Federal assistance.

- SEC. 303. (a) The Secretary of Labor shall be responsible for obtaining the compliance of such applicants with their undertakings under this Order. Each administering department and agency is directed to cooperate with the Secretary of Labor and to furnish the Secretary such information and assistance as the Secretary may require in the performance of the Secretary's functions under this Order.
- (b) In the event an applicant fails and refuses to comply with the applicant's undertakings pursuant to this Order, the Secretary of Labor may, after consulting with the administering department or agency, take any or all of the following actions: (1) direct any administering department or agency to cancel, terminate, or suspend in whole or in part the agreement, contract or other arrangement with such applicant with respect to which the failure or refusal occurred; (2) direct any administering department or agency to refrain from extending any further assistance to the applicant under the program with respect to which the failure or refusal occurred until satisfactory assurance of future compliance has been received by the Secretary of Labor from such applicant; and (3) refer the case to the Department of Justice or the Equal Employment Opportunity Commission for appropriate law enforcement or other proceedings.
- (c) In no case shall action be taken with respect to an applicant pursuant to clause (1) or (2) of subsection (b) without notice and opportunity for hearing.
[Sec. 303 amended by EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230]

- SEC. 304. (a) Any executive department or agency which imposes by rule, regulation, or order requirements of nondiscrimination in employment, other than requirements imposed pursuant to this Order, may delegate to the Secretary of Labor by agreement such responsibilities with respect to compliance standards, reports, and procedures as would tend to bring the administration of such requirements into conformity with the administration of requirements imposed under this Order: Provided, That actions to effect compliance by recipients of Federal financial assistance with requirements imposed pursuant to Title VI of the Civil Rights Act of 1964 shall be taken in conformity with the procedures and limitations prescribed in Section 602 thereof and the regulations of the administering department or agency issued thereunder.

Part IV - Miscellaneous

- SEC. 401. (a) The Secretary of Labor may delegate to any officer, agency, or employee in the Executive branch of the Government, any function or duty of the Secretary under Parts II and III of this Order.
[Sec. 401 amended by EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230]

- SEC. 402. (a) The Secretary of Labor shall provide administrative support for the execution of the program known as the "Plans for Progress."
- SEC. 403. (a) Executive Orders Nos. 10590 (January 19, 1955), 10722 (August 5, 1957), 10925 (March 6, 1961), 11114 (June 22, 1963), and 11162 (July 28, 1964), are hereby superseded and the President's Committee on Equal Employment Opportunity established by Executive Order No. 10925 is hereby abolished. All records and property in the custody of the Committee shall be transferred to the Office of Personnel Management and the Secretary of Labor, as appropriate.
- (b) Nothing in this Order shall be deemed to relieve any person of any obligation assumed or imposed under or pursuant to any Executive Order superseded by this Order. All rules, regulations, orders, instructions, designations, and other directives issued by the President's Committee on Equal Employment Opportunity and those issued by the heads of various departments or agencies under or pursuant to any of the Executive orders superseded by this Order, shall, to the extent that they are not inconsistent with this Order, remain in full force and effect unless and until revoked or superseded by appropriate authority. References in such directives to provisions of the superseded orders shall be deemed to be references to the comparable provisions of this Order.
[Sec. 403 amended by EO 12107 of Dec. 28, 1978, 44 FR 1055, 3 CFR, 1978 Comp., p, 264]
- SEC. 404. (a) The General Services Administration shall take appropriate action to revise the standard Government contract forms to accord with the provisions of this Order and of the rules and regulations of the Secretary of Labor.
- SEC. 405. (a) This Order shall become effective thirty days after the date of this Order.

END OF SECTION

**NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT
OPPORTUNITY FOR CONSTRUCTION (FEB 1999)**

- (a) The offeror's attention is called to the Equal Opportunity clause and the Affirmative Action Compliance Requirements for Construction clause of this solicitation.
- (b) The goals for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Goals for Minority Participation for Each Trade	Goals for Female Participation for Each Trade
<i>[Contracting Officer shall insert goals shall insert goals]</i>	<i>[Contracting Officer shall insert goals shall insert goals]</i>

These goals are applicable to all Contractors' construction work performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, the Contractor shall apply the goals established for the geographical area where the work is actually performed. Goals are published periodically in the *Federal Register* in notice form, and these notices may be obtained from any Office of Federal Contract Compliance Programs office.

- (c) The Contractor's compliance with Executive Order 11246, as amended, and the regulations in 41 CFR 60-4 shall be based on
- (1) its implementation of the Equal Opportunity clause,
 - (2) specific affirmative action obligations required by the clause entitled "Affirmative Action Compliance Requirements for Construction," and
 - (3) its efforts to meet the goals.

The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade. The Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor, or from project to project, for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, Executive Order 11246, as amended, and the regulations in 41 CFR 60-4. Compliance with the goals will be measured against the total work hours performed.

- (d) The Contractor shall provide written notification to the Deputy Assistant Secretary for Federal Contract Compliance, U.S. Department of Labor, within 10 working days following award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the --
- (1) Name, address, and telephone number of the subcontractor;
 - (2) Employer's identification number of the subcontractor;
 - (3) Estimated dollar amount of the subcontract;
 - (4) Estimated starting and completion dates of the subcontract; and
 - (5) Geographical area in which the subcontract is to be performed.

- (e) As used in this Notice, and in any contract resulting from this solicitation, the "covered area" is _____ *[Contracting Officer shall insert description of the geographical areas where the contract is to be performed, giving the state, county, and city].*

THIS PAGE INTENTIONALLY BLANK

ADDENDUM

Project Name: Sutton's Landing

Addendum No.:

Project No. :

Date:

From: **REB Architects, PLLC**
103 Wind Haven Drive, Suite 101
Nicholasville, Ky. 40356
859-523-1500 Fax 859-523-1514

To: **All Bidders**

This Addendum forms a part of the Contract Documents and modifies the original Bidding Documents dated as noted below. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so shall subject the Bidder to disqualification.

This Addendum consists of _____ page(s), including this sheet.

I - CHANGES TO PRIOR ADDENDA:

Item I-1.

II - CHANGES TO BIDDING REQUIREMENTS:

Item II-1.

III - CHANGES TO AGREEMENT & OTHER CONTRACT FORMS:

Item III-1.

IV - CHANGES TO CONDITIONS OF THE CONTRACT:

Item IV-1.

V - CHANGES TO SPECIFICATIONS:

Item V-1.

VI - CHANGES TO DRAWINGS:

Item VI-1

THIS PAGE INTENTIONALLY BLANK

CLARIFICATION NOTICE FORMProject Name Sutton's Landing

Notice No.

Project #DateAddresseSender

Subject of Clarification

This Clarification Notice is issued to clarify the Contract Documents based on an interpretation reasonably inferable from the Contract Documents, and is believed to have no effect on the Contract Sum or Contract Time. Proceeding with the work affected by this Clarification Notice indicates acceptance with no change in the Contract Sum or Contract Time.

Attachments: List Attachments

Copies: Owner Contractor Consultants Others File

Signed By: Name

Date:

Specification Section # & Title

Drawing Sheet: #

Article/Paragraph: Goes here

Sheet Reference: Spec Sheet #

Description:
Start Here

THIS PAGE IS INTENTIONALLY BLANK

DIVISION 01 – GENERAL REQUIREMENTS**01 11 00 SUMMARY OF THE WORK**

01 11 13 Work in Contract

01 26 00 CONTRACT MODIFICATION AND PROCEDURES01 26 19 Clarification Notice
01 26 33 Minor Changes in the Work
01 26 63 Change Orders**01 29 00 PAYMENT PROCEDURES**

01 29 76 Progress Payment Procedures

01 31 00 PROJECT MANAGEMENT AND COORDINATION

01 31 13 Project Coordination

01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION

01 32 16 Construction Timeline Progress Schedule

01 33 00 SUBMITTAL PROCEDURES

01 33 23 Submittal Procedures

01 41 00 REGULATORY REQUIREMENTS

01 41 13 Regulatory Requirements

01 42 00 REFERENCES

01 42 13 References

01 45 00 QUALITY CONTROL

01 45 33 Special Inspections

01 54 00 CONSTRUCTION AIDS

01 54 12 Temporary Facilities, Controls, and Construction Aids

01 58 00 PROJECT IDENTIFICATION

01 58 13 Project Identification

01 62 00 PRODUCT OPTIONS

01 62 10 Product Options

01 71 00 EXAMINATION AND PREPARATION

01 71 23 Field Engineering

01 73 00 EXECUTION

01 73 19 Installation

01 74 00 CLEANING AND WASTE MANAGEMENT

01 74 13 Cleaning

01 78 00 CLOSEOUT SUBMITTALS

01 78 10 Closeout Submittals and Procedures

01 11 13WORK IN CONTRACT**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Work included in but not limited to this section (description)
 - 1. Providing the labor, equipment, and materials to complete Construction of a multi-family housing complex consisting of nine residential buildings and one community building. The facility will include twenty-two (22) one-bedroom units, twelve (12) two-bedroom units and six (6) three-bedroom units.
 - 2. The work consists of earthwork, sitework, concrete, masonry, metals, wood framing, drywall, acoustical ceilings, interior finishes and painting, plumbing, mechanical, electrical, fire protection system, doors, windows, and other items defined in the Contract Documents.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, Div 00, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
- B. All Divisions and Sections included in Project Manual
- C. Unless indicated as not-in-contract (NIC), provide all materials, labor, equipment, tools, connections and transportation necessary for the successful completion and operation of the Project as described in the Contract.

1.3 SCHEDULING

- A. Normal working hours shall be from 7:00 a.m. to 6:00 p.m., Monday through Friday. Requests for additional work shall require written approval from the Owner 7 days in advance of the proposed work period."

1.4 EXISTING WORK

- A. Protect existing vegetation, structures, equipment, utilities, pavement and improvements as required.
- B. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.
- C. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as approved by the Architect. At the completion of operations, existing work shall be in a condition equal to or better than that which existed before new work started.

1.5 QUALITY ASSURANCE

- A. Pre-installation Meeting
 - 1. See Section 01 33 23 Submittal Procedures
 - 2. See each Section for individual Agendas
- B. Quality Assurance/Control submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports and other documentary data affirming quality of products and installations.
 - 1. Submit 2 copies to Architect immediately upon receipt.
- C. EPA Designated Items Incorporated In the Work:
 - 1. Various sections of the specifications contain requirements for materials that have been designated by the EPA as being energy efficient. These items, when incorporated into the work under this contract, shall meet the minimum requirements as outlined and be packaged with and/or labeled as an ENERGY STAR PRODUCT or EQUIPMENT. If the material or product is not generally labeled or packaged with this designation, proper data shall be submitted indicating its compliance. This requirement applies to all products, materials and equipment used for this project.

1.6 DELIVERY, STORAGE, AND HANDLING

A. None

1.7 PROJECT CONDITIONS

A. None

1.8 WARRANTY

A. None

PART 2 PRODUCTS

2.1 MATERIALS

A. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

PART 3 EXECUTION

3.1 EXAMINATION

A. Prior to installation, examine each piece to verify that all are proper in all respects.

3.2 INSTALLATION

A. Install according to manufacturers and/or responsible intitutes instructions.

END OF SECTION

01 26 19

CLARIFICATION NOTICE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Work included in but not limited to this section requirements and procedures for Clarification Notices.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
- B. Section 00 93 19 Clarification Notice Form

1.3 CLARIFICATION NOTICE

- A. The Clarification Notice is issued to clarify the Contract Documents based on an interpretation reasonably inferable from the Contract Documents, and is believed to have no effect on the Contract Sum or Contract Time. Proceeding with the work affected by this Clarification Notice indicates acceptance with no change in the Contract Sum or Contract Time.
- B. A Clarification Notice will be issued to any written Request for Information, in regard to the Contract Documents after the Bidding is complete and a Contract has been signed.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION – Not Used

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

01 26 33

MINOR CHANGES IN THE WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Work included in but not limited to this section procedures for Minor Changes in the Work.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.

1.3 MINOR CHANGES IN THE WORK

- A. Supplemental instructions authorizing minor changes in the Work, which do not involve an adjustment to Contract Sum or Contract Time, will be issued by the Architect as an Owner's Field Order.
- B. All conditions, requirements, materials and workmanship will be as described in the Contract Documents unless otherwise specifically stated.
- C. The Contractor's signature upon the Field Change Form is the Contractor's acknowledgment that he is not entitled to any change in Contract Time or any additional adjustment in the Contract Sum or any other damages or compensation as a result of the Change in the Work other than that provided for in this Field Change, irrespective of whether a subsequent claim for additional compensation relating to the Change in the Work is described as a change in the requirements of the Contract Documents, a delay, a disruption of the Work, an acceleration of the Work, an impact on the efficiency of performance of the Work, an equitable adjustment, or other claim and irrespective of whether the impact of the Change in the Work is considered singly or in conjunction with the impact of other Changes in the Work.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION – Not Used

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

01 26 63CHANGE ORDERS**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Work included in but not limited to this section; procedures for contract Modifications.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
 - 1. Section 01 29 76 Progress Payment Procedures
 - 2. Section 01 33 23 Submittal Procedures

1.3 CHANGE ORDER REQUESTS

- A. Any and all Change Order Requests will be issued from the Architects office. All issued Change Requests will be on a standard form, a copy of which is included in the Specifications. A Change Order Request will be issued once it has been determined that a change is required, either due to work not covered by the construction documents or other interpretation, additional work requested by the Owner, or unforeseen work which is discovered needing completed during the performance of this contract. When the proposal is acceptable a change Order will be compiled for signatures by the Architect, then by the Owner and then the Contractor. No work, unless of an emergency nature, will take place without written consent of the Architect and Owner, in the form of a Change Order.
- B. Owner-Initiated Change Requests:
 - 1. Proposed changes in the Work will be issued by the Architect with a detailed description of the proposed change and supplemental or revised Drawings and Specifications.
 - a. Change Requests issued are for information only. Do not consider them instructions to either stop work in progress or to execute proposed change.
 - b. Within 7 calendar days of receipt of the Change Request, the Contractor shall submit a proposed cost, (on the Contractor Proposal Form, sample copy in specification) necessary to execute proposed changes, to the Architect for the Owner's review. (If additional time is required due to the scope of the work, a request in writing shall be submitted).
 - 1) Include with the proposal a list of quantities for the products to be purchased, their unit costs, and the Labor quantities with fringe benefits. Include the total amount of purchases to be made and Labor required for the change.
 - 2) If the Change involves Earthwork or other Site Work, when requested, furnish survey data to substantiate quantities.
 - c. Indicate applicable taxes, delivery charges, equipment rental and amount(s) of trade discount(s).
 - d. Include statement indicating effect proposed change in the Work will have on Contract Time.
- C. Contractor-Initiated Change Requests:
 - 1. When hidden or other unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for change to Architect (All issued Change Requests will be on a standard form, a copy of which is included in the Specifications).

- a. Include a statement outlining reasons for the change and the effect the change will have on the Work.
- b. Provide complete description of proposed change including required modifications to Contract Documents. Indicate the effect the proposed change will have on the Contract Sum and Time.
 - 1) Include with the proposal a list of quantities for the products to be purchased, their unit costs, and the Labor quantities with fringe benefits. Include the total amount of purchases to be made and Labor required for the change.
 - a). If the Change involves Earthwork or other Site Work, when requested, furnish survey data to substantiate quantities.
 - c. Indicate applicable taxes, delivery charges, equipment rental and amounts of trade discounts.
- 2. Comply with the requirements in Section 01 61 00 Common Product Requirements if proposed change in the Work requires substitution of one product or system for product or system specified.

1.4 SUBMITTALS

- A. See Section 01 33 23 Shop Drawings, Product Data & Samples for requirements.
- B. Any data required for the clarification of the Change Order Request if a substitution is involved of one product or system for product or system specified..

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION – Not Used

END OF SECTION

01 29 76**PROGRESS PAYMENT PROCEDURES****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Work included in but not limited to this section is Administrative and procedural requirements governing the Contractor's Applications for Payment.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.

1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid by Owner.
 - 1. Application for Payment.
 - a. Application for Payment at time of Substantial Completion and final Application for Payment involve added requirements outlined below.
- B. Payment Application Forms.
 - Use all Forms listed as required to substantiate the current Estimate for Partial Pay.
 - 1. All payment forms to be AIA documents.
- C. Application Preparation:
 - 1. Complete every entry on form. Incomplete applications will be returned without action.
 - a. Entries shall match data on the Schedule Values and the Construction Progress Schedule. Use updated schedules if revisions have been made.
 - b. Include amounts of signed Change Orders issued prior to the last day of the construction period covered by application.
- D. Transmittal and Approval Procedures.
 - 1. Review of the Application for Payment will be made by the Architect, once a month, at a designated meeting which will be scheduled at the Preconstruction Conference. The application will be reviewed to insure all materials and work are completed as indicated on the submission.
 - 2. Prior to transmitting the Application for Payment, a review copy of the Estimate for Partial Pay is to be sent to the Architects office, two (2) days in advance of the Construction Progress Meeting for review.
 - a. Any materials stored off site should have a separate Application for Payment for that portion, submitted one week prior to the transmittal of the full Application for Payment. This allows the Architects office sufficient time to review all materials stored off site for which payment has been requested. All off site storage must be covered by proper insurance, under lock & key, accessible to the Owner and with required documentation per the contract documents, prior to any expected approval.
 - 3. Submit five executed originals of each Application for Payment to the Architect. Include Waivers of Lien and similar attachments, as required.
 - a. Send each copy with a transmittal form, listing attachments and appropriate information related to the Application, in a manner acceptable to the Architect.
- E. Initial Application for Payment.
 - 1. Administrative actions and submittals that shall precede or coincide with submittal of first Application for Payment include;
 - a. List of subcontractors (as submitted with Bid).

- b. List of principal suppliers and fabricators.
 - c. HUD Form 92326 for Contract Payments.
 - d. Construction Progress Schedule.
 - e. List of unit prices (as submitted with Bid).
 - f. Submittal Schedule (preliminary if not final).
 - g. Copies of any required building permits.
 - h. Copies of authorizations and licenses from governing authorities for performance of the Work
 - i. Initial progress report & final Construction Time Line Schedule.
 - k. Minutes of the Preconstruction Conference.
- F. Application for Payment at Substantial Completion.
- 1. Following issuance of a Certificate of Substantial Completion, submit an Application for Payment.
 - 2. Administrative actions and submittals that shall precede or coincide with this application include;
 - a. Occupancy permits and similar approvals.
 - b. Meter readings.
 - c. Operations & Maintenance Manuals.
 - d. Change-over information related to Owner's occupancy, use, operation and maintenance.
 - 3. Final cleaning
 - a. Application for reduction of retainage and consent of surety
- G. Final Payment Application.
- 1. Administrative actions and submittals which shall precede or coincide with the submission of the final Application for Payment include;
 - a. Project closeout requirements are completed.
 - b. Correction of the Substantial Completion Punch List, in its entirety.
 - c. Proof of that unsettled claims have been settled prior to Final Payment.
 - d. Evidence that work not completed and accepted is or will be completed (whether discovered after closeout & warranty period or not).
 - e. Proof of transmittal of the required Project construction records to Owner or Architect.
 - f. Proof that all taxes, fees and similar obligations have been paid.
 - g. Removal of temporary facilities and services.
 - h. Removal of surplus materials, rubbish and similar elements
 - i. Change of door locks to Owner's access if required.
- H. Schedule for Contract Payments. (Schedule Of Values)
- 1. Provide a schedule of dollar values to Architect not less than 20 days before submission of the first Application for Payment as a condition of processing the first payment. Coordinate preparation of Schedule for Contract Payments with preparation of the Contractor's Construction Schedule. Correlate line items in Schedule for Contract Payments, with other required administrative schedules and forms, including;
 - a. Contractor's Construction Time Line Schedule.
 - b. Payment Request form
 - c. Subcontractors & Suppliers List
 - d. Schedule of submittals.
 - 2. Format & Content.
 - a. Submit Schedule for Contract Payments on indicated form (sample of which is bound in this specification). The categories shown shall include the pro rata portion of overhead and profit for each line item, so the sum of items will equal the Contract Sum. The Schedule shall correspond to the items of work in Contractor's Construction Time Line Schedule including work of Subcontractors.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION – Not Used

END OF SECTION

01 31 13**PROJECT COORDINATION****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Work included in but not limited to this section.
 1. Administrative and supervisory requirements necessary for Project Coordination.
 2. Administrative and procedural requirements for Project Coordination Meetings.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
 1. 01 41 13 Regulatory Requirements
 2. 01 29 76 Progress Payment Procedures
- B. Definitions
 1. Designation for this Project is Sutton's Landing.
 2. This Project designation shall be included on documents generated for Project by Contractor and Subcontractors, or be present on a cover letter accompanying such documents.

1.3 PROJECT COORDINATION

- A. Coordinate construction activities included in Contract Documents to assure efficient and orderly installation of each part of the Work. Coordinate construction operations that are dependent upon each other for proper installation, connection, and operation.
 1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in sequence required to obtain best results.
 2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. When necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports and attendance at meetings. Prepare similar memoranda for Owner and separate Contractors when coordination of their Work is required.
- C. Administrative Procedures;
 1. Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to;
 - a. Preparing of schedules
 - b. Installing and removing temporary facilities
 - c. Delivering and processing submittals
 - d. Progress meetings
 - e. Project Close-out activities
 2. Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1.4. PROJECT MEETINGS

- A. Preconstruction Conference;
1. Architect will schedule a preconstruction conference and organizational meeting at the Project Site or other convenient location within 15 days of issuance of a Notice To Proceed and before commencement of construction activities. The Architect will conduct the meeting to review responsibilities and personnel assignments.
 2. Attendees;
The Owner, the Architect and his consultants, the Contractor and his superintendent, major Subcontractors and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.
 3. Agenda;
 - a. Discuss significant topics that could affect progress, including;
 - 1) Tentative construction schedule
 - 2) Critical Work sequencing
 - 3) Designation of responsible personnel
 - 4) Procedures for processing clarifications, interpretations and modifications
 - 5) Procedures for processing Application for Payments
 - 6) Distribution of Contract Documents
 - 7) Submittal of Product Data, Shop Drawings, Samples, Quality Assurance/Control submittals
 - 8) Preparation of record documents and O & M manual
 - 9) Use of the premises
 - 10) Office, work, and storage areas
 - 11) Equipment deliveries and priorities
 - 12) Safety procedures
 - 13) First aid
 - 14) Security
 - 15) Housekeeping
 - 16) Working hours
 - 17) Resolving current problems
 - 18) Further orientation as to requirements of Contract Documents
 - 19) Architect's responsibility to Owner for inspection
 - 20) Working out general schedule of Architect's inspection
 - b. Record significant discussions and agreements and disagreements of each meeting and distribute minutes of meeting within three working days to all, including the Owner.
- B. Progress Meetings;
1. Architect will conduct progress meetings at Project site at regularly scheduled intervals but at least once a month.
 2. Attendees will be the Owner, Architect, Contractor and Subcontractors involved with current progress, planning, coordination or performance of current and future activities. Representatives at these meetings should be persons familiar with the Project and authorized to conclude matters relating to progress.
 3. Agenda:
 - a. Review and discuss the following;
 - 1) Minutes of the previous progress meeting. Significant items which could affect progress. Include topics for discussion as appropriate to status of Project.
 - 2) Progress since last meeting, where each activity is in relation to Contractor's Construction Schedule, and determine whether it is on time, ahead or behind schedule. Discuss how construction behind schedule is to be expedited. Decide and secure commitments from parties involved in the late Work. Discuss required schedule revisions to ensure that current and subsequent activities will be completed within Contract Time.
 - 3) Present and future needs of each entity represented will be

discussed, including such items as;

- a) Interface requirements
 - b) Time
 - c) Sequences
 - d) Deliveries
 - e) Off-site fabrication problems
 - f) Access
 - g) Site use
 - h) Temporary facilities and services
 - i) Hours of work
 - j) Hazards and risks
 - k) Housekeeping
 - l) Quality and Work standards
 - m) Modifications
 - n) Documentation of information for Application for Payment
- b. Architect will include brief summary of progress since previous meeting in narrative form. Within three days after each progress meeting date, copies of meeting minutes will be distributed by Architect to each party present and to parties concerned but not present, including the Owner.
 - c. Revise Contractor's Construction Schedule after each progress meeting updating the schedule to reflect changes that have been made or recognized. Issue revised schedule within three days after each progress meeting date, to each party present and to parties concerned but not present, including the Owner.
- C. Pre-installation Meetings;
- 1. Develop a schedule for pre-installation meetings based on Contractor's Construction Time Line Schedule. These meetings are to occur at the same time as Architect's regularly scheduled inspection visits, if possible. Hold pre-installation meetings at site before commencement of work specified in trade Sections requiring such a meeting.
 - 2. Attendees & Agenda
Owner, Architect, Contractor, Subcontractors, item or system suppliers/installers, Manufacturer's representatives and others as specified or invited.
 - a. Review progress of other construction activities and preparations for particular activity under consideration at each pre-installation meeting, including;
 - 1) Reviewing and confirming requirements of Contract Documents including related Modifications
 - 2) Verifying that completed work is ready for installation of items or systems
 - 3) Resolving conditions not in compliance with installation requirements
 - 4) Establishing installation and inspection schedule
 - 5) Coordination between trades
 - 6) Other trades which affect work of trade Section
 - 7) Other items specified in individual Sections
 - 8) Deliveries
 - 9) Shop Drawings, Product Data, Samples and Quality Assurance/Control Submittals
 - 10) Possible conflicts
 - 11) Compatibility problems
 - 12) Weather limitations
 - 13) Manufacturer's recommendations
 - 14) Compatibility of materials
 - 15) Temporary facilities
 - 16) Space and access limitations
 - 17) Governing regulations
 - 18) Testing requirements
 - 19) Required performance results
 - 20) Recording requirements
 - 21) Protection

- b. Record significant discussions and agreements and disagreements of each meeting, and distribute meeting minutes within three working days to everyone concerned, including the Owner.
- c. Make adjustments to work schedule necessitated by decisions of meeting. Do not proceed with work of Section involved if conference cannot be successfully concluded. Initiate necessary actions to resolve impediments to performance of the Work and reconvene conference within one week.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

01 32 16**CONSTRUCTION TIMELINE PROGRESS SCHEDULE****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Work included in but not limited to this section.
 - 1. Administrative and supervisory requirements necessary for Project Scheduling.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
- B. Sections 01 31 13 Project Coordination

1.3 PROGRESS SCHEDULE & REPORTS

- A. Construction Schedule
 - 1. General Requirements
 - a. Submit and maintain schedule for the Work that defines critical path. Display accepted schedule in site construction office at all times and review with Subcontractors each week. Form of Schedule shall be acceptable to Architect and Owner.
 - b. Utilize schedule for planning, organizing, and directing the Work, for reporting progress, and for requesting payment for work completed. Review schedule at each periodic progress meeting.
 - c. Use the legend of symbols (separate or attached) to clearly explain abbreviations used in schedules.
 - 2. Show important stages of construction for each major portion of the Work, including testing and installation.
 - 3. Provide separate timeline to identify each major construction area for each major portion of the Work. Show the sequencing or integration of each element in an area with other activities.
 - 4. Following a response to the initial submittal, print and distribute copies to Architect, Owner, Subcontractors, other Contractors and other parties required to comply with scheduled dates. Post copies in Project meeting room and temporary field office. When revisions are made, distribute to same parties and post in same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
 - 6. Revise schedule after each meeting or activity where revisions have been recognized or made. Issue updated schedules concurrently with a report of each meeting.
 - 7. Acceleration Of The Work;
 - a. If circumstances require that the Work or portion thereof be completed at a date earlier than Contract completion date as adjusted by Modifications and if directed by Architect and Owner, increase forces, equipment, hours of work, and/or number of shifts and speed up delivery of materials to meet altered completion date(s) ordered or directed. Any increase in cost to Contractor in compliance with such orders or directives will be reflected in an adjustment in Contract Sum in accordance with additional work performed.

- b. If in judgment of the Architect and Owner the Work is behind schedule and rate of placement of work is inadequate to regain scheduled progress and if so informed by Architect and Owner, immediately take action to increase rate of work placement.
 - 1) This shall be accomplished by any one or a combination of the following or other suitable measures;
 - a) An increase in working forces
 - b) An increase in equipment or tools
 - c) An increase in hours of work or number of shifts
 - d) Speeding up delivery of materials
 - 2) Within 10 days after being so informed, notify Architect of specific measures taken and/or planned to increase rate of progress with an estimate of when scheduled progress will be regained. If the plan of action is deemed inadequate by the Architect and Owner, take additional steps or make adjustments to the plan of action until it meets with the Architect's and Owner's approval.
 - 3) The acceleration of work will continue until the originally scheduled progress is regained. Re-establish progress from the latest revised, approved progress schedule for the Project. Timely completion is understood to be contract completion date as revised by time extensions granted at time acceleration is undertaken.
 - 4) No additional compensation for additional effort applied to the Work under terms of this subparagraph will be granted.
 - c. Any directive or order to accelerate the Work will be in writing. Any directive or order terminating accelerated work will be in writing.
- B. Daily Construction Reports
1. Prepare daily reports of operations at Project containing at least following information;
 - a. List of Subcontractors at site
 - b. Approximate count of personnel at site by trade
 - c. High and low temperatures, general weather conditions
 - d. Major items of equipment on site
 - e. Materials, equipment, or Owner-furnished items arriving or leaving site
 - f. Accidents and unusual events
 - g. Site or structure damage by water, frost, wind or other causes
 - h. Meetings and significant decisions
 - i. Visitors to the job including those who attend meetings
 - j. Stoppages, delays, shortages, losses
 - k. Any tests made and their result if known
 - l. Meter readings and similar recordings
 - m. Emergency procedures
 - n. Orders and requests of governing authorities
 - o. Modifications received, carried out
 - p. Services connected, disconnected
 - q. Equipment or system tests and start-ups
 - r. Brief summary of work accomplished that day
 2. Forward daily reports to the Architect on at least a weekly basis. Preface each packet of daily reports with a Project Status Report summarizing the attached daily reports.
 3. Maintain file copies of daily reports on site and make available to Architect and Owner upon request.

PART 2 PRODUCTS**PART 3 EXECUTION****END OF SECTION**

01 33 23**SUBMITTAL PROCEDURES****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Work included in but not limited to this section.
 - 1. Administrative provisions relating to processing of submittals required by the Contract Documents.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
- B. All Sections which specify Shop Drawings, Product Information, Manufacturing Qualifications, Samples, Color Charts and any other information required for review by the Architect.

1.3 GENERAL PROCEDURES

- A. Coordinate the preparation and processing of submittals in a timely manner so as to be ahead of the performance of the construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals required for related elements of the Work so processing will not be delayed by need to review submittals concurrently for coordination. Architect reserves right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
 - 3. Allow sufficient review time so installation will not be delayed by the time required to process submittals, including time for resubmittals.
 - a. Allow 14 days for initial review. Allow additional time if processing must be delayed to allow coordination with subsequent submittals. Architect will promptly advise Contractor when a submittal being processed must be delayed for coordination.
 - b. If an intermediate submittal is necessary, process same as initial submittal.
 - c. Allow 10 days for reprocessing each submittal.
 - d. No extension of Contract Time will be authorized due to failure to sufficiently transmit submittals to Architect before work is to be performed to allow processing.
 - 4. Place a permanent label or title block on each submittal for identification. Include name of entity that prepared each submittal on label or title block.
 - a. Provide space approximately 4" x 5" on label or beside title block on Shop Drawings to record Contractor's review and approval markings and action taken.
 - b. Include following information on label for processing and recording action taken.
 - 1) Project name.
 - 2) Date.
 - 3) Name and address of Architect.
 - 4) Name and address of Contractor.
 - 5) Name and address of Subcontractor.
 - 6) Name and address of supplier.

- 7) Name of manufacturer.
 - 8) Number and title of appropriate Specification Section.
 - 9) Drawing number and detail references, as appropriate.
5. Package each submittal from Contractor to Architect appropriately for transmittal and handling using a transmittal letter. On the transmittal, record relevant information and requests for data. Include Contractor's certification that information complies with Contract Document requirements or on form or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations.
 6. Submittals received from sources other than the Contractor or not marked with Contractor's approval will be returned without action.
- B. Architect's Action;
1. Allow 14 calendar days for Architect's review and return for initial submittals and 10 calendar days for re-submittals.
 2. Submittals reviewed by the Architect will be identified as having received such review by being so stamped and dated.
 - a. Submittals marked "REVIEWED" cover that part of the Work detailed in the submittal and Work may proceed provided it complies with the requirements of the Contract Documents. Final acceptance will depend upon that compliance.
 - b. Submittals marked "REVIEWED WITH COMMENT" will allow that part of the Work detailed in the submittal to proceed, provided it complies with notations or corrections on submittal and requirements of Contract Documents. Final acceptance will depend on that compliance.
 - c. Submittals marked "REJECTED/RESUBMIT" cover that part of the Work detailed in the submittal, including purchasing, fabrication, delivery or other activity, and mean that work must not proceed. Revise or prepare new submittal in accordance with notations and resubmit without delay at any additional cost to Owner. Repeat as necessary to obtain a satisfactory action comment.
 - 1) Do not permit submittals marked "Revise and Resubmit" to be used at Project site, or elsewhere where the Work is in progress.
 - d. When submittal is marked "REJECTED," do not proceed with that part of the Work covered by submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare new submittal for work in compliance with requirements of Contract Documents in accordance with notations and resubmit without delay at any additional cost to Owner. Repeat as necessary to obtain satisfactory action comment.
 - 1) Do not permit submittals marked "REJECTED" to be used at Project site or elsewhere where the Work is in progress.
 - e. Where a submittal is primarily for information or record purposes, special processing, or other activity, submittal will be returned, without stamp.
 - f. Where submittals do not contain all Product data, Shop Drawings, color selection data, samples and other required data, they will be returned with no action.
 - g. **Architect will not make final color and finish selections until all color and finish data for all products has been received and product reviewed by Architect.**
 3. Two copies of each submittal will be retained in Architect's office until completion of Project.
 4. Except for submittals for record, information, or similar purposes, where action and return is required or requested, Architect will review each submittal, indicate action taken and promptly return to Contractor.

1.4. SUBMITTAL SCHEDULE

- A. Within 20 days of receipt of a Notice to Proceed, furnish submittal schedule listing items specified to be furnished for review to Architect including product data, shop drawings, samples and quality assurance/control submittals.
 - 1. Coordinate submittal schedule with list of Subcontractors, Schedule of Values and Contractor's Construction Schedule.
 - 2. Prepare schedule in chronological order, including submittals required during first 90 days of construction. Provide following information;
 - a. Scheduled date for first submittal
 - b. Related Section number
 - c. Submittal category
 - d. Name of Subcontractor
 - e. Description of part of the Work covered
 - f. Scheduled date for resubmittal
 - g. Scheduled date for Architect's final release or approval
 - 3. Schedule shall show 14 days minimum after receipt for review by Architect. If resubmittal is required, an additional 10 days will be allowed for after receipt.
- B. Following response to initial submittal schedule, print and distribute copies to Architect, Owner, Subcontractors and other parties required to comply with submittal dates shown. Post copies in Project meeting room and field office. When revisions are made, distribute to same parties and post in same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- C. Update schedule after each meeting or activity to reflect revisions. Issue updated schedule concurrently with meeting minutes.
- D. Furnishing of submittal schedule or revision thereto shall not be interpreted as relieving Contractor of his obligation to comply with Contract Document requirements for items on schedule.

1.5 SHOP DRAWINGS, PRODUCT DATA & SAMPLES

- A. Shop Drawings
 - 1. Submit newly prepared graphic data to accurate scale. Except for templates, patterns and similar full size Drawings, submit Shop Drawings on sheets at least 8.5" x 11" but no larger than 36" x 48". Mark deviations from Contract Documents. Include the following information as a minimum:
 - a. Dimensions
 - b. Identification of products and materials included
 - c. Compliance with specified standards
 - d. Notation of coordination requirements
 - e. Notation of dimensions established by field measurement
 - 2. Do not reproduce Contract Documents or copy standard information as basis of Shop Drawings. Standard information prepared without specific reference to Project is not considered Shop Drawings.
 - 3. Review and designate (stamp) approval of shop drawings. Submit shop drawings required by Contract Documents to Architect with reasonable promptness and in orderly sequence. Shop drawings not required by Contract Documents, but requested by Contractor or supplied by Subcontractor need not be submitted to the Architect for review. However, these shop drawings shall meet specified shop drawing requirements except those relating to submission to Architect.
 - a. Bear cost of reproducing copies of shop drawings required by all concerned. Instead of prints, sepia may be required.
 - b. Shop drawings shall be complete and detailed.
 - c. Shop drawings shall be properly identified as specified or as Architect requires.
 - d. Provide 5 copies of Shop Drawings unless required otherwise in Specification Section.
- B. Product Data

1. Collect Product Data, as required by individual Sections, into separate submittals. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as Shop Drawings.
2. Mark each copy to show applicable choices and options. Printed Product Data may include information on several products, some of which are not required for Project, mark copies to show relevant information.
3. Do not submit Product Data until compliance with requirements of Contract Documents has been confirmed.
4. Submit preliminary single-copy of Product Data where selection of options by Architect is required.
5. Submit five copies minimum of each required submittal. Architect will retain one and return others marked with action taken and with corrections or modifications required. Unless noncompliance with Contract Document provisions is observed, submittal may serve as final submittal. Insert one marked copy in Owner-provided three-ring binders used to become Operations & Maintenance Manuals specified in Section 01 78 00 Closeout Submittals.
6. Furnish copies of final submittal to Subcontractors and others as required for performance of construction activities. Show distribution on transmittal forms.
 - a. Do not proceed with installation until applicable copy of Product Data is in installer's possession.
 - b. Do not allow use of unmarked copies of Product Data in connection with construction.

C Samples

1. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
 - a. Mount, display or package Samples for easy review of qualities indicated. Prepare Samples to match samples provided by Architect, if applicable. Include following;
 - 1) Generic description of Sample
 - 2) Sample source
 - 3) Product name or name of manufacturer
 - 4) Compliance with recognized standards
 - 5) Availability and delivery time
 - b. Submit Samples for review of kind, color, pattern and texture for final check of these characteristics with other elements, and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
 - 1) Where variations in color, pattern, texture or other characteristics are inherent in material or product represented, submit multiple units (not less than 3), which show approximate limits of variations.
 - 2) Refer to other specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, and details of assembly, connections, operation and similar construction characteristics.
 - 3) Refer to other Sections for Samples to be returned to Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On transmittal, indicate special requests regarding disposition of Sample submittals.
 - c. Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit full set of choices for material or product. Preliminary submittals will be reviewed and returned with Architect's comment indicating selection and other action.
 - d. Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets, one will be returned marked with action taken.
 - e. Samples accepted and returned by Architect shall be used for quality

comparisons throughout the course of construction.

- 1) Unless noncompliance with Contract Documents is observed, submittal may serve as final submittal.
 - 2) Sample sets may be used to obtain final acceptance of construction associated with each set.
2. Prepare and distribute additional sets to Subcontractors and others as required for performance of the Work. Show distribution on transmittal forms.
- 1.6. QUALITY CONTROL SUBMITTALS
- A. Quality Assurance/Control submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports and other documentary data affirming quality of products and installations.
 1. Submit 2 copies to Architect immediately upon receipt.

1 PRODUCTS – Not Used

2 EXECUTION – Not Used

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

01 41 13**REGULATORY REQUIREMENTS****PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Work included in but not limited to this section.
 - 1. Administrative requirements for permissions and permits.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
- B. Section 01 31 13 Project Coordination

1.3 PERMITS

- A. Contractor shall obtain and pay cost of permits, licenses, fees and bonds necessary for completion of this Work.
- B. Contractor shall secure certificates of inspection and of occupancy that may be required by authorities having jurisdiction over the Work. He shall deliver these certificates to Architect prior to execution of Certificate of Substantial Completion.

1.4 REGULATION

- A. The Contractor and others working under his jurisdiction shall perform all work in compliance with laws, regulations and ordinances of any kind required by governmental authority or other agency having jurisdiction over this Work.
- B. If Contractor observes that Contract Documents are in variance with any laws, regulations, and ordinances, he shall notify Architect and shall not proceed unless necessary changes required for compliance with said laws, regulations and ordinances have been affected as provided in the General Conditions. The Contractor shall be fully responsible for any work knowingly performed contrary to said laws, regulations and ordinances and shall fully indemnify Owner and Architect against loss and bear all costs and penalties that may arise.

PART 2 PRODUCTS**PART 3 EXECUTION****END OF SECTION**

THIS PAGE IS INTENTIONALLY BLANK

01 42 13**REFERENCES****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Work included in but not limited to this section.
1. Administrative and procedural requirements relating to quality assurance.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
- B. Section 01 62 10 Product Options.

1.3 REFERENCES**A. INDUSTRY STANDARDS:**

1. Except where Contract Documents specify differentially, construction industry standards will apply and are made a part of Contract Documents by reference.
2. Where compliance with two or more standards is specified and standards apparently establish different or conflicting requirements for minimum quantities or quality levels, refer to Architect for decision before proceeding. Quantity or quality level shown or specified will be minimum provided or performed. Actual installation may comply exactly with minimum quantity or quality specified, or it may exceed minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for context of requirements. Refer uncertainties to Architect for decision before proceeding.
3. Each entity engaged in construction on Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with Contract Documents. Where copies of standards are needed for performance of a required construction activity, Contractor will obtain copies directly from publication source.
4. Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in Contract Documents, are defined to mean associated names. Names and addresses are subject to change and are believed to be, but are not assured to be, accurate and up to date as of date of Contract Documents.
 - a. **AABC:** Associated Air Balance Council, Washington, D.C. (202) 737-0202 www.aabchq.com.
 - b. **AAMA:** American Architectural Manufacturers Association, Schaumburg, IL (847) 303-5859 www.aamanet.org.
 - c. **AASHTO:** American Association of State Highway & Transportation Officials, Washington, D.C. (202) 624-5800 www.aashto.org.
 - d. **ACI:** American Concrete Institute International, Farmington Hills, MI (248) 848-3700 www.aci-int.org.
 - e. **AGA:** American Gas Association, Washington DC (202) 824-7000 www.aga.org.
 - f. **AIA:** American Institute of Architects, Washington, D.C. (202)

- 626-7300 www.aiaonline.com.
- g. **AISC**: American Institute of Steel Construction, Chicago, IL (312) 670-2400 www.aisc.org.
- h. **AISI**: American Iron & Steel Institute, Washington, D.C. (202) 452-7100 www.steel.org.
- i. **AITC**: American Institute of Timber Construction, Englewood, CO (303) 792-0669.
- j. **AMCA**: Air Movement & Control Association International Inc, Arlington Heights, IL (847) 394-0150 www.amca.org.
- k. **ANSI**: American National Standards Institute, New York, NY (212) 642-4900 www.ansi.org.
- l. **APA**: APA-The Engineered Wood Association, Tacoma, WA (253) 565-6600 www.apawood.org.
- m. **API**: American Petroleum Institute, Washington, DC 20005 (202) 682-8000 www.api.org.
- n. **ARI**: Air Conditioning & Refrigeration Institute, Arlington, VA 22203 (703) 524-8800 www.ari.org.
- o. **ASHRAE**: American Society of Heating, Refrigerating, & Air-Conditioning Engineers, Atlanta, GA (404) 636-8400 www.ashrae.org.
- p. **ASME**: American Society of Mechanical Engineers International, New York, NY (800) 843-2763 www.asme.org.
- q. **ASTM**: American Society for Testing & Materials, West Conshohocken, PA (610) 832-9585 www.astm.org.
- r. **AWI**: Architectural Woodwork Institute, Reston, VA (703) 733-0600 www.awinet.org.
- s. **AWPA**: American Wood Preservers' Association, Granbury, TX (817) 326-6300 www.awpa.com.
- t. **AWS**: American Welding Society, Miami, FL (800) 443-9353 www.amweld.org.
- u. **AWWA**: American Water Works Association, Denver, CO (303) 794-7711 www.awwa.org.
- v. **BHMA**: Builders Hardware Manufacturers Association, New York, NY (212) 297-2100 www.buildershardware.com.
- w. **BIA**: Brick Industry Association, Reston, VA (703) 620-0010 www.bia.org.
- x. **CFI**: International Certified Floorcovering Installers Association, Kansas City, MO (816) 231-4646 www.cfi-installers.org.
- y. **CRI**: Carpet & Rug Institute, Dalton, GA (800) 882-8846 www.carpet-rug.com.
- z. **CRSI**: Concrete Reinforcing Steel Institute, Schaumburg, IL (847) 517-1200 www.crsi.org.
- aa. **CISPI**: Cast Iron Soil Pipe Institute, Chattanooga, TN (423) 892-0137.
- bb. **DHI**: Door & Hardware Institute, Chantilly, VA (703) 222-2010 www.dhi.org.
- cc. **EIMA**: EIFS Industry Members Association, Morrow, GA (800) 294-3462 www.eifsfacts.com.
- dd. **FM**: FM Global (Formerly Factory Mutual), Johnston, RI www.fmglobal.com.
- ee. **GA**: Gypsum Association, Washington, D.C. (202) 289-5440 www.gypsum.org.
- ff. **ICBO**: International Conference of Building Officials, Whittier, CA (800) 423-6587 www.icbo.org.
- gg. **ISSA**: International Slurry Surfacing Association, Washington, DC (202) 857-1160 www.slurry.org.
- hh. **LPI**: Lightning Protection Institute, Arlington Heights, IL (800) 488-6864 www.lightning.org.
- ii. **MFMA**: Maple Flooring Manufacturers' Association, Northbrook, IL (847) 480-9138 www.maplefloor.org.
- jj. **MSS**: Manufacturer's Standardization Society of The Valve and

- kk. Fittings Industry, Vienna, VA (703) 281-6613 www.mss-hq.com.
NAAMM: National Association of Architectural Metal Manufacturers, Chicago, IL (312) 332-0405 www.naamm.org.
- ll. **NEC:** National Electric Code (from NFPA).
- mm. **NEMA:** National Electrical Manufacturer's Association, Rosslyn, VA (703) 841-3200 www.nema.org.
- nn. **NFPA:** National Fire Protection Association, Quincy, MA (800) 344-3555 www.nfpa.org.
- oo. **NFRC:** National Fenestration Rating Council, Silver Spring, MD (301) 589-6372 www.nfrc.org.
- pp. **NSF:** NSF International, Ann Arbor, MI (734) 769-8010 www.nsf.org.
- qq. **PCA:** Portland Cement Assoc, Skokie, IL (847) 966-6200 www.portcement.org.
- rr. **PCI:** Precast / Prestressed Concrete Institute, Chicago, IL (312) 786-0300 www.pci.org.
- ss. **PEI:** Porcelain Enamel Institute, Nashville, TN (615) 385-5357 www.porcelainenamel.com.
- tt. **SDI:** Steel Deck Institute, Fox River Grove, IL (847) 462-1930 www.sdi.org.
- uu. **SDI:** Steel Door Institute, Cleveland, OH (440) 899-0010 www.steeldoor.org.
- vv. **SIGMA:** Sealed Insulating Glass Manufacturer's Association, Chicago, IL (312) 644-6610 www.sigmaonline.org/sigma.
- ww. **SJI:** Steel Joist Institute, Myrtle Beach, SC (843) 626-1995 www.steeljoist.org.
- xx. **SMACNA:** Sheet Metal & Air Conditioning Contractors National Association, Chantilly, VA (703) 803-2980 www.smacna.org.
- yy. **SPIB:** Southern Pine Inspection Bureau, Pensacola, FL (850) 434-2611 www.spib.org.
- zz. **SSMA:** Steel Stud Manufacturer's Association, Chicago, IL (312) 332-0405 www.ssmma.com.
- aaa. **TCA:** Tile Council of America, Anderson, SC (864) 646-8453 www.tileusa.com.
- bbb. **TPI:** Truss Plate Institute, Madison, WI (608) 833-5900.
- ccc. **UL:** Underwriters Laboratories, Northbrook, IL (847) 272-8800 www.ul.com.
- ddd. **WDMA:** Window and Door Manufacturer's Association, Des Plaines, IL (847) 299-5200 www.nwwda.org.
- eee. **WWPA:** Western Wood Products Association, Portland, OR (503) 224-3930 www.wwpa.org.
5. Federal Government Agencies: Names and titles of federal government standard or specification producing agencies are often abbreviated. Following acronyms or abbreviations referenced in Contract Documents represent names of standard or specification producing agencies of federal government. Names and addresses are subject to change but are believed to be, but are not assured to be, accurate and up to date as of date of Contract Documents.
- a. **CS:** Commercial Standard (U S Department of Commerce), Washington, D C (202) 512-0000
- b. **EPA:** Environmental Protection Agency, Washington, D C (202) 260-2090
- c. **FCC:** Federal Communications Commission, Washington, D C (202) 418-0126
- d. **FS:** Federal Specifications Unit (Available from GSA), Washington, D C (202) 619-8925
- e. **MIL:** Military Standardization Documents (U S Department of Defense), Defense Printing Service, Philadelphia, PA (215) 697-2179
- f. **OSHA:** Occupational Safety & Health Administration (U S

- Department of Labor), Washington, D C (202) 219-8148
- g. **PS:** Product Standard of NBS (U S Department of Commerce), Washington, D.C. (202) 512-1800
6. Governing Regulations / Authorities:
Contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.
7. Obtain copies of regulations required to be retained at Project Site, available for reference by parties who have a reasonable need for such reference.

a. PRODUCTS

b. EXECUTION

END OF SECTION

01 45 33SPECIAL INSPECTIONS**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Work included in but not limited to this section;
 - 1. Special Inspections as required by the Kentucky Building Code for any structure requiring the services of a registered design professional. Special Inspections are in addition to testing and inspection requirements which are shown elsewhere in the specifications, on the drawings or required in other provisions of the KBC 20178
 - a. Seismic Design Category for the structure is "B" and is shown in the General Notes section of the structural drawings.
- B. Special inspections are required for the following materials, work & systems:
 - 1. Inspection of Fabricators per Section 1704.2.5 of the Kentucky Building Code 2018.
 - 2. Concrete Construction per Section 1705.3 of the Kentucky Building Code 2018.
 - 3. Steel Construction per Section 1705.2 of the Kentucky Building Code 2018.
 - 4. Masonry Construction per Section 1705.4 of the Kentucky Building Code 2018.
 - 5. Wood Construction per Section 1705.5 of the Kentucky Building Code 2018.
 - 6. Prepared Fill per Section 1705.6 of the Kentucky Building Code 2018.
 - 7. Pile Foundations per Section 1705.7 of the Kentucky Building Code 2018.

1.2 GENERAL

- A. Owner Responsibility:
 - 1. The Inspection Agency shall be retained by the Owner. A single Inspection Agency capable of providing testing and inspection service for all construction as listed herein shall be retained. Work may not be broken into separate contracts with multiple firms.
 - a. Costs for re-inspection and retesting, should discrepancies be found, shall be provided by the Contractor at no extra cost to the Owner.
- B. Design Professional Requirement:
 - 1. At the time of application for permit, the permit applicant shall submit a statement of special inspections prepared by the registered design professional(s) in responsible charge in accordance with Section 107.1, KBC 2018 as a condition for permit issuance. This statement shall be in accordance with Section 1704.2.3 of the Kentucky Building code 2018, and shall be included on the drawings submitted for permit.
- C. Contractor Responsibility.
 - 1. Each contractor responsible for the construction of a structural system, designated within the statement of special inspections shall submit a written statement of responsibility to the building official and the owner or registered design professional in responsible charge acting as the owner's agent, prior to the commencement of work on the System or component. The contractor's statement of responsibility shall contain the following:
 - a. Acknowledgment of awareness of the special requirements contained in the statement of special inspections;
 - b. Acknowledgment that control will be exercised to obtain conformance with the construction documents approved by the building official;
 - c. Procedures for exercising control within the contractor's organization, the method and frequency of reporting and the distribution of the reports; and

- d. Identification and qualifications of the person(s) exercising such control and their position(s) in the organization.

1.3 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
- B. Section 03 30 53 Cast-in-Place Concrete
- C. Section 04 05 11 Common Masonry Requirements
- D. Section 06 17 53 Shop-Fabricated Wood Trusses
- E. Division 31 Earthwork

1.4 REFERENCES

- A. Kentucky Building Code 2018.
 - 1. Special inspections as defined in Chapter 17. .
- B. American Society for Testing and Materials:
 - 1. ASTM E-699 Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components in Accordance with Test Methods promulgated by ASTM Committee E-6

1.5 SUBMITTALS

- A. See Section 01 33 00 Submittal Procedures for requirements.

1.6 QUALITY ASSURANCE

- A. Qualified Certification Authorities:
 - 1. Subject to compliance with Kentucky Building Code Requirements, Qualified Certification Authorities providing certification which may be applicable to Project include:
 - a. American Concrete Institute (ACI).
 - b. American Institute of Steel Construction (AISC).
 - c. American Welding Society (AWS).
 - d. National Institute of Certified Engineering Technology (NICET).
 - e. Truss Plate Institute (TPI).
- B. Inspection Agency Qualifications:
 - 1. An established and qualified person, firm or corporation regularly engaged in conducting tests or furnishing inspection services, when such qualified person, firm or corporation has been approved by the building official or the registered design professional in responsible charge, pursuant to Chapter 17 of KBC 2018.
 - 2. To qualify for acceptance, an independent testing agency must demonstrate to the Structural Engineer of Record's satisfaction, based on evaluation of agency submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
 - 3. Each inspector performing work on the Project shall be qualified to perform inspections for a particular type of construction or operation requiring a special inspection by a Qualified Certification Authority as defined in the Kentucky Building Code.
 - a. Qualified Certification Authority is defined as a nationally recognized organization, with the capability to observe, assess, document and monitor the professional, technical and production activities of the fabricator or special inspector.
 - 4. Subject to compliance with Kentucky Building Code requirements, Qualified Certification Authorities providing certification which may be applicable to Project include, but are not limited to, the following:
 - a. Concrete Construction
 - 1) Use of design mix – ACI Level 2.
 - 2) Material verifications, sampling of fresh concrete – NICET Level 1 (concrete).
 - 3) Reinforcing inspection – NICET Level 2 (concrete).

- b. Wood Construction
 - 1) Professional Engineer licensed in the State of Kentucky with experience in the design of building structures.
 - c. Soils and Rock Bearing Materials
 - 1) NICET Level 2 (soils).
 - d. Special inspections for seismic resistance.
 - 1). Special inspections itemized in Sections 1705.12 through 1705.13, of the KBC 2018 unless exempted by the exceptions of Section 1704.2, are required for the following:
 - a). The seismic-force-resisting systems in structures assigned to Seismic Design Category C, D, E or F, as determined in Section 1613.
 - b). Designated seismic systems in structures assigned to Seismic Design Category D, E or F.
 - c). Architectural plumbing, mechanical and electrical components in structures assigned to Seismic Design Category C, D, E or that are required in Sections 1705.12.5 and 1705.12.6.
5. Available Inspection Agency: Subject to compliance with requirements, Inspection Agencies that may perform Special Inspection Work include, but are not limited to, the following:
 - a. Solid Ground Engineering
1419 Lexington Rd,
Richmond, KY
 - b. LE Gregg
2456 Fortune Drive, Suite 155
Lexington, KY
 - c. Vector Engineering
1535 Old Finchville Rd, Shelbyville, KY 40065
(502) 633-7585
 6. For Inspection Agencies not listed herein, submit qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified. As mandated by the Kentucky Building Code, Engineer reserves the right to accept or reject Inspection Agency candidates based on the past experience, knowledge, and capacity of the proposed candidate. Inspection Agency shall be approved by Engineer prior to hiring.
 7. Prior to any construction, Inspection Agency shall submit list of personnel who may provide inspection work on project. List shall include the name and certification level (qualification) of each inspector. List shall also include the name and professional engineering registration number of the Special Inspector and the Professional Engineer with experience in the design of building structures.
 8. The Inspection Agency shall carry professional liability insurance for errors and omissions to a minimum limit of \$1,000,000 per occurrence and shall submit certificate of insurance along with the qualifications for approval by the Engineer. Qualification submittals not accompanied with the Certificate of Insurance will be returned to the sender without further action.
- C. Special Inspector Qualifications:
1. A professional engineer who is legally authorized to practice in the State of Kentucky and who is experienced in providing testing and inspection services of structure system types similar to this Project in material, design, and extent.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION

3.1 INSPECTION OF FABRICATORS

- A. Where fabrication of structural load-bearing members and assemblies is being performed on the premises of a fabricator's shop, special inspection of the fabricated items shall be as required by the KBC 2018.

1. The special inspector shall verify that the fabricator maintains detailed fabrication and quality control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards. The special inspector shall review the procedures for completeness and adequacy relative to the code requirements for the fabricator's scope of work.
 - a. Special inspections as required by KBC 2018 shall not be required where the fabricator is approved in accordance with paragraph 3.1.A.2 of this Specification.
2. Fabricator approval.
 - a. Special inspections required by this code are not required where the work is done on the premises of a fabricator registered and approved to perform such work without special inspection. Approval shall be based upon review of the fabricator's written procedural and quality control manuals and periodic auditing of fabrication practices by qualified certification authority. At completion of fabrication, the approved fabricator shall submit a certificate of compliance to the registered design professional in responsible charge stating that the work was performed in accordance with the approved construction documents.

3.2 INSPECTION OF CONCRETE CONSTRUCTION

- A. Provide special inspection of the fabrication of concrete structural elements and assemblies in accordance with the *Inspection of Fabricators*.
- B. Periodically verify the use of the proper design mix.
- C. Verify use of proper grade and ASTM designation of reinforcing steel.
- D. Perform periodic inspection on placement, spacing, clear cover, number, and splice lap lengths of reinforcing steel.
- E. Monitor concrete quality by means of site and laboratory tests. The Inspection Agency is authorized to reject plastic concrete not conforming to specifications. Immediately inform the Contractor, the Architect and the Structural Engineer of inadequacies in concrete quality. Sampling and testing for quality control during concrete placement shall include the following:
 1. Sampling Fresh Concrete: ASTM C 172.
 - a. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - b. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
 - d. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
 - e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
 3. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 4. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified

compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.

5. Test results will be reported in writing to Architect, Structural Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
- F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- G. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.
- H. Test the F-number tolerances of concrete slabs in accordance with the provisions set forth by ASTM Committee E6.21.10. All tests shall be performed within three working days after concrete placement and prior to any form removal.

3.3 INSPECTION OF MASONRY CONSTRUCTION

- A. At onset of masonry construction and periodically thereafter, verify proportions of site-prepared mortar, construction of mortar joints, and location of reinforcement and connectors.
- B. Perform periodic inspection to verify size and location of structural elements; type, size, and location of anchors, including anchorage to other structural elements, frames, and construction; and specified size, grade, and type of reinforcement.
- C. Prior to each grouting operation, verify cleanliness of grout space, placement of all reinforcement and connectors, including lap splice lengths, and proportions of site-prepared grout.
- D. Perform continuous inspection of grout placement to verify compliance with contract document provisions.
- E. Perform periodic inspection of masonry curing procedures to verify maintenance of specified curing temperature, protection, and techniques.
- F. Sample and test grout compressive strength according to ASTM C 1019 and the following:
 1. Compression Test Sample: one set of three standard cube specimens for each compressive-strength test, unless otherwise directed. Mold and store cubes for laboratory-cured test specimens except when field-cured test specimens are required.
 2. Compressive-Strength Tests: one sample for each day's grouting; one specimen tested at 7 days, one specimen tested at 28 days, and one specimen retained in reserve for later testing if required.

3.4 INSPECTION OF WOOD CONSTRUCTION

- A. Provide special inspection of the fabrication of wood structural elements and assemblies in accordance with the *Inspection of Fabricators*.
- B. Verify use of proper species and grade of lumber and engineered wood products.
- C. Perform periodic inspection of wood construction to verify installation of blocking, fasteners, and fastening with the contract document provisions.

3.5 INSPECTION OF SOILS

- A. Inspect the existing site soil conditions, fill placement, and load-bearing requirements for compliance with the recommendations of the approved geotechnical investigation report.
 1. The existing fill material should be undercut and any unsuitable material encountered during proof rolling should be removed and replaced with properly compacted onsite soils or stone.
 2. Soil fills shall be exempt from special inspection when total fill placement is less than 12 inches deep.

- B. Prior to placement of any engineered fill, excavate existing onsite fill material from the proposed building foot print and at least 5' away from all sides of the proposed building footprint, down to residual soils.
- C. Structural fill should be placed in 6-8" layers and compacted to at least 95% of the soil's maximum dry density as determined by the Standard Proctor Compaction test.

3.6 REPORTING

A. Report Requirements:

- 1. Special inspectors shall keep records of inspections.
 - a. The special inspector shall furnish inspection reports to the registered design professional in responsible charge.
 - b. Reports shall indicate that work inspected was done in conformance to the approved construction documents.
 - c. Discrepancies shall be brought to the immediate attention of the contractor for correction.
 - 1) If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional in responsible charge prior to the completion of that phase of work.
 - 2) Discrepancies that are not corrected may be grounds for denial of the certificate of occupancy.
 - d. A final report documenting completion of all required special inspections and correction of any discrepancies noted in the inspections shall be submitted to the building official by the registered design professional in responsible charge prior to issuance of a certificate of occupancy by the building official.
 - 1) This final report shall not be considered a certification by the registered design professional for any special inspections, tests or structural observations performed by others not under the direct supervision of the registered design professional.

END OF SECTION

01 54 12**TEMPORARY FACILITIES, CONTROLS & CONSTRUCTION AIDS****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Work included in but not limited to this section.
 - 1. Requirements for temporary utilities
 - a. Water service and distribution.
 - b. Temporary electric power and light.
 - c. Telephone service.
 - d. Storm and sanitary sewer.
 - 2. Requirements for temporary construction and support facilities
 - a. Temporary heat.
 - b. Field offices and storage sheds.
 - c. Temporary roads and paving.
 - d. Sanitary facilities.
 - e. Dewatering facilities and drains.
 - f. Temporary enclosures.
 - g. Hoists.
 - h. Temporary Project identification signs and bulletin boards.
 - i. Waste disposal services.
 - j. Rodent and pest control.
 - k. Construction aids and miscellaneous services and facilities.
 - 3. Requirements for security and protection facilities -
 - a. Temporary fire protection.
 - b. Barricades, fences, warning signs, lights.
 - c. Environmental protection.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
- B. Section 01 41 13 Regulatory Requirements

1.3 SUBMITTALS

- A. See Section 01 33 23 Submittal Procedures for requirements.
- B. Emergency Procedures Documentation
 - 1. Prior to starting work Contractor shall provide to the Architect a written document containing emergency procedures in case of:
 - a. Liquid spills or leaks,
 - b. Release of gases or toxic vapors,
 - c. Excessive smoke.
 - 2. This document shall contain but not be limited to:
 - a. Emergency medical, fire, and police telephone numbers including the Owner.
 - b. EPA telephone numbers,
 - c. IDEM telephone numbers,
 - d. Location of Material Safety Data sheets.
- C. Material Data Safety sheets
 - 1. Prior to using any chemical or hazardous material, the contractor shall provide the Architect with a copy of Material Data Safety Sheets covering the chemical or hazardous material.
 - 2. Maintain at the jobsite Material Safety Data sheets (MSDS) covering all chemicals and hazardous materials to be used in the work area. MSDS are to be available to workers personnel during normal working hours. Contractor shall use proper procedures based on MSDS when handling hazardous chemicals and materials.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements
 1. Comply with industry standards and applicable laws and regulations of authorities having jurisdiction.
 2. Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.
 3. All work performed by contractors shall be done in accordance with all applicable Federal, State, and Local laws, codes, and regulations and recommendations of Factory Mutual Engineering and Research (FM).
 4. Any safety hazard or unsafe act recognized shall be reported to the Contractor responsible for job coordination. The safety hazard shall be corrected in a timely manner dictated by the severity of the safety hazard or unsafe act.
 5. Contractors shall remove all rubbish from the job site daily.
 6. All construction materials shall be protected from wind damage. Materials shall be secured to prevent them from becoming airborne with subsequent injury to personnel or damage to property.
 7. Any Contractor employee who deliberately interferes with environmental monitoring shall be removed from the project immediately.

1.5 PROJECT CONDITIONS

- A. Prepare schedule indicating dates for implementation and termination of each temporary utility. At earliest feasible time, when acceptable to Owner and Architect, change over from use of temporary service to use of permanent service.
- B. Keep temporary services and facilities clean and neat in appearance. Operate in safe and efficient manner.
 1. Take necessary fire prevention measures.
 2. Do not overload facilities, or permit them to interfere with progress.
 3. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on Project site.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION

3.1 INSTALLATION:

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

3.2 TEMPORARY UTILITY INSTALLATION:

- A. Where necessary, coordinate installation or connection of temporary service to existing electrical distribution system. Where electrical system provides only part of service, provide remainder with matching, compatible materials and equipment. Comply with local Utility requirements to avoid damage to system and equipment.
 1. Provide adequate capacity at each stage of construction. Before temporary utility availability, provide trucked-in services.
 2. Cost or use charges for temporary facilities are not chargeable to Owner or Architect, and will not be accepted as basis of claims for a Change Order.
- B. Temporary Electrical Service
 1. Provide all temporary wiring, outlets, etc, complying with local codes and Article 590, Temporary Installations, NEC 2008.
 2. Electrical Contractor shall provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period.

3. All extension cords shall be protected from abrasion and traffic. Multiple lengths of extension cord shall be connected with waterproof twist-lock type connectors. Any electrical service over 115 volts shall be marked accordingly. All electrical power supplied from building service or portable generators shall have ground fault protection as part of the circuit.
 4. Portable generators or welders driven by internal combustion engines shall not be located inside the building. Positioning of this equipment outside the building shall be such that engine exhaust shall not enter the workplace or adjacent buildings.
- C. Temporary Lighting
1. Electrical Contractor shall provide temporary lighting with local switching.
 2. Install and operate temporary lighting that will fulfill security and protection requirements, without operating entire system, and will provide adequate illumination for construction operations and traffic conditions.
- D. Temporary Telephones
1. The Contractor shall provide temporary telephone service for all personnel engaged in construction activities, throughout construction period.
 - a. Local calls shall be paid for by Contractor. Long-distance and toll calls shall be paid for by party making call.
 - b. At each telephone, post list of important telephone numbers.
- E. Water Service
1. Contractor to provide water required for construction purposes.
 2. Distribution system shall be provided by the Contractor.
- F. Sanitary Facilities
3. Contractor shall provide temporary facilities for use of all personnel during the entire construction project. New facilities are not to be used during construction.

3.3 TEMPORARY CONSTRUCTION & SUPPORT FACILITIES INSTALLATION:

- A. Locate field offices, storage sheds, and other temporary construction and support facilities for easy access.
1. Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
 2. Provide incombustible construction for offices, shops, and sheds located within construction area, or within 30 feet of building lines.
- B. Heating, Cooling, & Ventilating
1. Install and operate temporary heating, cooling, and ventilating units including fuel, temporary piping, fittings, wiring, and connections necessary. Coordinate ventilation requirements to produce ambient condition required and minimize consumption of energy.
 2. Contractor shall be responsible for damage to building and contents caused by cold, heat or dampness, and heating, cooling and ventilating equipment. Select safe equipment that will not have harmful effect on completed installations or elements being installed.
 3. Maintain safe conditions for use of temporary heating, cooling, and ventilating systems including, but not limited to, following
 - a. Operate equipment in accordance with equipment manufacturer's instructions.
 - b. Provide fresh air ventilation required by equipment manufacturer.
 - c. Keep temperature of fuel containers stabilized.
 - d. Secure fuel containers from overturning.
 - e. Operate equipment away from combustible materials.
 4. When temporary heating, cooling, or ventilating is no longer required or as soon as the permanent heating system may be used, Contractor shall dismantle the temporary system and shall at his own expense, including cost of fuel, operate permanent mechanical system, assuming all responsibility and risk thereof. Contractor shall return permanent mechanical equipment to 'like-new' condition for Substantial Completion Inspection.

5. Provide adequate exhaust ventilation for work area when generation of air contaminants is likely, i.e., painting, handling flammable liquids, welding, cutting, applying adhesives, etc.
 6. Prevent fumes from welding, cutting, etc. and dust generated by construction from entering areas outside the work area by erecting plastic film barriers, sealing openings and ducts, and installing exhaust fans as required.
 7. Air contaminants in the work area shall not exceed OSHA regulations.
- C. Field Offices
1. Provide insulated, weather-tight temporary offices of sufficient size to accommodate Contractor's personnel at Project site and for use by Architect and subcontractors. This building shall be property of Contractor and be removed when directed. Keep office clean and orderly for use for small progress meetings.
 2. Office shall be heated or cooled when needed and provided with doors and locks, tables, benches, racks for drawings, and FAX machine.
- D. Storage & Fabrication Sheds
1. Provide and maintain on the premises, neat, weather-tight storage sheds or trailers for storage of materials which might be damaged or affected by weather or moisture.
 2. Sheds shall have wood floors raised above ground.
 3. Sheds and trailers shall be property of Contractor or subcontractor and be removed at completion of the Work.
 4. If necessary, install fabrication sheds, sized, furnished, and equipped to accommodate work involved, including temporary utility service.
 5. Fabrication sheds may be open shelters or fully enclosed spaces within building or elsewhere on Project site.
- E. Dewatering Facilities & Drains
1. At all times, protect excavation, trenches, and building from damage from rain water, spring water, ground water, backing up of drains or sewers, and all other water. For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with requirements of applicable local regulations. Where feasible, utilize permanent facilities. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities.
 - a. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.
 - b. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.
 - c. Provide pumps and equipment and enclosures necessary for such protection.
 - d. Construct and maintain necessary temporary drainage and do pumping necessary to keep site free of water.
 2. Cost of water control shall be borne by Contractor. Owner may, if promptly notified of adverse underground water conditions, negotiate reasonable financial relief for Contractor where such conditions could not have been reasonably determined.
 3. Meet local codes and regulations for discharge of storm water from Project Site.
- F. Temporary Enclosures
1. Provide temporary enclosures at exterior openings for protection of construction in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
- G. Project Identification & Temporary Signs
1. Prepare Project Identification and other signs to inform public and persons seeking entrance to Project.
 2. Support on posts of preservative treated wood or metal.
 3. No other signs or advertisements shall be displayed on building site.
- H. Collection & Disposal of Waste
1. Keep premises broom clean during progress of the Work.

2. Remove waste materials and rubbish caused by employees and subcontractors installing material, and Contractors under separate contract with Owner, if any.
 - a. Provide adequate waste receptacles and dispose of materials when full.
 - b. Properly store volatile waste and remove daily.
 - c. Do not burn or bury waste material on site.
 - d. Do not discharge any hazardous, or undesirable materials to sewers, or release toxic materials to the air.
 - e. Do not deposit waste into storm drains, sanitary sewers, streams, or waterways.
 - f. Dispose of waste in accordance with applicable laws.
3. Prior to and during process of painting and varnishing, clear area where such work is in progress of debris, rubbish, and building materials which may cause dust. Sweep floors and vacuum as required and take all possible steps to keep area dust free.
- I. Scaffolding, Platforms, Stairs, Etc
 1. Furnish and maintain equipment such as temporary stairs, ladders, ramps, platforms, scaffolds, hoists, runways, derricks, chutes, elevators, etc, as required for proper execution of the Work.
 2. Apparatus, equipment, and construction shall meet requirements of Labor Law, safety regulations, and other applicable State or local laws.
 3. Until permanent stairs are available, provide temporary stairs in lieu of ladders. Cover finished permanent stairs with protective covering of plywood or similar material so finishes will remain undamaged until time of acceptance.

3.4 SECURITY & PROTECTION FACILITIES INSTALLATION:

- A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by Architect. No fires shall be built on premises.
- B. Temporary Fire Protection
 1. Provide a type "ABC" fire extinguisher for each work crew. Extinguishers are to be kept within easy reach of each work crew and never farther than 10 feet from some worker. Inspection tags on extinguishers shall indicate the date of last inspection.
 2. Contractor's supervisor shall keep torch cutting operations to a minimum by instructing personnel to use power saws, pipe cutters, etc. It shall be the duty and responsibility of the Contractor performing any cutting or welding to comply with the safety provisions of the National Fire Codes (NFC) pertaining to such work. Contractor shall adhere to Factory Mutual Engineering and Research (FM) "Cutting and Welding" permit system. The permit system is as follows;
 - a. Contractor's supervisor completes the checklist of precautions listed on the permit tag. (Tags are furnished by Contractor and each tag is limited to one day's operation. Multiple tags are to be used for scattered areas).
 - 1) The area within approximately 35 feet of the welding/cutting operation shall be cleared of flammable liquids and materials.
 - 2) Flammable materials may be covered with fire resistive blankets if not easily moved.
 - 3) Special precautions shall be taken when cutting or welding near combustible walls, partitions, ceilings, or roofs.
 - b. Contractor's supervisor then identifies on the permit -
 - 1) job location,
 - 2) nature of work
 - 3) identity of welder
 - 4) estimated time and date work will be completed.
 - c. Contractor's supervisor signs permit and issues to welder.
 - d. Welder posts permit in the workplace.
 - e. Person designated as "fire watch" observes welding/cutting operation to completion.

- f. Two hours after completion of the welding/cutting job during which the "fire watch" observes the area, the welder signs the permit and returns it to the supervisor. (Area is observed for fire by Contractor for a minimum of 2 hours after welding/cutting is complete at no extra charge to Owner.)
 - g. Contractor's supervisor requests Owner to activate smoke alarms.
 - h. Contractor's supervisor gives completed tag to Owner at the end of the work shift.
- C. Bracing, Shoring, & Sheathing
- 1. Design, furnish, and install all shoring, bracing, and sheathing as required for safety and for proper execution of the Work and have same removed if required when the Work is completed.
- D. Barricades, Fences, Warning Signs, & Lights
- 1. Install and maintain necessary precautions to prevent unauthorized access to the site. Protect persons on site, including members of the general public, from injury or harm, including but not limited to:
 - a. Provide a 6'-0" high chain link fence at the perimeter of the site. Install gate(s) for access.
 - b. Posting of appropriate warning signs in hazardous areas.
 - c. Providing guardrails and barricades around obstructions, pits, trenches, and similar areas in on-site or adjacent streets, roads, sidewalks, or on site of structure itself.
 - d. When use or storage of explosives or other hazardous materials or equipment is necessary for the execution of the Work, exercise utmost care and carry on such activities under supervision of properly qualified personnel.
 - 2. Existing Tree & Plant Protection
 - a. Prior to commencing site work, erect and maintain protective fencing around existing trees and vegetation identified by Architect.
 - b. Individual trees shall have protective fencing erected beyond drip line and to satisfaction of Architect.
 - c. Groups of trees and other vegetation shall have protective fencing erected around entire group to satisfaction of Architect.
 - d. Areas within protective fencing shall remain undisturbed and shall not be used for any purpose.
 - e. Vegetation that dies or has been damaged beyond repair shall be removed and replaced by Contractor to satisfaction of Architect.
 - f. Maintain existing trees and plants which are intended to remain. Vegetation that dies or is damaged beyond repair shall be removed and replaced by Contractor to satisfaction of Architect.
 - 3. Protection Of Existing Work
 - a. Protect streets, private roads, and sidewalks, including overhead protection where required, and make necessary repairs for damage thereto during course of the Work at no additional expense to Owner.
 - b. Work damaged by failure to provide protection shall be removed and replaced with new work at no additional expense to Owner.
 - 4. Protection Of Adjacent Property
 - a. Provide necessary protection for adjacent property and lateral support thereof.
 - 5. Comply with standards and code requirements for erection of structurally adequate barricades. Guardrails around openings in floors or roofs shall be at least 3'6" in height. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.
- D. Security Enclosure & Lockup
- 1. Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
 - 2. Where materials and equipment must be stored, and are of value or attractive for theft, provide secure lockup. Enforce discipline in connection with installation and release of material to minimize opportunity for theft and vandalism.

3. Secure the job site at all times, have personnel on call 24 hours per day for emergencies. Protect equipment and materials and Owner's property from theft. Secure doors and openings, including roof openings.
4. Prior to a multiple day shutdown
 - a. Remove all debris and leave the premises broom clean.
 - b. Shut off all unnecessary electric power and water supplies.
 - c. Remove all flammable liquids from the work site.
 - d. Secure small tools in gang boxes.
 - e. Leave drives open for emergencies.
- E. Environmental Protection
 1. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize possibility that air, waterways, and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near site.
 2. Remove snow and ice as may be required for proper protection and prosecution of the Work.
 3. Contractor shall at all times provide protection against weather (rain, winds, storms, frost, or freeze).

3.5 OPERATION, TERMINATION, & REMOVAL:

- A. Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24 hour day basis where required to achieve indicated results and to avoid possibility of damage.
 2. Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Unless Architect requests that it be maintained longer, remove each temporary facility when need has ended, or when replaced by authorized use of permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. Remove temporary paving that is not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that does not comply with requirements for fill or subsoil in area. Remove materials which might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances as required by governing authority.
 3. At Substantial Completion, clean and renovate permanent facilities that have been used during construction period, including but not limited to -
 - a. Replace air filters and clean inside of ductwork and housings.
 - b. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
 - c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

01 58 13**PROJECT IDENTIFICATION****PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Work included in but not limited to this section.
 1. Project Identification Sign as shown on the Drawings

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.

1.3 REFERENCES

- A. AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)
 1. AWPA C1 (2003) All Timber Products - Preservative Treatment by Pressure Processes
 2. AWPA C2 (2003) Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes

1.4 SUBMITTALS

- A. See Section 01 33 23 Submittal Procedures for requirements.
 1. Preliminary drawing indicating layout and text content.

1.5 QUALITY ASSURANCE

- A. Quality Assurance/Control submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports and other documentary data affirming quality of products and installations.
 1. Submit 2 copies to Architect immediately upon receipt.

1.6 PROJECT SIGN

- A. Prior to initiating any work on site, provide one (1) project identification sign at the location indicated. Construct the sign in accordance with project sign detail. Maintain sign throughout the life of the project. Upon completion of the project, remove the sign from the site. See www.kyhousing.org.
 1. The field of the sign shall consist of a 4 by 8 foot sheet of 3/4" marine plywood Ab or corplast.
 2. Lumber shall be B or better Southern pine, pressure-preservative treated in accordance with AWPA C1 and AWPA C2. Nails shall be aluminum or galvanized steel.
 3. The entire signboard and supports shall be given one coat of exterior alkyd primer and two coats of exterior alkyd enamel paint.
 4. The lettering and sign work shall be performed by a skilled sign painter using paint known in the trade as bulletin colors.
 - a. The colors, lettering sizes, and lettering styles shall be as indicated.
 5. Where preservative-treated lumber is required, utilize only cured pressure-treated wood which has had the chemicals leached from the surface of the wood prior to painting.
 6. Logo: Either use two colors, PMS 2745 and 368 or use solid PMS 2745.
 7. Project Name: Use PMS 2745 or Black.
 8. See drawings for location and information to be included on the sign.

PART 2 PRODUCTS – Not Used**PART 3 EXECUTION – Not Used****END OF SECTION**

8'0"

Financing provided by:

KHC | Kentucky
Housing
Corporation
Investing in quality housing solutions.

Project Name
Developer/Management Company
800-000-0000

4'0"

01 62 10**PRODUCT OPTIONS****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Work included in but not limited to this section.
 1. Administrative and procedural requirements governing Contractor's selection of products for use in Project.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
- B. Section 01 31 13 Project Coordination
Section 01 32 16 Construction Time Line Progress Schedule
Section 01 33 23 Submittal Procedures
Section 01 42 13 References

1.3 QUALITY CONTROL

- A. When Contractor is given the option of selecting between two or more products for use on Project, the product selected shall be compatible with previously selected products, even if those products were also options.
- B. Except for required labels and operating data, do not attach or imprint manufacturers or producers nameplates or trademarks on any surfaces of products which will be exposed to view in occupied spaces or on building exterior.
 1. Locate required product labels and stamps on concealed surface or on accessible surface that is not conspicuous when required for observation after installation.
 2. Provide permanent nameplates on items of service connected or power operated equipment. Locate on easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain following information and other essential operating data:
 - a. Name of product and manufacturer
 - b. Model and serial number
 - c. Capacity
 - d. Speed
 - e. Ratings

1.4 PRODUCT DELIVERY, STORAGE & HANDLING

- A. Deliver, store and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.
 1. Schedule delivery to minimize long-term storage and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged or sensitive to deterioration, theft and other losses.
 3. Products are to be delivered in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
 4. Inspect products upon delivery to ensure compliance with Contract Documents and to ensure that products are undamaged and properly protected.
 5. Store products in a manner that will facilitate inspection and measurement of quantity or counting of units.

6. Store heavy materials away from Project structure so supporting construction will not be endangered.
7. Store products subject to damage by elements above ground, under cover in weather tight enclosures, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 PRODUCTS

2.1 PRODUCT SELECTION:

- A. Provide products that comply with Contract Documents, are undamaged and, unless otherwise indicated, are unused at time of installation.
 1. Provide products complete with accessories, trim, finish, safety guards and other devices and details needed for complete installation and for intended use and effect.
- B. Product selection is governed by Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include the following:
 1. Where only a single product or manufacturer is named, provide product indicated.
 2. Where two or more products or manufacturers are named, provide one of the products indicated. No substitutions will be permitted.
 - a. Where products or manufacturers are specified by name, accompanied by term "equal as approved by Architect prior to bidding," comply with Contract Document provisions concerning "substitutions" to obtain approval by Addendum prior to bidding for use of an unnamed product.
 3. When Specifications describe a product or assembly, listing exact characteristics required with or without use of brand or trade name, provide product or assembly that provides characteristics and otherwise complies with Contract requirements.
 4. Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by manufacturer for application indicated. General overall performance of product is implied where product is specified for specific application.
 - a. Manufacturer's recommendations may be contained in published product literature or by manufacturer's certification of performance.
 5. Where specifications only require compliance with an imposed code, standard, or regulation, select product that complies with specified standards, codes or regulations.
 6. Where Specifications require matching an established Sample, the Architect's decision will be final on whether proposed product matches satisfactorily.
 - a. Where no product available within specified category matches satisfactorily and also complies with other specified requirements, comply with provisions of Contract Documents concerning "substitutions" for selection of matching product in another product category, or for noncompliance with specified requirements.
 7. Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select product and manufacturer that complies with other specified requirements. The Architect will select color, pattern and texture from product line selected.
 8. Products and materials not specified in Contract Documents and installed in the Work shall be removed and replaced by specified products and materials at no additional cost to Owner and for no additional time added to Contract.

PART 3 EXECUTION

- 3.1 INSTALLATION OF PRODUCTS:
- A. Anchor each product securely in place, accurately located and aligned with other Work.
 - B. Clean and protect exposed surfaces as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

01 71 23**FIELD ENGINEERING****PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Work included in but not limited to this section (description)
 - 1. Establishing a benchmark
 - 2. Locating corners of construction
 - 3. Setting grade stakes

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.

1.3 SUBMITTALS

- A. See Section 01 33 23 Submittal Procedures for requirements.
- B. Submit Certified Survey, by a licensed surveyor or Engineer, for rough grading, curbs, gutters, catch basins, swales, and other drainage structures prior to beginning of placement.

1.4 QUALITY ASSURANCE

- A. Qualifications of Personnel
 - 1. The persons or organization undertaking this Work shall be normally engaged in this type and scope of work or shall be mutually agreeable to the Owner.

PART 2 PRODUCTS – Not Used**PART 3 EXECUTION**

3.1 INSTALLATION

- A. Benchmark -
 - 1. Establish benchmark at or on some easily identifiable feature such as a fire hydrant, telephone or utility pole, or governmental monument within a reasonable distance of the construction area. Identify such location, giving its elevation.
- B. Layout
 - 1. Locate work from site boundaries as indicated on site plan or as directed by Architect.
 - 2. Establish corners and provide stakes unless directed or required otherwise.
 - 3. Set stakes or pins so they will not be easily dislodged.
- C. Grades
 - 1. Establish grades at following locations by setting grade stakes -
 - a. Catch Basins.
 - b. Swales.
 - c. Elsewhere as directed.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

01 73 19**INSTALLATION****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Work included in but not limited to this section.
 - 1. Administrative and procedural requirements for installation, demolition and cleaning.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
- B. Section 01 33 23 Submittal Procedures

1.3 INSTALLATION PROVISIONS

- A. Inspection of Conditions
 - 1. Require installer of each component to inspect both substrate and conditions under which Work is to take place. Notify the Architect in writing of unsatisfactory conditions including unsuitable or damaged substrate. Do not proceed until unsatisfactory conditions have been corrected.
- B. Manufacturer's Instructions
 - 1. Comply with Manufacturer's installation instructions and recommendations to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again before installation; reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure work true to line, plumb and level, with allowances for expansion, contraction and building movement.
- E. Visual Effects
 - 1. Provide uniform joint widths in exposed Work.
 - 2. Arrange joints in exposed Work to obtain best visual effect.
 - 3. Refer questionable choices to Architect for final decision.
- F. Recheck measurements and dimensions before starting each installation.
- G. Install each component during weather conditions and Project status that will ensure best possible results.
 - 1. Isolate each part of completed construction from incompatible material as necessary to prevent deterioration or electrolysis.
- H. Coordinate temporary enclosures with required inspections and tests to reduce necessity of uncovering completed construction for that purpose.

PART 2 PRODUCTS – Not Used**PART 3 EXECUTION****END OF SECTION**

THIS PAGE IS INTENTIONALLY BLANK

01 74 13**CLEANING****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Work included in but not limited to this section.
 - 1. Administrative and procedural requirements for installation, demolition and cleaning.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
- B. Section 01 78 00 Closeout Submittals
Section 09 65 19 Resilient Flooring

1.3 CLEANING:

- A. Progress Cleaning
 - 1. Comply with regulations of authorities having jurisdiction and safety standards for cleaning.
 - 2. Keep premises swept clean during progress of the Work.
 - 3. During performance of demolition, keep building, site and adjoining streets clean and sweep areas affected by demolition operations daily. (If demolition is selective, remove all nails and trash from adjoining yards, sidewalks and streets continuously during the demolition operations. All selective demolition shall be deposited into containers, ie: dumpster, trucks, etc. and not onto the ground). As necessary, sprinkle rubbish and debris, in containers, to allay dust.
 - 4. During handling and installation, protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from soiling, damage or deterioration until Substantial Completion.

Clean and maintain completed construction as frequently as necessary throughout construction period. Adjust and lubricate operable components to ensure ability to operate without damaging effects.

 - 6. Supervise construction activities to ensure that no part of completed construction, or construction in progress, is subject to harmful, dangerous, damaging or otherwise deleterious exposure during the construction period.
 - 7. Before and during application of painting materials, clear area where such work is in progress of debris, rubbish, and building materials that may cause dust. Sweep floors and vacuum as required and take all possible steps to keep area dust free.
 - 8. Collection & Disposal of Waste
 - a. Remove and legally dispose of, waste materials and rubbish caused by employees, Subcontractors and Installers. Contractors under separate contract with Owner shall be responsible for removal of unsuitable or damaged materials and debris from the project property.
 - 1) Provide adequate waste receptacles and dispose of materials when full.
 - 2) Properly store volatile waste and remove daily.
 - 3) Do not deposit waste into storm drains, sanitary sewers, streams or waterways.
 - 4) Do not discharge volatile, harmful or dangerous materials into drainage systems.
 - b. Do not burn waste materials. Do not bury debris or excess materials on Owner's or any other property.
 - 9. Where extra materials of value remaining after completion of associated Work have become Owner's property, arrange for disposition of these materials as directed.

B. Final Cleaning

1. Clean each surface or unit to condition expected in normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions. Remove all rubbish from under and about building and leave building clean and habitable.
2. In addition to general cleaning noted above, perform cleaning for all trades at completion of work in areas where construction activities have occurred, including;
 - a. Interior
 - 1) Wash and polish inside glazing, exercising care not to scratch glass. Replace chipped or broken glass and other damaged glazing materials.
 - 2) Remove marks, stains, fingerprints and other soil and dirt from painted, decorated and stained work.
 - 3) Clean and polish woodwork.
 - 4) Remove labels that are not permanent labels.
 - 5) Clean and polish hardware for all trades, removing stains, dust, dirt, paint, etc.
 - 6) Remove spots, soil and paint and wash tile work.
 - 7) Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
 - 8) Clean other fixtures and equipment and remove stains, paint, dirt and dust.
 - 9) Remove temporary floor protection and clean floors. Spray buff resilient flooring.
 - 10) Clean metal surfaces required to have polished finishes, including doors and windows. Polish surfaces, leaving them without fingerprints or other blemishes.
 - 11) When required clean new vinyl base and tile as described;
 - a) Remove all excess adhesives from surface of flooring and base, skirting and accessories.
 - b) Vacuum floor thoroughly.
 - c) **Do not wash floor for at least five days after installation.**
 - d) . Damp-mop the floor with a neutral detergent solution such as **Armstrong S-485 Floor Cleaner** at 3 to 4 ounces per gallon, while carefully scrubbing off black marks and excessive soil.
 - e) Apply a minimum of two coats of a high-quality commercial floor polish such as **Armstrong S-480 Floor Polish**.
 - f) Inspect floor for conformance of installation and make any corrections required.
 - g) After inspection and corrections, scrub the floor with a neutral detergent solution such as **Armstrong S-485 Floor Cleaner** at 4 to 6 ounces per gallon, **using a single-disc floor machine (300 rpm or less) equipped with a scrub brush or a scrubbing pad (3M blue or green or equal) or equivalent brushes**. If the floor is, In the judgment of the Architect, badly soiled and / or scratched, the flooring shall be **stripped** using the same procedure as above, but substituting the detergent solution, with a stripping solution such as **Armstrong S-490 Stripper**.
 - h) Thoroughly rinse floor and allow it to dry.
 - i) Prior to applying floor polish seal floor with a high-quality stain-resistant sealer such as **Armstrong S-495 Floor Sealer**.
 - j) . After applying the sealer apply three coats of high-quality commercial floor polish such as **Armstrong S-480 Floor Polish**.
 - b. Exterior
 - 1) Wash and polish outside glazing, exercising care not to scratch glass.
 - 2) Remove marks, stains and dirt from exterior surfaces of building.

- 3) Clean and polish hardware for all trades, removing stains, dust, dirt, paint, etc.
 - 4) Clean fixtures and equipment and remove stains, paint, dirt and dust.
 - 5) Remove temporary protection systems.
 - 6) Clean all dirt, mud, and other foreign material from paving, sidewalks and gutters.
 - 7) Clean drop inlets, through-curb drains and other drainage structures.
 - 8) Remove trash, debris and foreign material from landscaped areas.
3. If any Contractor or Sub-contractor fails to clean as required, the Owner will do so and charge the cost to the Contractor .

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

01 78 10CLOSEOUT SUBMITTALS & PROCEDURES**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Work included in but not limited to this section.
 - 1. Administrative and procedural requirements for project closeout, Including;
 - a. Inspection closeout and sequence procedures.
 - b. O. & P. Manual procedures and requiremtns for information.
 - c. Submittal of warranties, occupancy permits, operating certificates and similar releases.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
- B. Section 01 33 23 Submittal Procedures
Section 01 74 13 Cleaning

1.3 CLOSEOUT PROCEDURES

- A. Pre-Substantial Completion Inspections
 - 1. At the completion of the Project, prior to the Substantial Completion Inspection, request in writing a Pre-Substantial Completion Inspection. The procedures in these following paragraphs, Completion of the Project and Final Cleaning of the Project shall be stated in the Contractor's Construction Schedule specified in Section 01 32 16 Construction Time Line Progress Schedule and shall leave sufficient time between completion of the Project and expiration of Contract time to allow for these procedures and correction of work.
 - 2. Upon receipt of request for Pre-Substantial Completion Inspection, the Owner (if he wishes), the Architect and his Consultants (if any) will schedule and conduct a Pre-Substantial Completion Inspection in the presence of the Contractor's designated representative. A list of items to be corrected will be furnished to Contractor within three (3) days after Pre-Substantial Completion Inspection.
 - a. If the Architect finds the Project is not completed, upon the Contractors request, he will advise Contractor of known requirements for completion prior to scheduling the Pre-Substantial Completion Inspection.
 - b. **The definition for Completion of a Project is all installations, equipment and Final Cleaning are 100% finished, adjusted and operating.**
 - 3. Architect will repeat inspection when requested and be assured that the Work has been substantially completed.
 - 4. Results of the completed Pre-Substantial Completion Inspection will form the basis of requirements for the Substantial Completion Inspection.
 - 5. **Before** requesting, in writing, an inspection for Substantial Completion, complete the following items and list any exceptions in the written request.
 - a. **Notify Architect in writing when items have been corrected on the Pre-Substantial Completion List and receive Architect's verification of corrected items.**

- b. In the Payment Request which coincides with or follows the date for Substantial Completion, show 100% completion for the Work (less retainage). Include supporting documentation for completion as specified in the Contract Documents and a statement showing an accounting of changes to Contract Sum.
 - c. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, equipment check-out sheets and similar documents.
 - d. Obtain and submit releases enabling Owner unrestricted use of the premises and access to services and utilities. Include required occupancy permits, operating certificates and similar releases and approvals.
 - e. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey and similar final record information.
 - f. Deliver tools, spare parts, extra stock and similar items.
 - g. Make final change-over of permanent locks and transmit keys to Owner. Advise Owner's personnel of change-over in security provisions.
 - h. Complete start-up and testing of systems.
 - i. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
 - j. Discontinue or change over and remove temporary facilities from site, along with construction tools, facilities, mock-ups and similar elements.
 - k. Complete Instruction of Owner's maintenance personnel. (May coincide with the Final Acceptance Meeting).
- B. Substantial Completion Inspection
- 1. Upon **receipt of notice from the contractor, in writing** that the Project is complete and the items in paragraph 1.3.A are complete, except items whose completion has been delayed because of circumstances acceptable to the Architect, the Architect will arrange a Substantial Completion Inspection to include the Owner's representatives. The Architect will also notify the Contractor and Owner, in writing, of the date and time of inspection. Upon completion of the inspection, unless building is rejected, the Architect will prepare a Certificate of Substantial Completion. The Certificate of Substantial Completion will be executed by the Owner, Architect, and Contractor that states dates for:
 - a. User occupancy or acceptance
 - b. Commencement of warranties
 - c. Final acceptance meeting date and time
 - d. Modifications to amount assessed for liquidated damages if any.
 - 2. After inspection and if necessary the Architect will furnish a final list of items to be corrected.
- C. Final Acceptance Meeting;
- 1. Before the Final Acceptance Meeting/Inspection for certification of final completion and final payment, list any exceptions in the request and be sure to complete the following:
 - a. Submit final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations when required.
 - b. Submit an updated final statement with accounting for final changes to the Contract Sum. Submit certified copy of Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance and the list has been endorsed and dated by Architect.
 - d. Submit final meter readings for utilities, measured record of stored fuel and similar data as of date of Substantial Completion or when Owner took possession of and responsibility for corresponding elements of the Work.
 - e. Submit consent of surety to final payment.
 - f. Submit final liquidated damages settlement statement.

2. The Final Acceptance meeting will ensure that deficiencies noted at Substantial Completion Inspection have been corrected according to terms of the Substantial Completion Certificate.
3. When all items have been corrected, the Architect will issue a letter to the Owner authorizing final payment.
4. If all items have not been corrected as agreed, Owner may elect to complete the Work under provisions of the General Conditions.

3.5 CLOSEOUT SUBMITTALS:

A. Warranties and Releases

1. Include the following items in the final closeout Manual in the order in which they are listed.
 - a. Permission to Occupy Project Mortgages : HUD-92485
 - b. Owner's Certification of Completion
 - c. Inspecting Architect's Certification
 - d. Certificate of Inspection – Plumbing
 - e. Certificate of Inspection – Electrical
 - f. List of Serial Numbers
 - g. Carpet Certification
 - h. Certificate of Operation – Fire Marshall Inspection
 - i. Certificate of Occupancy
 - j. Termite Certificate
 - k. *Permanent Insurance*
 - l. Certificate of Insulation
 - m. Warranty on Roof
 - n. Warranty on Doors
 - o. Warranty on Windows
 - p. *Warranty on Cabinets*
 - q. Certificate of Hardware (Door Locks)
 - r. All other guarantees and warranties required by the specifications.
2. When written guarantees beyond one year after substantial completion are required of any Section of the Work, Contractor shall secure such guarantees and/or warranties properly addressed and signed and in favor of the Owner. Include these documents in the Operations & Maintenance Manuals specified above.
3. Delivery of guarantees and warranties shall not relieve Contractor from any obligation assumed under any other provisions of his contract.
4. Nothing in this Section intends or implies that guarantees and/or warranties shall apply to work abused or neglected by Owner.

B. General Requirements

1. Refer to other specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately before date of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to Architect for Owner's records.
2. **Final payment for Project will not be made until closeout documents have been completed, submitted and approved.**

C. Operations & Maintenance Manuals

1. Contractor will prepare a set of binders containing the Operations & Maintenance Data and Product Data to be submitted during course of construction.
2. Include the following information in the Operations & Maintenance Manuals:
 - a. Copy of complete Project Manual including addenda and copies of other written construction documents such as Change Orders and interpretations issued during construction
 - 1) Mark these documents to show variations in actual Work performed in comparison with text of specifications and Modifications. Show substitutions, selection of options and similar information, particularly on elements that are concealed or cannot otherwise be readily discerned later by direct observation.

- 2) Note related record drawing information and Product Data.
- b. Product Data
 - 1) One copy of each Product Data submittal as specified in Section 01 33 23 Submittal Procedures.
- c. Operations & maintenance manuals required by each Division and Section of the Specifications
- d. Certifications and Releases
- e. Copies of specified warranties
- D. Project Record Documents
 - 1. Do not use record documents for construction purposes. Protect from deterioration and loss in secure, fire-resistive location. Provide access to record documents for Architect's reference during normal working hours.
 - 2. Maintain clean, undamaged set of blue or black line white-prints of Contract Drawings. Mark set to show actual installation and where installation varies from the Work as originally shown. Give particular attention to concealed elements that would be difficult to measure and record at later date.
 - a. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
 - b. Mark new information that is important to Owner but was not shown on Contract Drawings.
 - c. Note related Change Order numbers where applicable.
 - d. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets and print suitable titles, dates and other identification on cover of each set.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION – Not Used

END OF SECTION

DIVISION 02-EXISTING CONDITIONS

02 40 00 DEMOLITION & STRUCTURE MOVING

02 41 19 Site Demolition

THIS PAGE IS INTENTENIONALY BLANK

SECTION 02 41 19**SITE DEMOLITION**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

1. Demolition and removal of selected site elements.
2. Salvage of existing items to be reused or recycled.
3. Divisions 2 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

- B. Related Sections include the following:

1. Division 01 Section "Summary" for use of premises, and phasing, and Owner-occupancy requirements.
2. Division 01 Section "Photographic Documentation" for preconstruction photographs taken before selective demolition operations.
3. Division 01 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
4. Division 01 Section "Cutting and Patching" for cutting and patching procedures.
5. Division 01 Section "Construction Waste Management and Disposal" for disposal of demolished materials.
6. Division 31 Section "Site Clearing" for site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.
- E. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

- F. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.
 1. Coordinate with Owner's historical adviser, who will establish special procedures for removal and salvage.

1.5 SUBMITTALS

- A. Qualification Data: For demolition firm.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's and other tenants' on-site operations are uninterrupted.
 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 3. Coordination for shutoff, capping, and continuation of utility services.
 4. Locations of proposed dust- and noise-control temporary partitions and means of egress, including for other tenants affected by selective demolition operations.
 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
 6. Means of protection for items to remain and items in path of waste removal from building.
- C. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 3. Products: List products to be used and firms or entities that will perform the Work.
 4. Dates: Indicate when cutting and patching will be performed.
 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
 7. Architect's or Construction Manager's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

- D. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.
- E. Predemolition Photographs or Videotapes: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations. Comply with Division 01 Section "Photographic Documentation." Submit before Work begins.
- F. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
 - 1. Comply with submittal requirements in Division 01 Section "Construction Waste Management and Disposal."

1.6 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with ANSI A10.6 and NFPA 241.
- D. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
 - 1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:
 - a. Foundation construction
 - b. Bearing and retaining walls.
 - c. Structural Concrete.
 - d. Structural Steel.
 - e. Lintels.
 - f. Timber and primary wood framing.
 - g. Structural decking.
 - h. Stair systems.
 - i. Miscellaneous structural metals.
 - j. Exterior curtain-wall construction.
 - k. Equipment support.
 - l. Piping, ductwork, vessels, and equipment.
- E. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
- F. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.

4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

G. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

H. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.7 PROJECT CONDITIONS

A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.

D. Storage or sale of removed items or materials on-site is permitted.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.
- D. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- E. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs and / or preconstruction videotapes.
 - 1. Comply with requirements specified in Division 01 Section "Photographic Documentation."
- G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
 - 1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."
- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. Arrange to shut off indicated utilities with owner.
 - 3. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect equipment that have not been removed.
- C. Temporary Support: Provide temporary support of Work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize and prevent interruption to occupied areas.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces
 - 2. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 3. Maintain adequate ventilation when using cutting torches.
 - 4. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on surrounding pavements.
 - 6. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management and Disposal."

- B. Removed and Salvaged Items:
 1. Transport items to Owner's storage area designated by Owner.
 2. Protect items from damage during transport and storage.
- C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Cut concrete to a depth of at least 1 inch at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

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

END OF SECTION

PAGE IS INTENTIONALLY BLANK

DIVISION 03 - CONCRETE

03 11 00 CONCRETE FORMING

03 11 13 Cast in Place Concrete Formwork

03 15 00 CONCRETE ACCESSORIES

03 15 10 Concrete Joints

03 15 13 Concrete Accessories

03 24 00 FIBROUS REINFORCING

03 24 10 Concrete Reinforcing

03 30 00 CAST-IN-PLACE CONCRETE

03 30 53 Cast-in-Place Concrete

03 39 00 CONCRETE CURING

03 39 23 Concrete Curing

03 61 00 CEMENTITIOUS GROUTING

03 61 13 Non-Metallic (NS) Grouting

THIS PAGE IS INTENTIONALLY BLANK

03 11 13**CAST-IN-PLACE CONCRETE FORMWORK****PART 1 GENERAL****1.1 QUALITY CONTROL**

- A. Quality Assurance/Control submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports and other documentary data affirming quality of products and installations.
 - 1. Submit 2 copies to Architect immediately upon receipt.
- B. Design requirements
 - 1. The design, engineering, and construction of the formwork shall be the responsibility of the Contractor. The formwork shall be designed for anticipated live and dead loads and shall comply with the tolerances specified.
 - 2. However, for surfaces with an ACI Class A surface designation, the allowable deflection for facing material between studs, for studs between walers and walers between bracing shall be limited to 0.0025 times the span.
 - 3. The formwork shall be designed as a complete system with consideration given to the effects of cementitious materials and mixture additives such as fly ash, cement type, plasticizers, accelerators, retarders, air entrainment, and others.
 - 4. The adequacy of formwork design and construction shall be monitored prior to and during concrete placement as part of the Contractor's Quality Control Plan.

PART 2 PRODUCTS**2.1 FORMS**

- A. Wood, metal, or plastic as arranged by Contractor .
 - 1. Forming material shall be compatible with finish requirements for concrete to be left exposed or to receive a decorative finish.
- B. Form Release Agents
 - 1. Chemically acting type
 - 2. Approved Manufacturers -
 - a. Crete-Lease 727 or 20-VOC by Cresset Chemical Co, Weston, OH (800) 367-2020
 - b. Clean Strip (J-1 or J-3 VOC) by Dayton Superior, Oregon, IL (800) 745-3707
 - c. DEBOND Form Coating by L & M Construction Chemicals, Omaha, NE (800) 362-3331
 - d. Duogard or Duogard II by W. R. Meadows Elgin IL (847) 683-4500

PART 3 EXECUTION**3.1 INSTALLATION:**

- A. Formwork;
 - 1. Forms shall be mortar tight, properly aligned and adequately supported to produce concrete surfaces meeting the surface requirements specified and conforming to construction tolerance given in TABLE 1.
 - 2. Where concrete surfaces are to have a Class A or Class B finish, joints in form panels shall be arranged as approved.
 - 3. Where forms for continuous surfaces are placed in successive units, the forms shall fit over the completed surface to obtain accurate alignment of the surface and to prevent leakage of mortar.
 - 4. Forms shall not be reused if there is any evidence of surface wear and tear or defects which would impair the quality of the surface.
 - 5. Surfaces of forms to be reused shall be cleaned of mortar from previous concreting and of all other foreign material before reuse.
 - 6. Form ties that are to be completely withdrawn shall be coated with a

- nonstaining bond breaker.
- B. Chamfering;
 - 1. Except as otherwise shown, external corners that will be exposed shall be chamfered, beveled, or rounded by moldings placed in the forms.
 - C. Coating;
 - 1. Forms for Class A and Class B finished surfaces shall be coated with a form releasing agent before the form or reinforcement is placed in final position.
 - 2. The coating shall be used as recommended in the manufacturer's printed or written instructions.
 - 3. Forms for Class C and D finished surfaces may be wet with water in lieu of coating immediately before placing concrete, except that in cold weather with probable freezing temperatures, coating shall be mandatory.
 - 4. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.
 - D. Accessories;
 - 1. Provide for installation of inserts, templates, fastening devices, and other accessories to be set in concrete prior to placing.
 - 2. Position anchor bolts for hold-down anchors and columns and securely tie in place prior to placing concrete.
- 3.2 REMOVAL OF FORMS
- A. Forms shall be removed preventing injury to the concrete and ensuring the complete safety of the structure.
 - B. Formwork for columns, walls, side of beams and other parts not supporting the weight of concrete may be removed when the concrete has attained sufficient strength to resist damage from the removal operation but not before at least 24 hours has elapsed since concrete placement.
 - C. Supporting forms and shores shall not be removed from beams, floors and walls until the structural units are strong enough to carry their own weight and any other construction or natural loads.
 - D. Supporting forms or shores shall not be removed before the concrete strength has reached 70 percent of design strength, as determined by field cured cylinders or other approved methods.
 - 1. This strength shall be demonstrated by job-cured test specimens, and by a structural analysis considering the proposed loads in relation to these test strengths and the strength of forming and shoring system.
 - 2. The job-cured test specimens for form removal purposes shall be provided in numbers as directed and shall be in addition to those required for concrete quality control.
 - 3. The specimens shall be removed from molds at the age of 24 hours and shall receive, insofar as possible, the same curing and protection as the structures they represent.

END OF SECTION

03 15 10**CONCRETE JOINTS****PART 1 GENERAL****1.1 SUBMITTALS**

- A. See Section 01 33 23 Submittal Procedures for requirements.
- B. Product Data
 - 1. Preformed Expansion Joint Filler, Sealant;
 - a. Manufacturer's literature, including safety data sheets, for preformed fillers and the lubricants used in their installation; field-molded sealants and primers (when required by sealant manufacturer); preformed compression seals; and waterstops.
 - b. Manufacturer's recommended instructions for installing preformed fillers, field-molded sealants; preformed compression seals; and waterstops; and for splicing non-metallic waterstops.
- C. Samples
 - 1. Specimens identified to indicate manufacturer, type of material, size, quantity of material, and shipment or lot represented. Each sample shall be a piece not less than 300 mm 12 inch long cut from each 61 m 200 ft of finished waterstop furnished, but not less than a total of 1 m 4 ft of each type, size, and lot furnished. One splice sample of each size and type for every 50 splices made in the factory and every 10 splices made at the job site. The splice samples shall be made using straight run pieces with the splice located at the mid-length of the sample and finished as required for the installed waterstop. The total length of each splice shall be not less than 300 mm 12 inches long.

1.2 DELIVERY, STORAGE, AND HANDLING

- A. Material delivered and placed in storage shall be stored off the ground and protected from moisture, dirt, and other contaminants. Sealants shall be delivered in the manufacturer's original unopened containers. Sealants whose shelf life has expired shall be removed from the site.

PART 2 PRODUCTS**2.1 MATERIALS**

- A. PREFORMED EXPANSION JOINT FILLER
 - 1. Expansion joint filler shall be preformed material conforming to ASTM D 175 1or ASTM D 1752. Unless otherwise indicated, filler material shall be 3/8 inch thick and of a width applicable for the joint formed.
 - a. Backer material, when required, shall conform to ASTM D 5249.
- B. SEALANT
 - 1. Joint sealant shall conform to the following:
 - a. Preformed Polychloroprene Elastomeric Type ASTM D 2628.
- C. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

3.2 INSTALLATION

- A. Install according to manufacturers and/or responsible intitutes instructions.
- B. JOINTS
 - 1. Joints shall be installed at locations indicated and as authorized.
 - 2. Contraction Joints
 - a. Contraction joints may be constructed by inserting tempered hardboard strips or rigid PVC or HIPS insert strips into the plastic concrete using a steel parting bar, when necessary, or by cutting

the concrete with a saw after concrete has set. Joints shall be approximately 1/8 inch wide and shall extend into the slab one-fourth the slab thickness, minimum, but not less than 1 inch.

b. Joint Strips

1). Strips shall be of the required dimensions and as long as practicable. After the first floating, the concrete shall be grooved with a tool at the joint locations. The strips shall be inserted in the groove and depressed until the top edge of the vertical surface is flush with the surface of the slab. The slab shall be floated and finished as specified. Working of the concrete adjacent to the joint shall be the minimum necessary to fill voids and consolidate the concrete. Where indicated, the top portion of the strip shall be sawed out after the curing period to form a recess for sealer. The removable section of PVC or HIPS strips shall be discarded and the insert left in place. True alignment of the strips shall be maintained during insertion.

c. Sawed Joints

1). Joint sawing shall be early enough to prevent uncontrolled cracking in the slab, but late enough that this can be accomplished without appreciable spalling. Concrete sawing machines shall be adequate in number and power, and with sufficient replacement blades to complete the sawing at the required rate. Joints shall be cut to true alignment and shall be cut in sequence of concrete placement. Sludge and cutting debris shall be removed.

3. Expansion Joints

a. Preformed expansion joint filler shall be used in expansion and isolation joints in slabs around columns and between slabs on grade and vertical surfaces where indicated. The filler shall extend the full slab depth, unless otherwise indicated. The edges of the joint shall be neatly finished with an edging tool of 1/8 inch radius, except where a resilient floor surface will be applied.

1). Where the joint is to receive a sealant, the filler strips shall be installed at the proper level below the finished floor with a slightly tapered, dressed and oiled wood strip temporarily secured to the top to form a recess to the size shown on the drawings.

a). The wood strip shall be removed after the concrete has set. Contractor may opt to use a removable expansion filler cap designed and fabricated for this purpose in lieu of the wood strip. The groove shall be thoroughly cleaned of laitance, curing compound, foreign materials, protrusions of hardened concrete, and any dust which shall be blown out of the groove with oil-free compressed air.

4. Construction Joints

a. Construction joints are specified in Section 03 30 53 Cast-In-Place Structural Concrete except that construction joints coinciding with expansion and contraction joints shall be treated as expansion or contraction joints as applicable.

END OF SECTION

03 15 13**CONCRETE ACCESSORIES****PART 1- PRODUCTS**

1.1 MATERIALS

- A. Acceptable Manufacturer(s):
 1. Gunnebo Fastening Corp, Lonoke, AR (800) 336-1640
 2. Hilti Fastening Systems, Tulsa, OK (800) 879-6000
 3. ITW Ramset/Redhead, Wood Dale, IL (800) 348-3231
 4. Powers Fasteners, Inc, Brewster, NY (800) 524-3244
 5. Simpson Strong Tie, Pleaston CA (800) 999-5099
 6. U S Anchor Corp, Pampano Beach, FL (800) 892-1880:
- B. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

1.2 ANCHORS & INSERTS

- A. Adhesive Anchors
 1. Acceptable Products And Manufacturers -
 - a. HIT HY-200 System by Hilti
 - b. EPCON System by ITW Ramset / Redhead
 - c. Power-Fast System by Powers Fasteners
 - d. SET Adhesive by Simpson
 - e. Ultrabond by U S Anchor
- B. Drilled-In Anchors
 1. Acceptable Products And Manufacturers -
 - a. SUP-R-STUDS by Gunnebo Fastening
 - b. Kwik Bolts by Hilti
 - c. TruBolt Carbon Wedge Anchors by ITW Ramset / Redhead
 - d. Power-Stud by Powers Fasteners
 - e. Wedge-All Wedge Anchors by Simpson
 - f. Wedge Anchors by U S Anchor Corp

1.3 VAPOR RETARDER

- A. Vapor Retarder – see Section 07 26 16.

PART 2 EXECUTION

2.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

2.2 INSTALLATION

- A. Install according to manufacturers and/or responsible intitutes instructions.
- B. Vapor Retarder
 1. Provide beneath the on-grade concrete floor slab. Use the greatest widths and lengths practicable to eliminate joints wherever possible. Lap joints a minimum of 12 inches and tape or cement joints. Remove torn, punctured, or damaged vapor barrier material and provide with new vapor barrier prior to placing concrete.
 - a. Concrete placement shall not damage vapor barrier material.
 - b. Place a 2 inch layer of clean concrete sand on vapor barrier before placing concrete.
- C. Anchors & Inserts
 1. Install according to Manufacturer's instructions.

END OF SECTION

03 24 10**CONCRETE REINFORCING****PART 1 GENERAL**

1.1 SUBMITTALS

- A. Data sheets for the type of reinforcing used.

1.2 DELIVERY AND STORAGE

- A. Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

PART 2 PRODUCTS

2.1 MATERIAL

A. Reinforcing Steel

- 1. Reinforcing steel shall be deformed bars conforming to ASTM A 615/A 615M or ASTM A 706/A 706M, grades and sizes as indicated. Cold drawn wire used for spiral reinforcement shall conform to ASTM A 82/A 82M.

B. Welded Wire Fabric

- 1. Flat sheets of welded steel wire fabric for concrete reinforcement meeting requirements of ASTM A 185/A 185M (2006; E 2006) or ASTM A 497/A 497M (2006; R 2006);
 - a. Spacing Blocks
 - 1). Single cover block with wire by Frank Co, Humbolt TX
 - 2). Other Approved Types -
 - a). Full concrete brick

C. Wire Ties

- 1. Wire ties shall be 16 gauge or heavier black annealed steel wire.

D. Supports

- 1. Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI 1MSP and shall be steel or precast concrete blocks.
 - a. Precast concrete blocks shall have wire ties and shall be not less than 4 inches square when supporting reinforcement on ground.
 - b. Precast concrete block shall have compressive strength equal to that of the surrounding concrete.
- 2. Where concrete formed surfaces will be exposed to weather or where surfaces are to be painted, steel supports within 1/2 inch of concrete surface shall be galvanized, plastic protected or of stainless steel.
- 3. Concrete supports used in concrete exposed to view shall have the same color and texture as the finish surface.
- 4. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.

PART 3 EXECUTION

3.1 REINFORCEMENT

- A. Reinforcement shall be fabricated to shapes and dimensions shown and shall conform to the requirements of ACI 318M ACI 318/318R.

- 1. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill.
 - a. Bars shall not be bent after embedment in concrete.

- B. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety. Wire tie ends shall face away from the forms.

- C. Placement
1. Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete.
 2. Reinforcement shall be placed in accordance with ACI 318M ACI 318/318R at locations shown plus or minus one bar diameter.
 3. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints.
 4. Concrete coverage shall be as indicated or as required by ACI 318M ACI 318/318R. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.
- D. Splicing
1. Splices of reinforcement shall conform to ACI 318M ACI 318/318R and shall be made only as required or indicated.
 2. Splicing shall be by lapping or by mechanical or welded butt connection; except that lap splices shall not be used for bars larger than No. 11 unless otherwise indicated.
 3. Welding shall conform to AWS D1.4/D1.4M.
 - a. Welded butt splices shall be full penetration butt welds.
 4. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete.
 5. Lapped bars shall not be spaced farther apart than one-fifth the required length of lap or 6 inches.
 6. Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device.
 - a. Butt splices shall develop 125 percent of the specified minimum yield tensile strength of the spliced bars or of the smaller bar in transition splices.
 - b. Bars shall be flame dried before butt splicing.
 - c. Adequate jigs and clamps or other devices shall be provided to support, align, and hold the longitudinal centerline of the bars to be butt spliced in a straight line.
- 3.2 WELDED-WIRE FABRIC PLACEMENT
- A. Welded-wire fabric shall be placed in slabs as indicated. Fabric placed in slabs on grade shall be continuous between expansion, construction, and contraction joints. Fabric placement at joints shall be as indicated.
 - B. Lap splices shall be made in such a way that the overlapped area equals the distance between the outermost crosswires plus 2 inches.
 - a. Laps shall be staggered to avoid continuous laps in either direction.
 - b. Fabric shall be wired or clipped together at laps at intervals not to exceed 4 feet.
 - c. Fabric shall be positioned by the use of supports.
- 3.3 DOWEL INSTALLATION
- A. Dowels shall be installed in slabs on grade at locations indicated and at right angles to joint being doweled.
 - B. Dowels shall be accurately positioned and aligned parallel to the finished concrete surface before concrete placement.
 - C. Dowels shall be rigidly supported during concrete placement. One end of dowels shall be coated with a bond breaker.
- 3.4 SPECIAL INSPECTION AND TESTING FOR SEISMIC-RESISTING SYSTEMS
- A. Special inspections and testing for seismic-resisting systems and components shall be done in accordance with UFC 3-310-04 SEISMIC DESIGN FOR BUILDINGS and Section 01 45 35 SPECIAL INSPECTION FOR SEISMIC-RESISTING SYSTEMS.

END OF SECTION

03 30 53**CAST-IN-PLACE CONCRETE****PART 1 GENERAL****1.1 SYSTEM DESCRIPTION**

- A. Design Requirements -
 - 1. Concrete elements of Project are designed to a value of 2500 psi.
- B. Performance Requirements -
 - 1. Conform to requirements of ASTM C94 unless specified otherwise
 - 2. For testing purposes, following concrete strengths are required -
 - a. At 7 days - 60% minimum of 28 day strengths
 - b. At 28 days -
 - 1) 4000 psi - Exterior, above grade concrete exposed to weather and all flatwork
 - 2) 3000 psi - Concrete not specified elsewhere.

1.5 SUBMITTALS

- A. Quality Control Submittals -
 - 1. Submit Curing Compound Manufacturer's printed installation instructions.
 - 2. Delivery Tickets - Require mix plant to furnish delivery ticket for each batch of concrete. Keep delivery tickets at job-site for use of Owner or his representatives. Tickets shall show following -
 - a. Name of ready-mix batch plant
 - b. Serial number
 - c. Date and truck number
 - d. Name of Contractor
 - e. Name and location of job
 - f. Specific class or designation of concrete in conformance with that employed in job specification
 - g. Amount of concrete
 - h. Time loaded
 - i. Type, name, and amount of admixtures used
 - j. Amount and type of cement
 - k. Total water content
 - l. Water added by receiver of concrete with his initials

1.2 PROJECT/SITE CONDITIONS

- A. Environmental Requirements -
 - 1) Cold Weather Concreting Procedures:
 - a) General Requirements:
 - 1) Materials and equipment required for heating and protection of concrete shall be approved and available at Project site before beginning cold weather concreting.
 - 2) Forms, reinforcement, metallic embedments, and fillers shall be free from snow, ice, and frost. Surfaces that will be in contact with newly placed concrete, including sub-grade materials, shall be **35 deg F** minimum at time of concrete placement.
 - 3) Thaw sub-grade **6 inches** deep minimum before beginning concrete placement. If necessary, re-compact thawed material.
 - 4) Use no frozen materials or materials containing ice.
 - b) Requirements When Average 24 Hour Temperature, midnight to midnight, Is Below **40 deg F**:
 - 1) Temperature of concrete as placed and maintained shall be **55 deg F** minimum and **75 deg F** maximum.
 - 2) Heat concrete for 72 hours minimum after placing if regular cement is used; for 48 hours if high early strength cement is used; or longer if determined necessary by Architect. During this period, maintain concrete surface temperature between **55 and 75 deg F**.

- 3) Vent flue gases from combustion heating units to outside of enclosure to prevent carbonation of the concrete surface.
- 4) Prevent concrete from drying during heating period. Maintain housing, insulation, covering, and other protection 24 hours after heat is discontinued.
- 5) After heating period, if temperature falls below **32 deg F**, protect concrete from freezing until strength of **2000 psi** minimum is achieved. Protect flatwork exposed to melting snow or rain during day and freezing during night from freezing until strength of **3500 psi** minimum is achieved.
- c) Requirements When Average 24 Hour Temperature, midnight to midnight, Is Above **40 deg F**, but when temperature falls below **32 deg F**:
 - 1) Protect concrete from freezing for 72 hours after placing, or until a strength of **2000 psi** is achieved, whichever is longer. Protect flatwork exposed to melting snow or rain during day and freezing during night from freezing until strength of **3500 psi** minimum is achieved.
 - d) Protect soil supporting concrete footings from freezing under any circumstances.
- 2) Hot Weather Concreting Procedures:
 - a) Maximum concrete temperature allowed is **90 deg F** in hot weather.
 - b) Cool aggregate and subgrades by sprinkling.
 - c) Avoid cement over **140 deg F**.
 - d) Use cold mixing water or ice.
 - e) Use fog spray or evaporation retardant to lessen rapid evaporation from concrete surface.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Portland Cement - Meet requirements of ASTM C150.
- B. Coarse Aggregates;
 1. Meet requirements of ASTM C33 or nonconforming aggregate which by test or actual service produces concrete of required strength and conforms to local governing codes.
 2. Lightweight Concrete -
 - a. Meet requirements of ASTM C330.
 3. Aggregate shall be uniformly graded as follows -
 - a. Flat Work - Size #67 (3/4 inch to #4 or 3/4 maximum to 1/4 inch minimum).
 - b. All Other - Size #57 (One inch maximum to 1/4 inch minimum).
- C. Fine Aggregates - Meet requirements of ASTM C33.
- D. Water - Clear potable water.
- E. Admixtures;
 1. Mineral;
 - a. Do not use fly ash pozzolan
 2. Chemical;
 - a. No admixture shall contain calcium chloride nor shall calcium chloride be used as an admixture. All chemical admixtures used shall be from same manufacturer.
 - b. Air Entraining Agents -
 - 1) Meet requirements of ASTM C 260.
 - 2) Quality Standard - Daravair or Darex II AEA by W R Grace.
 - c. Water Reducer;
 - 1) Meet requirements of C 494, Type A.
 - 2) Quality Standard - Daracem 50/55 , WRDA-64, or WRDA-82 by W R Grace.
 - d. Water Reducer, Set Retarder -
 - 1) Meet requirements of ASTM C 494, Type D.
 - 2) Quality Standard - Daratard-17 or Daratard-40 by W R Grace.

- e. High Range Water Reducer;
 - 1) Meet requirements of ASTM C 494, Type F or G.
 - 2) Quality Standard - Darachem-100 or WRDA-19 by W R Grace.
 - f. Non-Chloride Accelerator -
 - 1) Meet requirements of ASTM C 494, Type C.
 - 2) Quality Standard - Daraset or Polarset by W R Grace.
 - g. Approved Manufacturers -
 - 1) Master Builders Company, Cleveland, OH (216) 831-5500
 - 2) Sika Corporation, Lyndhurst, NJ (800) 933-7452
 - 3) W R Grace Construction Products, Cambridge, MA (800) 521-2737
 - 3. Evaporation Retardant;
 - a. Approved Products;
 - 1) Sure Film J-74 by Dayton Superior, Oregon, IL (800) 745-3707
 - 2) Confilm by Master Builders, Cleveland, OH (216) 831-5500
 - 4. Bonding Agents;
 - a. Approved Products;
 - 1) Day-Chem Ad Bond (J-40) by Dayton Superior, Oregon, IL (800) 745-3707
- 2.2 MIXES:
- A. Mix designs shall meet following requirements;
 - 1. Proportions;
 - a. Exterior, above or on grade concrete exposed to weather, flatwork only.
 - 1) Minimum weight cement per cu yd concrete - 564 lbs
 - 2) Air Entrainment (plus or minus 1-1/2 percent) - 6 percent
 - 3) Water/Cement Ratio - 0.45 maximum by weight
 - b. Concrete not specified elsewhere – (not exposed to weather)
 - 1) Minimum weight cement per cu yd concrete - 517 lbs
 - 2) Air Entrainment (plus or minus 1-1/2 percent) - 3 percent
 - 3) Water/Cement Ratio - 0.50 maximum by weight
 - c. No water shall be added any time during mixing cycle above amount required to meet specified water/cement ratio. No reduction in the amount of cement is allowed.
 - 2. Admixtures;
 - a. Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use. Do not use any admixture without Architect's written approval.
 - b. Chemical;
 - 1) 4 inch slump maximum prior to use of high range water reducer.
 - 2) 8 inch slump maximum with use of high range water reducer.
 - 3) Use accelerator or retarder if necessary to meet environmental conditions.
 - 4) When admixtures are not used, slump may be 5 inch +/- 1 inch.

PART 2 EXECUTION

3.1 PREPARATION:

- A. Inserts, bolts, boxes, templates, pipes, conduits, and other accessories shall be installed and inspected prior to placing.
- B. Install inserts, bolts, boxes, templates, pipes, conduits, and other accessories furnished under other Sections to be installed as part of work of this Section. Tie anchor bolts for hold-down anchors and columns securely to reinforcing steel.
- C. Remove water and debris from space to be placed.

3.2 INSTALLATION:

- A. Site Tolerances –

1. ACI Standards shall govern concrete work except where otherwise specified
 2. Variation from plumb -
 - a. 0 to 10 feet - 1/4" maximum
 - b. 20 feet or more - 3/8" maximum
 3. Variation in thickness - 1/4" to 1/2" standard, 5% for footings
 4. Variation in grade -
 - a. 0 to 10 feet - 1/4" standard, 1/8" for floor slabs
 - b. 10 to 20 feet - 3/8" standard, 1/4" for floor slabs
 - c. 40 feet or more - 3/4" standard, 3/8" for floor slabs
 5. Variation in plan -
 - a. 0 to 20 feet - 1/2"
 - b. 40 feet or more - 3/4" standard, plus 1/2" for footings.
 6. Variation in eccentricity - 2% for footings
 7. Variation in openings -
 - a. Size - plus 1/8"
 - b. Location - 1/4"
 8. Variation in stairs & landings -
 - a. Consecutive steps -
 - 1) Treads - 1/8"
 - 2) Risers - 1/16"
 - b. Flight of stairs -
 - 1) Treads - 1/4"
 - 2) Risers - 1/8"
- B. Placing
1. Place as soon after mixing as possible. Deposit as nearly as possible in final position. Placing of concrete shall be continuous until a panel or section is complete.
 2. Placing Rate - In order to avoid overloading of forms and ties, observe following rate of filling per hour for various air temperatures -

Temperature	Rate of Fill Per HOUR
40 deg F	2'
50 deg F	3'
60 deg F	4'
70 deg F	5'
 3. Consolidate concrete in forms by vibrating and other means where required. Thoroughly work in concrete around reinforcing bars.
 4. Do not embed aluminum in concrete.
 5. Do not use contaminated, deteriorated, or re-tempered concrete.
 6. Avoid accumulation of hardened concrete.
 7. Locate construction joints to least impair strength of completed structure. Construction joints in foundation walls shall not occur within 6 feet of corner and be keyed.
- C. Bonding Fresh and Hardened Concrete
1. Retighten forms.
 2. Roughen surfaces.
 3. Clean off foreign matter and laitance.
 4. Wet but do not saturate.
 5. Slush with neat cement grout.
 6. Proceed with placing new concrete.
- D. Special Requirements -
1. Footings -
 - a. Bear 12 inches minimum into undisturbed earth or on mechanically compacted engineered fill. Step footings at ratio of 1-1/2 horizontal to One vertical unless detailed otherwise. Exterior wall footing shall bear 36 inches minimum below finish grades.
 - b. Level top of finish footing and leave rough.
 - c. Where joints are required, bulkhead, key horizontally, and dowel with two #5 rebars, 4 feet long.
 2. Foundations & Walls - Leave steel projecting where required for floor tie.
 3. Exterior Slabs -
 - a. Dusting with cement not permitted.

- b. For continuous placing, saw cut groove one inch deep at 40 foot spaced grid before shrinkage occurs.
 - 4. Equipment Bases - Coordinate with appropriate Sections for locations and dimensions.
 - 5. Anchor Bolts –
 - a. Place anchor bolts not tied to reinforcing steel immediately following leveling of concrete. Reconsolidate concrete around bolt immediately after placing bolt. Do not disturb bolts during finishing process.
 - E. Finishing -
 - 1. Rough - Top of slabs and stairs to receive ceramic tile.
 - 2. Rubbed Finish, Exposed Vertical Surfaces
 - a. Immediately after removing forms, remove joints, marks, bellies, projections, loose materials, and cut back metal ties from surfaces to be exposed.
 - b. Point up voids with cement mortar, 1:2 mix, and rub exposed surface with carborundum to smooth, even surface.
 - 4. Broom Finishes, Exterior Flatwork;
 - a. Broom finish exterior slabs.
 - b. Round edges including edges formed by expansion joints.
 - c. Remove edger marks.
 - F. Curing -
 - 1. Keep concrete moist seven days minimum for regular concrete and three days for high early strength.
 - 2. Apply curing compound according to Manufacturer's instructions to interior and exterior slabs and flatwork.
- 3.3 PROTECTION:
 - A. Protect concrete which has not received its initial set from precipitation to avoid excess water in mix and unsatisfactory surface finish.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

03 39 23

CONCRETE CURING

PART 1 PRODUCTS

1.1 MATERIALS

- A. Low VOC (less than 300 g/l), water-borne, membrane forming curing compound meeting requirements of ASTM C 309, Type 2.
 - 1. Approved Products -
 - a. Horn Cure 200-W by A C Horn
 - b. Day Chem White Pigmented (J-10-W) by Dayton Superior, Oregon, IL (800) 745-3707
 - c. L & M Cure R-2 by L & M Construction Chemicals, Omaha, NE (800) 362-3331
 - d. 1200 White by W. R. Meadows, Elgin, IL (708) 683-4500

PART 2 EXECUTION

2.1 APPLICATION

- A. Apply in accordance with Manufacturer's instructions.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

03 61 13**NON-METALLIC (NS) GROUT****PART 1 PRODUCTS****1.1 MATERIALS**

- A. Acceptable Manufacturer:
 1. Sure-Grip High Performance Grout by Dayton Superior, Oregon, IL (800) 745-3707
 2. 5 Star Grout by Five Star Products Inc, Fairfield, CT (800) 243-2206
 3. Crystex non-shrink grout by L&M Construction Chemicals Inc, Omaha, NE (800) 362-3331
 4. Masterflow 928 pre-mixed grout by BASF Construction Chemicals –Building Systems, Shakopee, MN, (800) 433-9517
- B. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

PART 2 EXECUTION**2.1 EXAMINATION**

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

2.2 MIXES

- A. Place estimated potable water into mixer, then slowly add grout. For fluid Consistency start with 1.1 gallons (4.2L) per 55 pound bag.
- B. Water demand will depend on mixing efficiency, material, and ambient-temperature conditions. Adjust water to achieve desired flow. Recommended flow is 25 to 30 seconds using ASTM C939 Flow-Cone Method. Use minimum amount of water required to achieve necessary placement consistency.
- C. Moderately sized batches of grout are best mixed in one or more clean mortar mixers. For large batches, use ready-mix trucks and 3,300 pounds (1,500 kg) bags for maximum efficiency and economy.
- D. Mix grout a minimum of 5 minutes after material and water is in mixer. Use mechanical mixer only.
- E. Do not mix more grout than can be placed in approximately 30 minutes.
- F. Transport by wheelbarrow or buckets or pump to equipment being grouted. Minimize transporting distance.
- G. Do not retemper grout by adding water and remixing after it stiffens.
- H. Do not vibrate grout to facilitate placement.

2.3 PREPARATION

- A. Clean steel surfaces free of dirt, oil, grease, or other contaminants.
- B. Ensure surfaces to be grouted are clean, SSD, strong, and roughened to CSP of 5 to 9 following ICRI Guideline 03732 to permit proper bond. For freshly placed concrete, consider using Liquid Surface Etchant (see Form No. 1020198) to achieve required surface profile.
- C. When dynamic, shear, or tensile forces are anticipated, chip concrete surfaces with "chisel-point" hammer, to roughness of (plus or minus) 3/8 inch (10 mm). Verify absence of bruising following ICRI Guideline 03732.
- D. Saturate concrete surfaces (ponded) with clean water for 24 hours just before grouting.
- E. Remove freestanding water from foundation and bolt holes immediately before grouting.
- F. Grout anchor bolt holes and sufficiently set before major portion of grout is placed.
- G. Shade foundation from sunlight 24 hours before and 24 hours after grouting.

2.4 FORMING

- A. Make forms liquid tight and nonabsorbent. Seal forms with putty, sealant, caulk, or polyurethane foam.
- B. Moderately sized equipment should utilize head form sloped at 45 degrees to enhance grout placement.
- C. Side and end forms should be minimum 1 inch (25 mm) distant horizontally from object grouted to permit expulsion of air and remaining saturation water as grout is placed.
- D. Leave minimum of 2 inches (51 mm) between bearing plate and form to allow for ease of placement.
- E. Use sufficient bracing to prevent grout from leaking or moving.
- F. Eliminate large, nonsupported grout areas wherever possible.
- G. Extend forms a minimum of 1 inch (25 mm) higher than bottom of equipment being grouted.
- H. Expansion joints may be necessary for both indoor and outdoor installation. Verify with grout manufacturer.

2.5 APPLICATION

- A. Always place grout from only one side of equipment to prevent air or water entrapment beneath equipment. Place grout in continuous pour. Discard grout that becomes unworkable. Make sure that material fills entire space being grouted and that it remains in contact with plate throughout grouting process.
- B. Immediately after placement, trim surfaces with trowel and cover exposed grout with clean wet rags (not burlap). Keep rags moist until grout surface is ready for finishing or until final set.
- C. Grout should offer stiff resistance to penetration with pointed mason's trowel before grout forms are removed or excessive grout is cut back. After removing damp rags, immediately coat with recommended curing compound compliant with ASTM C309 or preferably ASTM C1315.
- D. Do not vibrate grout. Use steel straps inserted under plate to help move grout.
- E. Consult grout manufacturer before placing lifts more than 6 inches (152 mm) in depth.

2.6 CURING

- A. Cure exposed grout with approved membrane curing compound. Apply compound immediately after wet rags are removed to minimize potential moisture loss.

2.7 CLEANING

- A. Use hot water and detergent to clean rollers and spray equipment before material dries.
- B. Clean up and properly dispose of debris remaining on Project site related to application.
- C. Remove temporary coverings and protection from adjacent Work areas.

END OF SECTION

DIVISION 04 - MASONRY

04 05 00 COMMON WORK RESULTS FOR MASONRY

- 04 05 13 Masonry Mortar
- 04 05 16 Masonry Grout
- 04 05 19 Masonry Anchorage
- 04 05 20 Continuous Joint Reinforcing
- 04 05 23 Masonry Accessories

04 21 00 CLAY UNIT MASONRY

- 04 21 13 Brick Masonry
- 04 21 14 Masonry Veneer Installation

THIS PAGE IS INTENTIONALLY BLANK

04 05 16**MASONRY GROUT****PART 1 PRODUCTS****1.1 MATERIALS**

- A. Portland Cement: Meet requirements of ASTM C 150. Use Type II Low Alkali in exterior walls or in walls subject to moisture, unless approved otherwise in writing by Architect.
- B. Hydrated Lime: Meet requirements of ASTM C 207, Type S.
- C. Aggregate:
1. Meet requirements of ASTM C 404, Table 1.
 - a. Fine Aggregate, Natural, Size 2:

Sieve Size	Weight Percent
No. 4	100
No. 8	95 to 100
No. 16	60 to 100
No. 30	35 to 70
No. 50	15 to 35
No. 100	2 to 15
 - b. Coarse Aggregate, Size 8:

1/2 inch	100
3/8 inch	85 to 100
No. 4	10 to 30
No. 8	0 to 10
No. 16	0 to 5
- D. Water: Clean and free of acids, alkalis, and organic materials.
- E. Admixtures: No additives are allowed which will increase air entrainment. Other additives may be used as approved in writing by Architect before use.
- F. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

2.2 MIXES

- A. Procedure:
1. Use of pre-blended dry grout mix is allowed only with submission of certification which indicates material specification requirements have been met.
 2. Use method of measuring and mixing materials that will ensure consistently proportioned grout batches throughout installation of masonry work.
 - a. No measuring of materials by 'shovels full' is permitted for field mixed grout.
 3. Batch, mix, and deliver transit-mixed grout in accordance with requirements of ASTM C 94.
- B. Proportions by Volume
- | Grout Type | <u>Fine</u> | <u>Coarse</u> |
|---------------------------------|-------------|---------------|
| Portland Cement: cu ft | 1 | 1 |
| Hydrated Lime: cu ft (optional) | 1/10 | 1/10 |
| Damp, Loose Sand: cu ft | 2-1/4 to 3 | 2-1/4 to 3 |
| Pea Gravel: cu ft | | 1 to 2 |
- Water: Enough to give creamy pouring consistency, usually slump of between 8 and 10.

PART 2 EXECUTION

2.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

2.2 INSTALLATION

- A. Install according to manufacturers and/or responsible intitutes instructions.
- B. Use fine grout for cavities **2 inches** and smaller in smallest dimension.
- C. Use coarse grout for cavities greater than **2 inches** in smallest dimension.

3.3 FIELD QUALITY CONTROL

- A. Site Testing: Test grout used in masonry bearing walls in accordance with ASTM C 1019. Test results of 2000 psi minimum are required.

END OF SECTION

04 05 19**MASONRY ANCHORAGE****PART 1 PRODUCTS**

1.1 MATERIALS

- A. Unit Masonry Over Framing:
 - 1. Brick Ties:
 - a. Quality Standard:
 - 1) D/A 431, without wire reinforcing, by Dur-O-Wal Inc.
 - 2. Fasteners:
 - a. Quality Standards:
 - 1) Wood Framing: Two D/A 808 screws by Dur-O-Wal Inc.
- B. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

2.2 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Dur-O-Wal Inc, Arlington Heights, IL (800) 323-0090 or (630) 898-1101. www.dur-o-wal.com
 - 2. Heckman Building Products Inc, Chicago, IL (800) 621-4140 or (708)-865-2403. www.heckmannbuildingproducts.com
 - 3. Hohmann & Barnard, Hauppauge, NY (631) 234-0600. www.h-b.com
 - 4. Masonry Reinforcing Corporation of America, Charlotte, NC (800) 849-6722 or (704) 525-5554. www.wirebond.com

PART 2 EXECUTION

2.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

2.2 INSTALLATION

- A. Install according to manufacturers and/or responsible intitutes instructions.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

04 05 20**CONTINUOUS JOINT REINFORCING****PART 1 GENERAL****1.1 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery:
 1. Reinforcing steel shall be free of heavy rust scales and flakes, or other bond-reducing coating at time of delivery and placing. Properly protect on site after delivery.
- B. Storage:
 1. Separate bars by size and tag with manufacturer's heat or test identification number.
- C. Handling:
 1. Tag joint reinforcing with Manufacturer's name, wire size, and ASTM specification

PART 2 PRODUCTS**2.1 MANUFACTURERS**

- A. Approved Manufacturers -
 1. Dur-O-Wal Inc, Arlington Heights, IL (800) 323-0090 or (630) 898-1101. www.dur-o-wal.com
 2. Heckman Building Products Inc, Chicago, IL (800) 621-4140 or (708)-865-2403. www.heckmannbuildingproducts.com
 3. Hohmann & Barnard, Hauppauge, NY (631) 234-0600. www.h-b.com
 4. Masonry Reinforcing Corporation of America, Charlotte, NC (800) 849-6722 or (704) 525-5554. www.wirebond.com

2.2 MANUFACTURED PRODUCTS

- A. Joint Reinforcing
 1. Conform to ASTM A 82. Exterior wall reinforcing shall be galvanized to meet requirements of ASTM A 153, Class B-2. Interior wall reinforcing shall be galvanized to meet requirements of ASTM A 641, Class A.
 2. Size - 2 inches less than nominal thickness of wall.
 3. Rod Size -
 - a. Side rods - 9 gauge
 - b. Cross rods - 9 gauge (unless noted otherwise)
 4. Cross Rods - Cross rods which serve as metal ties in exterior cavity and other multi-wythe walls shall be drip crimped.
 5. Corners & Tee Sections - Prefabricated of material and design similar to main reinforcement.
 6. Quality Standards -
 - a. Dur-O-Wal Ladur-Eye 9 gauge with 3/16 inch diameter wire pintle with two legs where wythes do not course out together. Where wythes do course out together, 9 ga Dur-O-Wal Ladur Trirod may be used.
- B. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

2.3 MATERIALS

- A. Rebars shall have grade identification marks and meet requirements of ASTM A 615, Grade 60 minimum. All but No. 2 bars shall be deformed type.

2.4 FABRICATION

- A. Fabricate and bend reinforcing steel according to 1988 edition of 'ACI Detailing Manual' and details on Drawings.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Interface With Other Work
 - 1. Coordinate with Division 03 for placement of dowels out of foundations for masonry reinforcing.
- B. Brick Ties
 - 1. Install as detailed with a maximum spacing of 16 inches vertically and horizontally unless indicated otherwise.

END OF SECTION

04 05 23**MASONRY ACCESSORIES****PART 1 PRODUCTS**

1.1 MATERIALS

- A. Embedded Flashing
 - 1. Flashing
 - a. Three ounces copper/sq ft of material with two layers of kraft paper.
 - 2. Approved Products
 - a. Cop-R-Kraft Duplex by Advanced Building Products Inc, Springvale, ME (800) 252-2306 info@advancedflashing.com
 - b. Multi-Flash 500 by York Manufacturing Inc, Sanford, ME (800) 551-2828 info@yorkmfg.com
 - c. Copper AquaFlash by Clark/Hammerbeam Corp., Dedham, MA (781) 461-1946 fiberweb@verizon.net
- B. Weep Vents
 - 1. Quality Standards
 - a. Plastic Weep Vents, #342S - Provided with screen insert (stainless steel) by Hohmann & Barnard
 - 2. Approved Manufacturers
 - a. Dur-O-Wal Inc, Arlington Heights, IL (800) 323-0090 or (630) 898-1101 www.dur-o-wal.com
 - b. Hohmann & Barnard, Hauppauge, NY (631) 234-0600. www.h-b.com
 - c. Mortar Maze Weep Vents, Advanced Building Products, Inc., Springvale, ME (800) 252-2306; www.advancedflashing.com
- C. Mortarguard
 - 1. Approved Materials
 - a. Washed pea gravel
 - b. Mortar Net by Mortar Net USA, Ltd., Gary, IN (800) 664-6638 www.mortarnet.com/
 - c. Mortar Break by Hohmann & Barnard, Hauppauge, NY (631) 234-0600. www.h-b.com
- D. Masonry Control Joints
 - 1. Control Joint Keys
 - a. Factory fabricated solid section of natural rubber, synthetic rubber, plastic, or other rubber-like materials.
 - b. Durometer Hardness - not less than 70 when tested according to ASTM D2240.
 - 2. Approved Products -
 - a. DA2001 Regular Rubber Control Joint, Dur-O-Wal Inc, Arlington Heights, IL (800) 323-0090 or (630) 898-1101, www.dur-o-wal.com
- E. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

PART 2 EXECUTION

2.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

2.2 INSTALLATION

- A. Install according to manufacturers and/or responsible intitutes instructions.
- B. Install weep vents at approximately 2'-0" on center in base course of masonry.
- C. Place mortar guard continuously between brick and sheathing or CMU and 8 inches high minimum at bottom course of masonry.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

04 21 13**BRICK MASONRY****PART 1 PRODUCTS**

1.1 MATERIALS

- A. Bricks shall be manufactured at one time and from the same batch. Blend all brick to produce a uniform appearance when installed. An observable "banding" or "layering" of colors or textures caused by improperly mixed brick is unacceptable.
- B. Color range and texture of brick shall be as indicated and shall conform to the approved sample. Brick shall conform to ASTM C216;
 - 1. Grade SW, Type FBX shall be used for all exterior work.
 - 2. Average dimensions of brick shall be 3-5/8 inches thick, 2-1/4 inches high, and 7-5/8 inches long (standard), subject to the tolerances specified in ASTM C 62.
 - 3. Brick shall be tested for efflorescence.
 - 4. Brick units shall be delivered factory-blended to provide a uniform appearance and color range in the completed wall.
 - 5. Brick shall be true to size and shape.
 - a. No warped brick permitted.
- C. Approved Manufacturer, Style and Color;
 - 1. Lee Brick and Block
 - i. Color to be chosen by owner.
 - 2. Or equivalent.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

04 21 14**MASONRY VENEER INSTALLATION****PART 1 GENERAL****1.1 PROJECT CONDITIONS****A. Cold Weather Installation**

1. Before erecting masonry when ambient temperature or mean daily air temperature falls below 40 degrees F or temperature of masonry units is below 40 degrees F, a written statement of proposed cold weather construction procedures shall be submitted for approval.
 - a. The following precautions shall be taken during all cold weather erection.
 - 1) Air Temperature 40 to 32 Degrees F. Sand or mixing water shall be heated to produce mortar temperatures between 40 and 120 degrees F.
 - 2) Air Temperature 32 to 25 Degrees F. Sand and mixing water shall be heated to produce mortar temperatures between 40 and 120 degrees F. Temperature of mortar on boards shall be maintained above freezing.
 - 3) Air Temperature 25 to 20 Degrees F. Sand and mixing water shall be heated to provide mortar temperatures between 40 and 120 degrees F. Temperature of mortar on boards shall be maintained above freezing. Sources of heat shall be used on both sides of walls under construction. Windbreaks shall be employed when wind is in excess of 15 mph.
 - 4) Air Temperature 20 Degrees F and below. Sand and mixing water shall be heated to provide mortar temperatures between 40 and 120 degrees F. Enclosure and auxiliary heat shall be provided to maintain air temperature above 32 degrees F. Temperature of units when laid shall not be less than minus 20 degrees F.

B. Protection

1. Ice or snow formed on the masonry bed shall be thawed by the application of heat. Heat shall be applied carefully until the top surface of the masonry is dry to the touch. Sections of masonry deemed frozen and damaged shall be removed before continuing construction of those sections.
2. Completed and in Progress Masonry Not Being Worked
 - a. Mean daily air temperature 40 to 32 degrees F. Masonry shall be protected from rain or snow for 24 hours by covering with weather-resistant membrane.
 - b. Mean daily air temperature 32 to 25 degrees F. Masonry shall be completely covered with weather-resistant membrane for 24 hours.
 - c. Mean Daily Air Temperature 25 to 20 degrees F. Masonry shall be completely covered with insulating blankets or equally protected for 24 hours.
 - d. Mean Daily Temperature 20 degrees F and Below. Masonry temperature shall be maintained above 32 degrees F for 24 hours by enclosure and supplementary heat, by electric heating blankets, infrared heat lamps, or other approved methods.

C. Hot Weather Installation

1. The following precautions shall be taken if masonry is erected when the ambient air temperature is more than 99 degrees F in the shade and the relative humidity is less than 50 percent or the ambient air temperature exceeds 90 degrees F and the wind velocity is more than 8 mph.
 - a. All masonry materials shall be shaded from direct sunlight;
 - b. Mortar beds shall be spread no more than 4 feet ahead of masonry;
 - c. Masonry units shall be set within one minute of spreading mortar;

- d. And after erection, masonry shall be protected from direct exposure to wind and sun for 48 hours.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Acceptable Manufacturer:
- B. Substitutions:
- C. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

3.2 INSTALLATION

- A. Laying Masonry Units
 - 1. Coordinate masonry work with the work of other trades to accommodate built-in items and to avoid cutting and patching.
 - 2. Masonry units shall be laid in running bond pattern.
 - a. Facing courses shall be level with back-up courses, unless the use of adjustable ties has been approved in which case the tolerances shall be plus or minus 1/2 inch.
 - b. Each unit shall be adjusted to its final position while mortar is still soft and plastic. Units that have been disturbed after the mortar has stiffened shall be removed, cleaned, and relaid with fresh mortar.
 - c. Air spaces, cavities, chases, expansion joints, and spaces to be grouted shall be kept free from mortar and other debris.
 - d. Units used in exposed masonry surfaces shall be selected from those having the least amount of chipped edges or other imperfections detracting from the appearance of the finished work.
 - e. Vertical joints shall be kept plumb.
 - f. Units being laid and surfaces to receive units shall be free of water film and frost.
 - g. Solid units shall be laid in a nonfurrowed full bed of mortar.
 - h. Mortar for veneer wythes shall be beveled and sloped toward the center of the wythe from the cavity side.
 - i. Units shall be shoved into place so that the vertical joints are tight.
 - j. Vertical joints of brick and the vertical face shells of concrete masonry units, except where indicated at control, expansion, and isolation joints, shall be completely filled with mortar.
 - k. Mortar will be permitted to protrude up to 1/2 inch into the space or cells to be grouted. Means shall be provided to prevent mortar from dropping into the space below.
 - l. In double wythe construction, the inner wythe may be brought up not more than 16 inches ahead of the outer wythe.
 - m. Collar joints shall be filled with mortar or grout during the laying of the facing wythe, and filling shall not lag the laying of the facing wythe by more than 8 inches.
- B. Brick Units
 - 1. Brick facing shall be laid with the better face exposed.
 - 2. Brick shall be laid in running bond with each course bonded at corners, unless otherwise indicated.
 - 3. Molded brick shall be laid with the frog side down.

4. Brick that is cored, recessed, or has other deformations may be used in sills, treads, soldier courses, except where deformations will be exposed to view.
- C. Cavity Walls
1. Provide a continuous cavity as indicated.
 2. Install brick veneer after sheathing, masonry anchors, and flashing have been installed to the framing system.
 3. Care shall be provided to avoid damaging the moisture barrier.
 - a. Damaged moisture barrier and flashing shall be repaired or replaced before brick veneer is installed.
 4. Means shall be provided to keep cavities clean and clear of mortar droppings.
- D. Tolerances
1. Masonry shall be laid plumb, true to line, with courses level.
 2. Bond pattern shall be kept plumb throughout.
 3. Corners shall be square unless noted otherwise.
 4. Except for walls constructed of prefaced concrete masonry units, masonry shall be laid within the following tolerances (plus or minus unless otherwise noted):

TOLERANCES

Variation from the plumb in the lines and surfaces of columns, walls and arises

In adjacent masonry units	1/8 inch
In 10 feet	1/4 inch
In 20 feet	3/8 inch
In 40 feet or more	1/2 inch

Variations from the plumb for external corners, expansion joints, and other conspicuous lines

In 20 feet	1/4 inch
In 40 feet or more	1/2 inch

Variations from the level for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines

In 20 feet	1/4 inch
In 40 feet or more	1/2 inch

Variation from level for bed joints and top surfaces of bearing walls

In 10 feet	1/4 inch
In 40 feet or more	1/2 inch

Variations from horizontal lines

In 10 feet	1/4 inch
In 20 feet	3/8 inch
In 40 feet or more	1/2 inch

Variations in cross sectional dimensions of columns and in thickness of walls

Minus	1/4 inch
Plus	1/2 inch

3.3 CUTTING AND FITTING

- A. Full units of the proper size shall be used wherever possible, in lieu of cut units.
1. Cutting and fitting, including that required to accommodate the work of others, shall be done by masonry mechanics using power masonry saws. Concrete masonry units may be wet or dry cut.
 - a. Wet cut units, before being placed in the work, shall be dried to the same surface-dry appearance as uncut units being laid in the wall.
 - b. Cut edges shall be clean, true and sharp.
 2. Openings in the masonry shall be made carefully so that wall plates, cover plates or escutcheons required by the installation will completely conceal the openings and will have bottoms parallel with the masonry bed joints.
 3. Reinforced masonry lintels shall be provided above openings over 12 inches wide for pipes, ducts, cable trays, and other wall penetrations, unless steel sleeves are used.

3.4 JOINTING

- A. Joints shall be tooled when the mortar is thumbprint hard. Horizontal joints shall be tooled last. Joints shall be brushed to remove all loose and excess mortar. Mortar joints shall be finished as follows:
1. Flush Joints
 - a. Joints in concealed masonry surfaces and joints at electrical outlet boxes in wet areas shall be flush cut.
 - b. Flush cut joints shall be made by cutting off the mortar flush with the face of the wall.
 - c. Joints in unpared masonry walls below grade shall be pointed tight.
 - d. Flush joints for architectural units, such as fluted units, shall completely fill both the head and bed joints.
 2. Tooled Joints
 - a. Joints in exposed exterior and interior masonry surfaces shall be tooled slightly concave.
 - b. Joints shall be tooled with a jointer slightly larger than the joint width so that complete contact is made along the edges of the unit.
 - c. Tooling shall be performed so that the mortar is compressed and the joint surface is sealed.
 - d. Jointer of sufficient length shall be used to obtain a straight and true mortar joint.
 3. Door and Window Frame Joints
 - a. On the exposed interior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch.
 - b. On the exterior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch.
- B. Joint Widths
1. Joint widths shall be as follows:
 - a. Concrete Masonry Units
 - 1) Concrete masonry units shall have 3/8 inch joints, except for prefaced concrete masonry units.
 - b. Prefaced Concrete Masonry Units
 - 1) Prefaced concrete masonry units shall have a joint width of 3/8 inch wide on unfaced side and not less than 3/16 inch nor more than 1/4 inch wide on prefaced side.
 - c. Brick
 - 1) Brick joint widths shall be the difference between the actual and nominal dimensions of the brick in either height or length. Brick expansion joint widths shall be as shown.

3.5 EMBEDDED ITEMS

- A. Spaces around built-in items shall be filled with mortar.
1. Openings around flush-mount electrical outlet boxes in wet locations shall be pointed with mortar.
 2. Anchors, ties, wall plugs, accessories, flashing, pipe sleeves and other items required to be built-in shall be embedded as the masonry work progresses.
 3. Anchors, ties and joint reinforcement shall be fully embedded in the mortar.
 4. Cells receiving anchor bolts and cells of the first course below bearing plates shall be filled with grout.

3.6 UNFINISHED WORK

- A. Unfinished work shall be stepped back for joining with new work.
1. Toothing may be resorted to only when specifically approved.
 - a. Loose mortar shall be removed and the exposed joints shall be thoroughly cleaned before laying new work.

3.7 MASONRY WALL INTERSECTIONS

- A. Each course shall be masonry bonded at corners and elsewhere as shown.

3.8 WEEP HOLES

- A. Wherever through-wall flashing occurs, provide weep holes to drain flashing to exterior at acceptable locations as required.
1. Weep holes shall be provided not more than 24 inches on centers in mortar joints of the exterior wythe above wall flashing, over foundations, bond beams, and any other horizontal interruptions of the cavity.
 2. Weep holes shall be perfectly horizontal or slightly canted downward to encourage water drainage outward and not inward. Weep holes shall be constructed using weep hole ventilators.
 3. Weep holes shall be kept free of mortar and other obstructions.

3.9 MORTAR

- A. Mortar shall be mixed in a mechanically operated mortar mixer for at least 3 minutes, but not more than 5 minutes.
1. Measurement of ingredients for mortar shall be by volume.
 2. Ingredients not in containers, such as sand, shall be accurately measured by the use of measuring boxes.
 3. Water shall be mixed with the dry ingredients in sufficient amount to provide a workable mixture which will adhere to the vertical surfaces of masonry units.
 4. Mortar that has stiffened because of loss of water through evaporation shall be retempered by adding water to restore the proper consistency and workability.
 5. Mortar that has reached its initial set or that has not been used within 2.5 hours after mixing shall be discarded.

3.10 JOINT REINFORCEMENT INSTALLATION

- A. Joint reinforcement shall be installed at 16 inches on center or as indicated.
1. Reinforcement shall be lapped not less than 6 inches.
 2. Prefabricated sections shall be installed at corners and wall intersections.
 3. The longitudinal wires of joint reinforcement shall be placed to provide not less than 5/8 inch cover to either face of the unit.

3.11 CONTROL JOINTS

- A. Control joints shall be provided as indicated and shall be constructed by using sash jamb units with control joint key in accordance with the details shown on the drawings. Sash jamb units shall have a 3/4 by 3/4 inch groove near the center at end of each unit.

1. The vertical mortar joint at control joint locations shall be continuous, including through all bond beams. This shall be accomplished by utilizing half blocks in alternating courses on each side of the joint.
2. The control joint key shall be interrupted in courses containing continuous bond beam steel.
3. In single wythe exterior masonry walls, the exterior control joints shall be raked to a depth of 3/4 inch;
 - a. Backer rod and sealant shall be installed in accordance with Section 07 92 00 Joint Sealants.
4. Exposed interior control joints shall be raked to a depth of 1/4 inch. Concealed control joints shall be flush cut.

3.12 BRICK EXPANSION JOINTS

- A. Brick expansion joints and concrete masonry veneer joints shall be provided and constructed as shown on the drawings. Joints shall be kept free of mortar and other debris.

3.13 STEEL LINTELS

- A. Steel lintels shall be as shown on the drawings.
 1. Lintels shall be set in a full bed of mortar with faces plumb and true.
 2. Steel lintels shall have a minimum bearing length of 8 inches unless otherwise indicated on the drawings.

3.14 ANCHORAGE TO CONCRETE

- A. Anchorage of masonry to the face of concrete columns, beams, or walls shall be with dovetail anchors spaced not over 16 inches on centers vertically and 24 inches on center horizontally.

3.15 POINTING AND CLEANING

- A. After mortar joints have attained their initial set, but prior to hardening, mortar and grout daubs or splashings shall be completely removed from masonry-unit surfaces that will be exposed or painted.
- B. Before completion of the work, defects in joints of masonry to be exposed or painted shall be raked out as necessary, filled with mortar, and tooled to match existing joints.
- C. Immediately after grout work is completed, scum and stains which have percolated through the masonry work shall be removed using a high pressure stream of water and a stiff bristled brush.
- D. Masonry surfaces shall not be cleaned, other than removing excess surface mortar, until mortar in joints has hardened.
- E. Masonry surfaces shall be left clean, free of mortar daubs, dirt, stain, and discoloration, including scum from cleaning operations, and with tight mortar joints throughout.
- F. Metal tools and metal brushes shall not be used for cleaning.
- G. Clay or Shale Brick Surfaces
 1. Exposed brick masonry surfaces shall be cleaned as necessary to obtain surfaces free of stain, dirt, mortar and grout daubs, efflorescence, and discoloration or scum from cleaning operations.
 - a. After cleaning, the sample panel of similar material shall be examined for discoloration or stain as a result of cleaning.
 - 1) If the sample panel is discolored or stained, the method of cleaning shall be changed to assure that the masonry surfaces in the structure will not be adversely affected.
 2. The exposed masonry surfaces shall be water-soaked and then cleaned with a solution proportioned 1/2 cup trisodium phosphate and 1/2 cup laundry detergent to one gallon of water or cleaned with a proprietary masonry cleaning agent specifically recommended for the color and texture by the clay products manufacturer.
 - a. The solution shall be applied with stiff fiber brushes, followed immediately by thorough rinsing with clean water.
 - b. Proprietary cleaning agents shall be used in conformance with the cleaning product manufacturer's printed recommendations.

- c. Efflorescence shall be removed in conformance with the brick manufacturer's recommendations.

3.16 PROTECTION

- A. Facing materials shall be protected against staining.
 - 1. Top of walls shall be covered with nonstaining waterproof covering or membrane when work is not in progress.
 - a. Covering of the top of the unfinished walls shall continue until the wall is waterproofed with a complete roof or parapet system.
 - b. Covering shall extend a minimum of 2 feet down on each side of the wall and shall be held securely in place.
 - 1) Before starting or resuming, top surface of masonry in place shall be cleaned of loose mortar and foreign material.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

DIVISION 05 - METALS

05 05 00 COMMON WORK RESULTS FOR METALS

- 05 05 10 Common Work Results for Metals
- 05 05 13 Coatings for Metals
- 05 05 23 Metal Fastening

05 12 00 STRUCTURAL STEEL FRAMING

- 05 12 23 Structural Steel

THIS PAGE IS INTENTIONALLY BLANK

05 05 10**COMMON WORK RESULTS FOR METALS****PART 1 GENERAL****1.1 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery:
 - 1. Deliver all materials to the job site properly marked to identify the structure for which it is intended. Marking shall correspond to marking indicated on the Shop Drawings.
- B. Storage:
 - 1. Store in a manner to maintain identification and to prevent damage
- C. Handling:
 - 1. Use all means necessary to protect the materials of this Section before, during, and after installation and the Work and materials of all other trades.
 - 2. In the event of damage immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 PRODUCTS**2.1 MATERIALS**

- A. See Drawings for materials required.
- B. Metals -
 - 1. Structural shape & plates
 - 2. Plates to be bent or cold formed
 - 3. Steel tubing hot formed, welded or seamless
 - 4. Steel tubing cold formed, welded or seamless
 - 5. Steel bars
 - 6. Cold rolled steel sheets
 - 7. Galvanized steel sheets
 - 8. Stainless steel sheets.
 - 9. Gray iron casting
 - 10. Cold finish steel bars
 - 11. Malleable iron castings
 - 12. Steel pipe.
 - 13. Steel castings
 - 14. Aluminum shapes
 - 15. Carbon steel sheets

2.2 FABRICATION:

- A. General
 - 1. Comply with the various standards listed within the Sections of this Division.
- B. Shop Fabrication
 - 1. Fabricate as indicated by the Drawings and reviewed submittals.
 - 2. Properly mark and match-mark materials for field assembly.
 - 3. Where finishing is required, complete the assembly, including welding, prior to beginning finished operations.
- C. Holes
 - 1. Provide holes required to attach other work to metal work.
 - 2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut or enlarge holes by burning.
 - 3. Cut, drill and tap units to receive hardware.

- D. Anchors -
 - 1. Equip units with integrally welded anchors for casting into concrete or building into masonry.
 - 2. Furnish inserts if units must be installed after concrete or masonry is placed.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

3.2 INSTALLATION

- A. Setting Loose Plates -
 - 1. Clean concrete or masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean the bottom surface of bearing plates.
 - 2. Set loose leveling and bearing plates on wedges, or other adjustable devices.
 - 3. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but, if protruding cut off flush with the edge of the bearing plate before packing with grout.
 - 4. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.
- B. Cutting, Fitting, and Placement -
 - 1. Perform cutting, drilling, and fitting required for placement of metal work.
 - 2. Set work accurately in location, alignment, and elevation, and make plumb, level, true, and free from rack, measured from established lines and levels.
 - 3. Provide temporary bracing or anchors in formwork for items which are to be built into concrete or similar construction.
 - 4. Fit exposed connections accurately together to form tight hairline joints.
 - 5. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations.
 - 6. Grind exposed joints smooth, and touch-up shop paint coat. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.

END OF SECTION

05 05 13**COATINGS FOR METALS****PART 1 PRODUCTS**

1.1 MATERIALS

A PAINTS

1. Primer

a. On Plain Iron or Steel:

- 1). Conform to requirements of FS TT-P-645, except primer on unexposed surfaces may be fabricators standard shop coat.

b. Repair of Welded Areas or Damaged Areas on Galvanized Steel:

- 1). Galvax by Alvin Products Inc, Everett, MA / (978) 423-7681
- 2). ZRC Cold Galvanizing Compound by ZRC Chemical Products Co, Marshfield MA / (781)-319-0400 info@zrcworldwide.com

- B. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

PART 2 EXECUTION

2.1 SHOP PAINTING

A. Scope

1. Shop paint all metal work, except members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise specified.

a. Do not apply primer at temperatures below 45°F

b. Protect machine-finished surfaces against corrosion

B. Preparation:

1. Remove scale, rust and other deleterious materials before applying shop coat.
2. Clean off heavy rust and loose mill scale according to SSPC-SP-2 or SSPC-SP-3.
3. Remove oil, grease and similar contaminations according to SSPC-SP-1.

C. Application

1. Immediately after preparing surface, apply primer according to manufacturer's recommendations and at a rate to provide the recommended minimum dry film thickness.
2. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces.
3. Apply one shop coat to all fabricated metal items and apply an additional shop coat to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first coat.

2.2 GALVANIZING

A. Conform to the following:

1. ASTM A 153/A 153M (2005) for galvanizing iron and steel hardware
2. ASTM A 123/A 123M (2002) for galvanizing rolled, pressed and forged steel shapes, plates, bars and strip 3 mm (1/8") thick and heavier.

2.3 ADJUSTMENTS:

A. Touch-up Painting

1. Immediately after erection, clean field welds, bolted connections and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting.
2. Apply by brush or spray to provide a minimum dry film thickness of 2 mils.

THIS PAGE IS INTENTIONALLY BLANK

05 05 23**METAL FASTENING****PART 1 PRODUCTS****1.1 MATERIALS**

- A. Bolt & Threaded Fasteners
 - 1. For steel-to-steel structural connections, including those for bolting steel members to steel plates or channels embedded in concrete:
 - a. Conform to requirements of ASTM A325
 - b. Use direct tension indicators meeting requirements of ASTM F959 at all friction connections.
 - 2. Anchor Bolts
 - a. Non-headed type meeting requirements of ASTM A307, Grade A, unless otherwise noted.
 - 3. Others Fasteners:
 - a. Bolts & nuts = ASTM A307, hexagonal head.
 - b. Machine screws = Fed. Spec. FF-S-92
 - c. Plain washers = Fed. Spec. FF-W-92
 - d. Expansion bolts = Fed. Spec. FF-S-325
- B. Arc-Welding Electrodes
 - 1. Type E70XX AWS Iron and Steel Arc-welding electrodes meeting current AISC Specifications.
- C. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

PART 2 EXECUTION**3.1 EXAMINATION**

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

3.2 INSTALLATION

- A. Fastening to In-Place Construction:
 - 1. Install anchorage devices and fasteners when necessary to secure metal work to in place construction including threaded fasteners for concrete inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.
- B. Bolting shall conform to AISC requirements.
- C. Field Welding
 - 1. Comply with referenced standards.
 - 2. Minimum weld sizes:
 - a. Weld pipe columns to base and top plates with 0.25" fillet weld all around.
 - b. Weld glu-lam connection side plates to base plates with 0.25" fillet weld all along outside edges.
 - c. Weld stiffeners to pipe columns with 0.25" fillet weld all around.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK.

05 12 23**STRUCTURAL STEEL****PART 1 GENERAL**

1.1 SUBMITTALS

- A. Data
 1. Shop drawings
 2. Setting drawings
 3. Mill certificates

1.2 QUALITY ASSURANCE

- A. Pre-installation Meeting
 1. See Section 01 33 23 Submittal Procedures
- B. Quality Assurance/Control submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports and other documentary data affirming quality of products and installations.
 1. Submit 2 copies to Architect immediately upon receipt.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Delivery
 1. Deliver all products to project site in sufficient quantities, at proper intervals and in ample time to prevent unduly delaying the work.
 2. Deliver all materials to the job site properly marked to identify the structure for which it is intended. Marking shall correspond to marking indicated on the Shop Drawings.
- B. Storage
 1. Store to permit easy access for inspection and identification.
 2. Keep steel members off ground using acceptable supports.
 3. Store in a manner to maintain identification and to prevent damage.
 4. Protect from corrosion and deterioration.
 5. Do not store materials on structure in a manner which might cause distortion or damage to structure or to materials.
 6. Repair or replace any damaged or distorted work.
- C. Protection
 1. Use all means necessary to protect the materials of this Section before, during and after installation and the Work and materials of all other trades.
 2. In the event of damage immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Metals
 1. Structural shape & plates = ASTM A36 except wide flange to be A992 (50 ksi).
 2. Plates to be bent or cold formed = ASTM A283 Grade C
 3. Steel tubing hot formed, welded or seamless = ASTM A501, Type C, Schedule 40
 4. Steel tubing cold formed, welded or seamless = ASTM A500, Grade B
 5. Steel bars = ASTM A306, Grade 65; or ASTM A36
 6. Structural pipe = ASTM A53, Type E or S, Grade B, Class STD or XS as indicated.

2.2 FABRICATION

A. General

1. Fabricate as indicated by the Drawings and reviewed submittals.
2. Properly mark and match-mark materials for field assembly.
3. When finishing is required, complete the assembly and welding prior to beginning finished operations.
4. Provide indicated camber in structural members.
5. Fabricate for delivery sequences which will expedite erection and minimize field handling of materials.
6. Weld bases and bearing plates to columns and members attached to concrete or masonry.
7. Assemble and weld built up sections by methods which will produce true alignment of axes without warp.

B. Holes

1. Provide holes required to attach other work to metal work.
2. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame cut or enlarge holes by burning.
3. Cut, drill and tap units to receive hardware.

C. Anchors

1. Equip units with integrally welded anchors for casting into concrete or building into masonry or concrete.
2. Furnish inserts if units must be installed after concrete or masonry is placed.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to proper and timely completion of the Work.
- B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 ERECTION

A. Temporary Shoring and Bracing

1. Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads.
2. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.
3. Remove temporary connections and members when permanent members are in place and final connections are made.

B. Temporary Planking

1. Install temporary planking and working platforms as needed for effective completion of the work of this Section.

C. Anchor Bolts

1. Install anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.
2. Tighten anchor bolts after supported members have been positioned and plumbed.

D. Setting Loose Bases & Bearing Plates

1. Clean concrete or masonry bearing surfaces of any bond-reducing materials and roughen to improve bond to surfaces. Clean the bottom surface of bearing plates.
2. Set loose leveling and bearing plates on wedges or other adjustable devices.
3. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding cut off flush with edge of bearing plate before packing with grout.
4. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

E. Structural Frame

1. Comply with requirements of standards referenced above and as herein specified.
2. Establish permanent bench marks necessary for the accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces and locations of anchor bolts and similar items before erection proceeds.

3. Splice members only where indicated.
 4. Set structural frames accurately to the lines and elevations indicated. Align and adjust the various members forming a part of a complete frame or structure before fastening permanently.
 5. Clean the bearing surfaces and other surfaces which will be in permanent contact before assembly.
 6. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 7. Level and plumb individual members of the structure within specified AISC tolerances.
 8. Establish required leveling and plumbing measurements on the mean operating temperature of the structure. Make allowances for the difference between temperature at time of erection and the mean temperature at which the structure will be when completed and in service.
- F. Gas Cutting
1. Do not use gas cutting torches in the field for correcting fabricating errors in the structural framing.
 2. Cutting will be permitted only on secondary members that are not under stress, as acceptable to the Architect.
 3. When gas-cutting is permitted, finish the sections equal to the sheared appearance.
- 3.3 FIELD QUALITY CONTROL
- A. Correct deficiencies in structural steel work which special inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests at Contractor's expense as may be necessary to reconfirm any noncompliance of original work, and as may be necessary to show compliance of corrected work.
- 3.4 ADJUSTMENTS & CLEANING
- A. Touch-up Painting
1. Immediately after erection, clean field welds, bolted connections and abraded areas of shop paint and paint exposed areas with same material as used for shop painting.
 2. Apply by brush or spray to provide a minimum dry film thickness of 2 mils.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

DIVISION 06 WOOD & PLASTICS

06 05 00 COMMON WORK RESULTS FOR WOOD, PLASTICS, AND COMPOSITES

06 05 23 Wood Plastic and Adhesive Fasteners
06 05 74 Preservative Treatment

06 10 00 ROUGH CARPENTRY

06 10 00 Rough Carpentry

06 11 00 WOOD FRAMING

06 11 20 Wood Framing

06 16 00 SHEATHING

06 16 10 Wood Panel Sheathing

06 17 00 SHOP FABRICATED STRUCTURAL WOOD

06 17 53 Shop Fabricated Wood Trusses

06 20 00 FINISH CARPENTRY

06 20 10 Finish Carpentry

06 22 00 MILLWORK

06 22 13 Wood Trim

06 40 00 ARCHITECTURAL WOODWORK

06 40 10 General Architectural Woodwork Requirements

06 41 00 ARCHITECTURAL WOOD CASEWORK

06 41 13 Wood Cabinets

06 44 00 ORNAMENTAL WOODWORK

06 44 43 Polyester Resin Stone Composite Columns

06 48 00 WOOD FRAMES

06 48 16 Interior Wood Door Frames

06 61 00 SIMULATED STONE FABRICATION

06 61 16 Solid Surfacing Fabrications

THIS PAGE IS INTENTIONALLY BLANK

06 05 23**WOOD, PLASTIC & ADHESIVE FASTENERS****PART 1 PRODUCTS**

1.1 MATERIALS

- A. Fasteners & Adhesives
 - 1. Wood Screws
 - a. Standard type and make for job requirements.
 - 2. Expansion Bolts
 - a. Standard type and make for job requirements.
 - 3. Powder Actuated Fasteners
 - a. Hilti, Tulsa, OK, (866) 445-8827 <http://www.us.hilti.com/>
 - b. ITW Ramset, Michigan City, IN, (800) 348-3231, custservmc@ramset.com
 - 4. Construction Adhesives
 - a. Meet requirements of ASTM D 3498 (2003) and GS-36 (2000).
 - b. Use phenol resorcinol type for use on pressure treated wood products.
- B. Framing Anchors
 - 1. Specific anchors by Simpson Strong Tie Company are shown on Drawings. Anchors by other manufacturers are acceptable upon submission of product data and shop drawings showing design values equivalent to Simpson anchor used in each particular instance.
 - 2. Approved Manufacturers
 - a. Advanced Connector Systems (ACS), Tempe, AZ, (800) 462-6779 www.acsboss.com
 - b. USP Lumber Connectors, Montgomery, MN, (800) 328-5934 customerservice@uspconnectors.com
 - c. Simpson Strong Tie Co, San Leandro, CA, (800) 999-5099 www.simpsonanchors.com
- C. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

PART 2 EXECUTION

3.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

3.2 INSTALLATION

- A. Install according to manufacturers and/or responsible institutes instructions.
- B. Secure one Manufacturer approved fastener in each hole of framing anchor that bears on framing member.
 - 1. The 'Boss' system by ACS is an acceptable nailing system for framing anchors.
- C. Provide bolt heads and nuts bearing on wood with washers.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

06 05 74

PRESERVATIVE TREATMENT

PART 1 PRODUCTS

1.1 MATERIALS

A. Pressure Treatment Of Wood

1. General

- a. Lumber grade and species shall be as specified for the particular use.
 - b. Permanently identify treated lumber with name of inspection agency, preservative used, name of treating plant, retention in lbs/cu ft, and suitable end use.
 - c. Season after treatment to moisture content required for nontreated material.
2. Lumber - Treat in accordance with AWPA C2 and dry after treatment.
 3. Plywood - Treat in accordance with AWPA C9 and dry after treatment.
 4. Millwork - Treat in accordance with AWPA N1 and dry after treatment.

PART 2 EXECUTION

2.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

2.2 INSTALLATION

- A. Install according to manufacturers and/or responsible intitutes instructions.
- B. Treat cuts and holes with treaters recommended coating when required.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

06 10 00**ROUGH CARPENTRY****PART ONE - GENERAL**

- 1.1 DESCRIPTION:
- A. Includes But Not Limited To -
 1. Roof framing required by Contract Documents.
 2. Plywood sheathings
 3. Miscellaneous rough carpentry
 - B. Related Documents -
 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 01, General Requirements, of these Specifications.
- 1.2 REFERENCES:
- A. ASTM A307, "Specification for Carbon Steel Bolts and Studs 60,000 psi Tensile Strength"
 - B. American Plywood Association Specifications
- 1.3 QUALITY ASSURANCE:
- A. Grading -
 1. Lumber -
 - a. Grade according to PS 20, ANSI A 199.1, and National Grading Rules for softwood dimension lumber.
 2. Plywood -
 - a. Grade according to PS 1/ANSI A199.1 except where APA Performance Rated Units are required.
 - B. Grade Marking -
 1. Identify lumber by grade mark or Certificate of Inspection issued by WWPA, SPIB, or other association recognized by the American Lumber Standards Committee.
 2. All sheets of plywood shall bear the appropriate grade stamp of APA.
- 1.4 PRODUCT DELIVERY, STORAGE, & HANDLING:
- A. Protect lumber and plywood and keep under cover in transit and at job site.
 - B. Do not deliver material unduly long before it is required.
 - C. Store on level racks and keep free of ground to avoid warping. Stack to insure proper ventilation and drainage.
- 1.5 SEQUENCING & SCHEDULING:
- A. Coordination -
 1. Fit carpentry work to other work. Scribe and cope as required.
 2. Correlate locations of furring, blocking, grounds, nailers and the like to allow proper attachment of other Work.

PART TWO - PRODUCTS

- 2.1 DIMENSION LUMBER:
- A. General -
 1. Lumber shall not exceed 19% moisture content and shall be stamped "S-DRY", "K-D", or "MC15".
 2. Lumber shall be S4S.
 3. Dimension lumber shall be clearly grade marked.
- 2.2 PLYWOOD :
- A. This specification is written for APA Performance Rated Plywood. Waferboard, Composite Board, and Oriented Strand Board (but not Structural Particle Board) are acceptable providing the following criteria are met -
 1. In all cases thickness shown is minimum regardless of span rating. All material used for same purpose shall be of same thickness.
 2. All material shall display APA Grade Mark
 3. All material shall be listed for Exposure 1.

- B. C-D Interior with exterior glue. Structural grades shall be as noted below and plywood shall be APA grade marked accordingly -
- | | |
|--------|-------|
| 3/8" | 24/0 |
| 15/32" | 32/16 |
| 1/2" | 32/16 |
| 19/32" | 40/20 |
| 5/8" | 40/20 |
| 23/32" | 48/24 |
| 3/4" | 48/24 |
- C. Moisture content shall not exceed 18% when fabricated, not more than 19% when installed.

PART THREE - EXECUTION

3.1 INSPECTION AND PREPARATION:

- A. Carefully examine each member, board, or piece prior to installing.
1. Discard any material which exhibits any defect which may impair its structural quality for rough members or its appearance in the completed work for finish components.
 2. These defects include but are not limited to excess moisture, mould, dry rot, checking, sap pockets, warp, twist, bow, or bark.
- B. Architect will reject defective materials even if already incorporated into work.
1. Contractor shall remove any rejected materials from work and replace with acceptable materials.

3.2 INSTALLATION:

- A. Frame, anchor, tie, and brace members or parts to develop strength and rigidity necessary for purposes for which they are used.
- B. Conform to good engineering practices when preparing, fabricating, and installing wood members and glues and mechanical devices for fastening them.
- C. Dimensional Lumber -
1. Set members to required levels and lines; plumb and true, and cut and fitted.
- D. Plywood -
1. Set nail heads flush with, but not penetrating, plywood surface.
 2. Protect with building paper until finished materials are installed.

3.3 ANCHORING DEVICES:

- A. Install as instructed, required, and according to best practice.
1. Use fasteners of sizes and types to draw and rigidly secure members into place.
 2. Select fasteners of size that will not penetrate member where opposite side is exposed to view or to receive finish materials.
 3. Use finishing nails for finish work.
 4. Make tight connections between members.
 5. Install fasteners without splitting wood. Pre-drill if required.
- B. Secure one Manufacturer approved spike in each hole that bears on framing member or according to Manufacturer's instructions to achieve maximum holding strength.

END OF SECTION

06 11 20**WOOD FRAMING****PART 1 GENERAL**

1.1 SUBMITTALS

- A. Technical and engineering data on nails to be set by nailing guns for Architect's approval of types proposed to be used as equivalents to specified hand set nails and adjusted number and spacing of pneumatically-driven nails to provide equivalent connection capacity.
 - a. Copies of pamphlets specified in REFERENCE Article. After Architect's examination, keep pamphlets on Project site with approved shop drawings. Pamphlets may be obtained from Truss Plate Institute or from Truss Fabricator.

1.2 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the site in an undamaged condition.
- B. Store, protect, handle, and install prefabricated structural elements in accordance with manufacturer's instructions and as specified.
- C. Store materials off the ground to provide proper ventilation, with drainage to avoid standing water, and protection against ground moisture and dampness.
- D. Store materials with a moisture barrier at both the ground level and as a cover forming a well-ventilated enclosure.
- E. Store wood I-beams and glue-laminated beams and joists on edge.
- F. Adhere to requirements for stacking, lifting, bracing, cutting, notching, and special fastening requirements.
- G. Remove defective and damaged materials and provide new materials.
- H. Store separated reusable wood waste convenient to cutting station and area of work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Dimension Lumber:
 - 1. Southern Pine No. 2, Douglas Fir No. 2, or HemFir No. 1 or No. 1 and No. 2 SPF
 - 2. Meet requirements of PS 20 and National Grading Rules for softwood dimension lumber.
 - 3. Bear grade stamp of WWPA, SPIB, or other association recognized by American Lumber Standards Committee identifying species of lumber by grade mark or by Certificate of Inspection.
 - 4. Lumber **2 inches** or less in nominal thickness shall not exceed 19 percent in moisture content at time of fabrication and installation and be stamped 'S-DRY', 'K-D', or 'MC15.'
 - 5. Lumber shall be S4S.
 - 6. Preservative Treated Plates / Sills:
 - a. **2x4:** Standard and better Douglas Fir, Southern Pine, or HemFir, or StrandGuard by Trus Joist, Boise, ID (800) 338-0515 or (208) 364-1200. www.tjm.com
 - b. **2x6 And Wider:** No. 2 or or MSR 1650f - 1.5e Douglas Fir, Southern Pine, HemFir, or StrandGuard by Trus Joist, Boise, ID (800) 338-0515 or (208) 364-1200. www.trusjoist.com

- B. Posts, Beams, And Timbers **5 Inches by 5 Inches** And Larger: No. 1 or better Douglas Fir or Southern Pine.
- C. Lumber Ledgers: No. 1 Douglas Fir, Larch, or Southern Pine.
- D. Blocking: Sound lumber without splits, warps, wane, loose knots, or knots larger than **1/2 inch**.
- E. Furring Strips: Utility or better.
- F. Sill Sealer: Closed-cell polyethylene foam, **1/4 inch** thick by width of plate.

PART 3 EXECUTION

3.1 ERECTION

- A. General: Use preservative treated wood for wood members in contact with concrete, including wall, sill, and ledger plates, etc.
- B. Interface With Other Work:
 - 1. Coordinate with other Sections for location of blocking required for installation of equipment and building specialties. Do not allow installation of gypsum board until required blocking is in place.
 - 2. Where manufactured items are to be installed in framing, provide rough openings of dimensions within tolerances required by manufacturers of such items. Confirm dimensions where not shown on Drawings.
- C. Floors:
 - 1. Place with crown side up.
 - 2. Provide accurately fitted header and trimmer joists of same size as regular joists around floor openings, unless detailed otherwise, and support by steel joist hangers.
 - 3. Double joists under partitions that parallel run of joists.
- D. Walls:
 - 1. Tolerances:
 - 1. **1/4 inch** in **20 feet**, non-cumulative in length of wall.
 - 2. **1/8 inch** in **10 feet** with **1/4 inch** maximum in height of wall.
 - 3. Distances between parallel walls shall be **1/4 inch** maximum along length and height of wall.
 - 2. Openings: Single, bearing stud supporting header and one adjacent stud continuous between plates, unless shown otherwise.
 - 3. Corners And Partition Intersections: Triple studs.
 - 4. Top Plates In Bearing Partitions: Doubled or tripled and lapped. Stagger joints at least **48 inches**.
 - 5. Firestops:
 - a. Horizontal or vertical concealed spaces in walls, light coves, soffits, drop ceilings, and other features over **10 feet** in length or height, and at stairs, ceiling levels, floor levels, and other junctures of horizontal to vertical concealed spaces.
 - b. Within concealed spaces of exterior wall finishes and exterior architectural elements, such as trims, cornices or projections, at maximum intervals of **20 feet**, length or height.
 - 6. Sill Plates:
 - a. Shear Walls And Bearing Walls:
 - 1) Provide anchor bolt **12 inches** maximum and **4 inches** minimum from each end of each plate.
 - 2) Shear Walls: Fasten only with bolts embedded in foundation wall.
 - 3) Bearing Walls: Fasten either with bolts embedded in slab or with expansion bolts in drilled holes.
 - b. Non-Bearing Walls: Fasten with powder actuated fasteners.
 - c. In addition to requirements of paragraphs 'a' and 'b' above, set sill plates of interior walls measuring less than **36 inches** in length in solid bed of specified construction adhesive, except where sill sealer is used.
 - d. Install specified seal sealer under sill plates of exterior walls of main building and of acoustically insulated interior walls.
 - 7. Posts And Columns: Unless shown otherwise, nail members of multiple member columns together with 16d at **6 inches** on center from each side.

8. Beams And Girders:
 - a. Built-Up Members:
 - 1) Stagger individual members of multiple span beams and girders so, over any one support, no more than half the members will have a joint. In all cases, however, joints shall occur over supports.
 - 2) Unless shown otherwise on Drawings, nail two-ply built-up members with 10d nails **12 inches** on center top and bottom, staggered on opposite sides. Nail three-ply built-up members with 16d nails at **12 inches** on center, top and bottom, staggered, on opposite sides. Set with crown edge up with full bearing at ends and intermediate supports.
 - f. Pre-Fabricated Members:
 - 1) Solid glu-lam, LVL or PSL members may be used in place of built-up **2x** framing members. Size shall be same as built-up member.
 - 2) Solid LVL or PSL members may be used in place of built-up LVL members. Size shall be same as sum of built-up members.
 - g. Wood shims are not acceptable under ends.
 - d. Do not notch framing members unless specifically shown in drawing detail.
9. Nailing:
 - a. Stud to plate:
 - 1) **2x4**: End nail, two 16d or toe nail, four 8d.
 - 2) **2x6**: End nail, three 16d or toe nail, four 8d.
 - 3) **2x8**: End nail, four 16d or toe nail, six 8d.
 - 4) **2x10**: End nail, five 16d or toe nail, six 8d.
 - 5) **1-3/4 by 5-1/2 Inch LVL**: End nail, three 16d or toe nail, four 8d.
 - 6) **1-3/4 by 7-1/4 Inch LVL**: End nail, four 16d or toe nail, six 8d.
 - 7) **1-3/4 by 9-1/4 Inch LVL**: End nail, five 16d or toe nail, six 8d.
 - 8) **1-3/4 by 11-1/4 Inch LVL**: End nail, six 16d or toe nail eight 8d.
 - b. Top plates: Spiked together, 16d, **16 inches** on center.
 - c. Top plates: Laps, lap members **48 inches** minimum and nail with 16d nails **4 inches** on center
 - d. Top plates: Intersections, three 16d.
 - e. Backing And Blocking: Three 8d, each end.
 - f. Corner studs and angles: 16d, **16 inches** on center.
- E. Roof And Ceiling Framing:
 1. Place with crown side up at **16 inches** on center unless noted otherwise.
 2. Install structural blocking and bridging as necessary and as described in Contract Documents.
 3. Special Requirements:
 - a. Roof And Ceiling Joists: Lap joists **4 inches** minimum and secure with code approved framing anchors.
 - b. Roof Rafters And Outlookers :
 4. Cut level at wall plate and provide at least **2-1/2 inches** bearing where applicable. Spike securely to plate with three 16d nails.
 5. Attach to trusses or other end supports with framing anchors described in Contract Documents.
 6. Provide for bracing at bearing partitions.
 7. Installation of Wood Trusses:
 - a. Handle, erect, and brace wood trusses in accordance with TPI HIB-91.
 - b. Do not install damaged or broken wood trusses. Replace wood trusses that are broken, damaged, or have had members cut out during course of construction.
 - c. Provide construction bracing for trusses in accordance with TPI DSB-89.

- d. Provide continuous 2x4 horizontal web bracing as shown on truss shop drawings.
 - 1) Secure bracing to each truss with two 10d or 16d nails.
 - 2) Lap splice bracing by placing bracing members side by side on common web member. Butt splices are not acceptable.

- f. Unless directed or shown otherwise, provide diagonal 2x4 bracing between trusses at each line of horizontal web bracing.
 - 1) This diagonal bracing shall be continuous and extend from junction of web and top chord of one truss to junction of web and bottom chord of different truss.
 - 2) Install bracing at approximately 45 degree angle. Bracing will extend over three trusses minimum or more as determined by height of trusses and 45 degree installation angle.
 - 3) Install brace on side of web opposite horizontal web bracing and nail to each web with two 10d or 16d nails.
 - 4) Install one brace every 20 feet as measured from top of brace to top of next brace.
- 8. Installation of Glue-Laminated Structural Units:
 - a. Install work in accordance with Fabricators instructions and Glue-Lam Erection Safety Practices.
 - b. Adequately support and brace work until tied into building structure to insure against collapse due to wind or other forces.
 - c. Maintain protection of beams until roofing has been installed.
- 9. Installation of Structural Composite Lumber:
 - a. Install temporary horizontal and cross bracing to hold members plumb and in safe condition until permanent bracing is installed.
 - b. Install permanent bracing and related components prior to application of loads to members.
- 10. Installation of Plywood Web Joists:
 - a. Handle, erect, and brace plywood web joists in accordance with Manufacturer's instructions.
 - b. Do not install damaged or broken plywood web joists.
 - c. Install temporary horizontal and cross bracing to hold members plumb and in safe condition until permanent bracing is installed.
 - d. Cut holes through webs at locations or of sizes shown on Drawings and as recommended by Manufacturer.
- F. Accessory / Equipment Mounting And Gypsum Board Back Blocking (nailers):
 - 1. Furnish and install blocking in wood framing required for hardware, specialties, equipment, accessories, and mechanical and electrical items, etc.
 - 2. Furnish and install back blocking in wood framing required for joints in gypsum wallboard.
 - a. Install back blocking between I-joist framing members with equivalent of Simpson Z2 clips attached with four 10d x 1-1/2 inch nails at each end, two into I-joist and two into blocking.
 - b. Attach back blocking at trusses, stick framing, or walls with two 10d nails in each end of each piece of blocking.
- G. Furring Strips: Nail or screw as required to secure firmly.

END OF SECTION

06 16 10**WOOD PANEL SHEATHING****PART 1 GENERAL**

1.1 SUBMITTALS

- A. List data

PART 2 PRODUCTS

2.1 MATERIALS

A. Sheathing:

1. Meet requirements of PS 1-95, PS 2-92, PRP-108 (APA), or PRP-133 (TECO). Plywood only shall be used as floor sheathing, oriented strand board (OSB) is acceptable for all other areas.
2. Every sheet of sheathing shall be stamped as follows:
 - a. Appropriate APA, TECO, or PFS grade stamp identifying thickness and span rating.
 - b. Sheathing shall be stamped 'Sized for Spacing'.
 - c. Exposure 1 or Exterior.
3. Sheathing shall not exceed 18 percent moisture content when fabricated or more than 19 percent when installed in Project.
4. Sheathing 3/4 inch thick and thicker used for single-layer subflooring shall be tongue and groove.
5. Sheathing used for same purpose shall be of same thickness. In all cases, thickness specified is minimum required regardless of span rating.
6. Minimum span ratings for given thicknesses shall be as follows:

1) Thickness	Span Rating
a) 3/8 inch	24/0
b) 15/32 inch actual	32/16
c) 1/2 inch nominal	32/16
d) 19/32 inch actual	40/20
e) 5/8 inch nominal	40/20
f) 23/32 inch actual	48/24
g) 3/4 inch nominal	48/24

B. Nails:

1. 3/8 inch panel: 8d common or box.
2. 15/32 inch and thicker panels:
 - a. 10d common or galvanized box.

- C. Thicknesses and nailing for sheathing are indicated on the Construction Drawings.

PART 3 EXECUTION

3.1 INSTALLATION

A. General:

1. Top of nail heads shall be flush with sheathing surface.
2. Use of edge clips to provide spacing between sheathing panels is acceptable.

B. Wall Sheathing:

1. Spacing: Provide 1/8 inch space between sheets at end and edge joints.
2. Edge Bearing And Blocking:
 - a. Panel edges shall bear on framing members and butt along their center lines.

- b. Back block panel edges, which do not bear on framing members, with 2 inch nominal framing.
- 3. Size:
 - a. 15/32 inch actual minimum thickness.
 - b. Do not install any piece of wall sheathing with shortest dimension of less than 24 inches.
- C. Roof Sheathing:
 - 1. Placing:
 - a. Lay face grain at right angles to supports. Provide blocking for support where framing turns at roof overhang.
 - b. Provide 1/8 inch space between sheets at end and side joints.
 - c. Stagger panel end joints.
 - d. Sheathing shall be continuous of two spans minimum.
 - 2. Size:
 - a. 19/32 inch actual minimum thickness.
 - b. Do not install any piece of roof sheathing with shortest dimension of less than 24 inches.
- D. Floor Sheathing (Plywood only):
 - 1. Subflooring:
 - a. Apply bead of glue to structural supports. Lay face grain / strength axis across supports and with panel continuous over two supports minimum.
 - b. Allow expansion gap of at least 1/2 inch at walls.
 - c. Size:
 - 1) 23/32 inch actual minimum thickness.
 - 2) Do not install any piece of floor sheathing with shortest dimension of less than 24 inches.

END OF SECTION

06 17 53**SHOP-FABRICATED WOOD TRUSSES****PART 1 GENERAL**

1.1 SUBMITTALS

A. Shop Drawings:

1. Base shop drawings on truss configurations and on truss loads shown on Drawings and on requirements of Contract Documents. Joint configurations may be modified to allow double cut webs. Determine member forces from exact analysis method as defined by TPI.
2. Include following information on submitted shop drawings:
 - a. Allowable loads in lbs per effective nail or lbs per sq inch for lumber and plates used as allowed by ICBO and current ICBO report number.
 - b. Stress reduction factors used for plates and lumber.
 - c. Top and bottom chord design loads in psf.
 - d. Size, thickness, and exact location by dimension of plates.
 - e. Lumber species and grades used.
 - f. Combine stress ratio for each member.
 - g. Stamp and signature of Engineer responsible for preparation of shop drawings.
 - h. Name and trademark of Plate Manufacturer if metal plates are used.
 - i. Name and address of Truss Fabricator and Project name and address.

1.2 DELIVERY, STORAGE, AND HANDLING

- A. Notify Architect two days minimum before arrival of trusses to allow for scheduling of truss inspection on site before unloading and for monitoring of unloading procedure.
- B. Unload trusses by one of following methods.
 1. As outlined in TPI Pamphlet 'Handling HIB.'
 2. Trusses may be unloaded by dumping if trusses are shipped horizontally, are rolled off low profile roller bed trailer, and if no part of any truss is required to drop more than **18 inches**.

PART 2 PRODUCTS

2.1 MATERIALS

A. Top And Bottom Chords And Web Members:

1. Douglas Fir or Southern Pine No. 2 or better.
2. 2 inch by 4 inch nominal minimum size.
3. Sizes, species, and grades of members shall be as required to provide combined stress ratios of less than one.
4. Designed in accordance with ANSI / TPI-1 and IBC for given design loads.
5. Of quality to meet or exceed stress grade requirements given in table below for each lumber classification and to meet requirements for dimension lumber in Section 06110. Truss members not called out on Drawings shall meet or exceed stresses of classification C.
 - a. Of quality to meet minimum stress grade requirements given in table below.

1)	Class A	Class B	Class C	Class C
2)	2x6's	2x6's	2x4's	2x6's

a)	Fb Bending	1720	1495	1510	1310
b)	Ft Tension	1010	880	825	725
c)	Fv Shear	75	75	75	75
d)	Fc Perpendicular	405	405	405	405
e)	Fc Parallel	1650	1485	1495	1430
f)	E	1.6x10 ⁶	1.5x10 ⁶	1.5x10 ⁶	1.5x10 ⁶

- b. Allowable stresses shown are for normal duration of load and repetitive member use.
- c. Following machine stress rated lumbers may be substituted for the above lumbers provided the combined stress ratio for each member is less than 1.0 by National Design Specification for Wood formulas, 2001. Total load deflection is less than L/240 and live load deflection is less than L/360.

1)	<u>A</u>	<u>B</u>	<u>C</u>
	2100f - 1.8E	1800f - 1.6E	1650f - 1.5E

B. Metal Gusset Plates

1. Plate design and manufacture shall be as approved by 'The Research Committee for the ICBO'. Plates shall be galvanized or otherwise protected from corrosion.
2. Manufacturer's name or trademark shall be visible on plates.
3. Approved Manufacturers:
 - a. Alpine Engineered Products Inc, Pompano Beach, FL (800) 735-8055 or (954) 791-3333. www.alpeng.com
 - b. CompuTrus Inc, Riverside, CA (909) 343-1302. www.computrus.com
 - c. MiTek Industries, Chesterfield, MO (314) 434-1200. www.mitekinc.com
 - d. Robbins Manufacturing Co, Tampa, FL (813) 972-1135. www.robbinseng.com
 - e. Tee-Lok Corp, Edenton, NC (252) 482-7000. www.teelok.com
 - f. Truswal Systems Corp, Arlington, TX (800) 521-9790 or (817) 633-5100.

2.2 FABRICATION

A. General:

1. Fabrication of trusses shall be as approved by ICBO except that this Specification shall govern when it exceeds ICBO requirements.
2. Fabricate trusses from approved shop drawings.
3. Fabricate trusses in jigs with members accurately cut to provide good bearing at joints. Joints shall be acceptable if the average opening between ends of members immediately after fabrication is less than **1/16 inch**.
4. Each chord section shall be involved in two panel points before being spliced.
5. Approved Fabricators:
 - a. Truss Manufacturing, Westfield, IN
 - b. Engineered Truss Inc, Ft. Wayne, IN
 - c. Precision Truss Systems Inc, Kirklín, IN
 - d. T&M Truss Inc, Otterbein, IN
 - e. Davidson Industries, Franklin, IN
 - f. Automated Building Components Inc, North Baltimore OH
 - g. K & K Industries, Inc. Montgomery IN
 - h. Kintec Wood Truss Mfg. Inc., Pewee Valley KY
 - i. E-town Truss, Elizabethtown KY

B. Metal Gusset Plates:

1. No panel point shall have more than one plate per truss side

2. Plates shall have minimum bite of **2-1/2 inches** on members. Measure bite along center line of webs and perpendicular to chord axes. Orient plate axis parallel with truss chord axis except where chords change pitch or terminate. Plates may be placed parallel with webs at single web joints.
3. Plate Sizes:
 - a. Minimum width of plates shall be **3 inches**.
 - b. Trusses Other Than Scissor Trusses: Size plates, nail and steel section, for 135 percent of member forces.
 - c. Scissor Trusses: Size plates, nail and steel section, for 160 percent of member forces.
 - d. No increase in plate values will be allowed for duration of loading or other factor.
4. Press plates into members to obtain full penetration without crushing outer surface of wood. Plate embedment is acceptable if opening between plate and wood surface is less than **1/32 inch**.
5. Lumber defects and plate misplacement, in combination, shall not reduce plate area or number of effective teeth, prongs, or nails by more than ten percent.
6. Do not apply metal gusset plates after shop fabrication.

2.3 SOURCE QUALITY CONTROL

- A. Inspections: Notify Architect 7 days before beginning truss fabrication to allow scheduling of Architect's inspection visit during truss fabrication.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

06 20 10**FINISH CARPENTRY****PART 1 GENERAL**

1.1 SUBMITTALS

- A. See Section 01 33 23 Submittal Procedures for requirements.
- B. Submit
 - 1. Catalog data for all manufactured items.
 - 2. Shop Drawings for all items to be fabricated.
 - 3. Finish carpentry hardware schedule.
 - 4. Color selection data.
 - 5. Sample of wood specie which is to receive transparent finish, if requested.

1.2 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Do not deliver products until completion of operations which could damage, soil, or deteriorate woodwork.
- B. Storage:
- C. Handling:
 - 1. Protect finish carpentry materials during transit, delivery, storage, and handling to prevent damage, soiling, and deterioration.

PART 2 PRODUCTS

2.1 MATERIALS

- A. WOOD:
 - 1. General Lumber
 - a. Lumber shall not exceed 19% moisture content and shall be stamped "S-DRY", "K-D", or "MC15".
 - b. Plywood shall not exceed 18% moisture content when fabricated not more than 19% when installed.
 - c. Lumber shall be S4S unless otherwise indicated.
 - 2. Softwood
 - a. For use as solid stock in work with opaque finish, solid pink with no finger joints.
 - 3. Hardwood Lumber
 - a. For use as solid stock in work with transparent finish, provide lumber in grain and uniform color matching the adjacent work.
 - b. For use as solid stock in all finish work, provide lumber having not more than 12% moisture content.
 - 4. Plywood
 - a. Veneer Core
 - 1) Comply with PS-51 for hardwood and decorative plywood.
 - b. Particleboard Core
 - 1). Comply with CS-236, type 1-B-2.
 - c. Lumber Core
 - 1) When used, provide a least 5-ply consisting of face veneer, back veneer, two crossband veneers, and a core composed of strips of lumber edge-glued into a solid slab.
 - d. Provide only plywood fabricated with water-resistant glue by the hot plate method.
 - e. For use with transparent finish, achieve uniformity of color, figure, and grain character within each panel, and from panel to panel within each fixture and group of fixtures, as approved by the Architect.
 - f. Provide back veneers to properly balance the face veneers.

5. Particleboard
 - a. Approved Products
 - 1) "Timberblend"
 - 2) "Duraflake"
 - 3) "Novaply"
 6. Hardboard Products -
 - a. Tempered hardboard of the thickness shown on the Drawings or, if thickness is not shown on the Drawings, of thickness appropriate for the condition of use.
 - 1) Provide 1/4" thick perforated tempered hardboard where indicated.
 - b. Approved Manufacturer -
 - 1) Masonite Corporation.
7. Accessories For Job-Built Shear Wall And Draft Stop Access Doors:
- 1) Latch:
 - a) Acceptable Products:
 - 1) 1261, with wire pull and washer for opening from opposite side, by Stanley, New Britain, CT (800) 337-4393 or (860) 255-5111/ www.stanleyworks.com
 - 2) Equal as approved by Architect before installation. See Section 01600.
 - 2) One Pair Self-Closing Hinges:
 - a) Acceptable Products:
 - 1) 2960 by Bommer Industries, Landrum, SC (800) 334-1654 or (864) 457-3301.
 - 2) 158 by Stanley, New Britain, CT (800) 337-4393 or (860) 255-5111. www.stanleyworks.com
 - 3) Equal as approved by Architect before installation. See Section 01600.
 - 3) Stenciled Caution Signs:
 - a) One on each side of draft stop door.
 - b) Sign text shall read 'CAUTION - This Door Must Be Kept Closed' in 2 inch high letters.

2.2 INSTALLATION MATERIALS:

- A. Back Prime
 1. Cuprinol #20 Wood Preservative
 2. Thompson's Water Seal.

2.3 FASTENERS & ADHESIVES:

- A. Glue
 1. Waterproof and of best quality.
- B. Fasteners & Anchorages -
 1. Nails, screws, and other anchorage devices of the type, size, material, and finish required for indicated application to provide secure attachment.
 2. Concealed where possible.
 3. Use aluminum or other non-corrosive, non-staining fasteners for finish exterior work.

2.4 WOOD TRIM & MOULDINGS:

- A. Softwood
 1. Solid stock Pine, C or better, S4S.
- B. Hardwood
 1. Plain sawn Red Oak.
- C. Hardwood Plywood -
 1. Rotary cut Red Oak.
- D. Interior for Opaque Finish
 1. Solid Wood – Any species allowed by custom grade
 2. Finger jointing not allowed.

2.5 HARDWARE & ACCESSORIES:

- A. Storage Shelves
 1. Wire Shelves and wall brackets
 2. See Section 10 56 23 Wire Storage Shelving

- B. Closet Rods & Shelf -
 - 1. Wire shelf and rod
 - 2. See Section 10 56 23 Wire Storage Shelving

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Prior to start of installation, verify that the work of other trades is sufficiently complete to properly permit this installation to proceed.

3.2 PREPARATION:

- A. Carefully examine each member, board, or piece prior to installing.
 - 1. Discard any material which exhibits any defect which may impair its structural quality for rough members or its appearance in the completed work for finish components.
 - 2. These defects include but are not limited to excess moisture, mould, dry rot, checking, sap pockets, warp, twist, bow, or bark.
- B. Architect will reject defective materials even if already incorporated into work.
 - 1. Contractor shall remove any rejected materials from work and replace with acceptable materials.

3.3 INSTALLATION:

- A. Finish Carpentry
 - 1. Make up work according to measurements taken on the job.
 - 2. Scribe, miter, and join accurately and neatly to conform to details. Make joints to conceal shrinkage, jointing only over solid supports.
 - 3. Sand exposed surfaces to produce smooth uniform surfaces. Always sand in direction of grain.
 - 4. Allow for free movement of panels.
 - 5. Back prime work to be installed against concrete or masonry or where subjected to moisture.
 - 6. Install work level and plumb. Align adjoining surfaces.
- B. Cut and fit the work of this Section as necessary to receive, clear, engage, or support other parts of the Work, and as needed for interface with electrical, plumbing, and other units.
- C. Rout, drill, and otherwise prepare the surfaces as needed, and firmly install all finish hardware and accessories according to the approved design and the manufacturers' recommendations.
- D. Fasteners & Adhesives
 - 1. Use fasteners of sizes and types to draw and rigidly secure members into place.
 - 2. Select fasteners of size that will not penetrate member where opposite side is exposed to view or to receive finish materials.
 - 3. Use finishing nails for finish work.
 - 4. Make tight connections between members.
 - 5. Install fasteners without splitting wood. Pre-drill if required.
 - 6. Countersink nails and screws.
- E. Standing & Running Trim
 - 1. Install with minimum number of joints using longest length of lumber available. Avoid use of short pieces.
 - 2. Stagger joints in adjacent related members.
 - 3. Produce tight fitting joints with full surface contact throughout length of joint.
 - 4. Ease edges and outside corners of hardwood trim.
- F. Hardware
 - 1. Securely install into place using fasteners and anchors appropriate for the substrate.
 - 2. Adjust hardware for smooth, easy operation.

- 3.4 ADJUSTMENTS & CLEANING:
- A. Repair or replace damaged or defective finish carpentry work. Adjust joinery for uniform appearance.
 - B. Clean exposed and semi-exposed surfaces and leave ready for finishing.

END OF SECTION

06 22 13**WOOD TRIM****PART 1 GENERAL**

1.1 SUBMITTALS

- A. See Section 01 33 23 Submittal Procedures for requirements.
- B. Product Data
 - 1. Material data for each type of wood and trim to be used.
- C. Shop Drawings
 - 1. Include materials used, standing and running trim profiles, joint details, and hardware.
- D. Close out Documents
 - 1. As required

1.2 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 62 10 Product Options
- B. Delivery.
 - 1. Deliver trim, and millwork to job site in an undamaged condition.
 - a. Stack materials to ensure ventilation and drainage.
- C. Storage.
 - 1. Store materials under cover in a well-ventilated enclosure and protect against extreme changes in temperature and humidity.
 - a. Do not store products in building until wet trade materials are dry.
- D. Handling.
 - 1. Protect against dampness before and after delivery.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Acceptable Manufacturers
 - 1. Interior Wood For Transparent Finish
 - a. Solid wood shall be plain sawn Red Oak.
 - 2. Interior Wood For Opaque Finish
 - a. Solid wood shall be any species allowed by AWI Custom grade.
- B. Substitutions,
 - 1. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

PART 3 EXECUTION - Not Used**END OF SECTION**

THIS PAGE IS INTENTIONALLY BLANK

06 40 10**GENERAL ARCHITECTURAL WOODWORK REQUIREMENTS****PART 1 GENERAL****1.1 PROJECT CONDITIONS****A. Environmental Requirements -**

1. Do not deliver cabinets and fixture materials or products to the job site until concrete and plaster installations are completed and dry, nor until the building interior has attained a relative humidity of 50% to 55% at 70°F.

PART 2 PRODUCTS**2.1 MATERIALS****A. Lumber****1. Grade -**

- a. No defects in boards smaller than 600 sq in.
- b. One defect per additional 150 sq inches in larger boards.
- c. Select pieces for uniformity of grain and color on exposed faces and edges.
- d. No mineral grains accepted.

2. Allowable Defects

- a. Tight knots not exceeding 1/8 inch in diameter. No loose knots permitted.
- b. Patches (dutchmen) not apparent after finishing when viewed beyond 18 inches.
- c. Checks or splits not exceeding 1/32" x 3" and not visible after finishing when viewed beyond 18 inches.
- d. Stains, pitch pockets, streaks, worm holes, and other defects not mentioned are not permitted.
- e. Normal grain variations, such as cats eye, bird's eye, burl, curl, and cross grain are not considered defects.

3. Length

- a. Use maximum lengths possible, but not required to exceed ten feet without joints.
- b. No joints closer than six feet in straight run.

4. Moisture Content

- a. 6% maximum at fabrication.
- b. No opening of joints due to shrinkage is permitted.

B. Panel Products**1. Core**

- a. Plywood (fiberboard not acceptable)

2. Facings

- a. Hardwood veneer shall be plain sliced AWI Grade AA
 - 1) For use with transparent finish, achieve uniformity of color, figure, and grain character within each panel, and from panel to panel within each fixture and group of fixtures, as approved by the Architect.
- b. Melamine or Kortron.

3. Edging

- a. Exposed and semi-exposed edges of panel product with one or both faces having hardwood veneer shall have 3/4 inch by 1/4 inch edge-band of wood species matching hardwood face veneer.
- b. Exposed and semi-exposed edges of panel product with both faces Melamine or Kortron shall have PVC 'T' molding.

4. Glues used in manufacture of panel products shall be Type I or II.**5. Moisture content shall be same as specified for lumber.**

- C. Hardboard Products
 - 1. Tempered hardboard of the thickness shown on the Drawings or, if thickness is not shown on the Drawings, of thickness appropriate for the condition of use.
 - 2. Approved Manufacturer -
 - a. Masonite Corporation.
 - D. Adhesives -
 - 1. Water and mold resistant.
 - 2. Comply with Fed. Spec, MM-A-125, Type II.
- 2.2 FABRICATION:
- A. General
 - 1. Fabricate work to measurements taken on job site.
 - 2. Fabricate and assemble units complete at the mill insofar as their dimensions will permit for transportation and proper handling.
 - 3. For units with sectional construction-
 - a. Accurately fit and align the separate parts.
 - b. Provide ample screw, glue-and-bolt blocks, draw-bolts, tongues, grooves, splines, dowels, tenons, mortises, and other means of fastening to render the work of this Section substantial, rigid, and permanently secured in the proper position.
 - B. 'Ease' sharp corners of exposed members to promote finishing and protect users from slivers.
 - C. Fabricate so veneer grain is vertical.
 - D. Joints
 - 1. Join members by pressure glue and biscuit joints, or pressure glue and dowels.
 - 2. Use lumber pieces with similar grain pattern when joining end to end.
 - 3. Compatibility of grain and color from lumber to panel products is required.
 - E. Scribe Members -
 - 1. Provide sufficient additional material to permit scribing to walls, floors, and related work.
 - 2. Provide adequate allowance for shrinkage occurring after installation.
 - F. Framing And Blocking -
 - 1. Assemble with bolted and screwed connections, securing to structural backings with cinch anchors, expansion screws, or toggle bolts as necessary.
 - 2. Mortise-and-tenon all rails and stiles, neatly miter and member throughout, make butt joints flush and smooth, and make up permanent joints with water resistant glue.
 - 3. Assemble fixtures without face nails or face screws, except as needed to attach trim. Where face nailing or face screwing is required, countersink face nails and face screws, fill with plastic wood or wood plugs, sand smooth, and touch up to be nearly invisible.
 - 4. Countersink the heads of all screws in every surface.
 - G. Cut and fit the work of this Section as necessary to receive, clear, engage, or support other parts of the Work, and as needed for interface with electrical, plumbing, and other units.
 - H. Finish Tolerances -
 - 1. No planer marks (KCPI) allowed. Sand all wood members and surfaces to 100 grit.
 - 2. Maximum Gap - none allowed
 - 3. Flushness variation - 0.015 inch maximum
 - 4. Sanding Cross Scratches - 0.025 inch maximum
 - 5. Compatibility of grain and color from lumber to panel products is required.
 - 6. Plug or fill screw and nail holes. Screw and nail locations not to be visible beyond 18 inches.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of

the Work. Do not proceed until unsatisfactory conditions are corrected.

- B. Prior to start of installation, verify that the work of other trades is sufficiently complete to properly permit this installation to proceed.

3.2 INSTALLATION:

- A. Install the work of this Section at the locations shown on the Drawings, and according to the approved Shop Drawings.
 - 1. Scribe units to wall, floor, and other surfaces as appropriate, with not more than 1/32" clear between the trim, cabinet, or fixture and the abutting permanent surface, and with no change of clearance in excess of 0.01" in any 4".
 - 2. Set each unit square, level, plumb, and aligned within a tolerance of one in 1000 vertically and horizontally, and within 1/4" of the designated location for freestanding work.
- B. Securely anchor into place.

3.3 ADJUSTMENTS & CLEANING:

- A. In addition to AWI requirements, repair or replace damaged or defective exposed finished surfaces of millwork to match adjacent similar undamaged surface as directed by Architect.
- B. Upon completion of installation, thoroughly clean each item by use of only such cleaning materials as are recommended by the manufacturer of the item being cleaned.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

06 41 13**WOOD CABINETS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This section includes the following:
1. Wood-faced kitchen cabinets.
 2. Wood-faced vanity cabinets.
 3. Plastic laminate countertops.
- B. Related Sections include the following:
1. Division 11 Section Residential Appliances for appliances mounted in the kitchen casework.
 2. Division 22 Section Plumbing Fixtures for sink units mounted in countertops.

1.3 REFERENCES

- A. American National Standards Institute (ANSI).
- B. Builders Hardware Manufacturers Association (BHMA).
- C. Hardwood Plywood & Veneer Association (HPVA).
- D. Kitchen Cabinet Manufacturers Association (KCMA).
- E. Laminating Materials Association (LMA).
- F. National Electrical Manufacturers Association (NEMA).

1.4 DEFINITIONS

- A. Exposed Surfaces of Casework: Surfaces visible when doors and drawers are closed, including visible surfaces in open cabinets or behind glass doors.
- B. Semi exposed Surfaces of Casework:
1. Surfaces visible when behind opaque doors and drawer fronts are open, including interior faces of doors and interiors and sides of drawers.
 2. Bottoms of wall cabinets are defined as semi exposed.
- C. Concealed Surfaces of Casework:
1. Surfaces not usually visible after installation, including sleepers, web frames, dust panels, bottoms of drawers, and ends of cabinets installed directly against and completely concealed by walls or other cabinets.
 2. Tops of wall cabinets and utility cabinets are defined as concealed.

1.5 SUBMITTALS

- A. Product Data: For the Following:
1. Cabinets.
 2. Plastic-laminate countertops.
 3. Cabinet hardware.
- B. Shop Drawings: For cabinets and countertops, include plans, elevations, details, and attachments to other work. Show materials, finishes, filler panels, hardware, edge and backsplash profiles, cutouts for plumbing fixtures, and methods of joining countertops.
- C. Material Samples for Initial Selection: Manufacturer's color charts showing the full range of colors, textures, and patterns available for each type of material exposed to view.
- D. Material Samples for Verification: For the following materials; in sets showing full range of color, texture, and pattern variations expected:

1. Wood-veneered panels with transparent finish, 3 1/4 x 5 3/4 inches (80 x 145mm), for each species.
 2. Solid wood with transparent finish, 50 sq. in. (300 sq. cm.), for each species.
 3. Plastic laminate for countertops, 8 by 10 inches (200 by 250mm).
 4. Solid surfacing for material for countertops, 6 inches (150mm) square.
 5. One unit of each type of exposed hardware.
- E. Product Samples for Verification: As Follows:
1. One full-size, finished 15" base cabinet complete with hardware, doors, and drawers, but without countertop.
 2. One full sized, finished 15" wall cabinet complete with hardware, doors, and adjustable shelves.
 3. Plastic laminate for countertops, 8 by 10 inches (200 by 250mm)
- F. Product Certificates: Signed by manufacturers of casework certifying that products furnished comply with specified requirements.

1.6 QUALITY ASSURANCE

- A. Source Limitations for Cabinets: Obtain cabinets through one source from a single manufacturer
- B. Product Designations: Drawings indicate size, configurations, and finish material of casework by referencing designated manufacturer's catalog numbers. Other manufacturer's casework of similar sizes, similar door and drawer configurations, similar finish materials, and complying with the Specifications may be considered. Refer to Division 1 Section Substitutions.
- C. Quality Standards: Unless otherwise indicated, comply with the following standards:
1. Cabinets: KCMA A161.1.
 2. Plastic Laminate Countertops: KCMA A161.2.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install residential casework until building is enclosed, wet-work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Established Dimensions: Where residential casework is indicated to fit to other construction, establish dimensions for areas where casework is to fit. Coordinate construction to ensure that the actual dimensions correspond to established dimensions. Provide fillers and scribes to allow for trimming and fitting.
- C. Field Measurements:
1. For cabinets: Where residential casework is indicated to fit existing construction, verify dimensions of existing construction by field measurements before fabrication and indicate measurements on Shop Drawings. Provide filler and scribe if necessary.
 2. Field Measurements for Countertops: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.8 COORDINATION

- A. Coordinate layout installation of blocking and reinforcement in partitions for support of residential casework.

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:
1. Kountry Wood Products, Harmony Auburn with HD Supply #800614 Satin Nickel Cabinet Pulls or equivalent.

- B. Manufacturers: Subject to compliance with specified requirements, provide products by one of the following:
 - 1. Plastic Laminate for Countertops:
 - a. Formica Corp
 - b. Laminart
 - c. Nevamar Corp.
 - d. Pioneer Plastics Corp.
 - e. Westinghouse Electric Corp.; Specialty Products Div.
 - f. Wilson: Ralph Wilson Plastics Co.
- C. Acceptable Products: Subject to compliance with specified requirements, provide
 - 1. Quality Heritage Oak available in assorted finishes
 - 2. Warranty: 5 year

2.2 COLORS, TEXTURES, AND PATTERNS

- A. Colors, Textures, and Patterns: As indicated by referencing manufacturer's designations.
- B. Colors, Textures, and Patterns: As selected by Architect from manufacturer's full range for these characteristics.

2.3 CABINET MATERIALS

- A. Exposed Materials: Comply with the following:
 - 1. Exposed Wood Species:
 - a. Unless otherwise indicated, do not use two adjacent exposed faces shall be similar that are noticeably dissimilar in color, grain, figure, and or natural character markings.
 - b. Oak.
 - 2. Solid Wood: Clear hardwood lumber of species indicated, free of defects, selected for compatible grain and color, kiln dried to 7 percent moisture content.
- B. Semi-exposed Materials: Unless otherwise noted, provide the following:
 - 1. Medium Density Particleboard: Moisture- and stain-resistant, easy clean laminate with printed wood grain complying with ANSI A208.1, Grade M-1 adhesively bonded to particleboard.
 - a. Provide laminate film on both sides of shelves, dividers, and other components with two semi-exposed surfaces and semi-exposed edges.
- C. Concealed Materials: Comply with the following:
 - 1. Plywood: Any hardwood or softwood species, with no defects affecting strength or utility.
 - 2. Particleboard: ANSI A208.1, Grade M-1

2.4 COUNTERTOP MATERIALS

- A. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
 - 1. Grade: HGS.
 - 2. Grade: HGP.
 - 3. Provide through-color plastic laminate
 - 4. Grade for Backer Sheet: BKL
 - 5. Add stiffener at island top locations.
- B. Particleboard: ANSI A208.1, Grade M-2
- C. Plywood: Exterior softwood plywood complying with PS 1, Grade C-C plugged, touch sanded.
- D. Solid-surfacing: Homogeneous solid sheet of filled plastic resin complying with material and performance requirements of ANSI Z124.3, without pre-coated finish.
- E. Solid Wood Edges and Trim: Clear hardwood lumber of species indicated, free of defects, selected for compatible grain and color, kiln dried to 7 percent moisture content.
 - 1. Wood Species: Oak

2.5 CASEWORK HARDWARE

- A. General: Manufacturer's standard units complying with BHMA A156.9, type, material, size, and finish as selected from manufacturer's standard choices.
- B. Hinges: All doors have 2-way European style, fully concealed, self-closing hinges with a 105° opening. NOTE: All butt door cabinets have hinges with 6-way adjustment capability.
- C. Drawer Guides: 75 pound rated drawer guide system, side mounted, 3/4 extension with self-adjusting mounting brackets at rear. Drawer slides are fastened to the drawer box with screws.

2.6 CABINET CONSTRUCTION

- A. Face Style: Reveal overlay: door and drawer faces partially cover body or face frame.
- B. Face Frames: 3/4-inch by 1 1/2-inch (19-by-38mm) solid wood.
- C. Door and Drawer Fronts:
 - 1. Solid wood stiles and rails, 3/4-inch (19mm), with 1/2-inch (12.7mm) thick, veneer-faced plywood center panels.
 - 2. Heritage doors are machined with reverse bevel to eliminate the need for hardware.
- D. Exposed Cabinet Ends:
 - 1. 3/8-inch (9.5mm) thick, moisture- and stain-resistant, easy clean laminate faced particleboard.
- E. Cabinet Tops and Bottoms: 1/2" thick-48 lb. density engineered wood. Reinforced with 1/2" thick engineered wood corner gussets in all four top corners with adhesive.
- F. Base Unit Top Rails: 1 1/16" x 2 1/4" solid pine or Douglas fir. .
- G. Wall-Hung Unit Top and Bottom Rails: 2 3/4" wide x 3/8" thick-48 lb. density engineered wood full-length hang rail across the top and bottom held in place with staples
- H. Base Unit Back Panels: 1/4"-thick 50 lb. density engineered wood interior covered with M-Guard™, with printed wood grain.
- I. Wall-Hung Unit Backs: 3/8" thick-48 lb. density engineered wood interior covered with M-Guard™, with printed wood grain.
- J. Front Face Frame Drawer Rails: 3/4" thick x 1 1/2" wide solid hardwood rail and stile members.
- K. Drawers: 1/2-inch sides, fronts & backs, engineered wood or equivalent; top edges and 2 surfaces finished with simulated wood grain finish to match cabinet interior. Drawer sides are rabbeted to join the drawer fronts and backs and secured with adhesive and staples.
- L. Shelves: 3/4" thick-48 lb. density engineered wood. Half-depth shelves are laminated on the top surface only and not on the underside. Adjustable shelves are supported by adjustable shelf clips.
- M. Joinery:
 - 1. Wall cabinet back panels shall be retained by a dado in the end panels and secured with adhesive. For extra strength, full-length dados shall be machined in the back panel near the top and bottom edges like the dados in the end panels to accept the top panels and secured with adhesive and staples.
 - 2. Base cabinets: A dado joint and adhesive shall be used to join the bottom to end panels. The upper portion of base cabinets shall be reinforced with 1/2" thick engineered wood corner gussets.
 - 3. The back panel shall be retained by a dado in the end panels secured with adhesive. The top of base and bath cabinets shall have an 1 1/16" x 2 1/4" solid wood screw rail retained by the same groove as the back panel in the end panels and secured with adhesive. The screw rail shall be grooved full length on the underside to accept the top edge of the back panel.
- N. Factory Finishing: To the greatest extent possible, finish casework at the factory. Defer only final touch up until after installation.

3.1 INSTALLATION

- A. Install casework with no variations in flushness of adjoining surfaces; use concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match casework face.
- B. Install casework without distortion so doors and drawers fit openings and are aligned. Complete installation of hardware and accessories as indicated.
- C. Install casework and countertop level and plumb to a tolerance of 1/8-inch in 8 feet (3mm in 2.4m).
- D. Fasten cabinets to adjacent units and to backing.
 - 1. Fasten wall cabinets through back, near top and bottom, at ends and not less than 24 inches o. c.
- E. Protect finished surfaces from damage or staining resulting from subsequent work until Date of Substantial Completion. Repair or replace damaged cabinet work, including warped or loose members.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

06 44 43
POLYESTER-RESIN-STONE-COMPOSITE COLUMNS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Columns shall be Composite Fiberglass Units. Erection per drawings, manufacturers' instructions and in compliance with local codes.

1.2 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are located in Division 1 of the Specifications.

1.3 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.
- C. Submit shop drawings for approval showing plans, sections and details, and installation instructions covering erection, and installation hardware.

1.4 WARRANTY

- A. At project closeout, provide to Owner or Owners Representative a copy of the manufacturer's limited warranty outlining its terms and conditions.
- B. The columns shall be guaranteed by the manufacturer against defects in materials or workmanship for "Lifetime of Original Ownership" when installed and maintained according to the manufacturer's installation and maintenance instructions. "Lifetime" is as long as the original owner owns the structure to which the columns are attached.

1.5 VERIFICATION OF DESIGN

- A. The components indicated on the drawings show dimensions established to accomplish the Architect's intended visual result and to conform to the building's configuration. The contractor shall verify that all components that will actually be provided for the work of this section will fit the building's structural elements and conform to the visual design criteria indicated on the drawings without materially altering profiles and alignments.
- B. Any installation hardware and additional support or backing components shall be provided by the installing contractor as part of the work of this section.

PART 2 - PRODUCTS**2.1 MANUFACTURER**

- A. Melton Classics, Inc., PO Box 465020, Lawrenceville, GA 30042, 800-963-3060
www.MeltonClassics.com .
- B. It is required that other manufacturers wishing to submit their products shall submit and a 3 part CSI specification and samples of each type of column, capital, and base at least fourteen (14) days prior to bid date. These products must be certified in writing by the manufacturer to meet or exceed all, materials, technical performance tests and warranty listed on the architectural specifications for those products. The design and aesthetic appearance of the column, capital, and base are of equal importance in determining if the column shaft, capital, and base are "equal". Manufacturers and products meeting these requirements will receive a letter of approval prior to bid date of this project. Manufacturers not receiving said letter will not be considered for this product.

2.2 DESCRIPTION

- A. Columns shall be Melton Classics DuraClassic™ Composite Fiberglass Columns according to following designation:
- B. (Design numbers ending in "0" are plain shaft. Replace the last digit with a "5" to indicate fluted shaft ex. 205DC.) (Add "S" after DC in the design number to indicate square shaft design ex. 200DCS = Tuscan Design Plain Shaft Square).
1. Tuscan - 200DC
 2. Roman Doric - 210DC
 3. Roman Doric Attic – 220DC
 4. Roman Ionic – 230DC
 5. Scamozzi – 240DC
 6. Roman Corinthian - 250DC
 7. Empire – 260DC
 8. Greek Angular Ionic – 270DC
 9. Empire with Necking – 280DC
 10. Greek Erectheum Ionic with Necking – 290DC
 11. Greek Erectheum Ionic – 300DC
 12. Modern Composite – 310DC
 13. Roman Doric Ornamental – 320DC
 14. Temple of Winds – 330DC
- C. Columns shafts, capitals and bases shall be manufactured from fiberglass reinforced polyester resin marble composite. No polyurethane capitals or bases will be allowed.
- D. Capitals and base/plinths shall be the manufacturers standard for the size and design indicated.

2.3 MATERIAL

- A. Column shaft, capital and base shall be cast fiberglass reinforced polyester resin and stone composite.
- B. Columns are cast using GP polyester resins, fiberglass, and crushed stone. Columns are available to meet ASTM E 84-01

Class 1 test specifications for Flame Spread and Smoke Development.

1. Flame Spread Index (FSI) < 25
 2. Smoke Developed Index (SDI) < 450
- C. Shaft thickness shall be approximately 3/8" to 5/8" depending on diameter.

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

- A. Transport and handle units in a manner that avoids excessive stresses or damage, and store on a level and clean surface.

3.2 PREPARATION

- A. Prior to manufacturing, dimensions and conditions not shown on the drawings will be checked by the erector for inclusion by the manufacturer.
- B. Prior to installation, the erector shall check job site dimensions. Any discrepancies between design and field dimensions shall be brought to the attention of the General Contractor. Work shall not proceed until these discrepancies are corrected.
- C. Lightly sand and thoroughly clean surfaces prior to installation to remove dirt and mold release prior to painting.
- D. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's detailed installation instructions
- B. Surface Preparation: Lightly sand all surfaces with 100 grit sandpaper and clean thoroughly to remove dust.
- C. Primer: Acrylic based General Purpose Primer by Sherwin Williams.
- D. Finish Coat: Acrylic based Duration by Sherwin Williams or approved equal.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

06 48 16**INTERIOR WOOD DOOR FRAMES****PART 1 GENERAL****1.1 SUBMITTALS**

- A. See Section 01 33 23 Submittal Procedures for requirements.
- B. Shop drawings:
 - 1. Indicate plans and elevations, materials, surface grain directions, profiles, assembly methods, joint details, fastening methods, accessories, hardware, compliance with specified fire-retardant treatments, and schedule of finishes

1.2 QUALITY ASSURANCE

- A. Pre-installation Meeting
 - 1. See Section 01 33 23 Submittal Procedures
 - 2. Agenda
- B. Quality Assurance/Control submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports and other documentary data affirming quality of products and installations.
 - 1. Submit 2 copies to Architect immediately upon receipt.
- C. Perform work in accordance with AWI Economy Grade quality
- D. Work in this Section shall comply with the specified Grade or Work and Section of the Current edition of the Architectural Woodwork Institute Quality Standards
- E. Woodwork manufacturers shall be certified by the AWI Quality Certification Program as competent to perform the work specified
- F. Certification shall be evidenced through the application of AWI Quality Certification labels and/or the issuance of an AWI letter of certification for the project

PART 2 PRODUCTS**2.1 MATERIALS**

- A. Acceptable Manufacturer:
 - 1. Any manufacturer which is a member in good standing of the Architectural Woodwork Institute
 - 2. Manufacturer shall be certified by the AWI Quality Certification Program to perform work in this Section of the AWI Grade of Work specified
- B. Softwood Lumber:
 - 1. Graded in accordance with AWI for Grade of Work specified mill option species, plain sawn, moisture content of 6-8 percent; with mixed grain, of quality suitable for paint finish.
 - a. Solid pink of required dimensions
 - b. No finger joints permitted.

2.2 FABRICATION

- A. Fabricate to AWI Economy Quality Standards
- B. Shop prepare and identify components for grain matching during site erection.
- C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting

2.3 FINISHING

- A. Sand work smooth and set exposed nails and screws
- B. Apply wood filler in exposed nail and screw indentations
- C. Finish work in the factory in accordance with AWI Quality Standards

- D. Finish work with opaque finish systems as listed for each item:
 - 1. Finish work to meet AWI Economy Quality Standards
 - a. Prime paint surfaces in contact with cementitious materials

PART 3 EXECUTION

3.1. 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

3.2. INSTALLATION

- A. Install work in accordance with AWI Economy Quality Standards
- B. Set and secure materials and components in place, plumb and level
- C. Scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps
- D. Install hardware in accordance with manufacturer's instructions.

3.3. ADJUSTING

- A. Adjust moving or operating parts to function smoothly and correctly

END OF SECTION

SECTION 06 61 16**SOLID SURFACING FABRICATIONS**

PART ONE - GENERAL

1.1 DESCRIPTION:

- A. Includes But Not Limited To -
 - 1. Moulded countertops in warming kitchen of Club House.
- B. Related Documents -
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 01, General Requirements, of these Specifications.

1.2 QUALITY ASSURANCE:

- A. Design Criteria -
 - 1. Specified Products shall be homogeneous and not laminated, coated, nor of composite construction.

1.3 SUBMITTALS:

- A. See Section 01 300
- B. Submit -
 - 1. Shop Drawings
 - 2. Color & Pattern Selection Data

PART TWO - PRODUCTS

2.1 MATERIALS:

- A. Approved Product -
 - 1. "Corian" by E. I. DuPont De Nemours & Co. Wilmington DE
 - 2. "Solid Surface" by Wilson Art International, 2400 Wilson Place, P.O.Box 6110, Temple, TX 76503
- B. Colors & Patterns -
 - 1. Selected by Architect from manufacturer's full range of available colors and patterns.

2.2 FABRICATION:

- A. Fabricate to dimensions and configurations indicated.
- B. Fabricate vanity tops and bowls into one-piece monolithic construction in as much as practical.

PART THREE - EXECUTION

3.1 INSTALLATION:

- A. Install according to manufacturer's instructions.
- B. Seal to adjacent surfaces with silicone sealant conforming to requirements of Section 07 920.

END OF SECTION

DIVISION 07 - THERMAL & MOISTURE PROTECTION**07 11 00 DAMP-PROOFING**

07 11 13 Asphalt Saturated Building Paper

07 21 00 THERMAL INSULATION

07 21 13 Board Insulation

07 21 16 Blanket Insulation

07 21 26 Loose Fill Blown Insulation

07 26 00 VAPOR RETARDERS

07 26 16 Below-Grade Vapor Retarder

07 27 00 AIR BARRIERS

07 27 19 Air Infiltration Barrier

07 31 00 SHINGLES AND SHAKES

07 31 13 Architectural Fiberglass Reinforced Shingles

07 46 00 SIDING

07 46 16 Manufactured Aluminum Fascia

07 46 33 Vinyl Siding & Soffits

07 60 00 FLASHING AND SHEET METAL

07 60 10 Sheet Metal Flashing & Trim

07 65 00 FLEXIBLE FLASHING

07 65 26 Self Adhering Flexible Sheet Flashing

07 71 00 ROOF SPECIALTIES

07 71 23 Gutters & Downspouts

07 72 00 ROOF ACCESSORIES

07 72 10 Roof Accessories

07 72 23 Gravity Ventilators

07 84 00 FIRESTOPPING

07 84 13 Penetration Fire Stopping

07 92 00 JOINT SEALANTS

07 92 13 Elastomeric Joint Sealants

THIS PAGE IS INTENTIONALLY BLANK

07 11 13**ASPHALT SATURATED BUILDING PAPER****PART 1 PRODUCTS****2.1 MATERIALS**

- A. Asphalt Saturated Felt
 - 1. ASTM D 226, Asphalt Saturated, Type II, 15 pound;
- B. Fasteners
 - 1. Corrosion resistant roofing nails with one inch diameter head and 3/4 inch long shank minimum.
 - a. If shingles are applied as underlayment is laid, use metal or plastic head Simplex nails or one inch long shingle roofing nails.
 - b. If shingles are not applied as underlayment is laid, use plastic head only.

PART 2 EXECUTION**2.1 EXAMINATION:**

- A. Examine deck to determine if it is satisfactory for installation of roofing system. Conditions include, but are not limited to, moisture on deck, protruding deck fasteners, specified gaps between sheathing, and other items affecting issuance of roofing warranty. Report all unsatisfactory conditions in writing to the Architect.

2.2 PREPARATION:

- A. Clean roof sheathing, including removal of dirt and debris, before installation of underlayment.

2.3 INSTALLATION

- A. General:
 - a. Do not use permanent underlayment installation as temporary roof. If temporary roof is used, remove completely before installation of permanent underlayment.
 - b. Follow Roofing Manufacturers recommendations for installation of primary underlayment, particularly at eaves, rakes, and penetrations, unless specified installation procedures and Drawing details are more stringent.
 - c. Apply shingle fashion lapped indicated in paragraph 3.3.B.1 at horizontal and vertical joints.
 - d. Cover all sheathings exposed to weather until final "finish" materials are applied.
- B. Underlayment
 - a. Apply 36 inch wide courses over complete deck, including areas covered with secondary underlayment unless specified otherwise. Maintain end laps of 8 inches and side laps of 19 inches. Stop primary underlayment between 3 and 6 inches of inside edge of strip of secondary underlayment installed over edge of formed valley metal.
 - b. Nailing;
 - 1) Secure primary underlayment to deck with roofing nails one inch in from edge and 18 inches on center.
 - 2) Do not nail through metal flashing, except drip edge, when installing primary underlayment.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

07 21 13**BOARD INSULATION****PART 1 PRODUCTS**

1.1 MATERIALS

- A. Extruded Polystyrene Insulation:
 - 1. Insulation Board underslab and on Basement Walls
 - a. Meet requirements of ASTM C578, Type IV
 - b. Meets R-Value: 10
 - c. Approved Products
 - 1) Styrofoam SM, Dow Chemical Co., Midland MI
 - 2) Foamular, UC Industries, Chicago, IL
 - 3) Amofoam CM, Amoco Foam Products Co, Atlanta GA
 - 2. Approved Adhesive
 - 1. Pro-Series PR-225 by Ohio Sealants
 - 2. Foam Board Adhesive by Franklin International
 - 3. Maxbond by H.B. Fuller Tech
 - 4. Contech PL300 by Rexnord Chemical Products
 - 3. Fasteners & Anchors
 - 1. All fasteners, anchors, clips, and the like shall be compatible with the insulation and conform to insulation manufacturer's requirements.
- B. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

PART 2 EXECUTION

.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

.2 INSTALLATION

- A. Remove ties and concrete protrusions that would keep insulation from fully contacting face of wall.
- B. Perimeter Insulation
 - 1. Install vertically using 3/8 inch beads of specified adhesive at 12 inches on center vertically and at each vertical and horizontal joint to completely seal insulation.
 - 2. Install horizontally for 24" under building slab continuously around building perimeter.
- C. Install extruded polystyrene insulation in basement furred concrete walls and as perimeter insulation.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

07 21 16**BLANKET INSULATION****PART 1 GENERAL****1.1 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery:
1. Deliver materials to site in original sealed wrapping bearing manufacturer's name and brand designation, specification number, type, grade, R-value, and class. Store and handle to protect from damage. Comply with manufacturer's recommendations for handling, storing, and protecting of materials before and during installation.
- B. Storage:
1. Inspect materials delivered to the site for damage;
 - a. Unload and store out of weather in manufacturer's original packaging.
 - b. Store only in dry locations, not subject to open flames or sparks, and easily accessible for inspection and handling.
 2. Do not allow insulation materials to become wet, soiled, crushed, or covered with ice or snow.

1.2 SAFETY PRECAUTIONS

- A. Respirators
1. Provide installers with dust/mist respirators, training in their use, and protective clothing, all approved by National Institute for Occupational Safety and Health (NIOSH)/Mine Safety and Health Administration (MSHA) in accordance with 29 CFR 1910.134.
- B. Smoking
1. Do not smoke during installation of blanket thermal insulation.
- C. Other Safety Concerns
1. Consider other safety concerns and measures as outlined in ASTM C 930.

PART 2 PRODUCTS**2.1 MATERIALS**

- A. Acceptable Manufacturer:
1. Certainteed Corp, Valley Forge PA
 2. Knauf Fiber Glass, Shelbyville IN
 3. Manville Corp, Denver CO
 4. Owens-Corning Fiberglass Corporation, Toledo OH
 5. U. S. Gypsum "Thermafiber", Chicago IL
- B. Fasteners & Anchors
1. All fasteners, anchors and clips shall be compatible with the insulation and conform to insulation manufacturers requirements.
- C. Insulation
1. Kraft faced meeting requirements of ASTM C 665, Type II, Class C.
 2. Foil faced meeting requirements of ASTM C-665, Type III, Class B.
 3. "R" Factor where thermal insulation required
 - a. 2x6 Framing - 21
 4. Sill Sealer Insulation
 - a. ASTM C 665, Type I.
 5. Where necessary to achieve designated "R" value or where more convenient due to framing conditions, use two layers of insulation.
- D. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

3.2 INSTALLATION

- A. Install according to manufacturers and/or responsible intitutes instructions.
- B. Completely enclose building with insulation envelope. Install insulation in such places as between jambs and framing and behind plumbing and wiring. Fit ends of batts snug against top and bottom plates.
 - 1. Do not cover recessed light fixtures with insulation.
 - 2. Maintain at least 6 inches minimum clearance between insulation and recessed lighting fixtures.
- C. Do not install insulation in a manner that would sandwich electrical wiring between two layers of insulation.
- D. Installation of Sill Sealer
 - 1. Size sill sealer insulation and place insulation over top of masonry or concrete perimeter walls or concrete perimeter floor slab on grade. Fasten sill plate over insulation.
- E. Access Panels and Doors
 - 1. Affix blanket insulation to all access panels and doors greater than one square foot in insulated floors and ceilings. Use insulation with same R-Value as that for floor or ceiling.
- F. Blocking Around Heat Producing Devices
 - 1. Install non-combustible blocking around heat producing devices to provide the following clearances:
 - a. Recessed lighting fixtures, including wiring compartments, ballasts, and other heat producing devices, unless these are certified by the manufacturer for installation surrounded by insulation: 3 inches from outside face of fixtures and devices or as required by NFPA 70 and, if insulation is to be placed above fixture or device, 24 inches above fixture.

END OF SECTION

07 21 26LOOSE FILL BLOWN INSULATION**PART 1 GENERAL**

1.1 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Delivery
 - a. Deliver materials in manufacturer's original unopened containers with labels intact and legible.
 - b. Deliver materials in sufficient quantities to allow continuity of work.
- B. Storage:
 - 1. Store materials on clean, raised platforms or pallets with weather protective covering.
 - 2. Provide continuous protection of materials against wetting and moisture absorption.
- C. Handling:
 - 1. Select and operate material handling equipment so existing construction, work of other Sections, and applied roofing is not damaged.

1.2 SAFETY PRECAUTIONS

- A. Respirators
 - 1. Provide installers with dust/mist respirators, training in their use, and protective clothing, all approved by National Institute for Occupational Safety and Health (NIOSH)/Mine Safety and Health Administration (MSHA) in accordance with 29 CFR 1910.134.
- B. Smoking
 - 1. Do not smoke during installation of blanket thermal insulation.
- C. Other Safety Concerns
 - 1. Consider other safety concerns and measures as outlined in ASTM C 930.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Acceptable Manufacturer:
 - 1. Manville Corp., Denver, Co
 - 2. Owens-Corning Fiberglass Corp, Toledo, OH
 - 3. Certainteed Corp, Valley Forge, PN
 - 4. Rockwool Insulation Division, Denver, CO
 - 5. U.S. Gypsum "Thermafiber", Chicago, IL
 - 6. ADO Products, Rogers, MN
- B. Loose Fill Insulation:
 - 1. Mineral Fiber Loose Fill:
 - a. ASTM C 764, Type I, for pneumatic application, or II, for poured application, category 1.
 - b. R-Value Ceilings: 49 min.
- C. Blocking
 - 1. Wood, metal, unfaced mineral fiber blanket material in accordance with ASTM C 665, Type I, or other approved materials. Provide only non-combustible materials, based on determination by ASTM E 136, for blocking around chimneys and heat producing devices.
- D. Baffles for Eave and Soffit Vents
 - 1. Baffle soffit and eave vents to keep wind from blowing loose-fill insulation from the eaves and preventing them from becoming clogged with insulation.
 - 2. Install baffles before placing insulation.
 - 3. Baffles shall maintain an opening equal to or greater than the size of the vent.
- E. Requests for substitutions will be considered in accordance with provisions of

Section 00 43 25.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

3.2 INSTALLATION

- A. Install according to manufacturers and/or responsible intitutes instructions.
- B. Blocking at Attic Vents and Access Doors
 - 1. Prior to installation of insulation, install permanent blocking to prevent insulation from covering, clogging, or restricting air flow through soffit vents at eaves.
 - a. Fasten baffles to roof rafters with at least 9/16-inch staples or roofing nails. Space anchor points no more than 4 inches apart down each side, in the upper one-half portion of the baffles.
 - b. All baffles to extend 4 inches above the final level of insulation.
 - c. Install a continuous dam along continuous soffit or eave vents.
 - 2. Install permanent blocking around attic trap doors.
- B. Attics
 - 1. Fill space between and above bottom truss chords to provide the specified R-Value. Place pneumatic installations, with the lowest air pressure allowed by manufacturer's instructions. Do not blow insulation into electrical devices, soffit vents, and mechanical vents which open into attic or other spaces to receive insulation.

END OF SECTION

07 26 16

BELOW-GRADE VAPOR RETARDER**PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
1. Vapor retarder, seam tape, and penetration accessories for installation under interior slabs-on-grade.
- B. Related Requirements:
1. Section 31 1123: 'Aggregate Base' for installation of vapor retarder over aggregate base under concrete slab.

1.2 REFERENCE

- A. Association Publications:
1. American Concrete Institute:
 - a. ACI 302.1R-04, 'Guide for Concrete Floor and Slab Construction'.
 - 1) Section 3.2.3, 'Vapor Retarder'.
 - b. ACI 302.2R-06, 'Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials'.
- B. Definitions:
1. Vapor Barrier: Material that has permeance of 0.1 perm or less. Vapor barrier is a material that is essentially vapor impermeable. Vapor barrier is a Class I vapor control layer. Test procedure for classifying vapor retarders is ASTM E-96 Test Method A—the desiccant or dry cup method.
 2. Vapor Retarder: Vapor retarder is a material that has permeance of 1.0 perm or less and greater than 0.1 perm. Vapor retarder is a material that is vapor semi-impermeable. Vapor retarder is a Class II vapor control layer. The test procedure for classifying vapor retarders is ASTM E-96 Test Method A—the desiccant or dry cup method.
 3. Vapor Retarder Classes and Permeance Descriptions:
 - a. Classes of Vapor Retarders:
 - 1) Class I Vapor Retarder: 0.1 perm or less.
 - 2) Class II Vapor Retarder: 1.0 perm or less and greater than 0.1 perm.
 - 3) Class III Vapor Retarder: 10 perm or less and greater than 1.0 perm.
 - b. Four general classes based on permeance):
 - 1) Vapor Impermeable: 0.1 perm or less.
 - 2) Vapor semi-impermeable: 1.0 perm or less and greater than 0.1 perm.
 - 3) Vapor semi-permeable: 10 perm or less and greater than 1.0 perm.
 - 4) Vapor permeable: greater than 10 perms.
- C. Reference Standards:
1. ASTM International:
 - a. ASTM D1709-16a, 'Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method'.
 - b. ASTM E96/E96M-16, 'Standard Test Methods for Water Vapor Transmission of Materials'.
 - c. ASTM E1745-11, 'Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs'.

1.3 SUBMITTALS

- A. Action Submittals:

1. Product Data:
 - a. Manufacturer's literature or cut-sheets.
 2. Samples:
 - a. Vapor Retarder:
 - 1) Submit sample of specified vapor retarder.
- B. Informational Submittals:
1. Test And Evaluation Reports:
 - a. Independent laboratory test results showing compliance with ASTM C1745 Standard.
 2. Source Quality Control Submittals:
 - a. Vapor Retarder:
 - 1) Installation, seaming, and penetration boot instructions.
- C. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Warranty Documentation:
 - 1) Final, executed copy of Warranty:
 - b. Record Documentation:
 - 1) Manufacturers documentation:
 - a) Manufacturer's documentation showing compliance to Contract Documents.

1.4 WARRANTY

- A. Manufacturer Warranty:
1. Manufacturer standard warranty to be free of defects and installed without damage.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

- A. Manufacturers:
1. Manufacturer Contact List:
 - a. Fortifiber, Reno, NV www.fortifiber.com.
 - b. Insulation Solutions, East Peoria, IL www.insulationsolutions.com.
 - c. Inteplast Group, Livingston NJ www.BarrierBac.com.
 - d. Raven Industries, Sioux Falls, SD www.ravenind.com.
 - e. Reef Industries, Houston, TX www.reefindustries.com.
 - f. Stego Industries, San Juan Capistrano, CA www.stegoindustries.com.
 - g. W R Meadows, Hampshire, IL www.wrmeadows.com.
- B. Materials:
1. Vapor Retarder:
 - a. Design Criteria:
 - 1) Meet requirements of ASTM E1745, Class A rating.
 - 2) Thickness: **6 mil** minimum.
 - 3) Physical Properties:
 - a) Water Vapor Pemeance ASTM E96, Method A Perm 0.01
 - b) Puncture Resistance ASTM D1709.
 - b. Approved Products. See Section 01 6200 for definition of Categories.
 - 1) Barrier-Bac VB-350 (16 mil) by Inteplast Group.
 - 2) Griffolyn15 by Reef Industries.
 - 3) Moistop Ultra 15Underslab Vapor Retarder by Fortifiber.
 - 4) Perminator(15 mil) by W R Meadows.
 - 5) Stego Wrap by Stego.
 - 6) VaporBlock 15 by Raven Industries.
 - 7) ViperVaporcheck II (**15 mil**) by Insulation Solutions.

2.2 ACCESSORIES

- A. Vapor Barrier:
 - 1. Seam Tape: As recommended by Membrane Manufacturer for continuous taping of seams and sealing of penetration boots.
 - 2. Penetration Boots at Utility Penetrations:
 - a. Quality Standard: Factory fabricated pipeboots:
 - 1) Moistop: The Boot.
 - 2) Raven: VaporBoot.
 - 3) Reef Industries: VaporBoot.
 - 4) All Others:
 - a) Other Manufacturer's boot system.
 - b) or
 - c) Field fabricated from same material as vapor retarder membrane.

PART 3 - EXECUTION Not Used

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

07 27 19AIR INFILTRATION BARRIER**PART 1 PRODUCTS**

1.1 MATERIALS

- A. Acceptable Manufacturer:
 1. Tyvek® CommercialWrap® by Dupont Company, Wilmington DE
 2. Substitutions: Performance information listed is proprietary to DuPont™ Tyvek® CommercialWrap®. The Contractor shall verify listed descriptive and performance criteria are obtainable by other products.
- B. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

1.2 WEATHER BARRIER

- A. A non-perforated, nonwoven, non-absorbing, breathable membrane that resists air flow, bulk water and wind driven rain and channels water and moisture to the outside of the building envelope. It has microscopic pores that allow moisture vapor to escape from inside walls.
- B. Physical Properties
 1. Spunbonded polyolefin membrane.
- C. Performance Characteristics:
 1. Air Penetration: 0.001 cfm/ft² at 75 Pa, when tested in accordance with ASTM E2178. Type I per ASTM E1677.
 2. Water Vapor Transmission: 28 perms, when tested in accordance with ASTM E96, Method B.
 3. Water Penetration Resistance: Minimum 280 cm when tested in accordance with AATCC Test Method 127.
 4. Basis Weight: Minimum 2.7 oz/yd², when tested in accordance with TAPPI Test Method T-410.
 5. Air Resistance: Air infiltration at >1500 seconds, when tested in accordance with TAPPI Test Method T-460.
 6. Tensile Strength: Minimum 38/35 lbs/in., when tested in accordance with ASTM D882, Method A.
 7. Tear Resistance: 12/10 lbs., when tested in accordance with ASTM D1117.
 8. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84. Flame Spread: 10, Smoke Developed: 10.

1.3 ACCESSORIES

- A. Seam Tape: As recommended by the weather barrier manufacturer.
- B. Fasteners:
 1. Wood Frame Construction
 - a. Nail Caps: #4 nails with large 1-inch plastic cap fasteners.
- C. Sealants:
 1. 07 92 13 Elastomeric Joint Sealants
- D. Adhesives:
 1. Provide adhesive recommended by weather barrier manufacturer.

Primers:

 1. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.
 2. Products: Primers recommended by the flashing manufacturer.
- F. Flashing:
 1. Flexible membrane flashing materials for window openings and penetrations

- recommended by manufacturer.
- 2. Straight flashing membrane materials for flashing windows and doors and sealing penetrations such as masonry ties, etc. recommended by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

3.2 INSTALLATION – WEATHER BARRIER

- A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations.
- B. Install weather barrier prior to installation of windows and doors.
- C. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.
- D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level.
- E. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.
- F. Window and Door Openings: Extend weather barrier completely over openings.
- G. Overlap weather barrier
 - 1. Exterior corners: minimum 12 inches.
 - 2. Seams: minimum 6 inches.
- H. Weather Barrier Attachment:
 - 1. Steel or Wood Frame Construction
 - a. Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 12-18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.
 - 2. Apply flashing to weather barrier membrane prior to installing cladding anchors.

3.3 SEAMING

- A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.

3.4 OPENING PREPARATION

- A. Cut weather barrier in a modified “I-cut” pattern.
 - 1. Cut weather barrier horizontally along the bottom of the header.
 - 2. Cut weather barrier vertically 2/3 of the way down from top center of window opening.
 - 3. Cut weather barrier diagonally from bottom of center vertical cut to the left and right corners of the opening.
 - 4. Fold side and bottom weather barrier flaps into window opening and fasten.
- B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.5 FLASHING

- A. Cut flexible flashing a minimum of 12 inches longer than width of sill rough opening.
- B. Cover horizontal sill by aligning flexible flashing edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
- C. Fan flexible flashing at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.
- D. On exterior, apply continuous bead of sealant to wall or backside of window

- mounting flange across jambs and head. Do not apply sealant across sill.
- E. Install window according to manufacturer's instructions.
 - F. Apply strips of flashing at jambs overlapping entire mounting flange. Extend jamb flashing 1-inch above top of rough opening and below bottom edge of sill flashing.
 - G. Apply strip of flashing as head flashing overlapping the mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.
 - H. Position weather barrier head flap across head flashing. Adhere flashing over the 45-degree seams.
 - I. Tape head flap in accordance with manufacturer recommendations.
 - J. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.
- 3.6 FIELD QUALITY CONTROL
- A. Notify manufacturer's designated representative to obtain [required] periodic observations of weather barrier assembly installation.
- 3.7 PROTECTION
- A. Protect installed weather barrier from damage.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

07 31 13ARCHITECTURAL FIBERGLASS REINFORCED SHINGLES**PART 1 - GENERAL**

1.1 DESCRIPTION

- A. Includes But Not Limited To -
 1. Shingle roofing system required by Contract Documents.
 2. Drip Edge
- B. Related Documents -
 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 01, General Requirements, of these Specifications.
 2. Section 07 60 10 Sheet Metal Flashing & Trim

1.2 REFERENCES

- A. American Society For Testing And Materials
 1. ASTM D 226, 'Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing'
 2. ASTM D 3018, 'Standard Specification for Class 'A' Asphalt Shingles Surfaced with Mineral Granules'
 3. ASTM D 3462, 'Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules'
 4. ASTM D 4586, 'Standard Specification for Asphalt Roof Cement, Asbestos-Free'

1.3 SYSTEM DESCRIPTION

- A. Design Requirements -
 1. This specification sets minimum standards for materials and workmanship.
 2. Manufacturer's bonding requirements or governing building codes shall apply where they impose higher standards.

1.4 SUBMITTALS

- A. See Section 01 33 23.
- B. Submit -
 1. Full size sample of shingle.
 2. Color selection data.
 3. Copy of specified warranties
 4. Manufacturer's literature or cut sheet for each component of system

1.5 QUALITY ASSURANCE

- A. Field Sample
 1. Before application of complete roofing system, install portions of single valley sufficient to show proper installation and material for following elements -
 - a. Valley flashing
 - b. Valley metal and clips
 - c. Primary underlayment, fasteners, and laps
 - d. Secondary underlayment and laps
 - e. Shingles and fasteners

1.6 PROJECT/SITE CONDITIONS

- A. Environmental Requirements
 1. When temperature at installation will be 45 deg F or less, store shingles at 70 deg F minimum for 72 hours minimum. Do not take more shingles to site than can be installed during same working day unless provisions to maintain 60 deg F minimum storage

- temperature are provided.
2. In addition to above requirements, do not install shingles at lower temperatures than allowed by Manufacturer for application.

1.7 SEQUENCING

- A. Install roofing system only after installation of metal fascia. Install underlayment and formed valley metal in valleys after installation of general secondary underlayment, but before installation of general primary underlayment.

1.8 WARRANTY

- A. Special Warranty
 1. Shingle Manufacturer's special 30 year minimum labor and material warranty including but not limited to -
 - a. First 5 years minimum of warranty will provide for full replacement cost, including tear-off and disposal, for any failure, including material defects and workmanship. Remaining 25 years of warranty will provide for pro-rated replacement cost.
 - b. Roofing system will resist blow-offs in winds up to 80 mph for 5 years when installed as specified below.
 - c. Algae resistance for 10 years.

1.9 MAINTENANCE

- A. Extra Materials -
 1. Provide 3 bundles of shingles for Owner's future use.

PART 2 – PRODUCTS

2.1 COMPONENTS:

- A. Shingles
 1. Fiberglass mat shingles meeting or exceeding requirements of ASTM D 3018, Type I and UL Class A. Meet requirements of ASTM D 3462, and following requirements -
 - a. Integral algae resistance.
 - b. Color as selected by Architect from Manufacturer's full color line.
 2. Approved Products -
 - a. Owens Corning
- B. Underlayment -
 1. Primary -
 1. 15 lb felt meeting requirements of ASTM 226, Type II
 2. Secondary -
 - a. Single layer of 36 mil rubberized asphalt on 4 mil polyethylene carrier sheet.
 - b. Approved Products -
 - 1) Ice & Water Shield by W. R. Grace, Cambridge, MA (800) 521-2737
 - 2) Mirandri WIP by Mirafi Inc, Charlotte, NC (800) 234-0484
 - 3) F-610 by NEI, Brentwood, NH (800) 998-4634
 - 4) Deck Guard by Polyguard Products Inc, Ennis, TX (214) 875-8421
 - 5) Rain Proof/Ice & Water Guard by Protecto Wrap Co, Denver, CO (800) 759-9727
 - 6) Moisture-Guard by Tamko, Joplin, MO (417) 624-6644
- C. Fasteners
 1. Primary Underlayment -
 - a. Corrosion resistant roofing nails with one inch diameter head and 3/4 inch long shank minimum.
 - 1) If shingles applied as underlayment is laid, use metal or plastic head Simplex nails or one inch long shingle roofing nails.
 - 2) If shingles not applied as underlayment is laid, use plastic head only.
 2. Shingles -
 - a. Eleven gauge hot-dipped galvanized roofing nails with 3/8 inch nominal diameter head and of sufficient length to penetrate through roof sheathing 1/4 inch.
 - b. Coil type non-corrosive gun-driven nails of same size as hand-driven nails are acceptable.

- c. Staples not permitted.
- D. Asphalt Roofing Cement - Any manufacturer's product meeting requirements of ASTM D 4586 and acceptable to Shingle Manufacturer.
- E. Drip Edge
 - 1. Aluminum
 - a. 0.024 inch thick minimum complete with accessories recommended by Manufacturer for proper installation.
 - b. Fastening Devices – One inch zinc or cadmium plated screws.
 - 2. Finishes –
 - a. Face coating polyvinylidene Fluoride (PVF₂) Resin-base finish (Kynar 500 or Hylar 5000) for coil coating components containing 70 percent minimum PVF₂ in resin portion formula. Thermo cured two coat system consisting of corrosion inhibiting epoxy or acrylic latex primer and top coat factory applied over properly pretreated metal.
 - b. Color as selected by Architect from Manufacturer's standard colors.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine deck to determine if it is satisfactory for installation of roofing system. Conditions include, but are not limited to, moisture on deck, protruding deck fasteners, specified gaps between sheathing, and other items affecting issuance of roofing warranty. Report unsatisfactory conditions in writing to Architect.

3.2 PREPARATION

- A. Clean roof sheathing, including removal of dirt and debris, before installation of underlayment.

3.4 INSTALLATION

A. Sheet Metal Flashing -

- 1. See Section 07 60 10 for installation requirements.

B. Underlayment

1. General -

- a. Do not use permanent underlayment installation as temporary roof. If temporary roof is used, remove completely before installation of permanent underlayment.
- b. Follow Roofing Manufacturer's recommendations for installation of primary and secondary underlayment, particularly at eaves, rakes, and penetrations, unless specified installation procedures and Drawing details are more stringent.
- c. Do not leave secondary underlayment exposed to weather more than 14 days after beginning of underlayment installation. If underlayment is exposed for more than 14 days after beginning of underlayment installation, treat as temporary roof under paragraph 3.4,A,1,a. If moisture is deposited on exposed underlayment, obtain written approval from Manufacturer's Representative before installing shingles.

2. Secondary -

- a. Lap end joints 6 inches and side joints 3 inches minimum.
- b. Apply continuous 12 inch wide strip at edge of eaves and rakes before installing drip edge.
- c. Apply two 36 inch wide courses along eaves and rakes as described in Contract Documents with first course overlapping drip edge and 12 inch wide previously applied strip.

3. Valleys -

- a. Apply three continuous 36 inch wide sheets of secondary underlayment in valley lapped so as to provide 8 foot 6 inch wide covered area centered over valley.
- b. Install one continuous 36 inch wide strip of primary underlayment atop secondary underlayment and centered over valley.
- c. Install formed valley metal over strip of primary underlayment. Nail top of each section and lap 8 inches in direction of flow. Seal laps with asphalt roofing cement. Secure edges of valley metal with fasteners spaced at 12 inches maximum on center and approximately 1/2 inch in from edge of metal.
- d. Install 12 inch wide strips of secondary underlayment lapping nailed edge of formed

- valley metal 3 inches.
4. Primary -
 - a. Apply 36 inch wide courses over complete deck, including areas covered with secondary underlayment unless specified otherwise. Maintain end laps of 8 inches and side laps of 19 inches. Stop primary underlayment between 3 and 6 inches of inside edge of strip of secondary underlayment installed over edge of formed valley metal.
 - b. Nailing -
 - 1) Secure primary underlayment to deck with roofing nails one inch in from edge and 18 inches on center.
 - 2) Do not nail through metal flashing, except drip edge, when installing primary underlayment.
- B. Shingles
1. Before installing shingles, inspect underlayment and metal installation with Architect and Owner. Correct improperly installed and damaged material before beginning shingle installation.
 2. Cut starter strip shingles on slotted end to 9 inch width. Nail to eave granule side up in continuous mastic bed with slot end down-slope and edge overhanging eave 3/8 inch so sealing tabs are at edge of eave. Install shingles with maximum exposure recommended by Manufacturer. Lay first course directly over starter strip with ends flush with starter strip at eaves and so joints in starter strip are offset 4 inches minimum from joints in first course.
 3. Insure alignment by snapping chalk line at least each fifth course to control horizontal alignment.
 4. Lay shingles so end joints are offset in accordance with Manufacturer's installation procedures.
 5. Except over formed valley metal, use 6 nails in each shingle placed as required by Shingle Manufacturer. Place nails one inch from each end of strip and remainder evenly spaced between. Should any nail fail to penetrate sheathing by 1/4 inch minimum, drive additional nail nearby. Adjust nail gun pressure for nailing flush and tight to deck without cutting shingle surface. Over valley metal, hand seal shingles. Do not drive nails through valley metal. Drive nails perpendicular to shingle surface so nail head is flat against shingle.
 6. Run chalk line so valley metal will be exposed 6 inches wide at top and diverge 3/32 inch per ft down to eaves. Neatly trim shingles to this line.
 7. Install specified hip and ridge shingles in accordance with Shingle Manufacturer's instructions. Run ridge shingles as directed by Architect.
 8. Vent pipe sleeve flange minimum width 6 inches. Fit shingles under lower edge and over sides and upper edge. Set vent pipe flange in asphalt roofing cement. Embed shingles in asphalt roofing cement where they overlap flange. Apply bead of asphalt roofing cement at junction of vent pipe and vent flashing.
 9. Run courses true to line with end joints properly placed. Leave shingles flat without wave and properly placed.
 10. Hand-Sealing -
 - a. Clip off and seal upper inside corner of each valley shingle to valley with asphalt roofing cement.
 - b. If ambient temperature or exposure to sun will not be sufficient to secure adhesive strip to under-lying shingle within one week, hand seal shingles with asphalt roofing cement.

3.5 CLEANING

- A. Clean shingles and building of soiling caused by this installation.
- B. Leave metals clean and free of defects, stains, and damaged finish. Replace fascia metal that is scratched through finish to base metal.

C. Remove debris resulting from work of this Section from roof and site.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

07 46 16**MANUFACTURED ALUMINUM FASCIA****PART 1 PRODUCTS**

1.1 MANUFACTURERS

- A. Acceptable Manufacturer:
1. Alcoa North America Rolled Products, Davenport, Iowa,
 2. AEP/Span, Dallas, TX or San Diego, CA
 3. Atas Aluminum Products, Allentown, PA
Copper Sales Inc, Minneapolis, MN
Engineered Components Inc, Stafford (Houston), TX
Alumax Building Specialties, Mesquite, TX
MM Systems Corp, Tucker, GA
Merchant & Evans Industries Inc, Burlington, NJ
Peterson Aluminum Corp, Elk Grove, IL
Vincent Metals, Minneapolis, MN
- B. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25 Substitution Request Form.

1.2 COMPONENTS

- A. Fascia & Drip Edge
1. Aluminum -
 - a. 0.019 inch thick minimum complete with accessories recommended by \ Manufacturer for proper installation.
 - b. Fastening Devices;
 - 1) One inch zinc or cadmium plated screws.
 2. Finishes;
 - a. Face coating polyvinylidene Fluoride (PVF₂) Resin-base finish (Kynar 500 or Hylar 5000) for coil coating components containing 70 percent minimum PVF₂ in resin portion of formula. Thermo cured two coat application consisting of corrosion inhibiting epoxy or acrylic latex primer and top coat factory applied over properly pretreated metal.
 - b. Color as selected by Architect from Manufacturer's standard colors.

1.3 FABRICATION

- A. Fascia may either be shop-fabricated using metal from a specified manufacturers, or a factory-fabricated standard system complying with the above requirements from a specified manufacturer.

PART 2 EXECUTION

2.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

2.2 INSTALLATION

- A. Install according to manufacturers and/or responsible institutes instructions.
- B. Conceal fasteners except where details might require a minimum number to be exposed. Paint heads of exposed fasteners to match background.
- C. Install with slip joints at each end. Screw to substrate through pre-drilled, over-size holes.
- D. Isolate from dissimilar metals not part of fascia system to prevent electrolytic action.
- E. Repair buckling or bowing due to improper installation at no cost to Owner.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

SECTION 07 46 33**VINYL SIDING & SOFFITS****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Work included in but not limited to this section.
 1. Vinyl siding & soffit required by Contract Documents.
 2. Associated vinyl trim required for a complete and proper installation.

1.2. RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.

1.3 REFERENCES

- A. American Society for Testing & Materials
 1. ASTM D 635, (2006) Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
 2. ASTM D 638, (2003) Standard Test Method for Tensile Properties of Plastics.
 3. ASTM D 696, (2003) Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between - 30 Degrees C and 30 Degrees C with a Vitreous Silica Dilatometer
 4. ASTM D 790, (2007) Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 5. ASTM D 1435, (2005) Standard Practice Method for Outdoor Weathering of Plastics.
 6. ASTM D 1929, (2001) Standard Test Method for Ignition Properties of Plastics.
 7. ASTM D 2843, (2004) Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics
 8. ASTM D 3679, (2006) Standard Specification for Rigid Polyvinyl Chloride (PVC) Siding
 9. ASTM D 4101, (2007) Standard Specification for Polypropylene Injection and Extrusion Materials.
 10. ASTM D 4216, (2006) Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Siding
 11. ASTM D 4226, (2005) Standard Test Methods for Impact Resistance of Rigid Poly(Vinyl Chloride) (PVC) Building Products
 12. ASTM D 4477, (2004) Standard Specification for Rigid (Unplasticized) Poly (Vinyl Chloride) (PVC) Soffit
 13. ASTM D 5206, (2006) Standard Test Method for Windload Resistance of Rigid Plastic Siding
 14. ASTM E 84, (2007) Standard Test Method for Surface Burning Characteristics of Building Materials
 15. ASTM E 119, (2007) Standard Test Methods for Fire Tests of Building Construction and Materials.

1.4 SUBMITTALS:

- A. See Section 01 33 23 Submittal Procedures.
- B. Manufacturer's data sheets on each product to be used, including:
 1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.
- C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- D. Verification Samples: For each finish product specified, two samples, minimum size 12" (300 mm) long, representing actual product, color and patterns.

1.5 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies
 - 1. Building Officials and Code Administrators International, Inc. (BOCA) Research Report No. 91-35.
 - 2. International Conference of Building Officials (ICBO) Report No. 3985
- B. Installer Qualification
 - 1. Installer with not less than three years of experience with products specified.
- C. Mock-Up: Provide a mock-up for evaluation of installation techniques and workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship and color is approved by Architect.
 - 3. Reinstall mock-up area as required to produce acceptable work.

1.6 PERFORMANCE REQUIREMENTS

- A. PVC Fire Resistance: Provide vinyl siding products that meet or exceed the following ratings:
 - 1. Flame spread index 20, fuel contribution 0, smoke development rating 360, per ASTM E 84.
 - 2. Self-ignition temperature: 824°F (440°C) per ASTM D 1929.
 - 3. Fire endurance classification of 1 hour, per ASTM E 119 as wall assembly.
- B. Cedar Impressions Perfection and Half-Round Siding: TPO Fire Resistance: Provide thermoplastic polyolefin siding products that meet or exceed the following ratings:
 - 1. Minimum self-ignition temperature of 650°F (343°C), per ASTM D 1929.
 - 2. Smoke density rating of 40, per ASTM D 2843.

1.7 DELIVERY STORAGE & HANDLING

- A. Deliver in manufacturers original packaging clearly marked with the manufacturer's name, the siding style, color and identifying lot number.
- B. Prior to application, store vinyl siding and accessories in an area that is clean, dry and out of direct sunlight.
- C. Handle material in a manner to prevent damage. Do not allow siding cartons to crease.

1.8 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.

1.9 WARRANTY

- A. Provide manufacturers 50-year transferable, non-prorated warranty including hail coverage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Approved Manufacturers
 - 1. Mastic Home Exteriors by PlyGem (888) 915-9436
 - 2. Alcoa Building Products, Sidney OH, (800) 962-6973
 - 3. Alside Inc., Akron OH (800) 922-6009
 - 4. CertainTeed Corporation, Valley Forge PA (800) 233-8990
 - 5. Crane/Royal Building Products, Woodbridge, ON. L4H1X9.
 - 6. Norandex, 1ABC Parkway, Beloit, WI, www.norandex.com.

2.2 MATERIAL

- A. Siding & Soffit
 - 1. Solid extruded polyvinyl chloride (PVC) compound as defined in ASTM D 3679 and ASTM D 4477.
 - 2. Fire-resistance ratings
 - a. ASTM E 84, Flame spread: less than 25, Fuel contribution: 0,

- Smoke density: 480
 - b. ASTM D 635, Avg. time of burning: less than 5 sec. , Avg. length of burning: 20mm
 - c. ASTM D 2843 , Smoke density: 48
- B. Fasteners -
1. Aluminum nails of 5056 or 6010 alloy and have a minimum tensile strength of 63,000 psi. Provide a minimum of 3/4" of penetration, excluding point, into stud or other solid nailing surface.

2.3 VINYL SIDING

A. Classic:

1. Design: Double 4" (102 mm) clapboard, select cedar finish with STUD finder Installation System.
2. Nail Hem: RigidForm 180 Technology Roll Over Nail Hem.
3. Lock: DuraLock post formed lock design.
4. Width: 8 inches \pm .062" .
5. Length: 12' 6" \pm .025").
6. Average Thickness: 0.042" min.
7. Panel Projection: 5/8" .
8. Exposure: 4" with single nailing hem.
9. Maximum Warp (per 2 panels): 0.250"
10. UV Protected.
11. Color: As selected by Architect from Manufacturer's standards.

2.4 VINYL CARPENTRY SOFFITS

A. Full Vented Lanced:

1. Design: 11.9 sq.in. vented.
2. Width: 5.87 sq. in.
3. Average Thickness: 0.036"
4. Exposure: 3-1/3" single nailing hem.
5. Maximum Warp (per 2 panels): 0.250" .
6. Color: As selected by Architect from Manufacturer's standards.

2.5 VINYL CARPENTRY ACCESSORIES

A. Standard Accessories:

1. Corner post: Standard width, 10' and 12' lengths.
2. J-Channel: Standard width, 12' 6" length.
3. Undersill trim.
4. Dual undersill trim: 12' 6" (3.81 m) length.
5. 2.5" inch Metal Starter Strip.

B. Optional Accessories:

1. 3.5" and 5" Window and Door Casing (Lineals).
2. 2.5" Vinyl Starter Strip.
3. 6" Traditional Corner (Super Corner)20' Lengths
4. 5.5" Crown Molding CAP

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify governing dimensions of building. Prior to installation, it is necessary to examine substrate and adjoining work for compliance with tolerances, anchorage, flashing and other requirements.

3.2 PREPARATION

- A. Repair any substrate flaws or defects before the vinyl siding is applied. Only apply siding to walls that are level, plumb, and true and free from obstructions.
1. Furr where necessary.

3.3. INSTALLATION

- A. Install in accordance with the latest edition of the ARigid Vinyl Siding Application Manual,@ published by the Vinyl Siding Institute of the Society of the Plastic Industry, Inc. Included in the application should be any special details from the drawings.
- B. Install siding and accessories with all joint members plumb and true and allowing for expansion and contraction
- C. Conceal fasteners where possible.

3.4. FIELD QUALITY CONTROL

- A. After installation of siding, check entire surface for obvious flaws or defects.
- B. Replace and repair any problem areas, paying close attention to the substrate for causes of the problem.

3.5 ADJUSTMENTS & CLEANING:

- A. After the vinyl siding has been applied, clean as necessary to remove all fingerprints and soiled areas.
- B. Upon completion of the siding application, the entire area is to be cleaned, removing all scrap, packaging and unused building materials.

END OF SECTION

07 60 10**SHEET METAL FLASHING & TRIM****PART 1 GENERAL**

1.1 PROJECT CONDITIONS

A. Environmental Requirements;

1. When temperature at installation will be 45°F or less, store materials at 70°F minimum for 72 hours minimum. Do not take more material to site than can be installed during same working day unless provisions to maintain 60°F minimum storage temperature are provided.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Use aluminum sheet metal listed by SMACNA Arch. Manual for a particular item, unless otherwise specified or indicated. Conform to the requirements specified and to the thicknesses and configurations established in SMACNA Arch. Manual for the Sheet Aluminum to be 3105-H25 alloy
 1. Flashing & Counter-flashing will be 0.024 inch thick minimum
 2. Hold-Down Clips to be 0.040 inch thick minimum
- B. Furnish sheet metal items in 8 to 10 foot lengths. Single pieces less than 8 feet long may be used to connect to any factory-fabricated inside and outside corners, and at ends of runs. Fabricate factory corner pieces with minimum 12 inch legs. Provide accessories and other items essential to complete the sheet metal installation.
 1. Provide accessories made of the same or compatible materials as the items to which they are applied. Fabricate sheet metal items of the materials specified above and to the gauge, thickness, or weight shown or indicated.
 2. Provide concealed sheet metal items with mill finish unless specified otherwise.
 3. Exposed Sheet Metal Items,
 - a. Must be of the same material. Consider the following as exposed sheet metal: gutters, including hangers; downspouts; gravel stops and fascias;
 - 1) Cap, valley, steeped, base, and eave flashings and related accessories.
 4. Finish;
 - a. Metal exposed to view shall have face coating of polyvinylidene Fluoride (PVF₂) esinbase finish (Kynar 500 or Hylar 5000) containing 70% minimum PVF₂ in resin portion of formula. Thermo cured two coat system consisting of corrosion inhibiting epoxy or acrylic latex primer and top coat factory applied over properly pretreated metal. Reverse side coating shall be thermo cured system consisting of corrosion inhibiting epoxy or acrylic latex primer applied over properly pretreated metal.
 5. Color as selected by Architect from Manufacturer's standard colors.
 6. Color for exposed valleys are to match shingle color.

2.2 FASTENERS:

A. Screws, Bolts, Nails, and Accessory Fasteners -

1. Of strength and type consistent with function.
2. Electrolytically compatible with sheet metal material.

2.3 FABRICATION:

A. Flashing & Trim;

1. Form accurately to details.
2. Make profiles, bends, and intersections even and true to line.

3. Fold exposed edges 1/2 inch to provide stiffness.
4. Leave metals clean and free of defects, stains, and damaged finish.

PART 3 EXECUTION

3.1 INSTALLATION:

A. General -

1. Provide small, watertight seams.
2. Slope to provide positive drainage.
3. Provide sufficient fasteners and hold down clips to insure true alignment, security against wind and expansion, contraction.
4. Provide four inches minimum overlap & bed in sealant.
5. Allow sufficient tolerance for expansion and contraction.
6. Form and lap step flashings to best practice.
7. Coat surfaces in contact with built-up roofing with asphaltum.
8. Isolate work to prevent electrolytic action.

B. Fastening;

1. Use fasteners appropriate for the type of work.
2. Use isolators between fasteners and sheet metal.
3. Provide a slotted hole for the installation of each fastener.

3.2 CLEANING & ADJUSTMENTS:

- A. Remove all excess materials, trash, debris, and the like at the completion of the work.
- B. Immediately neutralize excess soldering flux and rinse with clean water.

END OF SECTION

07 65 26**SELF-ADHERING FLEXIBLE SHEET FLASHING****PART 1 GENERAL**

1.1 PROJECT CONDITIONS

A. Environmental Requirements;

1. When temperature at installation will be 45°F or less, store materials at 70°F minimum for 72 hours minimum. Do not take more materials to site than can be installed during same working day unless provisions are provided to maintain 60°F minimum storage temperature.

PART 2 PRODUCTS

2.1 MATERIAL

A. Ice Dam Underlayment

1. Self-adhering leak barrier or ice dam underlayment shall be a single layer of 36 mil rubberized asphalt on 4 mil polyethylene carrier sheet, complying with ASTM D 1970 for seal-ability around nails.

B. Concealed flashing

1. Self-adhering, in-wall flashing membrane for use with concrete, masonry, gypsum or wood wall construction. Usage shall comply with typical wall flashing details.
 - a. Consists of 40 mil membrane, 32 mils of pliable and highly-adhesive rubberized asphalt compound bonded to an 8 mil, high density, cross laminated polyethylene film.
 - b. Supply material 18 inch rolls, interwound with silicone coated release paper. Length, manufacturers standard.

C. Door and Widow Flashing

1. Self-adhesive rubberized asphalt with protective sheet, compatible with air barrier and windows and doors specified, a 25 mil Butyl with cross-laminated HPDE and polyethylene film release liner.
 - a. Roll widths 9 inches x 75 feet.

2.2 MANUFACTURERS

A. Acceptable Manufacturer (s):

1. Approved Products; (Product listed first is underlayment, second is thru wall flashing, third is door and widow flashing).
 - a. Grace Ice & Water Shield by W. R. Grace, Cambridge, MA (800) 354-5414, extension 5363 David.M.Weaver@Grace.com
 - 1). Grace Vycor® V40 Self-Adhered Flashing
 - 2). GRACE VYCOR® BUTYL
 - b. CCW WIP 400 by Carlisle Coatings & Waterproofing Inc (800) 527-7092 <http://www.carlisle-ccw.com/PRODUCTS/>
 - 1). CCW-705-TWF Self-Adhering thru-Wall Flashing
 - 2). EZ FLASH 20-Mil Self-Adhering Flashing
 - c. Deck Guard by Polyguard Products Inc, Ennis, TX 800-541-4994, 214-515-5000 or 972-875-8421 polyguard@polyguardproducts.com
 - 1). POLYGUARD 400 Thru Wall Flashing
 - 2). JT-20 Membrane Construction Waterproofing Tape
 - e. Rain ProofIce & Water Guard by Protecto Wrap Co, Denver, CO (800) 759-9727 info@protectowrap.com
 - 1). P.W. 100/40 Air/Vapor Barrier – Thru Wall Flashing
 - f. Moisture Guard Plus® by Tamko, Joplin, MO (800) 641-4691
 - 1). TW-Thru-Wall Flashing Membrane

- B. Requests for substitutions will only be considered prior to Bidding, in accord with the provisions and use of Section 00 43 25 Substitution

Request Form.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Roof Underlayment
 1. Prior to installation, examine each piece to verify that all are proper in all respects.
 2. Examine deck to determine if it is satisfactory for installation of roofing system.
 - a. Conditions include, but are not limited to, moisture on deck, protruding deck fasteners, specified gaps between sheathing, and other items affecting issuance of roofing warranty.
 - b. Report all unsatisfactory conditions in writing to the Architect.
- B. Concealed flashing
 1. Surfaces to receive flashing must be clean and dry.

3.2 PREPARATION:

- A. Roof Underlayment
 1. Clean roof sheathing, including removal of dirt and debris, before installation of underlayment.
- B. Concealed flashing
 1. Concrete, masonry and some exterior gypsum substrates may require a preparation treatment (primer) or contact adhesive.

3.3 INSTALLATION

- A. Roof Underlayment
 1. Lap end joints 6 inches and side joints 3 inches minimum.
 2. Apply one 36 inch wide course along eaves and rakes.
 3. Apply as described in Contract Documents with course being under drip edge.
 4. Valleys
 - a. Apply three continuous 36 inch wide sheets of secondary underlayment in valley lapped so as to provide 8 foot 6 inch wide covered area centered over valley.
 - b. Install one continuous 36 inch wide strip of primary underlayment atop secondary underlayment and centered over valley.
- B. Concealed flashing
 1. Precut flashing to fit each location.
 2. Remove release liner and position flashing carefully before pressing in place. Press firmly in place with a steel hand roller, taking care to avoid air pockets and wrinkles.
 3. Overlap adjoining pieces 2 inches. Cut bottom edge back 1/2 inch from finished surface of building.
 - a. Terminations: Press terminating edges firmly in place with a hammer handle or similar tool. Apply mastic to all terminating edges, laps, cuts, and penetrations.
 - 1) The use of a surface mounted termination bar or placing the flashing membrane into a joint or reglet of the inner back up wall is recommended for vertical terminations. Horizontal terminations at end dams require a minimum 2 inch turn up of membrane to form a tray.
 - 2) Failure to use adequate pressure at terminating edges will result in a poor seal and potential leak. The use of mastic is not a substitute for a good seal.

- C. Door and Window
1. The sequence of installation is:
 - a. Window sill (prior to setting window).
 - b. Vertical pieces over window flanges.
 - c. Horizontal piece over top window flange.
 2. Make sure the surface is clean, dust free, smooth, and dry. (Note: do not apply over silicone caulk or other solvent based products).
 3. If surface is OSB board, prime with adhesive.
 4. Cut the length you want to use from the roll with utility knife or scissors.
 5. Remove 12" or more of the release film and center the tape over the area to be sealed.
 6. Firmly press or roll the tape to the area being sealed. As you go along, pull more of the release film from the tape, exposing the adhesive surface, pressing down the tape and keeping the tape smooth.
 7. When through with the strip, roll it into place.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

07 71 23**GUTTERS AND DOWNSPOUTS****PART 1 PRODUCTS**

1.1 COMPONENTS

- A. Seamless Aluminum Gutters;
 - 1. 6" OG, continuous roll formed gutters.
 - a. .027 gauge.
 - 2. Finish -
 - a. Manufacturer's standard painted finish.
 - b. Color selected by Architect.
- B. Downspouts -
 - 1. 3" x 4" minimum, lengths as required shaped as shown on drawings.
 - a. .027 gauge
 - b. Finish will match gutters.
 - 2. Provide elbows and transitions as required to connect pipe as indicated on the drawings.
- C. Hangers & Accessories -
 - 1. Compatible materials with gutters & downspouts.
 - 2. Hanger system shall be as detailed in SMACNA Manual, Sixth Edition, page 1.45, FIG. 1-17A attached.
- D. Screws, Bolts, Nails, & Accessory Fasteners -
 - 1. Strength and type consistent with function.

2.2 FABRICATION:

- A. Fabricate according to referenced standards.
- B. Form accurately to details.
- C. Make profiles, bends, and intersections even and true to line.

PART 2 EXECUTION

3.1 PREPARATION:

- A. Before starting work, verify governing dimension at building. Inspect for conditions which would prevent installation of first class system. Do not install over improper conditions.

3.2 INSTALLATION:

- A. Gutters -
 - 1. Install outlet tubes and gutter ends where required.
 - 2. Install expansion joints in runs exceeding 50'0" and in runs which are restrained at both ends. See attached drawing, page 1.21 of the SMACNA Manual, Sixth Addition.
 - 3. Lap joints in gutter one inch, apply sealant in joint, and rivet two inches on center.
- B. Downspouts -
 - 1. Lap joints in downspouts at least 1-1/2 inches in direction of water flow.
- C. Isolate all work to prevent electrolytic action.
- D. Run aluminum downspout down from roof to foundation line and stop. Connect to transition boot or elbow to splash block.
- E. Place splash block to slope away from building.

3.3 FIELD QUALITY CONTROL:

- A. At completion of this work, block downspouts and flood gutters in presence of Architect. Repair leaks and adjust gradients for proper drainage.
- B. Leave metals clean and free of defects, stains, and damaged finishes.

END OF SECTION

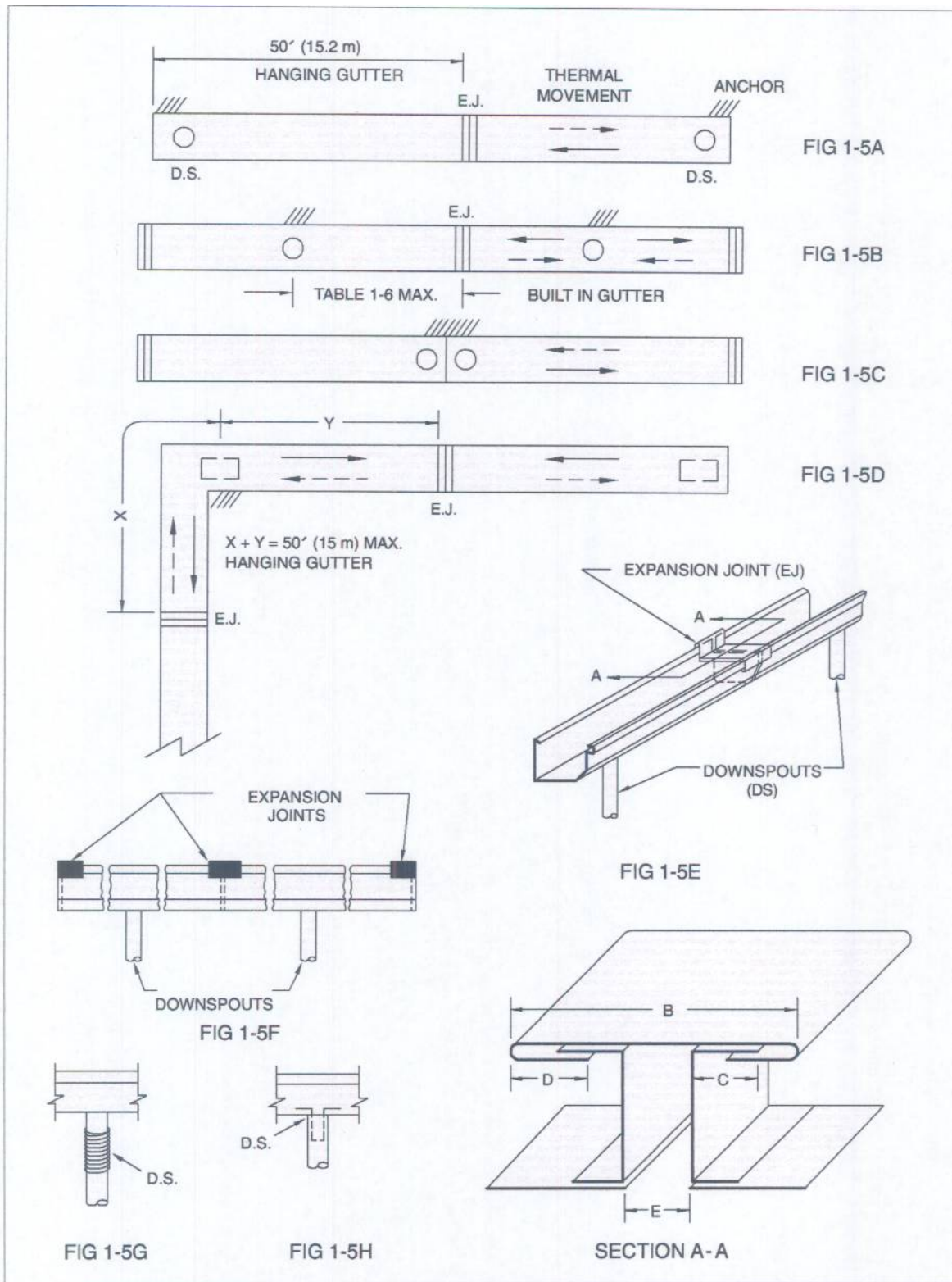


FIGURE 1-5 ALLOWANCES FOR GUTTER EXPANSION

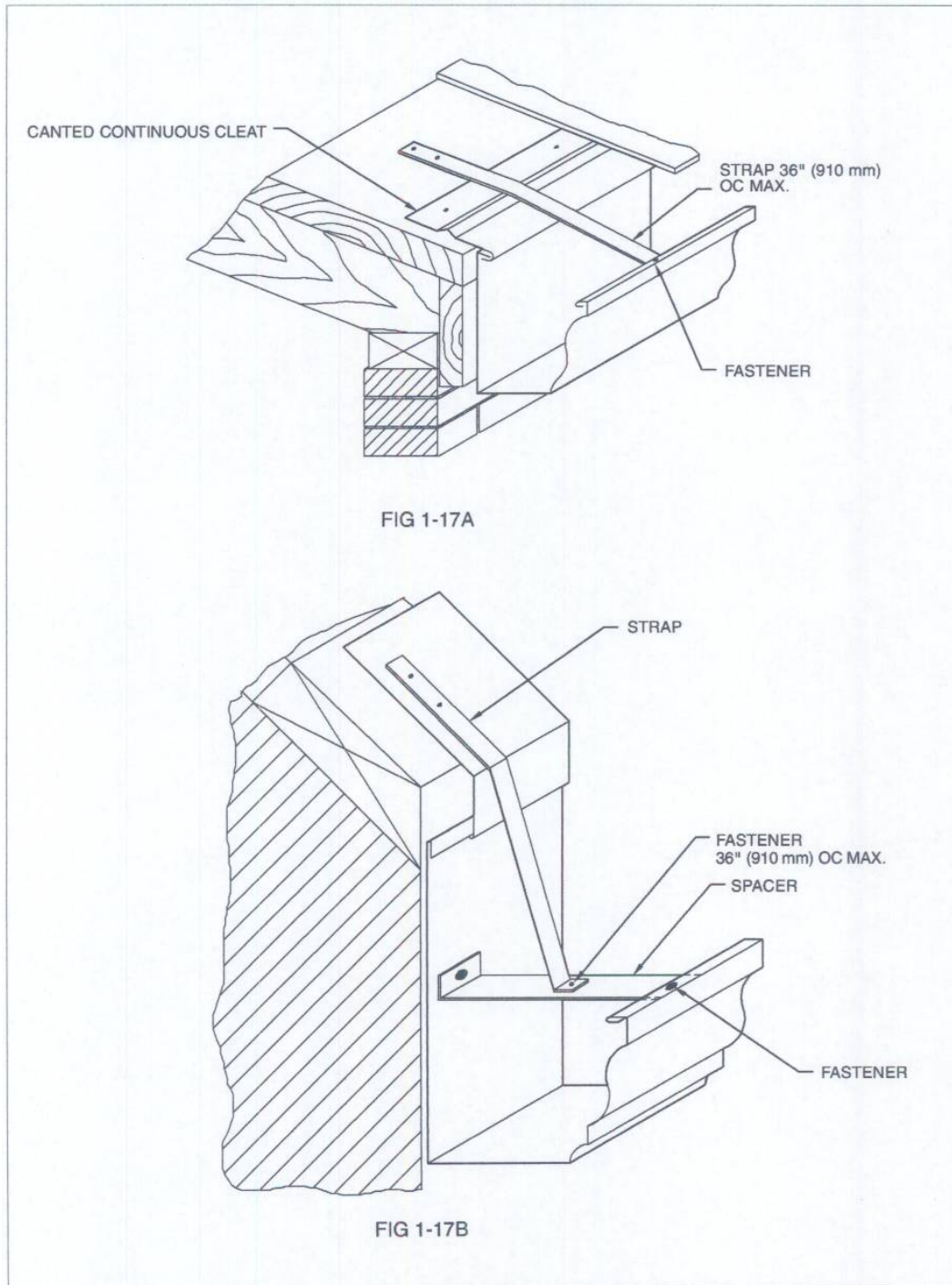


FIGURE 1-17 HANGING GUTTER INSTALLATIONS — SLOPED ROOF



THIS PAGE IS INTENTIONALLY BLANK

07 72 10**ROOF ACCESSORIES****PART 1 PRODUCTS**

1.1 MATERIALS

- A. Static Roof Exhaust Vents,
 - 1. Hood & throat designed to maximize airflow
 - 2. All aluminum construction
 - 3. For 3/12 to 12/12 roof pitch
 - 4. Heavy, aluminum integral screen
 - 5. Provide 50 square inches of net free area per piece
 - 6. The base of Vent will extend a minimum of 6" beyond the vent opening in all directions and be square.
 - 7. Colors:
 - a. Selected from Manufacturers Standard Selection
- B. Roof plumbing penetration jacks (lead boots)
 - 1. Factory made from lead sheet with minimum weight of 4 pounds per square foot. The flashing base will extend a minimum 6" beyond the tangent of the stack in any direction. Flashing base shall be square.

1.2 MANUFACTURERS

- 1.2.1 Acceptable Manufacturer:
 - 1. Any which meet the specifications

PART 2 EXECUTION

1.3 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

1.4 INSTALLATION

- A. Install according to manufacturers and/or responsible intitutes instructions,. as well as details on the Drawings.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

07 72 23**GRAVITY VENTILATORS****PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Work included in but not limited to this section.
 - 1. Roof mounted attic ventilators.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
- B. Section 07 11 13 Architectural Fiberglass reinforced Shingles

1.3 REFERENCES

- A. American Society for Testing and Materials:
 - 1. ASTM A 653/A 653M(2006a) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - 2. ASTM B 209(2006) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- B. Sheet Metal & Air Conditioning Contractors National Association, Inc..
 - 1. SMACNA Arch. Manual (2003, 6th Ed) Architectural Sheet Metal Manual

1.4 SUBMITTALS

- A. See Section 01 33 23 Submittal Procedures for requirements.
- B. Submit color selection data.

1.5 QUALITY ASSURANCE

- A. Pre-installation Meeting
 - 1. See Section 01 300
 - 2. Agenda
- B. Quality Assurance/Control submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports and other documentary data affirming quality of products and installations.
 - 1. Submit 2 copies to Architect immediately upon receipt.

1.6 WARRANTY

- A. Furnish Manufacturer's standard 25 year product warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer:
 - 1. "BIB - 12 Whirly Bird by Exterwally Braced Lamanco Inc., Jacksonville, Ark. 1-800-645-5596.
- B. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25 Substitution Request Form DURING BIDDING ONLY.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

3.2 INSTALLATION

- A. Install according to manufacturers and/or responsible intitutes instructions.
- B. The opening to be cut in the sheathing, is to be equal to the diameter of the discharge opening of each device.
- C. Install according to Manufacturer's recommendations.
- D. Install work straight and even without buckles or other unsightly conditions.

END OF SECTION

07 84 13**PENETRATION FIRESTOPPING****PART 1 GENERAL****1.1 DEFINITIONS**

- A. Penetration Firestopping System - Code approved system including type of penetrating item, construction materials assembly penetrated, and firestopping product.
- B. Penetrations -
 - 1. Through Penetration - Any penetration of a fire rated assembly that completely breaches the barrier
 - 2. Membrane Penetration - Any penetration of a fire rated assembly that breaches only one side of the barrier.

1.2 SUBMITTALS

- A. See Section 01 33 23 Submittal Procedures for requirements.
- B. Shop Drawings
 - 1. Firestopping Materials.
 - a. Detail drawings including manufacturer's descriptive data, typical details conforming to UL Fire Resistance or other details certified by another nationally recognized testing laboratory, installation instructions or UL listing details for a firestopping assembly in lieu of fire-test data or report.
 - 1) For those fire stop applications for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment, derived from similar UL system designs or other tests, shall be submitted for review and approval prior to installation.
 - b. Submittal shall indicate the firestopping material to be provided for each type of application.
 - c. When more than a total of 5 penetrations and/or construction joints are to receive firestopping, provide drawings that indicate location, "F" and "T" ratings, and type of application.
 - 2. Certificates
 - a. Firestopping Materials.
 - 1) Certificates attesting that firestopping material complies with the specified requirements.
 - a) In lieu of certificates, drawings showing UL classified materials as part of a tested assembly may be provided.
 - b) Drawings showing evidence of testing by an alternate nationally recognized independent laboratory may be substituted.
 - 3. Installer Qualifications.
 - a. Documentation of training and experience.
 - 4. Inspection.
 - a. Manufacturer's representative certification stating that firestopping work has been inspected and found to be applied according to the manufacturer's recommendations and the specified requirements.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements
 - 1. Firestopping materials shall be UL rated for type of penetration.
 - 2. Ratings
 - a. Flame (F) and Temperature (T) ratings shall conform with ASTM E814 or UL 1479 fire tests in a configuration that is representative of actual field conditions..
 - b. F rating must be at least one hour, but not less than the fire resistance rating of the assembly being penetrated.

- c. T rating shall be based on measurement of the temperature rise on penetrating item(s)
- d. Ratings for joints must be tested per pertinent UL test with movement capabilities equal to those of the anticipated conditions.
- B. Firestopping materials must be asbestos and lead free.
- C. All firestopping materials shall be products of a single manufacturer in as much as possible.

1.4 INSTALLER QUALIFICATIONS

- A. The Contractor shall engage an experienced Installer who is:
 - 1. FM Research approved in accordance with FM AS 4991, or
 - 2. Certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary staff, training, and a minimum of 3 years experience in the installation of manufacturer's products per specified requirements.
 - a. A manufacturer's willingness to sell its firestopping products to the Contractor or to an installer engaged by the Contractor does not in itself confer qualification on the buyer. The Installer shall have been trained by a direct representative of the manufacturer (not distributor or agent) in the proper selection and installation procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Deliver material in the manufacturer's original, unopened containers or packages with the manufacturer's name, product identification, lot number, UL label, and mixing and installation instructions as applicable.
- B. Storage:
 - 1. Store materials in the original, unopened containers or packages, and under conditions recommended by the manufacturer.
- C. Handling:
 - 1. Install all firestop materials prior to expiration of shelf life.

1.6 SEQUENCING

- A. Schedule firestopping after installation of penetrants but prior to concealing the openings.
- B. Firestopping shall precede gypsum board finishing.

1.7 PROJECT CONDITIONS

- A. Conform to manufacturer's printed instructions for installation and when applicable, curing in accordance with temperature and humidity. Conform to ventilation and safety requirements.
- B. Verify the condition of the substrates before starting work.
- C. Do not proceed with installation of firestop materials when temperatures fall outside the manufacturer's suggested limits.
- D. Take care to ensure that installation of firestopping materials does not contaminate adjacent surfaces.

PART 1 PRODUCTS

2.1 FIRESTOPPING MATERIALS

- A. Firestopping materials shall consist of commercially manufactured, asbestos-free, noncombustible products FM P7825a approved, or UL listed, for use with applicable construction and penetrating items, complying with the following minimum requirements:
 - 1. Material shall have a flame spread of 25 or less, and a smoke developed rating of 50 or less, when tested in accordance with ASTM E 84 or UL 723.
 - 2. Material shall be an approved firestopping material as listed in UL Fire Resistance or by a nationally recognized testing laboratory.
 - 3. Material shall be nontoxic to humans at all stages of application or during fire conditions.

4. Firestop systems shall be UL Fire Resistance listed or FM P7825a approved with "F" rating at least equal to fire-rating of fire wall or floor in which penetrated openings are to be protected, except that "F" rating may be 3 hours in through-penetrations of 4 hour fire rated wall or floor. Firestop systems shall also have "T" rating where required.

2.2 MANUFACTURERS

- A. Acceptable Manufacturer:
 1. The Carborundum Company, Fibers Division, Niagara Falls, NY
 2. FlameStop Inc, Fort Worth, TX
 3. Hilti, Tulsa, OK
 4. IPC, Oakhurst, NJ
 5. Rectorseal, Houston, TX
 6. Specified Technologies Inc/GC Pensil (STI), Somerville, NJ
 7. 3M Fire Protection Products/Dow Corning, St Paul, MN
 8. Tremco, Beachwood, OH
- B. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

2.3 MATERIALS:

- A. General -
 1. All firestop products and systems shall be designed and installed so that the basic sealing system will allow the full restoration of the thermal and fire resistance properties of the barrier being penetrated with minimal repair if penetrants are subsequently removed.
 2. For applications where combustible penetrants are involved, i.e., insulated and plastic pipe, a suitable intumescent material must be used.

2.4 QUALITY STANDARDS

- A. Intumescent Firestop Sealants and Caulks
 1. STI SpecSeal S100 and S500 Sealant
 2. 3M Fire Barrier Caulk CP25WB+
- B. Latex Firestop Sealant
 1. STI SpecSeal LC150 Sealant
- C. Silicone Firestop Sealants and Caulks
 1. STI SpecSeal Pensil 100 and 300
 2. 3M Fire Barrier Silicone Sealants
- D. Firestop Putty
 1. STI SpecSeal Firestop Putty Bars and Pads
 2. 3M Fire Barrier Moldable Putty
- E. Firestop Collars
 1. STI SpecSeal Firestop Collars
 2. 3M Fire Barrier PPD's
- F. Wrap Strips
 1. SpecSeal Wrap Strip
 2. 3M Barrier FS195 Wrap Strip
- G. 2-Part Silicone Firestop Foam
 1. STI SpecSeal Pensil 200
 2. 3M Fire Barrier 2001 Silicone Foam
- H. Firestop Mortar
 1. STI SpecSeal Mortar
- I. Composite Board
 1. 3M Barrier Sheet Material
- J. Accessories
 1. Forming/Damming Materials, Mineral fiberboard or other type recommended by firestopping manufacturer.

PART 3 EXECUTION**3.1 CONDITIONS REQUIRING FIRESTOPPING:**

- A. General;
 - 1. Firestop for conditions specified whether or not indicated, and if indicated, whether such material is designed as insulation, safing, or otherwise.
- B. Through-Penetrations;
 - 1. Firestop all open penetrations and the annular space in all penetrations in any bearing or non-bearing fire-rated barrier.
- C. Membrane-Penetrations;
 - 1. Where required by code, firestop all membrane-penetrations in rated walls products meeting requirements of third party time/temperature testing.
- D. Construction Joints/Gaps
 - 1. Firestop -
 - a. between the edges of floor slabs and exterior walls;
 - b. between the tops of walls and the underside of floors;
 - c. in the control joint in masonry walls and floors;
 - d. in expansion joints.
- E. Smoke-Stopping;
 - 1. As required by the other Sections, Smoke-Stop through-penetrations, membrane-penetrations, and construction gaps with a material approved and tested for such application.

3.2 EXAMINATION:

- A. Examine the areas and conditions where work is to be executed and notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Architect.
- B. Verify that environmental conditions are safe and suitable for installation of firestop products.
- C. Verify that all pipe, conduit, cable, and other items which penetrate fire-rated construction have been permanently installed prior to installation of firestops.

3.3 INSTALLATION:

- A. General
 - 1. The work of this Section shall be performed by an applicator/installer qualified and trained by the manufacturer. Perform installation strictly conforming to manufacturer's detailed installation procedures.
 - 2. Comply with fire test reports, fire resistance requirements, acceptable sample installations, and manufacturer's recommendations.
 - 3. Unless specified and approved, all insulation used in conjunction with through-penetrants shall remain intact and undamaged and may not be removed.
 - 4. Seal holes and penetrations to ensure an effective smoke seal.
 - 5. In areas of high traffic, protect firestopping materials from damage. If the opening is large, install firestopping materials capable of supporting the weight of a human.
 - 6. Insulation types specified in other sections shall not be installed in place of firestopping material specified herein.
 - 7. All combustible penetrants (e.g. non-metallic pipes or insulated metallic pipes) shall be firestopped using products and systems tested in a configuration representative of the field condition.
- B. Dam Construction
 - 1. When required to properly contain firestopping materials within openings, utilize damming or packing materials. Remove combustible damming material after appropriate curing. Non-combustible damming materials may be left as a permanent component of the firestop system.

3.4 FIELD QUALITY CONTROL:

- A. Prepare and install firestopping systems according to manufacturer's printed instructions and recommendations.
- B. Follow safety procedures recommended in the Material Safety Data Sheets.
- C. Finish surfaces of firestopping which are to remain exposed in the completed work to a uniform and level condition.

- D. All areas of work must be accessible until inspection by the applicable Code Authorities.
 - E. Correct unacceptable firestops and provide additional inspection to verify compliance with this specification.
- 3.5 CLEANING:
- A. Remove spilled and excess materials adjacent to firestopping without damaging adjacent surfaces.
 - B. Leave finished work in neat, clean condition with no evidence of spill overs or damage to adjacent surfaces.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

07 92 13**ELASTOMERIC JOINT SEALANTS****PART 1 PRODUCTS****1.1 MANUFACTURERS****A. Acceptable Manufacturer:**

1. Tremco, Beachwood, OH 44122 (800) 321-7906 TSCS@tremcoinc.com
2. Dow Corning Corp, Midland, MI (989) 496-7881
3. G E Silicone Products, Huntersville, NC (877) 943-7325
buy.silicones.com
4. Sika Corporation, Lyndhurst, NJ (800) 933-SIKA (7452)
sikainfo@sika-corp.com

2.2 MATERIALS: (Quality Standard is Tremco products)**A. General****1. Compatibility:**

- a. Provide joint sealants, joint fillers and accessory joint materials that are compatible with one another and with joint substrates under project conditions.
- b. Install joint sealants, joint fillers and related joint materials that are non-staining to visible joint surfaces and surrounding substrate surfaces.

2.3 ELASTOMERIC SEALANTS**A. Sealant Type A:**

1. For exterior joints in vertical surfaces and non-traffic horizontal surfaces such as, but not limited to:
 - a. Control and expansion joints in cast-in-place concrete.
 - b. Joints between architectural precast concrete units.
 - c. Control and expansion joints in unit masonry.
 - d. Butt joints between metal panels.
 - e. Joints between marble and/or granite.
 - f. Joints between different materials listed above.
 - g. Perimeter joints between materials listed above and frames of doors, windows, storefronts, louvers and similar openings.
 - h. Control and expansion joints in ceiling and overhead surfaces.
2. Provide single-component or multi-component, low-modulus, non-sag sealant; comply with ASTM C920, Type S or M, Grade NS, Class 25, Class 100/50
3. Sealants;
 - a. Urethanes
 - 1). Single Component
 - a) Vulkem 116
 - b) Dymonic
 - c) Dymonic FC
 - b. Multi Component
 - 1) Dymeric 240/240FC
 - 2) Vulkem 227
 - c. Silicones
 - 1). Single Component
 - a). Spectrem 1
 - b). Spectrem 2
 - c). Spectrem 3
 - d. Multi Component
 - 1). Spectrem 4-TS

B. Sealant Type B:

1. For interior joints in vertical surfaces and non-traffic horizontal surfaces such as, but not limited to:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints on exposed interior surfaces of exterior openings.

- c. Joints on precast beams and planks.
 - d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, storefronts, louvers, elevator entrances and similar openings.
 - e. Trim or finish joints subject to movement.
2. Sealants:
- a. Single Component Urethane
 - 1). Dymonic
 - a). Dymonic FC
 - b). Vulkem 116
 - 2). Multi Component Urethane
 - a). Vulkem 227
 - b). Dymeric 240/240FC
 - 3). Single Component Silicone
 - a) Spectrem 1
 - b) Spectrem 2
 - c) Spectrem 3
 - d) Proglaze
 - e) Tremsil 600
 - 4). Other
 - a) Tremflex 834
- C. Sealant Type C:
- 1. For exterior and interior joints in horizontal and sloped traffic surfaces such as, but not limited to:
 - a. Control, expansion and isolation joints in cast-in-place concrete.
 - b. Control, expansion and isolation joints in structural precast concrete units.
 - c. Joints between architectural precast concrete paving units.
 - d. Tile control and expansion joints.
 - e. Joints between different materials listed above.
 - 2. Provide single-component or multi-component polyurethane or silicone sealant having a Shore A hardness of not less than 15 or more than 50 and plus-or-minus 25 percent joint movement capability; comply with ASTM C920, Type S or M, Grade P or NS, Class 25.
 - 3. Sealants:
 - a. THC-900/901
 - d. Vulkem 45/45 SSL
 - e. Vulkem 227
 - f. Spectrem 800
 - g. Spectrem 900
- D Sealant Type D:
- 1. For interior joints in vertical and horizontal surfaces where incidental food contact may occur.
 - 2. Provide single component or multi-component sealant complying United States Department of Agriculture (USDA) guidelines for incidental food contact with the cured sealant; comply with ASTM C920, Type S or M, Grade P or NS, Class 25; select color from listing of those approved.
 - 3. Sealants:
 - a. Urethanes
 - 1). Vulkem 116
 - 2). Dymonic
 - 3). Dymonic FC
 - b. Silicones
 - 1). Proglaze
 - 2). Tremsil 200
 - 3). Spectrem 1
 - 4). Tremsil 600
 - 5). Spectrem 2
 - 6). Spectrem 3
- E. Sealant Type E:
- 1. For interior or exterior joints in vertical surfaces between laps in fabrications of sheet metal.
 - 2. Sealants:
 - a. Tremco Butyl Sealant
 - b. Tremco Acoustical Sealant

- F. Sealant Type F:
1. For exterior vertical joints under metal thresholds and saddles or as bedding sealant for sheet metal flashing and frames of metal or wood.
 2. Sealants:
 - a. Urethanes
 - 1). Vulkem 116
 - 2). Dymonic
 - 3). Dymonic FC
 - b. Silicones
 - 1). Spectrem 2
 - 2). Proglaze
 - 3). Spectrem 3
 - c. Other
 - 1). Tremco Butyl Sealant
 - 2). Tremco Acoustical

2.3 ACCESSORIES

- A. Joint cleaner: Cleaner as recommended by sealant manufacturer for substrates indicated.
- B. Joint primer: As recommended by sealant manufacturer for substrates, conditions and exposures indicated.
- C. Bond breaker: Polyethylene tape or other adhesive faced tape as recommended by sealant manufacturer to prevent sealant contact where it would be detrimental to sealant performance.
- D. Joint backer: Closed cell or soft rod Polyethylene foam rod or other compatible non-waxing, non-extruding, non-staining resilient material in dimension 25 percent to 50 percent wider than joint width as recommended by sealant manufacturer for conditions and exposures indicated.
- E. Masking tape: Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces that is suitable for masking.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Applicator shall examine the areas and conditions under which work of this Section will be performed.
 1. Verify conformance with manufacturer's requirements;
 2. Report unsatisfactory conditions in writing to the Architect;
 3. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Prepare surfaces to receive sealants in accord with sealant manufacturer's instructions and recommendations except where more stringent requirements are indicated.
- B. Thoroughly clean joint surfaces using cleaners approved by sealant manufacturer whether primers are required or not.
 1. Remove all traces of previous sealant and joint backer by mechanical methods, such as by cutting, grinding and wire brushing, in manner not damaging to surrounding surfaces.
 2. Remove paints from joint surfaces except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer.
 3. Remove wax, oil, grease, dirt film residues, temporary protective coatings and other residues by wiping with cleaner recommended for that purpose. Use clean, white, lint-free cloths and change cloths frequently.
 4. Remove dust by blowing clean with oil-free, compressed air.
- C. Provide joint backer material uniformly to depth required by sealant manufacturer for proper joint design using a blunt instrument.
 1. Fit securely by compressing backer material 25 percent to 50 percent so no displacement occurs during tooling.
 2. Avoid stretching or twisting joint backer.
- D. Provide bond-breaker where indicated or recommended by sealant

- manufacturer, adhering strictly to the manufacturers installation requirements.
- E. Prime joint substrates where required.
 - 1. Use and apply primer according to sealant manufacturers recommendations.
 - 2. Confine primers to sealant bond surfaces; do not allow spillage or migration onto adjoining surfaces.
 - F. Taping:
 - 1. Use masking tape where required to prevent sealant or primer contact with adjoining surfaces that would be permanently stained or otherwise damaged by such contact or the cleaning methods required for removal.
 - 2. Apply tape so as not to shift readily and remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION

- A. Provide the approved sealant system where shown on the Drawings, and in strict accord with the manufacturer's recommendations as approved by the Architect.
- B. Install sealants immediately after joint preparation.
- C. Mix and apply multi-component sealants in accord with manufacturer's printed instructions.
- D. Install sealants to fill joints completely from the back, without voids or entrapped air, using proven techniques, proper nozzles and sufficient force that result in sealants directly contacting and fully wetting joint surfaces.
- E. Install sealants to uniform cross-sectional shapes with depths relative to joint widths that allow optimum sealant movement capability as recommended by sealant manufacturer.
- F. Tool sealants in manner that forces sealant against back of joint, ensures firm, full contact at joint interfaces and leaves a finish that is smooth, uniform and free of ridges, wrinkles, sags, air pockets and embedded impurities.
 - 1. Dry tooling is preferred; tooling liquids that are non-staining, non-damaging to adjacent surfaces and approved by sealant manufacturer may be used if necessary when care is taken to ensure that the liquid does not contact joint surfaces before the sealant.
 - 2. Provide concave tooled joints unless otherwise indicated to provide flush tooling or recessed tooling.
 - 3. Provide recessed tooled joints where the outer face of substrate is irregular.
- G. Remove sealant from adjacent surfaces in accord with sealant and substrate manufacturer recommendations as work progresses.
- H. Protect joint sealants from contact with contaminating substances and from damages. Cut out, remove and replace contaminated or damaged sealants, immediately, so that they are without contamination or damage at time of substantial completion.

END OF SECTION

DIVISION 08 - OPENINGS

- 08 11 00 METAL DOORS & FRAMES**
 - 08 11 15 Packaged Steel Doors & Frames
- 08 14 00 WOOD DOORS**
 - 08 14 24 Molded Panel Interior Doors
- 08 31 00 ACCESS DOORS AND PANELS**
 - 08 31 16 Access Panels and Frames
- 08 53 00 PLASTIC WINDOWS**
 - 08 53 13 Vinyl Hung Windows
- 08 71 00 HARDWARE**
 - 08 71 10 Door Hardware
- 08 91 00 LOUVERS**
 - 08 91 19 Metal Wall Louvers

THIS PAGE IS INTENTIONALLY BLANK

08 11 15**PACKAGED STEEL DOORS & FRAMES****PART 1 GENERAL****1.1 SUBMITTALS**

- A. See Section 01 33 23 Submittal Procedures for requirements.
- B. Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Indicate the following:
 - 1. Door and frame schedule in accordance with SDI 111.
 - 2. Locations and sizes of lites and louvers.
 - 3. Frame sizes, profiles, and throat depths.
 - 4. Hardware preparation.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- F. Certificates:
 - 1. Provide manufacturer's certification that products comply with referenced standards as applicable.
 - 2. Provide evidence of manufacturer's membership in the Steel Door Institute.
- G. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver doors, frames, and accessories undamaged and with protective wrappings or packaging.
- B. Storage:
 - 1. Protect products from moisture, construction traffic, and damage; store under cover.
 - a. Place units upright on 4 inch (102 mm) high wood sills to prevent rust or damage.
 - b. Provide 1/4 inch (6 mm) space between doors to promote air circulation.
 - c. Do not use non-vented plastic or canvas shelters; should wrappers become wet, remove immediately.
- C. Ensure that jamb anchors are available to installers of other sections in time for building-in.

PART 2 PRODUCTS**2.1 MATERIALS**

- A. Acceptable Manufacturer:
 - 1. Jeld-Wen, www.jeld-wen.com
 - 2. Or equivalent
 - 3. Meets U-Value 0.21
- B. Substitutions:
 - 1. Any current member of Steel Door Institute meeting Contract Document requirements, when approved by Architect prior to bid.
- C. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

2.1 MANUFACTURED UNITS

- A. Insulated Hollow Metal Doors:
 - 1. Type:
 - a. Six-panel embossed door faces.
 - 2. Sizes: Indicated on drawings.
 - 3. Construction: 1-3/4 inches (44 mm) nominal thickness, and as follows:
 - a. Face sheets: Galvanized steel conforming to ASTM A 653, commercial quality, with minimum A40 coating and as follows:
 - 1) Doors for exterior use:
 - a) Minimum 16 gauge (1.3 mm) thickness.
 - 2) Visible seams on face sheets not permitted
 - b. Core:
 - 1) Drop in polystyrene chemically bonded to both door skins.
 - c. Vertical edges: Continuous flush interlocking seams joining face sheets.
 - d. Top and bottom edges:
 - 1). Inverted top and bottom "U" channels, flush caps available.
 - e. Hardware preparation: Doors prepared for hardware, reinforced as follows:
 - 1) Hinges:
 - a) Minimum 7 gauge (3.4 mm) reinforcement provided for full-mortise 4-1/2 inches (114 mm) standard weight template hinges (heavy weight compatible via located in accordance with ANSI/SDI 100.
 - 2) Lockset: Minimum 10 gauge (1.6 mm).
 - 3) Surface-mounted hardware: Concealed reinforcement of minimum 16 gauge (1.3 mm) provided for other door hardware specified in Section 08710.
 - 4. Door finish: Factory-applied primer for field painting.
- B. FrameSaver Door Frame – Endura Products, Inc.
 - 1. Lifetime Warranty
 - 2. Rot-Free
 - 3. SFI Certified
 - 4. 180 Day Primer
- C. Hinges for Pre-Hung Units:
 - 1. Type:
 - a. Full mortise 4-1/2 inches (114 mm) by 4-1/2 inches (114 mm) template.
 - 2. Pin:
 - a. Removable for in-swinging door operation;

2.3 FABRICATION

- A. Fabricate doors and frames to meet requirements of ANSI/SDI 100.
- B. Shop Assembly (Split Jamb & Retro-Fit Frames): Install one hinge at each hinge reinforcement location; ship doors and frames together as pre-hung units, with shipping clips and spreader bars to prevent warping or racking, in manufacturer's standard protective packaging.

2.4 FINISH

- A. Chemical Treatment: Treat steel surfaces to promote paint adhesion.
- B. Factory-Applied Dry Powder Prime Coat: Baked-on dry powder prime coating meeting requirements of ANSI A224.1. Use for Adjusta-Trim, Adjusta-Fit, or Secura-Fit frames.
- C. Factory-Applied Primer : Water-dispersed acrylic primer meeting requirements of ANSI A224.1. Use for Insulated Hollow Metal Doors and Commercial Steel Frames.

2.5 SOURCE QUALITY CONTROL

- A. Verification of Performance:
 - 1. Attach fire rating seal of certifying agency to fire-rated doors and frames.

2. Provide Mylar seals

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that project conditions are acceptable before beginning installation of frames; verify that completed openings to receive frames are of correct size and thickness. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Remove spreader bars provided for shipping before installing units; using spreader bars to assist installation and alignment is not permitted.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install frames in accordance with manufacturer's instructions, approved shop drawings, and requirements of SDI 105; in addition, install frames for fire-rated openings in accordance with requirements of NFPA 80
- C. Installation of door hardware is specified in Section 08710
- D. Field finishing of factory-primed doors and frames is specified in Section 09900

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

3.5 SCHEDULES

- A. Refer to Door and Frame Schedule on Contract Documents.
 - 1. Apartment entry doors only

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

08 14 24**MOLDED PANEL INTERIOR DOORS****PART 1 GENERAL****1.1 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery:
 1. Deliver doors to site, packaged and in an undamaged condition.
- B. Storage:
 1. Stack flat under cover.
 2. Support on blocking, a minimum of 4 inch thick, located at each end and at the midpoint of the door.
 3. Store doors in a well-ventilated building so that they will not be exposed to excessive moisture, heat, dryness, direct sunlight, or extreme changes of temperature and humidity.
 4. Doors must be sealed with an oil-based sealer or primer if stored for long periods.

PART 2 PRODUCTS**2.1 MANUFACTURER**

- A. Acceptable Manufacturer:
 1. Craftmaster.
 2. Jeld-Wen.
 3. Or equivalent.

2.2 PRODUCT SYSTEM

- A. Door system components include: door panel(s), door frame, hinges.
 1. Door is 1-3/4", solid core, side-hinged with hinges factory installed
 2. Wood jambs with applied stop.
 3. 3 – 4" x 4" radius corner hinges

2.3 MATERIALS

- A. Door Panel;
 1. Molded wood fiber facing
 2. Wood stiles
 3. Wood rails
 4. Particleboard core
- B. Door Jambs;
 1. Wood jambs to meet requirements of Section 06 48 16 Interior Wood Door Frames
- C. Hinges;
 1. Meet requirements of Section 08 71 10 Door Hardware

2.4 FABRICATION

- A. Doors;
 1. Doors shall be fabricated using loose lay up assembly that includes molded wood fiber facing, wood stiles, wood rails and particleboard core.
 2. Door facings to be bonded to stiles, rails and core forming a 3-ply structural attachment.
 3. Water based latex primer used on door faces, stile and rails.
 4. Hinge edge of door to be square, lock edge beveled.
 - a. Clearly note edge preparation when product is ordered.
- B. Jamb;
 1. Wood jambs shall be fabricated as a flat jamb with doorstop applied

- C. Hardware Preparation;
 1. Hinge preparations for 1-3/4" thick doors to be machined to accept specified hinges.
 2. Face bore(s) for cylindrical lock(s) are to be as specified in Door Hardware.

PERFORMANCE

- A. Acoustical Performance:
 1. The 1-3/4" thick molded panel door with particleboard core will have a sound transmission class (STC) rating of 29.
 - a. See manufacturers acoustical performance data for unit specific acoustical information.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.
- B. Verify of conditions substrate, which have been previously completed.
- C. Verify that door frame openings are constructed plumb, true and level before beginning installation process.

3.2 INSTALLATION

- A. Install according to manufacturers and/or responsible intitutes instructions.
- B. Remove protective packaging just prior to installation.
- C. Installer shall be experienced in performing work required and shall be specialized in the installation of work similar to that required for this project.
- D. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product packaging instructions for installation.

3.3 FINISHING

- A. Various materials are used in construction of the door system. Prime and/or seal each in accordance with manufacturer's specifications if not factory sealed.
- B. Completely seal and inspect all 6-surfaces (top, hinge side, bottom, lock side, front face and back face) with two coat minimum on operable panel(s).
- C. Finishing and/or re-finishing must be completed immediately after door has acclimated to the environment where it is to be installed and within a maximum of 7 days.
- D. Avoid finishing after a rain or damp and during periods of higher than average humidity.
- E. All painting and finishing will meet the requirements of Section 09 91 23 Interior Painting

END OF SECTION

08 31 16**ACCESS PANELS AND FRAMES****PART 1 PRODUCTS****1.1 MATERIALS**

- A. Acceptable Manufacturers: (Quality Standard set with Nystrom Building Products)
1. Cesco Products, Florence, KY 888-422-3726
customerservice@cescoproducts.com
 2. Dur-Red Products, Cudahy, CA (323) 771-9000
 3. Elmdor/Stoneman, Manufacturing Co., City of Industry, CA (800) 591-9181
 4. Jensen, Los Angeles, CA (800) 325-8351 [Information Request Form](#).
 5. Karp Associates Inc, Maspeth, NY (800) 888-4212 info@karpinc.com
 6. Larsen's Manufacturing Co, Minneapolis, MN (800) 527-7367
 7. Milcor Limited Partnership, Lima, OH (800) 624-8642
 8. Nystrom Building Products, Brooklyn Park, MN (800) 547-2635
 9. Williams Brothers Corporation of America, Front Royal, VA (800) 255-5515
- B. Substitutions:
1. 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.
- C. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.
- D. Commercial quality, cold steel sheet with baked on rust inhibitive gray primer.

1.2 ACCESS PANELS

- A. Non rated flush access doors, Babcock-Davis N series
1. Door: Fabricate from 14-gauge cold rolled sheet steel.
 2. Frame: Fabricate from 16-gauge cold rolled sheet steel. Provide 1/4" inch mounting holes.
 - a. B-NW - Wallboard surfaces – 22-gauge galvanized drywall bead at perimeter.
 3. Hinge:
 - a. B-NW – Concealed continuous piano hinge.
 4. Latching/Locking Devices:
 - a. Key operated cylinder cam lock with two (2) keys per lock, keyed alike.
 5. Finish:
 - a. Phosphate dipped with factory applied prime coat.
- B. Insulated fire rated access panels for walls and ceilings, Babcock-Davis I series
1. Maximum size horizontal applications = 24 inch x 36 inch.
 2. Maximum size vertical applications: B-IT= 48 inch x 48 inch, B-IW, and B-IP= 36 inch x 48 inch.
 3. Door: Fabricate from 20-gauge cold rolled sheet steel, insulated sandwich type construction.
 4. Frame: Fabricate from 16-gauge cold rolled steel of configuration to suit material application.
 - a. B-IW - Wallboard surfaces - 22-gauge galvanized drywall bead at perimeter.
 5. Hinge:
 - a. Concealed pin hinge on style B-IW .
 6. Latching/Locking mechanism:
 - a. Knurled knob/flush key operated latch bolt - standard.

7. Finish:
 - a. Phosphate dipped with factory applied prime coat.
8. Insulation:
 - a. 2" inch thick fire rated mineral fiber.
9. Automatic closure device:
 - a. Integral automatic spring closure device for each door.
10. Interior latch release:
 - a. Mechanism to allow for panel to open from interior side.

1.3 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. Recessed panel: Form face of panel to provide specified recess for application of finish material. Reinforce panel as required to prevent buckling.
- D. Furnish number of latches required to hold door in flush, smooth plane when closed.

PART 2 EXECUTION

2.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.
- B. Verify that rough openings for door and frame are correctly sized and located.
- C. Verify mechanical and electrical requirements for ceiling or wall access panels.

2.2 PREPERATION

- 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.

2.3 INSTALLATION

- A. Install according to manufacturers and/or responsible intitutes instructions. Install frames plumb and level in opening. Secure rigidly in place. Position units to provide convenient access to concealed Work requiring access.
- B. Fire-rated units: Include UL or Warnock-Hersey labels.

END OF SECTION

08 53 13**VINYL HUNG WINDOWS****PART 1 GENERAL****1.1 SUBMITTALS**

- A. See Section 01 33 23 Submittal Procedures for requirements.
- B. Product Data including;
 - 1. Elevations of windows, full-size sections, thicknesses of PVC, reinforcing members, fastenings, proposed method of anchoring, size and spacing of anchors, details of construction, method of glazing, details of operating hardware, mullion details, method and materials for weatherstripping, method of attaching screens, material and method of attaching subframes, type of glazing, accessories, installation details, window flashings and other related items.

1.2 QUALITY ASSURANCE

- A. Quality Assurance/Control submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports and other documentary data affirming quality of products and installations.
 - 1. Submit 2 copies to Architect immediately upon receipt.
 - 2. Labels
 - a. Each window unit shall bear a certification label from an independent, nationally recognized testing organization validating that the product complies with AAMA 101 for the type, grade, and performance class specified or that the product complies with ASTM D 4099 for the grade specified.
 - 1) Certified test reports attesting that the window units meet the requirements of AAMA 101 or ASTM D 4099 as specified will be acceptable in lieu of product labeling or marking.
 - b. Plastic windows (including frames and glass) shall be energy efficient qualified products as appropriate to project site climate zone.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Deliver windows to the project site in an undamaged condition.
- B. Storage:
 - 1. Store windows and components out of contact with the ground, under a weathertight covering, to prevent bending, warping, or otherwise damaging the windows.
- C. Handling:
 - 1. Use care in handling and hoisting windows during transportation and at the job site.

PART 2 PRODUCTS**2.1 MATERIALS**

- A. Acceptable Manufacturer:
 - 1. Ply-Gem.
 - 2. Or equivalent.
- B. Windows: (Single Hung)
 - 1. Factory glazed.
 - 2. Weatherstripped.
 - 3. Flanged for installation in framed buildings; Non-flanged for installation in masonry buildings. Installation method shall not require drilling into frame.
 - 4. Balance mechanism serviceable in field.

5. Outside window surfaces cleanable from inside building.
6. U-Factor equal to or less than .32 and SHGC rating equal to or less than .40.
7. Color: As selected by Architect from manufacturer's standard colors.
- B. Glazing Characteristics:
 1. Clear interior pane and clear exterior pane with Low E treatment on surface
- C. Glazing Beads: Manufacturer's standard.
- D. Muntin Pattern: Determined by building style selection.
- E. Screens: Extruded aluminum frames with mitered corners and 18 x 14 mesh with 0.013 inch diameter aluminum wire or fiberglass.
- F. Anchoring Devices:
 1. Aluminum or stainless steel.
 2. Other corrosion-resistant or insulated anchors as specifically approved by Architect in writing prior to use.
- G. Flashing:
 1. See Section 07 65 26 Self-Adhering Sheet Flashing
- H. Fabrication
 1. Corners shall be thermally fused.
- I. Substitutions:
- J. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with the window manufacturer's printed instructions and details.
- B. Build in windows as work progresses or install without forcing into prepared window openings.
- C. Set windows at proper elevation, location, and reveal; plumb, square, level, and in alignment; and brace, strut, and stay properly to prevent distortion and misalignment.
- D. Bed screws or bolts in sill members, joints at mullions, contacts of windows with sills, built-in fins, and subframes in mastic sealant of a type recommended by the window manufacturer.
- E. Install and seal windows in a manner that will prevent entrance of water and wind.
- F. Fasten insect screens securely in place.
- G. Fasten hardware to windows.

3.2 Anchors and Fastenings

- A. Secure units to each other, to masonry, and to other adjoining construction with clips, fins, screws, or other devices recommended by the window manufacturer.

3.3 ADJUSTING

- A. After installation of windows and completion of glazing, adjust ventilators and hardware to operate smoothly and to provide weathertight sealing when ventilators are closed and locked.
 1. Lubricate hardware and operating parts as necessary. Verify products are properly installed, connected, and adjusted.

3.4 CLEANING

- A. Clean interior and exterior surfaces of window units of mortar, plaster, paint spattering spots, and other foreign matter to present a neat appearance, to prevent fouling of weathering surfaces and weatherstripping, and to prevent interference with operation of hardware.
- B. Replace stained, discolored, or abraded windows that cannot be restored to their original condition with new windows.

3.5 PROTECTION

- A. Protect ventilators and operating parts against accumulation of dirt and building materials by keeping ventilators tightly closed and locked to frame.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

08 71 10**DOOR HARDWARE****PART 1 GENERAL****1.1 SUBMITTALS**

- A. See Section 01 33 23 Submittal Procedures for requirements.
- B. Submit
 - 1. Schedule of Proposed Hardware.
 - a. Schedule shall indicate details such as proper type of strikeplates, spindle lengths, hand, backset, and bevel of locks, hand and degree opening of closer, length of kickplates, length of rods and flushbolts, type of door stop, and other necessary information necessary to determine exact hardware requirements.
 - b. Prepare schedule in vertical format as illustrated by the Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute.
 - 1) Schedules, which do not comply, will be returned for correction before checking.
 - c. Hardware schedule shall clearly indicate architect's hardware group and manufacturer of each item proposed.
 - 2. Provide 2 copies of illustrations from manufacturer's catalogs and data in brochure form.
 - 3. Provide listing of manufacturer's template numbers for each item of hardware in hardware schedule.
 - 4. Furnish other Contractors and Subcontractors concerned with copies of final approved hardware schedule. Submit necessary templates and schedules as soon as possible to hollow metal, wood door, and aluminum door fabricators in accordance with schedule they require for fabrication.
 - 5. Samples: Lever design or finish sample: Provide 3 samples if requested by architect.
- C. Installation Instructions: Provide manufacturer's written installation and adjustment instructions for finish hardware. Send installation instructions to site with hardware.
- D. Templates: Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.
- E. Contract Closeout Submittals: Comply with Section 01700 including specific requirements indicated.
 - 1. Operating and maintenance manuals: Submit 3 sets containing the following:
 - a. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Name, address, and phone number of local representative for each manufacturer.
 - d. Parts list for each product.
 - 2. Copy of final approved hardware schedule, edited to reflect "As installed".
 - 3. Copy of final keying schedule.
 - 4. As installed "Wiring Diagrams" for each opening connected to power, both low voltage and 110 volts.
 - 5. One complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

1.2 QUALITY ASSURANCE

- A. Quality Assurance/Control submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports and other documentary data affirming quality of products and installations.

1. Submit 2 copies to Architect immediately upon receipt.
 2. Provide inspection report verifying correct operation of installed hardware
- B. Requirements of Regulatory Agencies
1. Provide hardware for fire-rated openings complying with NFPA 80 and local code requirements. Provide only hardware which has been tested and listed by UL or FM for types and sizes of doors required and complies with requirements of door and door frame labels.
 2. Conform to pertinent requirements of ICC/ANSI A117.1, Standard on Accessible and Usable Buildings and Facilities
 3. Single Source Requirements.
 - a. Manufacturer: Obtain each type of hardware (ie. latch and locksets, hinges, closers) from single manufacturer, although several may be indicated as offering products complying with requirements.
 4. Supplier: Recognized architectural finish hardware supplier, with warehousing facilities, who has been providing hardware for period of not less than 3 years.
 5. Installer: Firm with 3 years experience in installation of similar hardware to that required for this project, including specific requirements indicated.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
1. Deliver hardware in original individual containers, complete with necessary appurtenances including fasteners and instructions.
 2. Mark each individual container with item number as shown in hardware schedule.
 3. Deliver permanent keys and removable cores to the Owner, either directly or by certified mail. Deliver construction master keys with the locks.
 4. It is the responsibility of the Contractor to properly check hardware deliveries and verify what has been shipped. Indicate any discrepancies on the delivery ticket. When signed for by the Contractor or his agent, the safety and security of the hardware becomes the responsibility of the Contractor. Any delivered hardware which is missing after that point will be replaced at the Contractors expense.
- B. Storage:
1. All hardware is to be stored in a secure location at all times.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Finishes
1. Steel, brass, or bronze hardware items - US26D, Chromium plated, satin.
 2. Materials other than steel, brass, or bronze - Finished to match the appearance of US26D.
- B. Fasteners
1. Fasteners shall be of suitable types, sizes and quantities to properly secure hardware.
 2. Fasteners shall be of same material and finish as hardware unless otherwise specified.
 3. Fasteners exposed to weather shall be non-ferrous or corrosion resisting steel.
 4. Including, but not limited to, wood or machine screws, bolts, nuts, anchors, etc. of proper type, material, and finish required for installation of hardware.
 5. Use phillips head for exposed screws. Do not use aluminum screws to attach hardware.
 6. Provide self-tapping (TEC) screws for attachment of sweeps and stop-applied weatherstripping.

2.2 HARDWARE:

A. Hinges

1. Sizes
 - a. 2-1/4 inch Doors 5 inch by 5 inch
 - b. 1-3/4 inch Doors 4-1/2 inch by 4-1/2 inch
 - c. 1-3/8 inch Doors 3-1/2 inch by 3-1/2 inch
2. Quantity:
 - a. 2 - hinges per leaf for openings through 60 inches high.
 - b. 1 - additional hinge per leaf for each additional 30 inches in height or fraction thereof.
 - c. 4 - Dutch doors up to 90 inches in height.
3. Extra heavy weight hinges on doors over 3 feet 5 inches in width.
4. Deadbolts: stainless steel 1-inch throw
5. Use non-removable pins on exterior opening doors.
6. Provide shims and shimming instructions for proper door adjustment.
7. Application
 - a. Exterior outswinging doors (HW)BB x 5K x NRP x FM
 - b. Exterior inswinging doors and vestibule doors BB x 5K x FM x HW
 - c. Interior doors with closers BB x 5K x FM x HW
 - d. Interior doors over 36 inches wide BB x 5K x FM x HW
 - e. Interior doors 36 inches or less without closer 5K x FM x SW
 - f. Provide NRP (non-removable pins) at out-swinging lockable doors.
 - g. BB=Bearings, 5K= Five Knuckle, FM = Full Mortise, NRP=Non-removable Pin, HW=Heavy Weight, SW=Standard Weight
8. Approved Products:
 - a. Ives - 5BB1
 - b. Bommer - BB5002
 - c. Hager - BB1191
 - d. McKinney - TB2314
 - e. Stanley - FBB191

B. Cylindrical Locksets

1. All locks sets to be ANSI A156.2, 1994, Series 4000 Grade 1, UL listed for A label and lesser class single doors up to 4ft x 8ft
2. Chassis: cylindrical design, corrosion-resistant plated cold-rolled steel, through-bolted
3. Locking spindle: stainless steel, interlocking design
4. Latch retractors: forged steel. Balance of inner parts: corrosion-resistant plated steel, or stainless steel
5. Lever Trim: design, independent operation, spring-cage supported, minimum 2" clearance from lever mid-point to door face
6. Approved Manufacturers:
 - a. Falcon T Series
 - b. Schlage D Series
 - c. Yale 5400LN Series
 - d. Sargent 10 Line
 - e. Kwikset

C. Deadbolts

1. All deadbolts to be Grade 1.
2. Removable Core – Best Hardware
2. Approved Manufacturers: (must accept Best core)
 - a. Falcon. D Series
 - b. Schlage B Series
 - c. Yale 3700 Series
 - d. Sargent 480 Series
 - e. Kwikset 780 Titan

D. Exit Devices/Panic Hardware

1. 3/4" throw deadlocking latchbolts.
2. Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function. Releasable with 32 lb. maximum pressure under 250 lb. load to the door. Rod and latch guards with surface vertical rod devices.

3. Fire-Labeled Devices: UL label indicating "Fire Exit Hardware". Vertical rod devices less bottom rod (LBR) unless otherwise scheduled.
 4. Electrically Operated Devices: Single manufacturer source for electric latch retraction devices, electrically controlled trim, power transfers, power supplies, monitoring switches and controls.
Approved Manufacturers:
 - a. Von Duprin 33A Rim Device
 - b. Precision Apex 2100 Series
 - c. Sargent 80 Series
 - d. Yale 2100 Series
 - e. Monarch 18R
- E. Surface Closers
1. Full rack-and-pinion type cylinder with removable non-ferrous cover and aluminum or cast iron body. Heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
 2. Thru-bolts and wood doors unless doors are provided with closer blocking. Non-sized and adjustable. Place closers inside building, stairs and rooms.
 3. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
 4. Opening pressure: Exterior doors 8.5 lb., interior doors 5 lb., labeled fire doors 15 lb.
 5. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
 6. Exterior doors do not require seasonal adjustments in temperatures from 120 degrees F to -30 degrees F, furnish data on request.
 7. Non-flaming fluid will not fuel door or floor covering fires.
 8. Approved Manufacturers:
 - a. Ryobi D-2550 Series
 - b. LCN 1000 Series
 - c. Sargent 351 Series
 - d. Dor-O-Matic SC80 Series
 - e. Norton 8000 Series
- F. Protection Plates
1. .050 inches minimum thickness, height and width as scheduled. Use sheet-metal screws of bronze or stainless steel to match other hardware.
 2. Approved Manufacturers:
 - a. Ives 8400 Series
 - b. Hager 190S
 - c. Trimco K0050
 - d. Rockwood K1038
- G. Stops
1. Provide stops to protect walls, casework or other hardware.
 2. Unless otherwise noted in Hardware Sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type
 3. Approved Manufacturers:
 - a. Ives WS401CCV
 - b. Hager 234W
 - c. Trimco 1270CVPV
 - d. Rockwood 403
- H. Thresholds
1. As scheduled and per details.
 2. Exteriors: Set in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements Section 07 92 13 Elastomeric Joint Sealants.
 - a. Non-ferrous ¼ inch fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors (SS/FHSL).
 3. Sound control openings: Set in bed of mastic sealant.
 4. Approved Manufacturers:
 - a. National Guard Products 425
 - b. Reese S483A
 - c. Pemko 2005AT

- I. Weatherstripping
 - 1. Hager 800S
 - 2. NGP A625A
 - 3. Reese 961
 - 4. Sealeze J-135
 - 5. Memtech A-35
- J. Smoke Gaskets:
 - 1. Hager 726 .
 - 2. NGP 5050 .
 - 3. Pemko PK55
- K. Silencers:
 - 1. Interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Omit where adhesive mounted seal occurs. Leave no unfilled/uncovered pre-punched silencer holes.
- L. Key-system
 - 1. New factory registered key-system.
 - 2. I.C. Removable core by Best Hardware (9 pin).
 - 3. Furnish Owner's written approval of the system.
 - 4. Construction keying: furnish temporary keyed-alike cores. Remove at substantial completion and install permanent cylinders/cores in Owner's presence. Demonstrate that construction key no longer operates.
 - 5. Furnish 10 construction keys and 2 control keys.
 - 6. Key Cylinders: 6-pin solid brass construction.
 - 7. Cylinder cores: furnish keyed at factory of lock manufacturer where permanent records are maintained.
 - 8. Permanent keys: use secured shipment direct from point of origination to Owner.
 - 9. Bitting List: use secured shipment direct from point of origination to Owner upon completion.
 - 10. Approved Manufacturers:
 - a. Best Hardware

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.
- B. Examine doors, frames, and related items for conditions that would prevent the proper application of finish hardware. Do not proceed until defects are corrected.

3.2 INSTALLATION

- A. Install according to manufacturers and/or responsible intitutes instructions.
- B. Install finish hardware in accordance with reviewed hardware schedule and manufacturer's printed instructions. Prefit hardware before finish is applied, remove and reinstall after finish is completed. Install hardware so that parts operate smoothly, close tightly and do not rattle.
- C. Installation of hardware shall comply with NFPA 80 and NFPA 101 requirements.
- D. Set units level, plumb and true to line and location. Adjust and reinforce attachment to substrate as necessary for proper installation and operation.
- E. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant, forming tight seal between threshold and surface to which set. Securely and permanently anchor thresholds, using countersunk non-ferrous screws to match color of thresholds (stainless steel screws at aluminum thresholds).

3.3 FIELD QUALITY CONTROL

- A. After installation has been completed, provide services of qualified hardware consultant to check Project to determine proper application of finish hardware according to schedule. Also check operation and adjustment of hardware items.

- B. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- 3.4 ADJUSTING AND CLEANING
- A. At final completion, hardware shall be left clean and free from disfigurement. Make final adjustment to door closers and other items of hardware. Where hardware is found defective repair or replace or otherwise correct as directed.
 - B. Adjust door closers to meet opening force requirements of Uniform Federal Accessibility Standards.
 - C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of space or area, return to work during week prior to acceptance or occupancy, and make final check and adjustment of hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors.
 - D. Instruct Owner's personnel in proper adjustment and maintenance of door hardware and hardware finishes.
 - E. Clean adjacent surfaces soiled by hardware installation.
- 3.5 PROTECTION
- A. Provide for proper protection of items of hardware until Owner accepts Project as complete.
- 3.6 HARDWARE GROUPS
- A. The schedule of hardware groups shown in the Construction Documents shall be considered a guide only, and the supplier is cautioned to refer to general conditions, special conditions, and the preamble to this section. It shall be the hardware supplier's responsibility to furnish all required hardware.
 - B. Refer to the door schedule for hardware group required at each door opening. Ignore hardware groups not used on the door schedule.

END OF SECTION

08 91 19**METAL WALL LOUVERS****PART 1 PRODUCTS**

1.1 MANUFACTURED UNITS:

- A. Weather resistant type, with bird screens and made to withstand a wind load of not less than 30 pounds per square foot.
 - 1. Wall louvers shall bear the AMCA certified ratings program seal for air performance and water penetration in accordance with AMCA 500-D and AMCA 511. The rating shall show a water penetration of 0.20 or less ounce per square foot of free area at a free velocity of 800 feet per minute.
- B. For aluminum louvers, provide 1/4 inch square mesh, 16 gage aluminum bird screening.
 - 1. Mount screens in removable, rewirable frames of same material and finish as the louvers.
- C. Clean and prime exposed aluminum surfaces and apply a baked enamel finish conforming to AAMA 2603, 0.8 mil minimum dry film thickness.
 - 1. Kynar 500, color as selected by Architect.
- D. Wall Louvers
 - 1. ASTM B 221MASTM B 221, alloy 6063-T5 aluminum
 - 2. Metal thickness minimum
 - a. 0.050" - Louvers up to 24" x 24"
 - b. 0.081" - Louvers over 24 inches either dimension
 - 3. Flange type frame.
 - 4. Louvers shall be sloped and shaped to prevent penetration of driving rains or snow.
- E. Approved Products -
 - 1. Airlite, Marietta, OH (614) 373-7676
 - 2. American Warming & Ventilating, Maumee, OH (419) 865-5000
 - 3. Arrow United Industries, Wyalusing, PA (717) 746-1888
 - 4. Carnes, Verona, WI (608) 845-6411
 - 5. Industrial Louvers, Delano, MN (612) 972-2981
 - 6. Ruskin Manufacturing, Grandview, MO (816) 761-7476
 - 7. Vent Products, Chicago, IL (800) 368-8368
 - 8. Wonder Metals Corp, Redding, CA (916) 241-3251

PART 2 EXECUTION

2.1 INSTALLATION:

- A. Wall Louvers
 - 1. Install using stops or moldings, flanges, strap anchors, or jamb fasteners as appropriate for the wall construction and in accordance with manufacturer's recommendations.
 - 2. Where aluminum contacts metal other than zinc, paint the dissimilar metal with a primer and two coats of aluminum paint.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

DIVISION 9 - FINISHES

09 20 00 PLASTER AND GYPSUM WALLBOARD

09 29 50 Gypsum Wallboard

09 30 00 TILING

09 30 13 Ceramic Tiling

09 60 00 FLOORING

09 65 19 Vinyl Composition Tile
09 65 19 Resilient Plank Flooring

09 74 00 WALL COVERINGS

09 74 20 Special Wall Surfacing (Fiberglass Reinforced Plastic Panels)

09 81 00 ACOUSTIC INSULATION

09 81 16 Acoustic Blanket Insulation

09 90 00 PAINTING REQUIREMENTS

09 90 01 General Painting Requirements

09 91 00 PAINTING

09 91 13 Interior Painting
09 91 15 Exterior Painting

THIS PAGE IS INTENTIONALLY BLANK

09 29 50GYPSUM WALLBOARD**PART 1 GENERAL**

1.1 DELIVERY, STORAGE, & HANDLING:

- A. Delivery:
 1. Deliver materials in original packages, containers, or bundles bearing brand name, applicable standard designation, and Manufacturer's name.
- B. Storage:
 1. Keep materials dry by storing inside a sheltered building.
 2. Where necessary to store gypsum board and cementitious backer units outside, store off the ground, properly supported on a level platform, and protected from direct exposure to rain, snow, sunlight, and other extreme weather conditions.
 3. Provide adequate ventilation to prevent condensation.
 4. Store per manufacturer's recommendations for allowable temperature and humidity range.
 5. Gypsum wallboard shall not be stored with materials which have high emissions of volatile organic compounds (VOC) or other contaminants.
 6. Do not store panels near materials that may offgas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.
- C. Handling:
 1. Neatly stack gypsum board and cementitious backer units flat to prevent sagging or damage to the edges, ends, and surfaces.

1.2 PROJECT CONDITIONS:

- A. See Section 01 73 19 Installation
- B. Environmental Conditions
 1. Maintain a uniform temperature of not less than 50 degrees F in the structure for at least 48 hours prior to, during, and following the application of gypsum board, cementitious backer units, and joint treatment materials, or the bonding of adhesives.
 2. Protect gypsum board and cementitious backer unit products from direct exposure to rain, snow, sunlight, and other extreme weather conditions.
 3. Provide ventilation to eliminate excessive moisture.
 4. Avoid hot air drafts which will cause too rapid drying.

PART 2 PRODUCTS

2.1 MANUFACTURERS:

- A. Approved Manufacturers -
 1. Georgia-Pacific, Atlanta, GA (800) 225-6119
 2. National Gypsum, Charlotte, NC (800) 252-1065
centralareacsr's@nationalgypsum.com
 3. U S Gypsum Co, Chicago, IL 800.USG4YOU (800.874.4968) usg4you@usg.com.

2.2 MATERIALS:

- A. Gypsum Board -
 1. For single layer gypsum board applied to wood trusses and walls apply following
 - a. Fireguard C by Georgia-Pacific
 - b. Fire-Shield Wallboard by National Gypsum
 - c. Sheetrock Brand Firecode C Core, by U S Gypsum Co
 2. For use on painted walls and ceilings in Restrooms, Mechanical Rooms, and against exterior door frames and window sash
 - a. Water Resistant gypsum board meeting requirements of ASTM C 630, UL one-hour rated, tapered edge, green treated face paper suitable for painting.
 3. For all other applications
 - a. Product of any manufacturer listed above, and meeting requirements of ASTM C 36, tapered edge, face paper suitable for painting.
- B. Accessories
 1. Electrolytic galvanized zinc-coated, treated for maximum cement and paint adhesion. Surfaces to receive bedding cement shall be knurled for maximum bonding.
 - a. Corner Beads

- 1). Formed galvanized steel angle, min. base steel 0.014 in. thick, and complying with ASTM C 1047.
- b. Casing
 - 1). Formed galvanized steel trim, min. base steel 0.014 in. thick, and complying with ASTM C 1047, Type as follows:
 - a). LC-Bead.
 - b). L-Bead.
 - c). U-Bead.
 - c. Furring Channels
 - 1). Rigid Furring Channels:
 - a). 7/8 in. hat shaped channels, weighing 287 lbs. per 1000 lin. ft. with min. base steel of 0.0179 in., galvanized, and complying with ASTM C 645.
 - 2). Resilient Furring Channels:
 - a). ½ in. hat shaped channel with resilient legs, weighing 220 lbs. per 1000 lin. ft. with min. base steel of 0.019 in., galvanized.
 - 3). Z Furring Channels:
 - a). 1 in., 1-1/2 in. and 2 in. Z shaped channels, weighing 201 lbs., 236 lbs. and 268 lbs. per 1000 lin. ft. with min. base steel of 0.0179 in., galvanized, and complying with ASTM C 645.
 - d. Control Joint:
 - 1). Bent zinc sheet formed with V shaped slot, covered with plastic tape, with perforated flanges and Complying with ASTM C 1047.
 - e. Other accessories as required by Manufacturer's fire tests to provide necessary fire ratings.
2. Approved Manufacturers
 - a. Any product meeting specification
- C. Joint Compound & Reinforcing
 1. Best grade or type recommended by Wallboard Manufacturer and meeting requirements of ASTM C475.
 - a. Use drying type pre-mixed vinyl base taping compound for first coat to embed tape
 - b. Use drying type pre-mixed vinyl base compound, all-purpose joint compound, for subsequent coats except final coat.
 - c. Use drying type vinyl base topping compound, pre-mixed for final coat and skim coating.
 - d. Acrylic latex, high-build, spray applied coating to provide a Level 5 finish
 2. Joint Reinforcing
 - a. 2 in. wide paper reinforcing tape with metal strips laminated along the center crease to form inside and outside corners.
 3. Textured Coatings:
 - a. Ceiling Coating:
 - 1). Compound of minerals and clays for mixing with a mineral or polystyrene aggregate and water
- D. Fasteners
 1. Bugle head screws meeting requirements of ASTM C1002.
 - a. Types
 - 1) Type W
 - a). For fastening gypsum board to wood members other than truss members and plywood web joists.
 - 2) Type S
 - a). For fastening gypsum board to steel framing members, truss members, and plywood web joists.
 - b. Lengths -
 - 1) Of length to penetrate wood framing 5/8 inch minimum.
 - 2) Of length to penetrate steel framing 3/8 inch minimum.

PART 3 EXECUTION

3.1 INSTALLATION

A. Coordination:

1. Coordinate with Division 06 for location of back blocking for edges and ends of gypsum

board and for blocking required for installation of equipment and building specialties. Do not install gypsum board until required blocking is in place.

- B. Mounting Accessories
 - 1. Furring Channels
 - a. Apply with screws through flanges into each framing member.
- C. Gypsum Wallboard
 - 1. General
 - a. Install so trim and reinforcing tape is fully backed by gypsum wallboard. No hollow spaces over 1/8 inch wide are permitted.
 - 2. Single Layer Application
 - a. Apply ceilings first using minimum of two men.
 - b. Use board of length to give minimum number of joints.
 - c. On walls over 9 feet high and on ceilings, apply board perpendicular to support.
 - d. Stagger end joints.
 - 1). End and edge joints of board applied on ceilings shall occur over framing members or be back blocked with 2x4 blocking.
 - 2). End joints of board horizontally applied on walls shall occur over framing members.
 - 3). Edge joints of board vertically applied on walls shall occur over framing members.
 - e. Butt edges in moderate contact. Do not force in place. Shim to level.
 - f. Leave facings true with joint, finishing flush. Vertical work shall be plumb and ceiling surfaces level.
 - g. Scribe work closely.
 - 1). Keep joints as from openings as possible.
 - 2). If joints occur near an opening, apply wallboard so vertical joints are centered over openings.
 - 3). No vertical joints shall occur within 12 inches of external corners or openings.
 - h. Install board tight against support with joints even and true. Tighten loose screws.
 - i. Caulk perimeter joints in sound insulated rooms with specified acoustical sealant.
 - 3. Double Layer Application
 - a. Apply base layer as specified for single layer application, except edge joints need not occur over framing members or be back blocked.
 - b. Apply face layer with joints staggered in relationship to base and occurring over supports.
 - 1). Use combination of adhesive and screws to meet Manufacturer's specifications for fire-rated construction.
 - 2). Apply screws attaching face layer through base layer into support.
 - 4. Fastening
 - a. Apply from center of wallboard towards ends and edges.
 - b. Apply screws 3/8 inch minimum from ends or edges, one inch maximum from edges, and 1/2 inch maximum from ends.
 - c. Space screws not over 7 inches on center at edges where blocking or framing occurs. In panel field, space screws 7 inches on center.
 - d. Set screw heads 1/32 inch below plane of board, but do not break face paper. If face is accidentally broken, apply additional screw 2 inches away.
 - f. Screws on adjacent ends or edges shall be opposite each other.
 - g. Drive screws with shank perpendicular to face of board.
- D. Trim
 - 1. Corner Beads
 - a. Attach metal or paper faced metal corner beads to outside corners.
 - 1) Attach metal corner bead with screws spaced 8 inches apart maximum.
 - 2) Set paper-faced trim in solid bed of taping compound.
 - 2. Edge Trim
 - a. Apply where gypsum board abuts dissimilar material in accordance with Manufacturer's instructions. Hold channel and 'L' trim back from exterior metal window & door frames 1/8 inch to allow for caulking.
- E. Finishing
 - 1. General
 - a. Tape and finish joints and corners as specified below to correspond with final finish material to be applied to gypsum board. When sanding, do not raise nap of gypsum board face paper or paper-faced trim.
 - b. Finish in accordance with GA-214 as follows:

1. Level 1: Plenums and service corridors.
 2. Level 2: Water resistant gypsum backing board scheduled to receive tile.
 3. Level 3: Gypsum board scheduled to receive heavy or medium textured coatings and heavy-grade wall coverings.
 4. Level 4: Gypsum board scheduled to receive light textured coatings and light-grade wall coverings.
 5. Level 5: All other gypsum board.
- c. First Coat
 - 1) Apply tape over center of joint in complete, uniform bed of specified taping compound. If metal corner bead is used, apply reinforcing tape over flange of metal corner bead and trim so half of tape width is on flange and half is on gypsum wallboard.
 - 2) Completely fill gouges, dents, and fastener dimples.
 - 3) Allow to dry and sand lightly if necessary to eliminate high spots or excessive compound.
 - d. Second Coat
 - 1) Apply coat of specified joint compound over embedded tape extending 3-1/2 inches on both sides of joint center. Use finishing compound only if applied coat is intended as final coat.
 - 2) Re-coat gouges, dents, and fastener dimples.
 - 3) Allow to dry and sand lightly to eliminate high spots or excessive compound.
 - e. Third Coat
 - 1). Apply same as second coat except extend application 6 inches on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
 - f. Fourth Coat
 - 1). Apply same as second coat except extend application 9 inches on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
 - g. Skim Coat
 - 1). Apply thin layer of finishing compound to entire surface of panel and immediately shear excess compound, leaving thin film. Eliminate laps and tool marks with fine sandpaper or damp sponge.

3.2 CLEANING

- A. Remove from site debris resulting from work of this Section including taping compound spills.

END OF SECTION

09 30 13**CERAMIC TILING****PART ONE - GENERAL**

1.1 DESCRIPTION:

- A. Includes But Not Limited To -
 1. Interior ceramic tile required by Contract Documents.
- B. Related Documents -
 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 01, General Requirements, of these Specifications.

1.2 SYSTEM DESCRIPTION:

- A. Setting Methods -
 1. Floors - TCNA Method #F112
 2. Walls & Wainscots - TCA Method #W244

1.3 REFERENCES:

- A. American National Standards Institute
 1. ANSI A137.1, >Ceramic Tile=

1.4 SUBMITTALS:

- A. See Section 01 33 23
- B. Submit -
 1. Manufacturer's literature for each component of system.
 2. Provide 2' x 2' sample on cement board showing all types of tile, grout, and colors specified for Project. 1/2 of sample board shall show paver tile, 1/4 of board shall show Rest Room floor tile, and 1/4 of board shall show wall tile.
 3. Color selection data
 4. Cleaning and maintenance instructions
- C. Quality Assurance -
 1. Master grade certificate.

1.5 DELIVERY, STORAGE, & HANDLING:

- A. Deliver and store packaged materials in their original unopened containers with labels intact until time of use. Store and handle materials in a manner to prevent damage or contamination by water, freezing, or foreign matter.
- B. Keep grade seals intact and cartons dry until tile are used.

1.6 PROJECT/SITE CONDITIONS:

- A. Environmental Requirements - Keep ambient temperatures of area to receive tile work and surface temperatures of substrates at 50 deg F minimum during preparation of mortar bed, laying of tile, and for 72 hours after completion of tile work. Use electric heat to prevent discoloration of grout.

PART TWO - PRODUCTS

2.1 MANUFACTURERS

- A. Approved Manufacturers

1. American Olean Tile Co, Lansdale, PA
2. Dal-Tile, Dallas, TX
3. Florida Tile, Lakeland, FL

2.2. COMPONENTS

- A. Tile -
 1. Tile shall be standard quality, dust-pressed, machine-made, white or off-white body, square or cushion edge, graded in accordance with TCA A137.1-1976.
 - a. Field tile shall have two lugs on each edge to assure uniform joint, approximately 0.040 inch.
 - b. External corners shall be standard round.
 - c. Internal corners shall be square.
 2. Restroom -
 - a. Base and inside corners shall be coved. Exterior corners & wainscot cap shall be bullnose.
 - b. Tile Size - 12" x 12" nominal Floor, 12x12 nominal wall tile.
 - c. Quality Standard - American Olean

PART THREE - EXECUTION

3.1 EXAMINATION

- A. Before commencing ceramic tilework, inspect surfaces to receive tile and accessories and notify Architect in writing of defects or conditions that will prevent satisfactory tile installation. Installation work shall not proceed until satisfactory conditions are provided.

3.2 PREPARATION

- A. Allow concrete to cure for 28 days minimum before application of setting bed.
- B. Grounds, anchors, plugs, hangers, door frames, electrical, mechanical, and other work in or behind tile shall be installed before tile work is started.

3.3 INSTALLATION

- A. Site Tolerances
 1. Sub-floor Surfaces - 1/8 inch in 10 feet from required plane.
 2. Plane of Vertical Surfaces - 1/8 inch in 8 feet from required plane. Shall be plumb and true with square corners.
- B. General
 1. Install as follows –
 - a. Use setting bed method on recessed concrete slabs, and on CMU walls.
 - b. Use thin set method on cement board on framed walls, framed floors, and ceilings.
 - c. Use thin set method directly to existing concrete slabs.
 2. Center and balance areas of tile if possible.
 3. Maintain heights of tilework in full courses to nearest obtainable dimension where heights are given in feet and inches and are not required to fill vertical spaces exactly.
 4. Hold cuts to a minimum with no cut pieces smaller than 1/2 tile size unless absolutely necessary. Make cuts on outer edges of field. Smooth cut edges. Install tile without jagged or flaked edges.
 5. Fit tile closely where edges will be covered by trim, escutcheons, or similar devices.
 6. Splitting of tile is expressly prohibited except where no alternative is possible.
 7. Make corners of tile flush and level with corners of adjacent tile, with due allowance to tolerance for tile as specified in ANSI A137.1
 8. Keep joint lines straight and of even width, including miters.
 9. Thoroughly back-up with thin-set bonding material thin-set trim units, molded, or shaped pieces, and secure firmly in place.

10. Finish floor and wall areas level and plumb with no variations exceeding 1/8 inch in 8 feet from required plane.
11. Accessories in tilework shall be evenly spaced, properly centered with tile joints, and level, plumb, and true to correct projection. Install accessories at locations and heights designated.
12. Finished tilework shall be clean and free of pitted, chipped, cracked, or scratched tiles. Clean in accordance with ANSI A137.1.

C. Application to Walls & Ceilings

1. On Setting Bed -
 - a. Apply vapor retarder to framing.
 - b. Apply metal reinforcing directly to framing over vapor retarder
 - c. Apply setting bed to required thickness of 1/2 inch maximum and properly cure before installing tile.
2. On Cement Board Sheathing -
 - a. Attach board with construction adhesive and with screws spaced 8 inches on center on walls and 6 inches on center on ceilings through wood sheathing into framing members. Pre-drill holes in cement board for screws if required by Cement Board Manufacturer.
 - b. Shim board so face is flush with adjoining gypsum wallboard and to be plumb and flat or level and flat, depending on location.
 - c. Tape and fill joints as required by Cement Board Manufacturer.
3. Dampen dry backings as determined by environmental conditions and Manufacturer=s recommendations to achieve cure. Float mortar with pressure over an area no greater than can be covered with tile while mortar remains plastic. Cover evenly with no bare spots. Comb mortar with notched trowel of type recommended by Manufacturer ten minutes maximum before applying tile. Do not apply tile to skinned-over mortar. Finished mortar bed thickness, 3/32 to 1/8 inch thick after beating-in.
5. Press glazed tile firmly into freshly notched mortar. Tap and beat to a true surface. Determine joint width by spacers on tile or by strings or pegs if tile without spacers are used. Press and beat tile into place to obtain at least 80 percent coverage by mortar on back of each tile except for tile in showers where coverage shall be 100 percent.

D. Application to Floors

1. On Setting Bed - Apply setting bed 3/4 inch thick minimum at floor drain to maximum depth equal to depression in slab minus 1/2 inch. Properly cure before installing tile.
2. On Cement Board Sheathing -
 - a. Install vapor retarder over floor prior to installing cement board.
 - b. Attach board through subfloor into framing with screws spaced 8 inches on center. Pre-drill holes in cement board for screws if required by Cement Board Manufacturer.
 - c. Tape and fill joints as required by Cement Board Manufacturer.
3. Clean base surface thoroughly. Dampen if very dry, but do not saturate.
4. Float mortar over area no greater than can be covered with tile while mortar remains plastic. Cover evenly with no bare spots. Comb mortar with notched trowel of type recommended by Manufacturer within ten minutes of applying tile.
5. Insert temporary filler in expansion and control joints.
6. Finished mortar bed thickness 3/32 inch to 1/8 inch thick with thinset mortar after beating-in. If substrate is uneven, use medium bed mortar from one of the specified manufacturers 3/16 to 3/4 inch thick after beating-in.
7. Press tile firmly into freshly notched mortar. Beat-in and adjust tile before initial set takes place.
8. Press and beat tile into position to obtain 100 percent contact with mortar bed with no voids in mortar. Obtaining 100 percent contact with rib-backed tile may require troweling mortar layer on back of each tile prior to placing on mortar bed.
9. Install safety strip consisting of one course of tile at the nose of each stair tread below the waterline.

E. Grouting of Tile & Application of Joint Sealants

1. Grout Types -

- a. Use epoxy grout with floor and base tile.
 - b. Use Portland cement grout with wall tile.
 2. Firmly set tile before grouting or applying joint sealants. This requires 48 hours minimum.
 3. Remove spacers or ropes before grouting or applying joint sealants.
 4. Remove glue from face-mounted tile before grouting or applying joint sealants.
 5. Apply joint sealants instead of grout at joint between wall and base or floor tile, and in joints in wall tile full height at corners of rooms.
 6. Using grout of type and mix specified, force grout into joints using hard rubber grouting trowel or other suitable tool recommended by Grout Manufacturer. Use sufficient pressure and flow grout in progressively to avoid air pockets and voids.
 7. Fill joints full. Fill joints of cushion edge tile to depth of cushion. Fill joints of square edge tile flush with surface.
 8. Remove excess grout from surface of tile with squeegee or rubber trowel before it loses its plasticity or begins to set. Follow Grout Manufacturer's recommendations for final clean-up.
 9. Finished grout shall be uniform in color, smooth, and without voids, pin holes, or low spots, and tile shall be clean.
- F. Curing - Keep installation at 65 to 85 deg F during first 8 hours of cure. Shade tiled areas completely from sun during this period.

3.3 PROTECTION

- A. Close to traffic spaces in which tile is being set and other tile work being done. Keep closed until tile is firmly set. Before, during, and after grouting, keep area clean, dry, and free from foreign materials and air flow which will interfere with setting and curing of grout.
- B. Newly tiled floors shall not be walked on nor worked on without using kneeling boards or equivalent protection of tiled surface.

END OF SECTION

09 65 19**RESILIENT PLANK FLOORING****PRODUCTS**

1.1 MANUFACTURERS:

A. Approved Products -

1. JJ Flooring Group, LVT, Alloy, Greg Nieter, gnieter@jjflooring.com, 502-415-8513
2. Or approved equal

1.2 MATERIALS:

A. Flooring

1. Conform to ASTM F 1700 for solid vinyl flooring, Class I monolithic, minimum wear layer thickness .20 mm and minimum overall thickness 3 mm. ASTM E 648 Critical Radiant Flux Class I, 0.45 or more watts/cm². Static Load Limit of 200 lbs/in². Static Co-efficient of Friction .60. Size of tile is 9 inches x 48".
2. Extend color and pattern throughout the thickness of the wear layer. Sheet vinyl flooring may contain post-consumer or post-industrial recycled content. As required, provide welding rods as recommended by the manufacturer for heat welding of joints.
3. Colors & Patterns
 - A. Selected by Owner from manufacturers standard colors.

B. Adhesive

1. Glue down.

C. Surface Preparation Materials

1. Provide surface preparation materials, such as panel type underlayment, lining felt, and floor crack fillers as recommended by the flooring manufacturer for the subfloor conditions.
2. Comply with ASTM F 1482 for panel type underlayment products. Use the following substrate:
 - 1) Plywood: As specified in Section 06 16 10 Wood Panel Sheathing.
3. Patching Compound
 - a. Calcium sulfate or plaster-of-paris type patching compounds are prohibited.
 - b. Approved Products
 - 1) Armstrong S-180 Latex Underlayment

1.3 MAINTENANCE:

A. Extra Materials

1. Leave 4 boxes extra tile of each pattern and color used on job with Owner for future repairs.

PART 2 EXECUTION

2.1 EXAMINATION:

- A. Inspect surfaces for conditions not suitable for first class installation including but not limited to the following
 1. Excessive moisture,
 2. Alkaline salt,
 3. Hydrostatic pressure.
 4. Indication of substrate instability

2.2 PREPARATION:

A. Irregularities

1. Remove all ridges and other irregularities by sanding or grinding as required.
2. Fill all cracks, holes, depressions, and the like with specified patching compound.

B. Surface Coatings

1. Remove all waxes, paint, oil, sealers, and curing compound which is incompatible with the product to be employed.
2. Broom or vacuum surface to remove dirt, dust, and other loose particle just prior to installing flooring.

2.3 INSTALLATION:**A. General Installation**

1. Install flooring in manner to produce smooth, even finished surfaces tightly jointed and accurately aligned according to Manufacturer's recommendations.
2. Fit neatly against projections, piping, electrical service outlets, etc.
3. Leave flooring level, free from buckles, cracks, and projecting edges.

B. Protection

1. Protect the flooring from damage by other trades and placement of fixtures and furnishings.

2.4 ADJUSTMENTS & CLEANING:**A. Inspect floors, make necessary adjustments within one month after mechanical heat or other heat has been supplied continuously in finished areas.****B. Initial Cleaning**

1. Sweep or vacuum thoroughly and remove any adhesive residue from surface. Mineral Spirits is acceptable for spot cleaning.
2. Do not wash the floor for at least 48 hours after installation.
3. Lightly damp mop with a very diluted solution of Metroflor Cleaner. Remove any scuffs and excessive soil by careful scrubbing. Certain types of rubber heel marks may be removed by rubbing with a cloth dampened in mineral spirits.

C. Routine Commercial Maintenance:

1. Light daily sweeping, dust mopping or vacuuming will prevent dirt and grit particles from being ground into the surface of the tile. Non-rubber, non-staining walk off mats should be used to control the amount of dirt and grit reaching the floor. Frequent light mopping will prevent the floor from becoming heavily soiled and will remove most spills and stains. Wash the floor by damp mopping with a neutral cleaner diluted with warm water.
2. If the floor receives hard use and becomes extremely dirty, an occasional scrubbing may be necessary. This can be accomplished by using a low speed power buffer with a red scrubbing-type (polyester or nylon) pad. Spray the floor with diluted neutral cleaner and work the solution over the floor using the buffer and the scrubbing pad. After completing, remove the dirty residue by damp mopping with clear water or with a wet vacuum.

END OF SECTION

09 74 20**SPECIAL WALL SURFACING**
(FIBERGLASS REINFORCED PLASTIC PANELS)**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Work included in but not limited to this section.
 - 1. Supply and install kitchen Fire Resistant Panel behind stove as shown on drawings and specified herein.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
- B. Sections

1.3 REFERENCES

- A. American Society for Testing and Materials:
 - 1. ASTM D 2583 (2007) Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
 - 2. ASTM D 5420 (2004) Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)
 - 3. ASTM E 84 (2004) Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. See Section 01 33 23 Submittal Procedures for requirements.
- B. Product Data: Submit product data, including manufacturer's SPEC-DATA® product sheet, for specified products.
- C. Submit shop drawings for approval in complete sets of drawings at 3/4 inch scale, indicating layout, profiles and product components, including anchorage, accessories, finish colors, patterns and textures.
 - 1. Indicate location and dimension of joints, fastener attachment, of all gas, electrical, and ventilation cutouts within panels.

1.5 QUALITY ASSURANCE

- A. Pre-installation Meeting
 - 1. See Section 01 33 23 Submittal Procedures
 - 2. Agenda
- B. Quality Assurance/Control submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports and other documentary data affirming quality of products and installations.
 - 1. Submit 2 copies to Architect immediately upon receipt.
- C. Mock-Ups:
 - 1. Install at project site a job mock-up using acceptable products and manufacturer approved installation methods. Obtain Owner's and Architect's acceptance of finish color, texture, pattern and workmanship standards.

1.6 DELIVERY, STORAGE & HANDLING

- A. Storage and Protection:
 - 1. Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
 - 2. Store panels indoors in a dry place at the project site.
- B. Handling:
 - 1. Remove foreign matter from face of panel by using a soft bristle brush, avoiding abrasive action.

1.7 PROJECT CONDITIONS

- A. See Section 01 73 19 Installation
- B. Environmental Requirements:
 - 1. Installation shall not begin until building is enclosed, permanent heating and cooling equipment is in operation, and residual moisture from plaster, concrete or terrazzo work has dissipated.
 - 2. During installation, and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.
 - 3. Provide ventilation to disperse fumes during application of adhesive as recommended by adhesive manufacturer.
- C. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.8 WARRANTY

- A. See Section 01 78 10 Closeout Submittals & Procedures

PART 2 PRODUCTS

2.1 FIBERGLASS REINFORCED PLASTIC (FRP) PANELS

- A. Manufacturer: Crane Composites, Inc. Contact: Joliet Sales Office, PO Box 2429, Joliet, IL 60434; Telephone: (800) 435-0080, (815) 467-8600; Fax: (815) 467-8666; E-mail: salesjol@cranecomposites.com; website: www.glasbord.com.
 - 1. Kemply Panels:
 - a. FRP Face:
 - 1). Fire-X Glasbord.
 - b. Color:
 - 1). 85 white.
 - c. Moldings:
 - 1). Provide harmonizing PVC (polyvinyl chloride) moldings.- 85 white.
 - d. Rivets:
 - 1). Of type, size and color as recommended by the manufacturer for the required installation.
 - e. Surface Protection:
 - 1). Provide manufacturer's proprietary *Surfaseal* surface protection for fiberglass reinforced plastic (FRP) panels.
 - f. Division Bars, Corner Trim:
 - 1). Panel manufacturer's standard length extruded vinyl pieces; longest length possible to eliminate end joints.
 - g. Fasteners:
 - 1). Noncorrosive drive rivets.

2.2 MANUFACTURED UNITS

- A. Kemlite Fire-X Glasbord Fiberglass Panels with *Surfaseal* Surface Protection:
 - 1. Rating:
 - a. Fire-X Glasbord Underwriters Laboratories, Inc. (UL) classified, Class I (A) Interior Finish Material.
 - b. Fire-X Glasbord FM Class I (A) Interior Finish Material, Factory Mutual approved per Standard 4880, Test Report 2B2A2.AM.
 - 2. Wall Panels: Finish, thickness and color shall be:
 - a. Embossed 0.09 inch (2.3 mm) Fire-X Glasbord with *Surfaseal* Color: 85 white.

2.3 ACCESSORIES

- A. Adhesive: Provide panel adhesive as recommended by panel manufacturer.

PART 3- EXECUTION**3.1 MANUFACTURER'S INSTRUCTIONS**

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

3.2 EXAMINATION

- A. Site Verification of Conditions: Verify that substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.
1. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails are countersunk and joints and cracks are filled flush and smooth with the adjoining surface.
 2. Do not begin installation until backup surfaces are in satisfactory condition.

3.3 INSTALLATION

- A. Fiberglass Reinforced Panel (FRP) Installation:
1. Cut and drill panels with carbide tipped saw blades or drill bits, or cut with snips.
 2. Install panels with manufacturer's recommended gap for panel field and corner joints.
 3. Predrill fastener holes in panels with 1/8 inch (3.2 mm) oversize.
 4. For trowel type and application of adhesive, follow adhesive manufacturer's recommendations.
 5. Use products acceptable to panel manufacturer and install FRP system in accordance with panel manufacturer's printed instructions. Comply with panel manufacturer's *Installation Guide #6211*.

3.4 CLEANING

- A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace products that have been installed and are damaged. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.
1. Remove any adhesive or excessive sealant from panel face using solvent or cleaner recommended by panel manufacturer.

3.5 PROTECTION

- A. Protection: Protect installed product and finish surfaces from damage during construction.

END OF SECTION

BLANK PAGE

09 81 16ACOUSTIC BLANKET INSULATION**PART 1 PRODUCTS**

1.1 MATERIALS

- A. Acceptable Manufacturers
 - 1. Certaineed
 - 2. Knauf Fiber Glass
 - 3. Manville Corp.
 - 4. Owens Corning
 - 5. U.S. Gypsum
- B. Substitutions,
 - 1. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

1.2 SOUND ATTENUATION BATTS

- A. Type:
 - 1. Un-faced glass fiber acoustical insulation complying with ASTM C 665, Type I
- B. Size:
 - 1. Thickness 3 ½" Width 16" Length 96"
- C. Surface Burning Characteristics
 - 1. Maximum flame spread: 10
 - 2. Maximum smoke developed: 10 When tested in accordance with ASTM E 84
- D. Combustion Characteristics:
 - 1. Passes ASTM E 136.
- E. Fire Resistance Ratings
 - 1. Passes ASTM E 119 as part of a complete fire tested wall assembly
- F. Sound Transmission Class: STC 36
- G. Dimensional Stability
 - 1. Linear Shrinkage less than 0.1%

1.3 QUIET ZONE ACOUSTIC BATTS

- A. Type: Kraft faced glass fiber acoustical insulation complying with ASTM C 665, Type II, Class C
- B. Size:
 - 1. Thickness 3 ½" Width 16" Length 96"
 Surface Burning Characteristics:
 - 1. Maximum flame spread: Not Rated
 - 2. Maximum smoke developed: Not Rated
 - a. When tested in accordance with ASTM E 84
 - 3. Kraft facing on this insulation will burn and must not be left exposed. The facing must be installed in substantial contact with the unexposed surface of the wall finish material. Protect facing from any open flame or heat source
- D. Fire Resistance Ratings
 - 1. Passes ASTM E 119 as part of a complete fire tested wall assembly
- E. Sound Transmission Class: STC 36
- F. Dimensional Stability
 - 1. Linear Shrinkage less than 0.1%

PART 2 EXECUTION

2.1 EXAMINATIONS

- A. Prior to installation, examine each piece to verify that all are proper in all respects
 - 1. Examine substrates and conditions under which insulation work is to be performed. A satisfactory substrate is one that complies with requirements of the section in which substrate and related work is specified
 - 2. Verify mechanical and electrical services within the shaftwall have been tested and inspected.
 - 3. Obtain installer's written report listing conditions detrimental to performance of work in this section. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.
 - 4. Clean substrates of substances harmful to insulation

2.2 INSTALLATION

- A. Comply with manufacturer's instructions for particular conditions of installation in each case
- B. Batts may be friction-fit in place until the interior finish is applied.
 - 1. Install batts to fill entire stud cavity.
 - 2. If stud cavity is less than 96" in height, cut lengths to friction-fit against floor and ceiling tracks.
 - 3. Walls with penetrations require that insulation be carefully cut to fit around outlets, junction boxes and other irregularities
- C. Where walls are not finished on both sides, or insulation does not fill the cavity depth, supplementary support must be provided to hold product in place.
- D. Where insulation must extend higher than 8 feet, temporary support can be provided to hold product in place until the finish material is applied.

2.3 ADJUSTING AND CLEANING

- A. Clean site of all excess material and dispose of properly.

2.4 PROTECTION

- A. Protect installed insulation as recommended by manufacturer.

END OF SECTION

09 90 01**GENERAL PAINTING REQUIREMENTS****PART 1 GENERAL**

- 1.1 SECTION INCLUDES:
- A. Work included but not limited to this Section;
 - 1. Surface preparation and field application of paints and coatings required by Contract Documents.
- 1.2 RELATED SECTION:
- A. Documents affecting work of this Section include, but are not limited to, General Conditions, Supplementary Conditions, and Sections in Division 01, General Requirements, of these Specifications.
 - 1. Section 09 91 13 Exterior Painting
- 1.3 DESCRIPTION OF SYSTEMS:
- A. Systems specified in this Section are in addition to shop applied coatings specified in other Sections or existing coats.
 - B. It is the intent of this Specification to require all surfaces, except those explicitly exempted herein, to be painted so Owner is not required to do any painting.
- 1.4 SUBMITTALS:
- A. See Section 01 33 23 Submittal Procedures
 - B. Product Data
 - 1. Written list of specific products proposed along with Manufacturer's certification that products meet specified requirements.
 - a. Data shall be specific as to Manufacturer's brand name and identifying numbers.
 - b. Indicate items to be finished as work of each painting Section.
 - c. Outline preparation and application procedures to be followed including application methods, time between coats, and environmental and other conditions which may cause alteration of outlined procedures.
 - 2. Maintenance instructions.
 - C. Samples
 - 1. Provide paint card for each color and for each paint system. Card to show each components of system as well as total system.
- 1.5 QUALITY ASSURANCE:
- A. Pre-installation Meeting
 - 1. See Section 01 31 13 Project Coordination
 - 2. Agenda
 - B. Quality Assurance/Control submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports and other documentary data affirming quality of products and installations.
 - 1. Submit 2 copies to Architect immediately upon receipt.
 - C. Field Samples
 - 1. Prior to application of any paint system, meet on Project site with Architect and Owner's representative . Architect may select one surface for application of each paint system specified.
 - 2. Apply paint systems to surfaces indicated by Architect following procedures outlined in Contract Documents and Product Data submission specified above.
 - 3. After approval of samples, proceed with application of paint system throughout Project.
 - C. Applicator shall have experience in application of specified products for five years minimum and be acceptable to Architect and Manufacturer.
- 1.6 DELIVERY, STORAGE, & HANDLING:
- A. Deliver specified products in original containers with labels intact on each container.
 - B. Store materials in single place.
 - C. Keep storage area clean and rectify any damage to area at completion of work of this Section.

- D. Place waste, cloths and material which may constitute fire hazard in water filled closed metal containers and remove at end of each workday site.

1.7 PROJECT/SITE CONDITIONS:

- A. Environmental Conditions -
1. Maintain temperature of paint storage area at 55°F minimum.
 2. Perform painting operations at temperature conditions recommended by Manufacturer for each operation and the following -
 - a. Air and surface temperatures are at least 55°F but less than 110°F.
 - b. Relative humidity is not above 70% and the surface temperature is at least 5°F above dew point.
 3. Do not apply finishes unless moisture content of surface is 12% or less.
 4. Provide adequate continuous ventilation and maintain environmental conditions for 24 hours prior to application and 48 hours minimum after application of materials.

1.8 SCHEDULING:

- A. Coordinate with other Sections for work that requires painting prior to installation.
- B. Examine Contract Documents for painting requirements of other trades. Become familiar with their painting provisions and the painting of finish surfaces left unfinished by the requirements of other Sections.

1.9 MAINTENANCE:

- A. Extra Materials
1. Provide one gallon of each finish coat material in Manufacturer's original container in each color used.
 2. Provide one quart of each primer and of each undercoat in each color used.

PART 2 PRODUCTS

2.1 MANUFACTURERS:

- A. Approved Manufacturers
1. Benjamin Moore, Montvale, NJ (888) 236-6667 or (201) 573-9600
 2. Chemcraft International Inc, Grand Rapids, MI (616) 776-6200
 3. ICI Paints
 - a. ICI Dulux Paints, Cleveland, OH (800) 984-5444 or (216) 984-5444
 - b. ICI Devoe, Cleveland, OH (888) 861-6353 or (216) 344-8000
 - c. ICI Fuller O'Brien, Cleveland, OH (888) 861-6353
 4. PPG Paints
 - a. PPG Pittsburgh Paints, Pittsburgh, PA (800) 441-9695
 - b. PPG Porter, Louisville, KY (800) 322-6370 or (502) 588-9200
 5. Pratt & Lambert, Cleveland, OH (800) 289-7728 or (216) 566-2000
 6. Sherwin-Williams, Cleveland, OH (800) 321-8194 or (216) 566-2000
 7. Sonneborn, Shakopee, MN (800) 496-6067 or (612) 4965-6000
 8. United Gilsonite Laboratories, Scranton, PA (800) 845-5227 or (717) 344-1202
 9. Wm. Zinsser & Co, Somerset, NJ (800) 899-1211 or (732) 469-4367
 10. M.A.Bruder & Sons Inc, Broomall PA (800) 622-1899

2.2 MATERIALS

- A. Linseed oil, shellac, turpentine, and other painting materials shall be pure, of highest quality, and bear identifying labels on containers.
- B. Tinting color shall be best grade of type recommended by Manufacturer of paint or stain used on Project.

PART 3 EXECUTION

3.1 INSPECTION:

- A. Prior to installation of work of this Section, inspect installed work of other Sections and verify that such work is complete as necessary to permit successful completion of work of this Section.
- B. If inspection reveals deficiencies in work of other Sections such that painting cannot be successfully completed, do not proceed with work of this Section in area of deficiency until resolved.
- C. Starting painting work will be construed as acceptance of surfaces and conditions within any particular area.

3.2 PREPARATION:

- A. Protection
 - 1. Remove all oily rags and waste from building each night. Take every precaution to avoid danger of fire.
 - 2. Protect finish work and adjacent materials during painting.
 - 3. Good painting practice excludes splattering, dripping or painting any surfaces not intended to be painted. These items will not be spelled out in detail but pay special attention to the following -
 - a. Do not paint finish copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.
 - b. Keep cones of ceiling speakers completely free of paint. If it is required that metal speaker grilles are to be painted, paint prior to mounting grilles to speakers. Mask off metal grilles installed on ceiling speakers if ceiling is being spray painted.
- B. General Surface Preparation
 - 1. Surfaces to be painted shall be clean and free of loose dirt. Clean and dust surfaces before painting or finishing.
 - 2. Do no exterior painting while surface is damp, unless recommended by Manufacturer, nor during rainy or frosty weather. Interior surfaces shall be dry before painting.
 - 3. Apply barrier coats over incompatible materials.
 - 4. Remove hardware, electrical device covers, lighting fixtures, and similar in place work or provide surface applied protection prior to surface preparation and painting. After completion of painting, reinstall any removed work.
 - 5. Fill holes and cracks in surfaces to receive paint or stain.
 - 6. De-gloss existing painted surfaces if recommended by Paint manufacturer . Sand smooth and clean entire surface prior to painting.
 - 7. Remove mildew by scrubbing with solution of bleach and water. Rinse with clean water and allow surface to thoroughly dry.
- C. Metal Surfaces
 - 1. Aluminum and Copper -
 - a. Remove surface contamination by steam, high pressure detergent wash, or solvent washing.
 - b.. Apply etching primer or acid etch and apply paint immediately following cleaning and etching.
 - 2. Galvanized Surfaces
 - a. Remove surface contamination and oils and wash with solvent (SSPC-SP1) rinse and allow to thoroughly dry.
 - b. Pre-treat and apply an acid etch and galvanized primer.
 - 3. Uncoated Steel and Iron Surfaces -
 - a. Remove grease, rust, scale, dirt, and dust according to SSPC-1 Where heavy coatings of rust or scale are evident, use wire brushing (SSPC-SP2) or other approved method to ensure surfaces are clean before painting.
 - 4. Shop Coated Metal Surfaces
 - a. Clean shop coats of paint that have become marred and touch up with proper type primer.
 - b. Sand and scrape to remove loose primer and corrosion, Sand and feather feather edges to a smooth surface.
 - c. Spot prime
- D. Wood Surfaces -
 - 1. Sand woodwork smooth with 220 sandpaper and clean surfaces before proceeding with stain or first coat application.
 - 2. Use fine sandpaper between coats to produce smooth, even surfaces.
- E. Cementitious & Masonry Surfaces -
 - 1. Clean to remove efflorescence, chalk, dust, dirt, grease, oils, and the like.
 - 2. Roughen where required to remove glaze.
 - 3. Clean concrete floors with etching cleaner and flush with clean water.
 - 4. Pay particular attention to the paint manufacturer's preparation instructions.
 - 5. Except for steam cured products, allow surfaces to cure from 30 to 90 days according to manufacturer's recommendations before painting.
- F. Existing Surfaces
 - 1. Apply barrier coats where new paint is incompatible with new finish.
 - 2. Remove chalk, dust, soil, grease, oil, and other materials detrimental to bond.

3. Sand glossy finishes to enhance bond.
4. Apply additional coats if necessary to prevent bleed through of existing finish or color.
5. Apply filler coats where necessary to emulate build-up of multiple coats of finish.

3.3 APPLICATION:

- A. Paint or finish complete all surfaces to be painted as described in Contract Documents.
 1. Finish casework and wood trims to be installed under Section 06201. Back prime wood elements to be installed against concrete or masonry or subjected to moisture.
 2. Paint mechanical and electrical items that require field painting as determined by Architect. These include but are not limited to -
 - a. Gas pipe from gas meter into building
 - b. Metal protective structures for refrigerant lines
 - c. Mechanical flues and pipes penetrating roof
 - d. Electrical panel and disconnect enclosures
 3. Paint surfaces behind speaker grilles incorporating grille cloth with flat black paint.
 4. Paint surfaces in organ chamber behind grille cloth with flat black paint.
- B. Tint priming coat and undercoat to approximate shade of final coat, but with enough difference so it is possible to check application of specified number of coats.
- C. Spread materials smoothly and evenly.
- D. Putty nail holes in wood after application of first finish coat using natural colored type to match wood finish. Bring putty flush with adjoining surfaces.
- E. Touch up suction spots after application of first coat.
- F. Paint shall be thoroughly dry and surfaces clean before applying succeeding coats.
- G. Use fine sandpaper between coats as necessary to produce even, smooth surfaces.
- H. Make edges of paint adjoining other materials or colors clean, sharp, and without overlapping.
- I. Finishing Mechanical and Electrical Equipment -
 1. Refer to Division 15 and 16 for schedule of color coding and identification of banding of equipment, duct work, piping, and conduit. Paint in accordance with requirements.
 2. Finish paint shop primed equipment.
 3. Remove and paint separately unfinished louvers, grilles and access panels for mechanical and electrical systems.
 4. Prime and paint insulated and exposed ducts and pipes, covers, conduit, boxes, hangers, brackets, collars except where items are plated or prefinished.
 5. Replace identification markings on mechanical or electrical equipment when painted or spattered.
 6. Paint interior surfaces of air ducts, convactor and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint. Paint dampers exposed immediately behind louvers, grilles, convactor and baseboards cabinets to match face panels.
 7. Paint exposed conduit and electrical equipment in finished areas to match adjacent surfaces.
 8. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
 9. Replace electrical plates, hardware, light fixture trim and fittings removed prior to finishing.
- J. Finished work shall be uniform, of approved color, smooth, and free from runs, sags, defective brushing, rolling, clogging, and excessive flooding.

3.4 ADJUSTMENT:

- A. At completion of Project, touch up work to match specified finish. Repaint areas damaged during construction with specified finish at no additional cost to Owner.

3.5 CLEANING:

- A. Upon completion of work of this Section, remove paint spots from floors, walls, glass, or other surfaces and leave work clean, orderly, and in acceptable condition. Remove debris caused by work of this Section from premises.

END OF SECTION

09 91 13**INTERIOR PAINTING****PART 1 GENERAL**

- 1.1 REGULATORY REQUIREMENTS:
- A. Conform to the latest edition of Occupational, Safety and Health Act (OSHA) issued by applicable authorities having jurisdiction in regard to site safety (ladders, scaffolding, ventilation, etc.).
 - B. Conform to requirements of local authorities having jurisdiction in regard to the storage, mixing, application and disposal of all paint and related waste materials.
- 1.2 PRODUCT DELIVERY, STORAGE AND HANDLING:
- A. Deliver all painting materials in sealed, original labeled containers bearing manufacturer's name, brand name, type of paint or coating and color designation, standard compliance, materials content as well as mixing and/or reducing and application requirements.
 - B. Store all paint materials in original labeled containers in a secure (lockable), dry, heated and well ventilated single designated area meeting the minimum requirements of both paint manufacturer and authorities having jurisdiction and at a minimum ambient temperature of 45° F. Only material used on this project to be stored on site.
 - C. Where toxic and/or volatile / explosive / flammable materials are being used, provide adequate fireproof storage lockers and take all necessary precautions and post adequate warnings (e.g. no smoking) as required.
 - D. Take all necessary precautionary and safety measures to prevent fire hazards and spontaneous combustion and to protect the environment from hazard spills. Materials that constitute a fire hazard (paints, solvents, drop clothes, etc.) shall be stored in suitable closed and rated containers and removed from the site on a daily basis.
 - E. Comply with requirements of authorities having jurisdiction, in regard to the use, handling, storage and disposal of hazardous materials.
- 1.3 PROJECT / SITE REQUIREMENTS:
- A. UNLESS specifically pre-approved by the Architect and the manufacturer, perform no painting or decorating work when the ambient air and substrate temperatures are below 50° F for both interior and exterior work.
 - B. Perform no exterior painting work unless environmental conditions are within MPI and paint manufacturer's requirements or until adequate weather protection is provided. Where required, suitable weatherproof covering and sufficient heating facilities shall be in place to maintain minimum ambient air and substrate temperatures for 24 hours before, during and after paint application.
 - C. Perform no interior painting or decorating work unless adequate continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above minimum requirements for 24 hours before, during and after paint application. Provide supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
 - D. Perform no painting or decorating work when the relative humidity is above 85% or when the dew point is less than 5° F variance between the air / surface temperature.
 - E. Perform no painting or decorating work when the maximum moisture content of the substrate exceeds:
 - 1. 12% for concrete and masonry (clay and concrete brick/block).
 - 2. 15% for wood.

3. 12% for plaster and gypsum board.
- F. Conduct all moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple cover patch test.
- G. Test concrete, masonry and plaster surfaces for alkalinity as required.
 1. Concrete and masonry surfaces must be installed at least 28 days prior to painting and decorating work and must be visually dry on both sides.
- H. Apply paint only to dry, clean, properly cured and adequately prepared surfaces in areas where dust is no longer generated by construction activities such that airborne particles will not affect the quality of finished surfaces.
- I. Perform no painting or decorating work unless a minimum lighting level of 30 foot candles is provided on surfaces to be painted or decorated. Adequate lighting facilities shall be provided by the General Contractor.

1.4 WASTE MANAGEMENT AND DISPOSAL:

- A. Paint, stain and wood preservative finishes and related materials (thinners, solvents, etc.) are regarded as hazardous products and are subject to regulations for disposal. Obtain information on these controls from applicable National, State and Local authorities having jurisdiction.
- B. All waste materials shall be separated and recycled. Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility. Materials that cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
- C. Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
- D. To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground the following procedures shall be strictly adhered to:
 1. Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case shall equipment be cleaned using free draining water.
 2. Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
 3. Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
 4. Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
 5. Empty paint cans are to be dry prior to disposal or recycling (where available).
 6. Close and seal tightly partly used cans of materials including sealant and adhesive containers and store in protected, well ventilated, fire-safe area at moderate temperature.
- E. Set aside and protect surplus and uncontaminated finish materials not required by the Owner and deliver or arrange collection for verifiable re-use or re-manufacturing.

PART 2 PRODUCTS

2.1 MATERIALS:

- A. Only materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, etc.) listed in the latest edition of the MPI Approved Product List (APL) are acceptable for use on this project. All such material shall be from a single manufacturer for each system used.
- B. Other materials such as linseed oil, shellac, thinners, solvents, etc. shall be the highest quality product of an MPI listed manufacturer and shall be compatible with paint materials being used as required.
- C. All materials used shall be lead and mercury free and shall have low VOC content where possible.

- D. Where required, use only materials having a minimum MPI "Environmentally Friendly" E1 rating based on VOC (EPA Method 24) content levels.
- E. Where indoor air quality (odour) is an issue, use only **MPI** listed materials having a minimum E2 rating.
- F. Where required to meet LEED (Leadership in Energy and Environmental Design) program requirements, use only MPI listed materials having an "L" rating designation.
- G. All paint materials shall have good flowing and brushing properties and shall dry or cure free of blemishes, sags, air entrapment, etc.

- H. Where required, paints and coatings shall meet flame spread and smoke developed ratings designated by State Code requirements and/or authorities having jurisdiction.
- I. Slip Resistant Additive (SRA): rubber aggregate, clean/washed silica sand or ground walnut chips (interior dry areas only) for use with or as a component part of paint (usually floor / porch / stair enamel) on horizontal surfaces as required to provide slip resistance.
 - 1. Where site applied, with material, either mixed into paint and mixed constantly to keep material in suspension, or broadcast into first or prime coat as required.

2.2 EQUIPMENT:

- A. Painting and Decorating Equipment, to best trade standards for type of product and application.
- B. Spray Painting Equipment, of ample capacity, suited to the type and consistency of paint or coating being applied and kept clean and in good working order at all times.

2.3 MIXING AND TINTING:

- A. Unless otherwise specified herein or pre-approved, all paint shall be ready-mixed and pre-tinted. Re-mix all paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and color and gloss uniformity.
- B. Paste, powder or catalyzed paint mixes shall be mixed in strict accordance with manufacturer's written instructions.
- C. Where thinner is used, addition shall not exceed paint manufacturer's recommendations.
 - 1. Do not use kerosene or any such organic solvents to thin water-based paints.
- D. If required, thin paint for spraying in strict accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Architect.

2.4 FINISH AND COLORS:

- A. Unless otherwise specified herein, all painting work shall be in accordance with MPI Custom Grade finish requirements.
- B. Colors shall be as selected by the Architect from a manufacturer's full range of colors. A Finish Schedule will be furnished after award of the Contract.
- C. Generally and unless otherwise specified herein or noted on finish schedules the quantity of colors and finishes shall be based on the following criteria:
 - 1. Interior colors will be based on five (5) base colors and three (3) accent colors with a maximum of one (1) deep or bright color. No more than eight (8) colors will be selected for the entire project and no more than three (3) colors will be selected in each area. Note that this does not include pre-finished items by others, e.g. aluminum or vinyl windows, aluminum doors and handrails, etc.

2. Interior colors and/or patterns shall be consistent throughout each unit with one color scheme prepared.
3. Unless otherwise noted or scheduled, walls shall be painted the same color within a given area.
4. Ceilings (except those having a spray textured coating) shall be painted white.
5. Corridors shall be painted different colors on alternate floors with two (2) separate two (2) color schemes prepared for doors and trim.
6. Designated rooms / spaces shall be painted using different colors or more than one color than typical rooms in accordance with Finish Schedule requirements with a minimum of two (2) colors required.
7. Except as noted herein or indicated on the Finish Schedule, interior walls and ceiling surfaces shall be painted in accordance with the following criteria over appropriate prime / sealer coat:
 - a. All areas (except as noted): washable latex with G3 (eggshell) finish.
 - b. Laundry facilities / rooms, public wash / shower / bathrooms, residential kitchens and bathrooms and ensuites: washable latex with G5 (semi-gloss) finish.
8. Doors, frames and trim shall be painted a different color than walls. Unless otherwise noted or scheduled all doors, frames and trim shall be painted using a G5 (semi-gloss) finish.
9. Window frames (unless pre-finished) including trim and sills shall be painted a different color than walls. Unless otherwise noted or scheduled all window frames, trim and sills shall be painted using a G5 (semi-gloss) finish.
10. Where required by authorities having jurisdiction, exit and vestibule doors shall be painted a contrasting color to walls and a different color than any other door in the same area.
11. Access doors, prime coated butts and other prime painted hardware (e.g. door closers), registers, radiators and covers, exposed piping and electrical panels shall be painted to match adjacent surfaces (i.e. same color, texture and sheen), unless otherwise noted or where pre-finished.
12. Plywood service panels (e.g. electrical, telephone and cable vision panels) including edges shall be back-primed and painted flat gray.
13. The inside of light valances shall be painted gloss white.
14. The inside of all duct work behind louvers, grills and diffusers for a minimum of 18" or beyond sight line, whichever is greater, shall be painted using flat black (non-reflecting) paint.

2.5 GLOSS / SHEEN RATINGS:

- A. Paint gloss shall be defined as the sheen rating of applied paint, in accordance with the following MPI values:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte or Flat finish	0 to 5	10 max.
G2	Velvet finish	0 to 10	10 to 35
G3	Eggshell finish	10 to 25	10 to 35
G4	Satin finish	20 to 35	35 min.
G5	Semi-Gloss finish	35 to 70	
G6	Gloss finish	70 to 85	
G7	High-Gloss finish	> 85	

- B. Gloss level ratings of all painted surfaces shall be as specified herein and as noted on Finish Schedule.

PART 3 EXECUTION**3.1 EXAMINATION:**

- A. All surfaces requiring painting shall be inspected by the contractor and will notify the Architect in writing of any defects or problems, prior to commencing painting work, or after the prime coat shows defects in the substrate.
- B. Prior to commencement of work of this section, thoroughly examine (and test as required) all conditions and surfaces scheduled to be painted and report in writing to the Contractor and Architect any conditions or surfaces that will adversely affect work of this section.
- C. No painting work shall commence until all such adverse conditions and defects have been corrected and surfaces and conditions are acceptable to the Painting Subcontractor.
- D. Substrate defects shall be made good and sanded by others ready for painting particularly after the first coat of paint.
 - 1. The starting of finish painting by Painting Subcontractor of defective surfaces shall indicate acceptance of correcting defects and deficiencies in the substrate which may adversely affect the painting work. Any costs of making good defects shall be borne by the painter including re-painting of entire defective surface (no touch-up painting).
 - 2. It shall always be the responsibility of the Painting Subcontractor to see that surfaces are properly prepared before any paint or coating is applied.

3.2 PREPARATION OF SURFACES:

- A. Prepare all surfaces in accordance with MPI requirements. Refer to the MPI Painting Manual in regard to specific requirements, for the following:
 - 1. environmental conditions.
 - 2. acid etching.
 - 3. vertical and horizontal concrete surfaces.
 - 4. galvanized and zinc coated metal.
- B. Sand, clean, dry, etch, neutralize and/or test all surfaces under adequate illumination, ventilation and temperature requirements.
- C. Protect all miscellaneous hardware and surface fittings / fastenings (e.g. electrical plates, mechanical louvers, door and window hardware (e.g. hinges, knobs, locks, trim, frame stops), removable rating / hazard / instruction labels, washroom accessories, light fixture trim, etc. from wall and ceiling surfaces, doors and frames, prior to painting.
 - 1. Carefully clean all such items upon completion of painting work in each area.
 - 2. Do not use solvent or reactive cleaning agents on items that will mar or remove finishes (e.g. lacquer finishes).
 - 3. Doors shall be removed before painting to paint bottom and top edges and then re-hung.
- D. Protect all adjacent interior surfaces and areas, including rating and instruction labels on doors, frames, equipment, piping, etc., from painting operations and damage by drop cloths, shields, masking, templates, or other suitable protective means and make good any damage caused by failure to provide such protection.

3.3 APPLICATION:

- A. Do not paint unless substrates are acceptable and/or until all environmental conditions (heating, ventilation, lighting and completion of other sub trade work) are acceptable for applications of products.
- B. Apply paint or stain in accordance with MPI Painting Manual Custom Grade finish requirements.
- C. Apply paint and decorating material in a workmanlike manner using skilled and trade qualified applicators as noted under Quality Assurance.
- D. Apply paint and coatings within an appropriate time frame after cleaning when environmental conditions encourage flash-rusting, rusting, contamination or the

- manufacturer's paint specifications require earlier applications.
- E. Painting coats specified are intended to cover surfaces satisfactorily when applied at proper consistency and in accordance with manufacturer's recommendations.
 - F. Tint each coat of paint progressively lighter to enable confirmation of number of coats.
 - G. Unless otherwise approved by the Architect, apply a minimum of four coats of paint where deep or bright colors are used to achieve satisfactory results.
 - H. Sand and dust between each coat to provide an anchor for next coat and to remove defects visible from a distance up to 39".
 - I. Do not apply finishes on surfaces that are not sufficiently dry. Unless manufacturer's directions state otherwise, each coat shall be sufficiently dry and hard before a following coat is applied.
 - J. Prime coat of stain or varnish finishes may be reduced in accordance with manufacturer's directions.
 - K. Paint finish shall continue behind all wall-mounted items (e.g. chalk and tack boards).

3.4 INTERIOR PAINT AND COATING SYSTEMS:

- A. Paint interior surfaces in accordance with the following MPI Painting Manual requirements:
 1. CONCRETE VERTICAL SURFACES: (INCLUDING HORIZONTAL SOFFITS)
 - a. INT 3.1D Alkyd G1 finish.
 2. CONCRETE HORIZONTAL SURFACES: (FLOORS AND STAIRS)
 - a. INT 3.2B Alkyd floor enamel low gloss finish.
 3. GALVANIZED METAL: (DOORS, FRAMES, RAILINGS, MISC. STEEL, PIPES, OVERHEAD DECKING, DUCTS, ETC.)
 - a. INT 5.3A Latex G5 finish.
 4. DRESSED LUMBER: (INCLUDING DOORS, DOOR AND WINDOW FRAMES, CASINGS, MOLDING, ETC.)
 - a. INT 6.3A High performance architectural latex G5 finish.
 5. FIBERGLASS: (PANELS, TRIMS, FABRICATIONS, ETC.)
 - a. INT 6.7B Alkyd G5 finish.
 6. SPRAY TEXTURED SURFACES: (CEILINGS)
 - a. INT 9.1A Latex flat finish. [for spray application only]
 7. PLASTER AND GYPSUM BOARD: (GYPSUM WALLBOARD, DRYWALL, "SHEET ROCK TYPE MATERIAL", ETC., AND TEXTURED FINISHES)
 - a. INT 9.2B High performance architectural latex G5 finish.

3.7 FIELD QUALITY CONTROL / STANDARD OF ACCEPTANCE:

- A. All surfaces, preparation and paint applications shall be inspected.
- B. Painted interior surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent to the Architect:
 1. brush / roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.
 2. evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.
 3. damage due to touching before paint is sufficiently dry or any other contributory cause.
 4. damage due to application on moist surfaces or caused by inadequate protection from the weather.
 5. damage and/or contamination of paint due to blown contaminants (dust, spray paint, etc.).
- C. Painted surfaces shall be considered unacceptable if any of the following are evident under natural lighting source for final lighting source (including daylight)

for interior surfaces:

1. visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 39”.
2. visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 39”.
3. visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.
4. when the final coat on any surface exhibits a lack of uniformity of color, sheen, texture, and hiding across full surface area.

- D. Painted surfaces rejected shall be made good at the expense of the Contractor. Small affected areas may be touched up; large affected areas or areas without sufficient dry film thickness of paint shall be repainted. Runs, sags of damaged paint shall be removed by scraper or by sanding prior to application of paint.

3.8 PROTECTION:

- A. Protect all interior surfaces and areas, including glass, aluminum surfaces, etc. and equipment and any labels and signage from painting operations and damage by drop cloths, shields, masking, templates, or other suitable protective means and make good any damage caused by failure to provide such protection.
- B. Erect barriers or screens and post signs to warn of or limit direct traffic away from work area as required.

3.9 CLEAN-UP:

- A. Remove all paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.
- B. Keep work area free from an unnecessary accumulation of tools, equipment, surplus materials and debris.
- C. Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.
- D. Clean equipment and dispose of wash water / solvents as well as all other cleaning and protective materials (e.g. rags, drop cloths, masking papers, etc.), paints, thinners, paint removers / strippers in accordance with the safety requirements of authorities having jurisdiction.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

09 91 15**EXTERIOR PAINTING****PART 1 GENERAL****1.1 REGULATORY REQUIREMENTS:**

- A. Conform to the latest edition of Occupational, Safety and Health Act (OSHA) issued by applicable authorities having jurisdiction in regard to site safety (ladders, scaffolding, ventilation, etc.).
- B. Conform to requirements of local authorities having jurisdiction in regard to the storage, mixing, application and disposal of all paint and related waste materials

1.2 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver all painting materials in sealed, original labeled containers bearing manufacturer's name, brand name, type of paint or coating and color designation, standard compliance, materials content as well as mixing and/or reducing and application requirements.
- B. Store all paint materials in original labeled containers in a secure (lockable), dry, heated and well ventilated single designated area meeting the minimum requirements of both paint manufacturer and authorities having jurisdiction and at a minimum ambient temperature of 45° F. Only material used on this project to be stored on site.
- C. Where toxic and/or volatile / explosive / flammable materials are being used, provide adequate fireproof storage lockers and take all necessary precautions and post adequate warnings (e.g. no smoking) as required.
- D. Take all necessary precautionary and safety measures to prevent fire hazards and spontaneous combustion and to protect the environment from hazard spills. Materials that constitute a fire hazard (paints, solvents, drop clothes, etc.) shall be stored in suitable closed and rated containers and removed from the site on a daily basis.
- E. Comply with requirements of authorities having jurisdiction, in regard to the use, handling, storage and disposal of hazardous materials.

1.3 PROJECT / SITE REQUIREMENTS:

- A. UNLESS specifically pre-approved by the Architect and the manufacturer, perform no painting or decorating work when the ambient air and substrate temperatures are below 50° F for both interior and exterior work.
- B. Perform no exterior painting work unless environmental conditions are within MPI and paint manufacturer's requirements or until adequate weather protection is provided. Where required, suitable weatherproof covering and sufficient heating facilities shall be in place to maintain minimum ambient air and substrate temperatures for 24 hours before, during and after paint application.
- C. Perform no interior painting or decorating work unless adequate continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above minimum requirements for 24 hours before, during and after paint application. Provide supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
- D. Perform no painting or decorating work when the relative humidity is above 85% or when the dew point is less than 5° F variance between the air / surface temperature.
- E. Perform no painting or decorating work when the maximum moisture content of the substrate exceeds:
 - 1. 12% for concrete and masonry (clay and concrete brick/block).
 - 2. 15% for wood.
 - 3. 12% for plaster and gypsum board.
- F. Conduct all moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple cover patch test.
- G. Test concrete, masonry and plaster surfaces for alkalinity as required.
 - 1. Concrete and masonry surfaces must be installed at least 28 days prior to

- painting and decorating work and must be visually dry on both sides.
- H. Apply paint only to dry, clean, properly cured and adequately prepared surfaces in areas where dust is no longer generated by construction activities such that airborne particles will not affect the quality of finished surfaces.
 - I. Perform no painting or decorating work unless a minimum lighting level of 30 foot candles is provided on surfaces to be painted or decorated. Adequate lighting facilities shall be provided by the General Contractor.

1.4 WASTE MANAGEMENT AND DISPOSAL:

- A. Paint, stain and wood preservative finishes and related materials (thinners, solvents, etc.) are regarded as hazardous products and are subject to regulations for disposal. Obtain information on these controls from applicable National, State and Local authorities having jurisdiction.
- B. All waste materials shall be separated and recycled. Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility. Materials that cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
- C. Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
- D. To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground the following procedures shall be strictly adhered to:
 - 1. Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case shall equipment be cleaned using free draining water.
 - 2. Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
 - 3. Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
 - 4. Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
 - 5. Empty paint cans are to be dry prior to disposal or recycling (where available).
 - 6. Close and seal tightly partly used cans of materials including sealant and adhesive containers and store in protected, well ventilated, fire-safe area at moderate temperature.
- E. Set aside and protect surplus and uncontaminated finish materials not required by the Owner and deliver or arrange collection for verifiable re-use or re-manufacturing.

1.5 WARRANTY:

- A. Furnish either the local MPI Accredited Quality Assurance Association's two (2) year guarantee, or, alternatively, a 100% two (2) year Maintenance Bond, both in accordance with MPI Painting Manual requirements.
 - 1. The Maintenance Bond shall warrant that all painting work has been performed in accordance with MPI Painting Manual requirements.
- B. Painting and decorating Subcontractors choosing the Maintenance Bond option shall provide maintenance bond consent from a reputable surety company licensed to do business in the U.S.A. Cash or certified check is not acceptable in lieu of surety consent.

PART 2 PRODUCTS

2.1 MATERIALS:

- A. Only materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, etc.) listed in the latest edition of the MPI Approved Product List (APL) are acceptable for use on this project. All such material shall be from a single manufacturer for each system used.

- B. Other materials such as linseed oil, shellac, thinners, solvents, etc. shall be the highest quality product of an MPI listed manufacturer and shall be compatible with paint materials being used as required.
- C. All materials used shall be lead and mercury free and shall have low VOC content where possible.
- D. Where required, use only materials having a minimum MPI "Environmentally Friendly" E1 rating based on VOC (EPA Method 24) content levels.
- E. Where required to meet LEED (Leadership in Energy and Environmental Design) program requirements, use only MPI listed materials having an "L" rating designation.
- F. All paint materials shall have good flowing and brushing properties and shall dry or cure free of blemishes, sags, air entrapment, etc. Refer to 3.7, Field Quality Control / Standard of Acceptance requirements.
- G. Where required, paints and coatings shall meet flame spread and smoke developed ratings designated by local Code requirements and/or authorities having jurisdiction.
- H. Slip Resistant Additive (SRA): rubber aggregate, clean/washed silica sand or ground walnut chips (interior dry areas only) for use with or as a component part of paint (usually floor / porch / stair enamel) on horizontal surfaces as required to provide slip resistance.
 - 1. Where site applied, with material, either mixed into paint and mixed constantly to keep material in suspension, or broadcast into first or prime coat as required.

2.2 EQUIPMENT:

- A. Painting and Decorating Equipment: to best trade standards for type of product and application.
- B. Spray Painting Equipment: of ample capacity, suited to the type and consistency of paint or coating being applied and kept clean and in good working order at all times.

2.3 MIXING AND TINTING:

- A. Unless otherwise specified herein or pre-approved, all paint shall be ready-mixed and pre-tinted. Re-mix all paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and color and gloss uniformity.
- B. Paste, powder or catalyzed paint mixes shall be mixed in strict accordance with manufacturer's written instructions.
- C. Where thinner is used, addition shall not exceed paint manufacturer's recommendations.
 - 1. Do not use kerosene or any such organic solvents to thin water-based paints.
- D. If required, thin paint for spraying in strict accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Architect.

2.4 FINISH AND COLORS:

- A. Unless otherwise specified herein, all painting work shall be in accordance with MPI Custom Grade finish requirements.
- B. Generally and unless otherwise specified herein or noted on finish schedules the quantity of colors and finishes shall be based on the following criteria:
 - 1. Exterior colors will be based on three (3) base colors and two (2) accent colors with a maximum of one (1) deep or bright color. No more than six (6) colors will be selected for the entire project. Note that this does not include pre-finished items by others, e.g. flashings, aluminum or vinyl windows, aluminum doors, etc.

2.5 GLOSS / SHEEN RATINGS:

- A. Paint gloss shall be defined as the sheen rating of applied paint, in accordance with the following MPI values:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte or Flat finish	0 to 5	10 max.
G2	Velvet finish	0 to 10	10 to 35
G3	Eggshell finish	10 to 25	10 to 35
G4	Satin finish	20 to 35	35 min.
G5	Semi-Gloss finish	35 to 70	
G6	Gloss finish	70 to 85	
G7	High-Gloss finish	> 85	

- B. Gloss level ratings of all painted surfaces shall be as specified herein and as noted on Finish Schedule.

PART 3 EXECUTION

3.1 EXAMINATION:

- A. All surfaces requiring painting shall be inspected by the contractor and will notify the Architect in writing of any defects or problems, prior to commencing painting work, or after the prime coat shows defects in the substrate.
- B. Prior to commencement of work of this section, thoroughly examine (and test as required) all conditions and surfaces scheduled to be painted and report in writing to the Contractor and Architect any conditions or surfaces that will adversely affect work of this section.
- C. No painting work shall commence until all such adverse conditions and defects have been corrected and surfaces and conditions are acceptable to the Painting Subcontractor.
- D. Substrate defects shall be made good and sanded by others ready for painting particularly after the first coat of paint.
1. The starting of finish painting by Painting Subcontractor of defective surfaces shall indicate acceptance of correcting defects and deficiencies in the substrate which may adversely affect the painting work. Any costs of making good defects shall be borne by the painter including re-painting of entire defective surface (no touch-up painting).
 2. It shall always be the responsibility of the Painting Subcontractor to see that surfaces are properly prepared before any paint or coating is applied.

3.2 PREPARATION OF SURFACES:

- A. Prepare all surfaces in accordance with MPI requirements. Refer to the MPI Painting Manual in regard to specific requirements for the following:
1. environmental conditions.
 2. structural steel and miscellaneous metals.
 3. galvanized and zinc coated metal.
- B. Sand, clean, dry, etch, neutralize and/or test all surfaces under adequate illumination, ventilation and temperature requirements.
- C. Protect all adjacent interior surfaces and areas, including rating and instruction labels on doors, frames, equipment, piping, etc., from painting operations and damage by drop cloths, shields, masking, templates, or other suitable protective means and make good any damage caused by failure to provide such protection.

3.3 APPLICATION:

- A. Do not paint unless substrates are acceptable and/or until all environmental conditions are acceptable for applications of products.
- B. Apply paint or stain in accordance with MPI Painting Manual Custom Grade finish requirements.

- C. Apply paint and decorating material in a workmanlike manner using skilled and trade qualified applicators as noted under Quality Assurance.
- D. Apply paint and coatings within an appropriate time frame after cleaning when environmental conditions encourage flash-rusting, rusting, contamination or the manufacturer's paint specifications require earlier applications.
- E. Painting coats specified are intended to cover surfaces satisfactorily when applied at proper consistency and in accordance with manufacturer's recommendations.
- F. Tint each coat of paint progressively lighter to enable confirmation of number of coats.
- G. Unless otherwise approved by the Architect, apply a minimum of four coats of paint where deep or bright colors are used to achieve satisfactory results.
- H. Sand and dust between each coat to provide an anchor for next coat and to remove defects visible from a distance up to 39".
- I. Do not apply finishes on surfaces that are not sufficiently dry. Unless manufacturer's directions state otherwise, each coat shall be sufficiently dry and hard before a following coat is applied.
- J. Paint finish shall continue behind all wall-mounted items.

3.4 EXTERIOR FINISH / COATING SYSTEMS:

- A. Paint exterior surfaces in accordance with the following MPI Painting Manual requirements:
 - 1. CONCRETE HORIZONTAL SURFACES: (DECKS, STAIRS, DRIVEWAYS, PARKING AND COURT AREAS, ETC.)
 - a. EXT 3.2C Epoxy non-slip deck coating.
 - 2. CEMENTITIOUS COMPOSITION BOARD SURFACES: (VERTICAL SURFACES, HORIZONTAL SOFFITS)
 - a. EXT 3.3B Alkyd G5 finish.
 - 3. CONCRETE MASONRY UNITS: (SMOOTH AND SPLIT FACE BLOCK AND BRICK).
 - a. EXT 4.2A Latex G1 finish.
 - 4. STRUCTURAL STEEL AND METAL FABRICATIONS:
 - a. EXT 5.1A Quick dry enamel G5 finish.
 - 5. GALVANIZED METAL: (NOT CHROMATE PASSIVATED)
 - a. For low contact / low traffic areas (overhead decking, ducts, gutters, flashing, etc.)
 - b. EXT 5.3B Alkyd G5 finish.
 - 6. PLASTIC: (VINYL SIDING AND WINDOWS INCLUDING RELATED TRIMS, ABS / PVA / PVC MATERIALS, FABRICATIONS, ETC.)
 - a. EXT 6.8B Alkyd G5 finish.
 - 7. BITUMINOUS COATED SURFACES: (CAST IRON PIPE, CONCRETE, ETC.)
 - a. EXT 10.2C Alkyd G5 finish.

3.5 MECHANICAL / ELECTRICAL EQUIPMENT AND RELATED SURFACES:

- A. Unless otherwise specified or noted, paint all "unfinished" conduits, piping, hangers, ductwork and other mechanical and electrical equipment with color and texture to match adjacent surfaces, in the following areas:
 - 1. where exposed-to-view in all exterior and interior areas.

3.6 FIELD QUALITY CONTROL / STANDARD OF ACCEPTANCE:

- A. All surfaces, preparation and paint applications shall be inspected.
- B. Painted exterior surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent to the Painting Inspection Agency inspector:
 - 1. brush / roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.
 - 2. evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.
 - 3. damage due to touching before paint is sufficiently dry or any other contributory cause.

4. damage due to application on moist surfaces or caused by inadequate protection from the weather.
 5. damage and/or contamination of paint due to blown contaminants (dust, spray paint, etc.).
- C. Painted surfaces shall be considered unacceptable if any of the following are evident under natural lighting source for exterior surfaces and final lighting source (including daylight) for interior surfaces:
1. visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 39".
 2. visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 39".
 3. visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.
 4. when the final coat on any surface exhibits a lack of uniformity of color, sheen, texture, and hiding across full surface area.
- D. Painted surfaces rejected by the Architect shall be made good at the expense of the Contractor. Small affected areas may be touched up; large affected areas or areas without sufficient dry film thickness of paint shall be repainted. Runs, sags of damaged paint shall be removed by scraper or by sanding prior to application of paint.

3.7 PROTECTION:

- A. Protect all exterior surfaces and areas, including landscaping, walks, drives, all adjacent building surfaces (including glass, aluminum surfaces, etc.) and equipment and any labels and signage from painting operations and damage by drop cloths, shields, masking, templates, or other suitable protective means and make good any damage caused by failure to provide such protection.
- B. Erect barriers or screens and post signs to warn of or limit or direct traffic away or around work area as required.

3.8 CLEAN-UP:

- A. Remove all paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.
- B. Keep work area free from an unnecessary accumulation of tools, equipment, surplus materials and debris.
- C. Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.
- D. Clean equipment and dispose of wash water / solvents as well as all other cleaning and protective materials (e.g. rags, drop cloths, masking papers, etc.), paints, thinners, paint removers / strippers in accordance with the safety requirements of authorities having jurisdiction.

END OF SECTION

DIVISION 10 - SPECIALTIES

10 14 00 SIGNAGE

- 10 14 16 Interior Signs
- 10 14 26 Post and Panel Signage

10 28 00 TOILET, BATH, AND LAUNDRY ACCESSORIES

- 10 28 13 Toilet Accessories

10 44 00 FIRE PROTECTION SPECIALTIES

- 10 44 13 Fire Extinguisher Cabinets

10 55 00 MAIL DELIVERY BOXES

- 10 55 13 Mail Delivery Boxes

10 56 00 STORAGE ASSEMBLIES

- 10 56 23 Wire Storage Shelving

THIS PAGE IS INTENTIONALLY BLANK

10 14 16**INTERIOR SIGNS****PART 1 PRODUCTS**

1.1 MANUFACTURED UNITS

A. Signs

1. Provide tactile/Braille features in signage/ Raised Letters 1" in Height
2. Room Signs, molded acrylic sub-surface graphics sign with set-screw to attach to included mounting bracket.
3. Exit door signs mounted according to ICC/ANSI 117.1
4. Color:
 - a. Background: Black.
 - b. Lettering: White.
 - c. Size : 5"x5"
5. Schedule of Signs:
 - a. Managers Office
 - b. Group Room
 - c. Laundry
 - d. Business Center
 - e. Men's Restroom
 - f. Women's Restroom
 - g. Meeting Room
 - h. Storage
 - i. Mechanical (2 each)
 - j. Maintenance

PART 2 EXECUTION

2.1 INSTALLATION

- A. Install signs square and plumb.
- B. Room Signs:
 1. Install bracket using two screws. Use proper anchor for substrate.
 2. Attach sign to bracket using set-screw.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

SECTION 10 14 26**POST AND PANEL SIGNAGE**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Nonilluminated post and panel signs.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls" for temporary Project identification signs and for temporary informational and directional signs.
 - 2. Division 03 Section "Cast-in-Place Concrete" for concrete foundations and concrete fill.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide post and panel signs capable of withstanding the effects of gravity loads determined according to SEI/ASCE 7, "Minimum Design Loads for Buildings and Other Structures" and the applicable provisions of the "Kentucky Building Code", whichever is more restrictive.
- B. Seismic Performance: Provide post and panel signs capable of withstanding the effects of earthquake motions determined according to SEI/ASCE 7, "Minimum Design Loads for Buildings and Other Structures" and the applicable provisions of the "Kentucky Building Code", whichever is more restrictive.
- C. Thermal Movements: Provide post and panel signs that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for post and panel signage.
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Provide message list, typestyles, graphic elements, and layout for each sign at least half size and full-size details of graphics.
 - 3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available for the following:
 - 1. Aluminum.
 - 2. Die-cut vinyl characters and graphic symbols. Include representative samples of available typestyles and graphic symbols.
- D. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
 - 1. Aluminum: For each form, finish, and color, on 6-inch- long sections of extrusions and squares of sheet at least 4 by 4 inches.
 - 2. Trim and Frame: 6-inch-- long sections of each profile.
 - 3. Accessories: Manufacturer's full-size unit.
- E. Sign Schedule: Use same designations indicated on Drawings.
- F. Qualification Data: For Installer and fabricator.
- G. Maintenance Data: For signs to include in maintenance manuals.
- H. Warranty: Special warranty specified in this Section.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- C. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- D. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Indicate measurements on Shop Drawings.

1.8 COORDINATION

- A. Coordinate installation of anchorages for post and panel signage. Furnish setting drawings, templates, and directions for installing anchorages and other items that are to be embedded in concrete.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of post and panel signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metal and polymer finishes beyond normal weathering.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
- B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.
- C. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils with pressure-sensitive adhesive backing, suitable for exterior applications.
- D. Color: As indicated.

2.2 POST AND PANEL SIGNS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Allen Industries Architectural Signage.
2. APCO Graphics, Inc.
3. Best Sign Systems Inc.
4. Bunting Graphics, Inc.
5. Charleston Industries, Inc.
6. Nelson-Harkins Industries.
7. Signature Signs, Incorporated.
8. Supersine Company (The).
9. Vomar Products, Inc.
10. Integrated Signage, Inc.

2.3 PANEL SIGNS

- A. Sign Message Panels: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.
1. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.
 2. Increase metal thickness or reinforce with concealed stiffeners or backing materials as needed to produce surfaces without distortion, buckles, warp, or other surface deformations.
 3. Continuously weld joints and seams unless other methods are indicated; grind, fill, and dress welds to produce smooth, flush, exposed surfaces with welds invisible after final finishing.
 4. All fasteners shall be concealed and tamper resistant.

2.4 POSTS

- A. General: Fabricate posts to lengths required for mounting method indicated.
1. Baseplate Method: Provide posts with baseplates, flanges, or other fittings, welded to bottom of posts. Drill holes in baseplate for anchor-bolt connection.
 - a. Provide anchor bolts of size required for connecting posts to concrete foundations.
- B. Aluminum Posts: Manufacturer's standard 0.125-inch- thick, extruded-aluminum tubing, with vertical slots to engage sign panels. Provide stop blocks in slots to hold panels in position. Include post caps, fillers, spacers, junction boxes, access panels, and related accessories required for complete installation.
1. Square Posts: 2 inches square.
 2. Post Finish: Match sign panel face.
 3. Color: As indicated.

2.5 ACCESSORIES

- A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.6 FABRICATION

- A. General: Provide manufacturer's standard post and panel signs of configurations indicated.
 - 1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
 - 2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
 - 3. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
 - 4. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.7 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES

- A. High-Performance Organic Finish (2-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2604 and with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items, including anchor inserts, and electrical power are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Excavation: Excavate for sign foundation to elevations and dimensions indicated. Reconstruct subgrade that is not firm, undisturbed, or compacted soil, or that is damaged by freezing temperatures, frost, rain, accumulated water, or construction activities by excavating a further 12 inches, backfilling with satisfactory soil, and compacting to original subgrade elevation.
 - 1. Excavate hole depths approximately 39 inches below finished grade.
- B. Set anchor bolts and other embedded items required for installation of signs. Use templates furnished by suppliers of items to be attached.
 - 1. Protect portion of posts, inserts above ground from concrete splatter.
- C. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION

10 28 13**TOILET ACCESSORIES****PART 1 GENERAL**

1.1 SUMMARY

- A. Products Supplied But Not Installed Under This Section
 - 1. Accessories for Bath Rooms
- B. Related Sections
 - 1. Division 06 Woods, Plastics & Composites
 - a. Blocking
 - b. Installation

1.2 SUBMITTALS

- A. Product Data; Manufacturer's literature or cut sheets
- B. Shop Drawings; Schedule showing items used, location where installed, and proper attaching devices for substrate.

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

- A. Quality Standards
 - 1. Bath Rooms (Residential Units)
 - a. Toilet Tissue Dispensers -
 - 1) Moen-Mason Collection
 - b. Medicine Cabinet -
 - 1) Creative Images
 - c. Grab Bars - Concealed mount, 18 ga, type 304 stainless steel, 1-1/2 inch diameter, and non-slip finish in configuration shown on Drawings.
 - d. Shower Rod -
 - 1) Moen-Donner 63-5-SS
 - e. Towel Rod -
 - 1) Moen-Mason Collection
 - f. Mirror -
 - 1) AJW U711 (16x20 min)
 - 2. Restrooms (Community Building)
 - a. Toilet Tissue Dispensers -
 - 1) AJW UX142
 - b. Grab Bars Concealed mount, 18 ga, type 304 stainless steel, 1-1/2 inch diameter, and non-slip finish in configuration shown on Drawings.
 - c. Soap Dispenser
 - 1) AJW US142
 - d. Mirror
 - 1) AJW U711 (16x20 min)
 - e. Paper Towel Dispenser
 - 1) AJW U180

2.2 APPROVED MANUFACTURERS

- A. A & J Washroom Accessories, New Windsor, NY (845) 562-3332
systemat@ajwashroom.com
- B. ASI - American Specialties Inc, Yonkers, NY (914) 476-9000
info@americanspecialties.com
- C. Bobrick Washroom Equipment Inc, North Hollywood, CA (818) 764-1000
customerservicela@bobrick.com
- D. Bradley Corp, Menomonee Falls, WI (800) BRADLEY service@bradleycorp.com
- E. GAMCO - General Accessory Manufacturing Co, Durant, OK. (800) 451-5766
mail@gamcousa.com
- F. Better Home Products, San Francisco, CA. (650) 827-9270 betterhomeproducts.com
- G. American Pride, Flat Rock, NC. (828) 697-8847 apcabinets.com
- H. Moen, 1-800-Buy- Moen

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install items in accordance with Manufacturer's instructions. Provide mounting devices proper for base structure.
- B. Where possible, mount like items in adjoining compartments back-to-back on same partition.
- C. Locate as shown on drawings.

END OF SECTION

10 44 13**FIRE EXTINGUISHER CABINETS****PART 1 PRODUCTS**

1.1 MANUFACTURED UNITS

A. Fire Extinguishers:

1. Ten pound dry chemical ABC stored pressurized type equipped with pressure gauge, which does not need recharging except after use.
2. Instructions for repairs, maintenance, and recharging shall be attached.
3. Unit shall be tested and approved by UL and have minimum 2A UL rating. UL rating shall appear on extinguisher labels and be attached to and a part of fire extinguisher units.
4. Approved Manufacturers:
 - a. Amerex Corp, Trussville, AL (205) 655-3271. www.amerex-fire.com
 - b. Ansul Incorporated, Higganum CT, (860) 345-8085
mjross@tycoint.com
 - c. Extinguishers private-labeled by manufacturers approved above are approved, with appropriate documentation.

B. Fire Extinguisher Cabinets:

1. Two-piece, semi-recessed or flush type depending on wall thickness, and have white baked enameled steel tubs with white baked enamel return trim and doors, DSA full break-glass, and cylinder locks.
2. Supply each cabinet with one fire extinguisher specified above.
3. Quality Standard, Ambassador 1017V10 by J L Industries.

C. Wall-Mounted Brackets

1. Quality Standard, MB8846C by JL Industries

D. Acceptable Manufacturers:

1. J L Industries, Bloomington, MN (800) 554-6077 or (612) 835-6850
www.jlindustries.com
2. Larsen's Manufacturing Co, Minneapolis, MN (800) 527-7367 or (763) 571-1181 www.larsensmfg.com
3. Modern Metal Products / Technico, Owatonna, MN (800) 435-5544 or (507) 451-7114 www.modern-metal.com
4. Potter-Roemer, Cerritos, CA (800) 366-3473 or (714) 430-5300
www.potterroemer.com
5. Samson / J L Industries, City of Commerce, CA (800) 228-9489 or (323) 726-9070 inquiries@samsonproducts.com
6. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

PART 2 EXECUTION

2.1 INSTALLATION

- A. Securely mount cabinets and hangers plumb with wall surfaces.
- B. Trim for cabinets shall be neat in appearance.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

10 55 13**MAIL DELIVERY BOXES****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Work included in but not limited to this section.
- B. U.S.P.S. approved 4C Pedestal Mailbox and fully integrated parcel lockers.
- C. Provide one per unit

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specification.
- B. Section 06 11 20 Wood Framing
Section 06 20 10 Finish Carpentry

1.3 REFERENCES

- A. American Society for Testing and Materials
 - 1. ASTM A 591 – Specification for Steel Sheet, Electrolytic Zinc Coated, for Light Coating Mass Applications.
 - 2. ASTM A 653 – Specification for Steel Sheet, Zinc Coated (Galvanized), or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process.
 - 3. ASTM A 666 – Specification for Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.
 - 4. ASTM A 1008 – Specification for Steel, sheet Cold-Rolled, Carbon, Structural high Strength Low-Alloy and high Strength Low-Alloy with Improved Formability.
 - 5. ASTM B 209 – Specification Aluminum and Aluminum Alloy Sheet and Plate.
 - 6. ASTM B 221 – Specification Aluminum and Aluminum Alloy Extruded Bar, Rods, Wire, Shapes and Tubes.
 - 7. USPS STD-4B – Receptacles, Apartment House, Mail.
 - 8. USPS Publication 16.
 - 9. Submittals.
- B. Architectural and Transportation Barriers Compliance Board (ATBCB): Americans with Disabilities Act Accessorily Guidelines for Buildings and Facilities (ADAAG0).

1.4 SUBMITTALS

- A. Submittal under provisions of Section 01 33 23 Submittal Procedures.
 - 1. Manufacturer's data sheets on each product to be used.
 - 2. Shop Drawings: Indicate locations, construction and anchorage details, dimensions, rough-in openings sizes, number and arrangement of box sizes.
 - 3. Selection Samples: For each finish product specified, two complete sets of samples representing manufacturer's full range of available finishes.
 - 4. Manufacturer's Installation Instructions: Submit special procedures, perimeter conditions requiring special attention.
 - 5. Certificate: Final USPS local postmaster approval for installed postal specialties to be served by USPS.
- B. Selection Samples:
 - 1. For each finish product specified, two complete sets of color chips representing manufacturers full range of available colors and patterns.

- C. Verification Samples:
 - 1. For each finish product specified, two samples, minimum size 6 inches (150mm) square, representing actual product, color and patterns.
- 1.5 REGULATORY REQUIREMENTS
 - A. Comply with USPS-STD-4C for wall recessed, front loading, centralized mailboxes.
 - B. Comply with Americans with Disabilities Act Accessibility Guidelines (ADAAG).
- 1.6 QUALITY ASSURANCE
 - A. Manufacturer Qualifications:
 - 1. Manufacturer shall have a Quality System in place to ensure and be able to substantiate that manufactured units conform to requirements and match the approved design.
- 1.7 DELIVERY, STORAGE, AND HANDLING
 - A. Inspect the materials upon delivery to ensure that specified products have been received.
 - B. Store materials protected from exposure to harmful weather conditions.
 - C. Handle materials to prevent damage or marring of finish.
- 1.8 WARRANTY
 - A. Manufacturer's standard warranty to repair or replace components of postal specialties that fail in materials or workmanship within five years from date of Substantial Completion.

PART 2 PRODUCTS

- 2.1 MANUFACTURERS
 - A. Acceptable Manufacturer:
 - 1. Salsbury Industries, 1010 East 62nd Street, Los Angeles, CA 90001-1598, 800-MAILBOX (624-5269), salsbury@mailboxes.com
 - 2. Postal Products Unlimited, Inc., 500 W. Oklahoma Avenue.; Milwaukee, WI 53207-2649; 800-229-4500; 800-570-0007; tomr@postalproducts.com; Web: www.mailproducts.com
 - 3. Security Manufacturing Corporation, 815 S. Main; Grapevine, TX 76051; 800-POBOXES; 817-329-1600; Fax 817-481-3993; ddurbin@securitymanufacturing.com; www.securitymanufacturing.com
 - 4. Auth-Florence Mfg. Co., 5935 Corporate Dr.; Manhattan, KS 66503; 800-275-1747; Fax: 800-275-5081; sales@auth-florence.com; ww.auth-florence.com
 - B. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25 Substitution Request Form.
- 2.2 Cluster Pedestal Box
 - A. Front-loading Outdoor Mailboxes: USPS approved Cluster Box Unit (CBU); aluminum with one outgoing mail slot. 360 degree wrapped hinges on all doors. Tenant doors equipped with five-pin cylinder lock cam with dust and rain shield. F-Spec as manufactured by Salsbury Industries.
 - 1. Model: 3300 Series.
 - a. Model 3308, Type I: 8 compartments, 1 outgoing mail receptacle, 2 parcel lockers.
 - b. Model 3312, Type II: 12 compartments, 1 outgoing mail receptacle, 1 parcel locker.
 - c. Model 3316, Type III: 16 compartments, 1 outgoing mail receptacle, 2 parcel lockers.
 - d. Model 3313, Type IV: 13 compartments, 1 outgoing mail receptacle,

- 1 parcel locker.
- 2. Cabinet: 0.10 inch (2.5 mm) thick welded aluminum sheet.
- 3. Doors: Minimum 0.125 inch (3 mm) thick aluminum, with stainless steel hardware and hinges.
- 4. Locks: 5-pin cylinder cam lock with spring-loaded cover on each unit, 3 keys each lock; USPS-1172 910B lock.
- 5. Pedestal: Model 3395 for Types I and II; 28.5 inches (724 mm) high.
- 6. Pedestal: Model 3385 for Types III and IV; 14.5 inches (368 mm) high.
- 7. Finish: Powder coated.
 - A. Color: Sandstone – standard.
 - B. Color: Bronze – standard.
 - C. Color: Green – standard.
 - D. Color: Black – standard.
 - E. Color: White – standard.
 - F. Color: Gray - standard (for replacement units)
- 8. Box Identifications: Self-adhesive with black text on silver background; weather resistant.

PART 3 EXECUTION

3.1 EXAMINATION

A. Installer's Examination:

- 1. Examine conditions under which construction activities of this section are to be performed; submit written notifications if such conditions are unacceptable. Beginning installation indicates acceptance of conditions.

3.2 INSTALLATION

- A. Install mail boxes in accordance with shop drawings and manufacture's printed installation instructions.
- B. Align, plumb, and level; anchor in accordance with manufacturer's requirements.

3.3 ADJUSTING

- A. Adjust doors and locks to operate correctly.

3.4 CLEANING

- A. Clean surfaces with mild dish detergent. Do not use harsh abrasive cleaners. Lubricate locks with graphite type lubricants only.

3.5 PROTECTION OF INSTALLED PRODUCTS

- A. Protect finishes from damage by construction activities.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

10 56 23**WIRE STORAGE SHELVING****PART 1 PRODUCTS**

- 1.1 MANUFACTURERS
- A. Acceptable Manufacturers
 - 1. ClosetMaid (Clairson International), Ocala, FL (800) 874-0008]
 - 2. Rubbermaid, Fairlawn, Ohio, (888) 895-2110
 - 3. Closet Magic, Bergenfield, NJ, 800.370.7709 info@Closet-Magic.com
 - B. Provide all shelving and accessories from a single manufacturer
 - C. Substitutions,
 - 1. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.
- 1.2 MATERIALS
- A. Steel Wire:
 - 1. Basic cold drawn, Grade C-1006; average tensile strength over 100,000 psi coated
 - B. Wire Coating:
 - 1. Heavy-duty polyvinyl chloride (PVC) formula resin, plasticizers, stabilizers, pigments, and other additives.
 - a. Thickness:
 - 1) 9 to 11 mils
 - 2. Classification:
 - a. No ingredients listed as hazardous per OSHA 29CFR1910.0017
- 1.3 MANUFACTURED UNITS
- A. Wire Shelving:
 - 1. Coated steel wire, 1/2 to 1 inch incremental cross-deck spacing.
 - B. Accessories
 - 1. Wall Clips.
 - 2. End Brackets.
 - 3. Support Brackets.
 - 4. Poles.
 - 5. Standards.
 - 6. Shelf Brackets.
 - 7. Pole Clips.
 - 8. Hanging Rod:
 - a. 1 inch diameter by 20 gage epoxy-coated tubular steel

PART 2 EXECUTION

- 2.1 EXAMINATIONS
- A. Prior to installation, examine each piece to verify that all are proper in all respects
 - 1. Verification of Conditions:
 - a. Prepared spaces are sized and located in accordance with shop drawings.
 - b. Framing, reinforcement, and anchoring devices are correct type and are located in accordance with shop drawings.
 - 2. Installer's Examination
 - a. Examine conditions under which installation is to be performed; submit written notification if such conditions are unacceptable
 - b. Installation activities before unacceptable conditions have been corrected are prohibited
 - c. Installation indicates installer's acceptance of conditions

2.2 INSTALLATION

- A. Cut shelves 1/2 inch shorter than actual wall measurements;
 - 1. Cap all exposed ends
- B. Install shelving plumb and level at heights indicated in accordance with shop drawings and manufacturer's printed installation instructions
- C. Standards and Brackets
 - 1. Install standards vertically every 16 inches (400 mm) on studs
 - 2. Install horizontal tracks level, secured with screws or mollies in studs or drywall; use hanging adapters to connect wall standards for hanging
 - 3. Attach shelf brackets with, heavy duty, linen shelf and rod and close mesh 12-inch or 16-inch decking
- D. Shelf Supports
 - 1. Place shelf support brackets No. vertically to the shelf, attach with wall anchors
 - 2. Install down clips or cable clips with 1/4 inch anchor on the back rod behind every support bracket
 - 3. 24 inches o.c. maximum
- E. Attach pole clips at same elevations as wall clips for a given shelf;
 - 1. Use with manufacturers poles
- F. Use corner support brackets on all corner "butt" joints

2.3 ADJUSTING AND CLEANING

- A. As work proceeds, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris related to this work
- B. Upon completion of installation, clean all surfaces that have become soiled during installation

END OF SECTION

DIVISION 11 - EQUIPMENT

11 31 00 RESIDENTIAL EQUIPMENT

11 31 10 Appliances

THIS PAGE IS INTENTIONALLY BLANK

APPLIANCES

PART 1 PRODUCTS

1.1 MANUFACTURED UNITS:

- A. Range
 - 1. 30 inch free-standing slide-in model with following features
 - a. Two 8 inch and two 6 inch smooth surface heating units
 - b. 1-year limited warranty
 - c. Storage drawer
 - d. Non-vented
 - e. Standard clean
 - 2. Color - Black
 - 3. Approved Manufacturers & Models -
 - a. GE
 - b. Whirlpool
 - c. Frigidaire
 - d. Hotpoint

- B. Range ADA Compliant
 - 1. 30 inch drop-in model with following features
 - a. Two 8 inch and two 6 inch smooth surface heating units
 - b. 1-year limited warranty
 - c. Non-vented
 - d. Self-cleaning
 - e. Front controls
 - 2. Color - Black
 - 3. Approved Manufacturers & Models
 - a. GE
 - b. Whirlpool
 - c. Frigidaire
 - d. Hotpoint

- C. Range Hood-ADA Units
 - 1. 270 CFM fan motor, 1.5 Sones
 - 2. Wall Mount
 - 3. 23 gauge cold rolled steel
 - 4. Flush mounted controls on fan. (Provide remote switching and control for ADA apartments).
 - 5. Dual LED lamp
 - 6. Grease filter included.
 - 7. Baked enamel finish in black
 - 8. 120V, 60Hz
 - 9. Approved Manufacturers & Models
 - a. GE

- D. Microwave/Rangehood combo-Standard Units
 - 1. 1.6 cu. Ft capacity
 - 2. 950 watts
 - 3. Two-speed, 300 CFM fan motor
 - 4. Wall Mount
 - 5. 10 power levels
 - 6. Black
 - 7. 120V, 60Hz
 - 10. Approved Manufacturers & Models
 - a. GE

- E. Refrigerator/Freezer (Residential units)
 - 1. 18.2 cu ft frost-free model with top-freezer compartment and reversible doors.
 - 2. Color - Black
 - 3. Energy Star Compliant
 - 4. Approved Manufacturers & Models -
 - a. GE
 - b. Whirlpool
 - c. Frigidaire
 - d. Hotpoint

- F. Refrigerator/Freezer (Clubhouse)
 - 1. 21.2 cu ft frost-free model with top-freezer compartment and reversible doors.
 - 2. Color - Stainless
 - 3. Energy Star Compliant
 - 4. Approved Manufacturers & Models -
 - a. GE
 - b. Whirlpool
 - c. Frigidaire
 - d. Hotpoint

- G. Dishwasher (Standard Residential Unit)
 - 1. 24" built in
 - 2. Color: Black
 - 3. Energy Star Compliant
 - 4. Less than 4.25 gal/cycle and 295 kWh per year.
 - 5. Approved Manufacturers & Models-
 - a. GE
 - b. Whirlpool
 - c. Frigidaire
 - d. Hotpoint

- H. Dishwasher (Clubhouse and ADA units)
 - 1. 24" built in
 - 2. Color: Stainless Steel (Clubhouse), Black (ADA units)
 - 3. Energy Star Compliant
 - 4. Less than 4.25 gal/cycle and 295 kWh per year.
 - 5. ADA complaint 32 1/4" H
 - 5. Approved Manufacturers & Models-
 - a. GE - GDT225SGL
 - b. Whirlpool
 - c. Frigidaire
 - d. Hotpoint

- I. Wall Oven (Club House)
 - 1. 30 inch wall mount model with following features
 - a. Self-cleaning
 - b. 1-year limited warranty
 - c. Front controls
 - 2. Color - Stainless Steel
 - 3. Approved Manufacturers & Models
 - a. GE
 - b. Whirlpool
 - c. Frigidaire
 - d. Hotpoint

- J. Microwave (ADA units)
 - 1. 1.4 cu. Ft. capacity
 - a. 1100 watts
 - b. Weight and time defrost
 - c. Turntable
 - d. Control lock out.
 - 2. Color - Black
 - 3. Approved Manufacturers & Models -
 - a. GE
 - b. Whirlpool
 - c. Frigidaire
 - d. Hotpoint

- K. Microwave (Clubhouse)
 - 1. 0.7 cu. Ft. capacity
 - a. 700 watts
 - b. Auto and time defrost
 - c. Turntable
 - d. Control lock out.
 - 2. Color - Stainless Steel
 - 3. Approved Manufacturers & Models -
 - a. GE
 - b. Whirlpool
 - c. Frigidaire
 - d. Hotpoint

- L. Commercial Clothes Washer
 - 1. 21.5 capacity
 - 2. 3.42 cu.ft. cylinder volume
 - 3. Modified Energy Factor (MEF): equal to or greater than 2.2
 - 4. Water Factor (WF): equal to or less than 4.5
 - 5. ADA compliant
 - 6. Huebsch Vended Front Load Washer
 - a. HFNBCASP113TW01

- M. Commercial Clothes Dryer
 - 1. 18 lb capacity
 - 2. 7.0 cu.ft. cylinder volume
 - 3. ADA compliant
 - 4. Huebsch Vended Dryer
 - a. HDEBXAGS173CW01

PART 2 EXECUTION

- 2.1 PERFORMANCE:
 - A. Install according to layout shown on plans and in strict conformity with the manufacturer's recommendations.
 - 1. This includes the installation of the anti-tip device that accompanies the range.
 - B. Install any equipment items or appliances furnished by the Owner.

- 2.2 CLEANING & ADJUSTMENTS:
 - A. Check and make necessary adjustments to ensure that all installed items operate faultlessly.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

DIVISION 12 - FURNISHINGS

12 21 00

WINDOW BLINDS

12 21 13

Horizontal Louver Blinds

THIS PAGE IS INTENTIONALLY BLANK

12 21 13**HORIZONTAL LOUVER BLINDS****PART 1 GENERAL****1.1 FIELD MEASUREMENTS**

- A. Become familiar with details of the work, verify all dimensions in the field, and advise the Architect of any discrepancy before performing the work.

PART 2 PRODUCTS**2.1 MATERIALS**

- A. Window Blinds
1. Provide each blind, including hardware, accessory items, mounting brackets and fastenings, as a complete unit produced by one manufacturer. All parts must be one color, unless otherwise indicated, to match the color of the blind slat.
- B. Horizontal Blinds
1. Provide horizontal blinds with 1 inch slats
 - a. Blind units must be capable of nominally 180 degree partial tilting operation and full-height raising.
 - b. Blinds to be inside mount.
 - c. Tapes for slats must be braided polyester or nylon.
- C. Head Channel and Slats
1. Provide head channel made of steel or aluminum with corrosion-resistant finish nominal 0.024 inch.
 2. Provide slats of aluminum, not less than 0.006 inch thick, and of sufficient strength to prevent sag or bow in the finished blind.
 3. Provide a sufficient amount of slats to assure proper control, uniform spacing, and adequate overlap.
 4. Enclose all hardware in the headrail.
- D. Controls
1. The slats must be tilted by a transparent tilting wand, hung vertically by its own weight, and must swivel for easy operation.
 2. The tilter control must be of enclosed construction.
 - a. Provide moving parts and mechanical drive made of steel materials which do not require lubrication during normal expected life.
 - 1) Construct as worm and gear mechanism
 - b. The tilter must tilt the slats to any desired angle and hold them at that angle so that any vibration or movement of ladders and slats will not drive the tilter and change the angle of slats.
 - c. Include a mechanism to prevent over tightening.
 - d. Provide a wand of sufficient length to reach to within 5 feet of the floor.
 - e. Cord Lock to be crash-proof, steel, with cord separators
 - f. Tilt Rod to be steel with corrosion resistant finish
 - g. Ladder Drums to be steel or acetate resin, designed to properly align ladders
- E. Intermediate Brackets
1. Provide intermediate brackets for installation, as recommended by the manufacturer, of blinds over 48 inch wide.
- F. Bottom Rail
1. Provide bottom rail made of steel, corrosion-resistant, with baked-on polyester paint, color coordinated with slats, and formed with a double-lock seam into a closed oval shape for optimum strength.

- a. Provide end caps to match the rail in color.
- G. Braided Lift Cords & Ladders
Provide braided ladders of 100 percent polyester yarn of a color to match the slat color. Space ladders a maximum of and a minimum 15.2 slats per foot of drop in order to provide a uniform overlap of the slats in a closed position.
- H. Finish of all exposed metal.
 - 1. Polyester enamel
- I. Color as selected by Architect from Manufacturers full range of available colors.

2.2 MANUFACTURERS:

- A. Acceptable Manufacturers:
 - 1. "1" Aluminum Blinds" by Springs Window Fashions, Montgomery, PA, 877-792-0002, windowfashions@springswindowfashions.com
 - 2. "Celebrity" by Hunter Douglas Inc, 800-789-0331, consumer@hunterdouglas.com
 - 3. "Monaco® 6 1" Blind", Contract Customer Service by Levolor Corporation, High Point, NC, 800-826-8021, www.levolorcontract.com
 - 4. "Project Source", Lowes.
- B. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

3.2 FABRICATION:

- A. Fabricate blinds to fill the openings from head-to-sill and jamb-to-jamb with inside mounted brackets.
 - 1. A clearance of 1/4 inch should be allowed at each jamb.
 - 2. The height of the blind will be ½" longer than the measured height of the window. Upon installation the bottom of the blind is to rest on the window sill, so that continuous strain is not placed on the cords.

3.2 INSTALLATION

- A. Install according to manufacturers and/or responsible intitutes instructions.
- B. Perform installation in accordance with the approved detail drawings from the manufacturer's installation instructions.
- C. Install units level, plumb, secure, and at proper height and location relative to window units.
- D. Furnish and install supplementary or miscellaneous items in total, including clips, brackets, or anchorages incidental to or necessary for a sound, secure, and complete installation.
- E. Do not start installation until completion of room painting and finishing operations.

3.3 CLEAN-UP & ADJUSTMENT:

- A. Upon completion of the installation, free window treatments from soiling, damage or blemishes
 - 1. Adjust for form and appearance and proper operating condition.
 - 2. Repair or replace damaged units as directed by the Architect.
 - 3. Isolate metal parts from direct contact with concrete, mortar, or dissimilar metals.
 - 4. Include all hardware, brackets, anchors, fasteners, and accessories necessary for a complete, finished installation.

END OF SECTION

DIVISION 22 - PLUMBING

22 05 00	COMMON WORK RESULTS FOR PLUMBING
	22 05 10 Common Work Results for Plumbing
	22 05 29 Hangers and Supports
22 07 00	PLUMBING INSULATION
	22 07 19 Plumbing Piping Insulation
22 11 00	FACILITY WATER DISTRIBUTION
	22 11 13 Facility Water Distribution Piping
	22 11 16 Domestic Water Piping System
22 13 00	FACILITY SANITARY SEWAGE
	22 13 13 Exterior Facility Sanitary Sewers
22 33 00	ELECTRIC DOMESTIC WATER HEATER
	22 33 33 Electric Hot Water Heaters
22 42 00	COMMERCIAL PLUMBING FIXTURES
	22 42 10 Plumbing Fixtures

THIS PAGE IS INTENTIONALLY BLANK

22 05 10**COMMON WORK RESULTS FOR PLUMBING****PART 1 GENERAL****1.1 QUALITY ASSURANCE**

- A. Requirements of Regulatory Agencies
 - 1. Perform work in accordance with applicable provisions of local Plumbing Code, Gas Ordinances, and adoptions thereof.
 - a. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
 - 2. In case of differences between building codes, state laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern.
 - a. Promptly notify Architect in writing of such differences.
- B. Identification
 - 1. Motor and equipment name plates as well as applicable UL and AGA labels shall be in place when Project is turned over to Owner.

1.2 PRODUCT DELIVERY, STORAGE, & HANDLING:

- A. Follow Manufacturer's directions in delivery, storage, protection, and installation of equipment and materials.
- B. Deliver equipment and material to site and tightly cover and protect against dirt, water, and chemical or mechanical injury but have readily accessible for inspection.

1.3 WARRANTIES

- A. In addition to guarantee specified in General Conditions, guarantee all systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
- B. Provide certificates of warranty for each piece of equipment made out in favor of Owner. Clearly record 'start-up' date of each piece of equipment on certificate. Include certificates as part of Operation & Maintenance Manual.

PART 2 PRODUCTS**2.1 COMPONENTS**

- a. Sleeves:
 - 1. In Framing
 - a. Standard weight galvanized iron pipe, Schedule 40 PVC, or 14 ga galvanized sheet metal two sizes larger than bare pipe or insulation on insulated pipe.
 - 2. In Concrete And Masonry
 - a. Sleeves through outside walls, interior shear walls, and footings shall be schedule 80 black steel pipe with welded plate.

PART 3 EXECUTION**3.1 EXAMINATION:**

- A. Drawings
 - 1. Plumbing drawings show general arrangement of piping and equipment, etc. Follow layout as closely as actual building construction and work of other trades will permit.
 - 2. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over plumbing drawings.
 - 3. Because of small scale of the Drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.
- B. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections.

Furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents.

3.2 INSTALLATION:

- A. Interface with Other Work
 - 1. Electrical
 - a. Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.
 - 2. Testing & Balancing
 - a. Put systems into full operation and continue their operation during each working day of testing and balancing.
 - 3. Furnish sleeves, inserts, supports, and equipment that are to be installed by others in sufficient time to be incorporated into construction as work proceeds. Locate these items and see they are properly installed.
- B. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.
- C. Arrange pipes and equipment to permit ready access to valves, unions, traps, connections and to clear openings of doors and access panels.
- D. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus.
 - 1. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Division from responsibility for proper erection of systems of piping in every respect.
 - 2. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings.
 - a. Arrange so as to facilitate removal of tube bundles.
 - b. Provide accessible flanges or ground joint unions, as applicable for type of piping specified, at connections to equipment and on bypasses.
 - 1) Make connections of dissimilar metals with di-electric unions.
 - 2) Install valves and unions ahead of traps and strainers. Provide unions on both sides of traps.
 - c. Do not use reducing bushings, street elbows, bull head tees, close nipples, or running couplings.
 - d. Install piping systems so they may be easily drained. Provide drain valves at low points and manual air vents at high points in hot water heating and cooling water piping.
 - e. Install piping to insure noiseless circulation.
 - f. Place valves and specialties to permit easy operation and access. Valves shall be regulated, packed, and glands adjusted at completion of work before final acceptance.
 - 3. Do not install piping in shear walls.
- E. Properly support piping (Section 22 05 29 Hangers & Supports) and make adequate provisions for expansion, contraction, slope, and anchorage.
 - 1. Cut piping accurately for fabrication to measurements established at site. Remove burr and cutting slag from pipes.
 - 2. Work piping into place without springing or forcing. Make piping connections to pumps and other equipment without strain at piping connection. Remove bolts in flanged connections or disconnect piping to demonstrate that piping has been so connected, if requested.
 - 3. Make changes in direction with proper fittings.
- F. Provide sleeves around pipes passing through concrete or masonry floors, walls, partitions, or structural members. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete floors on grade. Seal sleeves with specified sealants.
 - 1. Sleeves through floors shall extend **1/4 inch** above floor finish in mechanical equipment rooms above basement floor. In other rooms, sleeves shall be flush with floor.
 - 2. Sleeves through floors and foundation walls shall be watertight.

- G. Provide spring clamp plates (escutcheons) where pipes run through walls, floors, or ceilings and are exposed in finished locations of building. Plates shall be chrome plated heavy brass of plain pattern and shall be set tight on pipe and to building surface.
- 3.3 REPAIR/RESTORATION:
- A. Patch and repair any walls, floors, ceilings, and roofs damaged in installation of this work with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.
- 3.4 ADJUSTMENT:
- A. Properly adjust equipment before Owner's acceptance.
 - B. Repair damaged finishes leaving everything in working order.
- 3.5 CLEANING:
- A. Clean exposed piping, equipment, and fixtures.
 - B. Remove stickers from fixtures and adjust valves.
- 3.6 PROTECTION:
- A. Do not use installed fixtures for temporary construction use, unless approved by the Architect.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

22 05 29

HANGERS & SUPPORTS

PART 1 PRODUCTS

1.1 MANUFACTURED UNITS:

- A. Hangers of same type shall be of same manufacturer.
- B. Hangers and accessories shall be Grinnell numbers specified or equals by B-Line.
 - 1. Support horizontal piping from clevis hangers or on roller assemblies with channel supports, except where trapeze type hangers are explicitly shown on Drawings. Hangers shall have double nuts.
 - 2. Support insulated pipes with clevis hanger equal to Grinnell Fig 260 or roller assembly equal to Grinnell Fig 171 with an insulation protection shield equal to Grinnell Fig 167. Gauge and length of shield shall be according to Grinnell design data.
 - 3. Except uninsulated copper pipes, support uninsulated pipes from clevis hanger equal to Grinnell Fig 260. Support uninsulated copper pipe from Grinnell Fig CT-65 copper plated hangers and otherwise fully suitable for use with copper tubing.

C. Support rods for single pipe shall be in accordance with following table:

	<u>Rod Diameter</u>	<u>Pipe Size</u>
1.	3/8 inch	2 inches and smaller.
2.	1/2 inch	2-1/2 to 3-1/2 inches.
3.	5/8 inch	4 to 5 inches.
4.	3/4 inch	6 inches.
5.	7/8 inch	8 to 12 inches.

D. Support rods for multiple pipe supported on steel angle trapeze hangers shall be in accordance with following table:

	<u>Rod</u>		<u>Number of pipes of Sizes Listed.</u>						
	<u>No</u>	<u>Diam</u>	<u>2"</u>	<u>2-1/2"</u>	<u>3"</u>	<u>4"</u>	<u>5"</u>	<u>6"</u>	<u>8"</u>
1.	2	3/8 inch	2	-	-	-	-	-	-
2.	2	1/2 inch	3	3	2	-	-	-	-
3.	2	5/8 inch	6	4	3	2	-	-	-
4.	2	3/4 inch	9	7	5	3	2	2	-
5.	2	7/8 inch	12	9	7	5	3	2	2

- E. Size trapeze angles so bending stress is less than 10,000 psi.
- F. Riser Clamps for Vertical Piping: Grinnell Figure 261.

1.2 MANUFACTURERS

- A. Contact Information:
 - 1. B-Line Systems, Highland, IL (800) 280-7994 or (618) 654-2184. www.bline.com
 - 2. EPCO Products Inc, Fort Wayne, IN (800) 879-3726 or (219) 747-8888. www.epcoproducts.com
 - 3. Globe Pipe Hanger Products Inc, Cleveland, OH (800) 338-3555 or (216) 362-6300.
 - 4. Grinnell Corp, Exeter, NH (603) 778-9200 www.grinnell.com.
 - 5. Michigan Hanger Company, Niles, OH (800) 333-0852 or (330) 544-4700.
 - 6. Superstrut by Thomas & Betts, Memphis, TN (800) 888-0211 or (901) 682-7766. www.tnb.com
 - 7. Victaulic Company of America, Easton, PA (610) 559-3300 www.victaulic.com.
 - 8. Watts Regulator Co, North Andover, MA (978) 688-1811. www.wattsreg.com

PART 3 EXECUTION

3.1 INSTALLATION:

- A. Properly support piping and make adequate provisions for expansion, contraction, slope and anchorage.
1. Except for underground pipe, suspend piping from roof trusses or clamp to vertical walls using Unistrut and clamps. Do not hang pipe from other pipe, equipment, or ductwork. Laying of piping on any building element is not allowed.
 2. Supports For Horizontal Piping:
 - a Support metal piping at **96 inches** on center maximum for pipe **1-1/4 inches** or larger and **72 inches** on center maximum for pipe **1-1/8 inch** or less.
 - b Support thermoplastic pipe at **48 inches** on center maximum.
 - c Provide support at each elbow. Install additional support as required.
 3. Supports for Vertical Piping:
 - a Place riser clamps at each floor or ceiling level.
 - b Securely support clamps by structural members, which in turn are supported directly from building structure.
 - c Provide clamps as necessary to brace pipe to wall.
 4. Insulate hangers for copper pipe from piping by means of at least two layers of Scotch 33 plastic tape.
 5. Expansion of Thermoplastic Pipe:
 - a Provide for expansion in every **30 feet** of straight run.
 - b Provide **12 inch** offset below roof line in each vent line penetrating roof.

END OF SECTION

22 07 19**PLUMBING PIPING INSULATION****PART 1 GENERAL**

1.1 SECTION INCLUDES

A. Work Included in but not limited to this section:

1. Furnish and install insulation on hot and cold water lines, fittings, valves, and accessories as described in Contract Documents.

1.2 RELATED SECTIONS

A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.

- B. Section 22 05 10 Common Work Results for Plumbing
- Section 22 05 29 Hangers & Supports
- Section 22 11 16 Domestic Water Piping

1.3 REFERENCES

A. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

1. ASHRAE 90.2 (2007) Energy Efficient Design of Low-Rise Residential Buildings

B. ASTM INTERNATIONAL (ASTM)

1. ASTM C 1126 (2004) Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation
2. ASTM C 534 (2007) Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
3. ASTM C 552 (2003) Standard Specification for Cellular Glass Thermal Insulation

PART 2 PRODUCTS

2.1 MATERIALS

A. Above Grade:

1. Insulation For Piping:

- a. Snap-on glass fiber or melamine foam pipe insulation, or heavy density pipe insulation with factory vapor jacket.

b. Insulation Thickness:

	Service Water Temp In Deg F	Pipe Sizes in inches		
		Up to 1-1/4	1-1/2 to 2	Over 2
a)	170 - 180	1	1-1/2	2
b)	140 - 160	1/2	1	1-1/2
c)	45 - 130	1/2	1/2	1

c. Quality Standards: Techlite SSL by Accessible Products or Fiberglas ASJ by Owens-Corning.

d. Approved Manufacturers:

- 1) Accessible Products.
- 2) Childers Products.
- 3) Knauf.
- 4) Manson.
- 5) Owens-Corning.
- 6) Johns-Manville.

2. Fitting, Valve, And Accessory Covers:

- a. PVC.
- b. Quality Standard: Techlite SSL-ASJ by Accessible Products.

- c. Approved Manufacturers:
 - 1) Accessible Products.
 - 2) Knauf.
 - 3) Speedline.
 - 4) Zeston by Johns-Manville.
- B. Below Grade Piping:
 - 1. Insulation:
 - a. **1/2 inch** thick.
 - b. Approved Products:
 - 1) DG Tubolit by Armacell.
 - 2) ImcoLock or ImcoShield by Imcoa.
 - 3) Nomalock or Nomaply by Nomaco.
 - 4) Therma-Cel by Rubatex.
 - 2. Joint Sealant:
 - a. Armacell 520.
 - b. Rubatex R-373.

2.2 MANUFACTURERS

- A. Contact Information:
 - 1. Accessible Products Inc, Tempe, AZ (800) 922-5252 or (602) 967-8888. www.accessibleproducts.com
 - 2. Armacell, Mebane, NC (800) 232-3341. www.armaflex.com
 - 3. Childers Products Co, Eastlake, OH (440) 953-5200.
 - 4. IMCOA, Haltom City, TX (800) 535-5078 or (817) 485-5290 www.imcoa.com.
 - 5. Johns-Manville, Denver, CO (800) 654-3103 or (303) 978-2000. www.jm.com
 - 6. Knauf, Shelbyville, IN (800) 825-4434 or (310) 398-4434 www.knauffiberglass.com.
 - 7. Manson, Brossard, PQ, Canada (800) 626-7661 or (450) 659-9101.
 - 8. Nomaco Inc, Zebulon, NC (800) 345-7279 or (919) 269-6500. www.nomaco.com
 - 9. Owens-Corning, Toledo, OH (800) 438-7465 or (419) 248-8000 www.owenscorning.com.
 - 10. Rubatex, Roanoke, VA (800) 782-2839 or (540) 561-6000. www.rbxcorp.com
 - 11. Speedline.

PART 3 EXECUTION

3.1 APPLICATION

- A. Above Grade Piping:
 - 1. Apply insulation to clean, dry piping with joints tightly butted.
 - 2. Install insulation in manner to facilitate removal for repairs. Place sections or blocks so least possible damage to insulation will result from inspection or repairs of piping or equipment.
 - 3. Piping up to **1-1/4 Inch** Diameter: Adhere 'factory applied vapor barrier jacket lap' smoothly and securely at longitudinal laps with white vapor barrier adhesive. Adhere **3 inch** wide self-sealing butt joint strips over end joints.
 - 4. Piping **1-1/2 Inch** mm Diameter And Larger:
 - a. Use broken-joint construction in application of two-layer covering.
 - b. Fill cracks and depressions with insulating cement mixed to thick plastic paste. Apply by hand in several layers to make up total specified thickness. Final layer shall have smooth uniform finish before application of covering.

- c. Apply one heavy brush coat of sizing such as Foster Sealfast 30-36 or CP-10 or 11 lagging adhesive to canvas before painting.
- 5. Fittings, Valves, And Accessories:
 - a. Do not apply insulation over flanged joints or victaulic couplings until piping has been brought up to operating temperature and flange bolts have been fully tightened. Insulate valves so wheel, stem, and packing nut are exposed.
 - b. Insulate with same type and thickness of insulation as pipe, with ends of insulation tucked snugly into throat of fitting and edges adjacent to pipe insulation tufted and tucked in.
 - c. In Piping Up To 1-1/4 Diameter: Cover insulation with one piece fitting cover secured by stapling or taping ends to adjacent pipe covering.
 - 1) Alternate Method: Insulate fittings, valves, and accessories with one inch of insulating cement and vapor seal with two 1/8 inch wet coats of vapor barrier mastic reinforced with glass fabric extending 2 inches onto adjacent insulation.
 - d. For Piping 1-1/2 inches To 2 Inches: Insulate with hydraulic setting insulating cement or equal, to thickness equal to adjoining pipe insulation. Apply final coat of fitting mastic over insulating cement.
 - e. For Piping 2-1/2 inches and larger: Insulate with segments of molded insulation securely wired in place and coated with skim coat of insulating cement. Apply fitting mastic, fitting tape and finish with final coat of fitting mastic.
 - f. Except where pre-formed, pre-finished covers are used, finish fittings, regardless of pipe size, with 4 oz canvas coated with vapor barrier adhesive.
- 6. Pipe Hangers:
 - a. Do not allow pipes to come in contact with hangers.
 - b. Provide 16 ga by 6 inch long galvanized shields at each pipe hanger to protect pipe insulation from crushing by clevis hanger.
- 7. Protect insulation wherever leak from valve stem or other source might drip on insulated surface, with aluminum cover or shield rolled up at edges and sufficiently large in area and of shape that dripping will not splash on surrounding insulation.
- B. Below Grade Piping: Slip underground pipe insulation onto pipe and seal butt joints. Where slip-on technique is not possible, slit insulation, apply to pipe, and seal seams and joints.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

SECTION 22 11 13**FACILITY WATER DISTRIBUTION PIPING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes water-distribution piping and related components outside the building for water service and fire-service mains.
- B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

1.3 DEFINITIONS

- A. PVC: Polyvinyl chloride plastic.
- B. DIP: Ductile Iron Pipe

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components. Retain subparagraph below if equipment includes wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
- B. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
4. Comply with Ten States Standards, Latest Edition for Potable Water Distribution.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.

D. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

E. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

F. NSF Compliance:

1. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-pw" on piping.
2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, including fire hydrants, according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.9 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
 1. Notify Architect no fewer than 10 days in advance of proposed interruption of service.
 2. Do not proceed with interruption of water-distribution service without Architect written permission.

1.10 COORDINATION

- A. Coordinate connection to water main with utility owner and operator.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

- A. Soft Copper Tube: ASTM B 88, Type K, water tube, annealed temper.
 1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
 2. Copper, Pressure-Seal Fittings:
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Viega; Plumbing & Heating Systems.
 - b. NPS 2 and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
 - c. NPS 2-1/2 to NPS 4 : Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.
- B. Hard Copper Tube: ASTM B 88, Type K, water tube, drawn temper.
 1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
 2. Copper, Pressure-Seal Fittings:
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Viega; Plumbing & Heating Systems.
 - b. NPS 2 and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.

- c. NPS 2-1/2 to NPS 4 Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.
- C. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
- D. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

2.2 DUCTILE-IRON PIPE AND FITTINGS

- A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated. Pipe shall be coated with a bituminous coating in accordance with ANSI/AWWA C151/A21.51. Interior shall be cement mortar lines and seal coated in compliance with the latest Rev. of ANSI/AWWA C104/A21.4. The cement mortar lining shall be double thickness.
 - 1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - 2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Anvil International, Inc.
 - 2) Victaulic Company of America.
- B. Flanges: ASME 16.1, Class 250, cast iron.

2.3 PVC PIPE AND FITTINGS

- A. PVC, Schedule 40 Pipe: ASTM D 1785.
 - 1. PVC, Schedule 40 Socket Fittings: ASTM D 2466.
- B. PVC, Schedule 80 Pipe: ASTM D 1785.
 - 1. PVC, Schedule 80 Socket Fittings: ASTM D 2467.
 - 2. PVC, Schedule 80 Threaded Fittings: ASTM D 2464.
- C. PVC, AWWA Pipe: AWWA C900, DR-14, with bell end with gasket, and with spigot end.
 - 1. Comply with UL 1285 for fire-service mains if indicated.
 - 2. PVC Fabricated Fittings: AWWA C900, DR-14, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
 - 3. PVC Molded Fittings: AWWA C907, Class 200, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
 - 4. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - a. Gaskets: AWWA C111, rubber.

5. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
 - b. All mechanical joint fittings where thrust blocking is required will also be secure by joint restrain glands.
6. The use of solvent Cement connections is not allowed.

2.4 SPECIAL PIPE FITTINGS

A. Ductile-Iron Rigid Expansion Joints:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. EBAA Iron, Inc.
 - b. U.S. Pipe and Foundry Company.
3. Description: Three-piece, ductile-iron assembly consisting of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Select and assemble components for expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
 - a. Pressure Rating: 250 psig minimum.

B. Ductile-Iron Flexible Expansion Joints:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. EBAA Iron, Inc.
 - b. Hays Fluid Controls; a division of ROMAC Industries Inc.
 - c. Star Pipe Products.
2. Description: Compound, ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections. Assemble components for offset and expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
 - a. Pressure Rating: 250 psig minimum.

C. Ductile-Iron Deflection Fittings:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. EBA Iron, Inc.
- 2. Description: Compound, ductile-iron coupling fitting with sleeve and 1 or 2 flexing sections for up to 15-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
 - a. Pressure Rating: 250 psig minimum.

2.5 JOINING MATERIALS

- A. Brazing Filler Metals: AWS A5.8, BCuP Series.
- B. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.6 PIPING SPECIALTIES

- A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
- B. Tubular-Sleeve Pipe Couplings:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cascade Waterworks Manufacturing.
 - b. Dresser, Inc.; Dresser Piping Specialties.
 - c. Ford Meter Box Company, Inc. (The); Pipe Products Div.
 - d. Hays Fluid Controls; a division of ROMAC Industries Inc.
 - e. JCM Industries.
 - f. Smith-Blair, Inc.
 - g. Viking Johnson.
 - 2. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.
 - a. Standard: AWWA C219.
 - b. Center-Sleeve Material: Stainless steel
 - c. Gasket Material: Natural or synthetic rubber.
 - d. Pressure Rating: 200 psig minimum.
 - e. Metal Component Finish: Corrosion-resistant coating or material.
- C. Split-Sleeve Pipe Couplings:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Victaulic Depend-O-Lok.

2. Description: Metal, bolted, split-sleeve-type, reducing or transition coupling with sealing pad and closure plates, O-ring gaskets, and bolt fasteners.
 - a. Standard: AWWA C219.
 - b. Sleeve Material: Stainless steel.
 - c. Sleeve Dimensions: Of thickness and width required to provide pressure rating.
 - d. Gasket Material: O-rings made of EPDM rubber, unless otherwise indicated.
 - e. Pressure Rating: 200 psig minimum.
 - f. Metal Component Finish: Corrosion-resistant coating or material.

D. Flexible Connectors:

1. Nonferrous-Metal Piping: Bronze hose covered with bronze wire braid; with copper-tube, pressure-type, solder-joint ends or bronze flanged ends brazed to hose.
2. Ferrous-Metal Piping: Stainless-steel hose covered with stainless-steel wire braid; with ASME B1.20.1, threaded steel pipe nipples or ASME B16.5, steel pipe flanges welded to hose.

E. Dielectric Fittings:

1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
2. Dielectric Unions:
 - a. Description:
 - 1) Standard: ASSE 1079.
 - 2) Pressure Rating: 250 psig.
 - 3) End Connections: Solder-joint copper alloy and threaded ferrous.
3. Dielectric Flanges:
 - a. Description:
 - 1) Standard: ASSE 1079.
 - 2) Factory-fabricated, bolted, companion-flange assembly.
 - 3) Pressure Rating: 250 psig minimum at 180 deg F
 - 4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
4. Dielectric-Flange Insulating Kits:
 - a. Description:
 - 1) Nonconducting materials for field assembly of companion flanges.
 - 2) Pressure Rating: 250 psig.
 - 3) Gasket: Neoprene or phenolic.
 - 4) Bolt Sleeves: Phenolic or polyethylene.
 - 5) Washers: Phenolic with steel backing washers.
5. Dielectric Nipples:
 - a. Description:

- 1) Standard: IAPMO PS 66
- 2) Electroplated steel nipple. complying with ASTM F 1545.
- 3) Pressure Rating: 250 psig at 225 deg F
- 4) End Connections: Male threaded or grooved.
- 5) Lining: Inert and noncorrosive, propylene.

2.7 CORROSION-PROTECTION PIPING ENCASEMENT

A. Encasement for Underground Metal Piping:

1. Standards: ASTM A 674 or AWWA C105.
2. Form: Sheet
3. Material: High-density, crosslaminated PE film of 0.004-inch (0.10-mm) minimum thickness.
4. Color: Natural

2.8 GATE VALVES

A. AWWA, Cast-Iron Gate Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American AVK Co.; Valves & Fittings Div.
 - b. American Cast Iron Pipe Co.; American Flow Control Div.
 - c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
 - d. Crane Co.; Crane Valve Group; Stockham Div.
 - e. East Jordan Iron Works, Inc.
 - f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
 - g. McWane, Inc.; Kennedy Valve Div.
 - h. McWane, Inc.; M & H Valve Company Div.
 - i. McWane, Inc.; Tyler Pipe Div.; Utilities Div.
 - j. Mueller Co.; Water Products Div.
 - k. NIBCO INC.
 - l. U.S. Pipe and Foundry Company.
2. Nonrising-Stem, Resilient-Seated Gate Valves:
 - a. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.
 - 1) Standard: AWWA C509.
 - 2) Minimum Pressure Rating: 250 psig .
 - 3) End Connections: Mechanical joint.
 - 4) Interior Coating: Complying with AWWA C550.
3. OS&Y, Rising-Stem, Resilient-Seated Gate Valves:
 - a. Description: Cast- or ductile-iron body and bonnet, with bronze or gray- or ductile-iron gate, resilient seats, and bronze stem.
 - 1) Standard: AWWA C509.

- 2) Minimum Pressure Rating: 250 psig .
- 3) End Connections: Flanged.

B. UL/FMG, Cast-Iron Gate Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. American Cast Iron Pipe Co.; American Flow Control Div.
- b. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
- c. Crane Co.; Crane Valve Group; Stockham Div.
- d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
- e. McWane, Inc.; Kennedy Valve Div.
- f. McWane, Inc.; M & H Valve Company Div.
- g. Mueller Co.; Water Products Div.
- h. NIBCO INC.
- i. U.S. Pipe and Foundry Company.

2. UL/FMG, Nonrising-Stem Gate Valves:

- a. Description: Iron body and bonnet with flange for indicator post, bronze seating material, and inside screw.

- 1) Standards: UL 262 and FMG approved.
- 2) Minimum Pressure Rating: 250 psig.
- 3) End Connections: Flanged.

3. OS&Y, Rising-Stem Gate Valves:

- a. Description: Iron body and bonnet and bronze seating material.

- 1) Standards: UL 262 and FMG approved.
- 2) Minimum Pressure Rating: 250 psig.
- 3) End Connections: Flanged.

C. Bronze Gate Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. Crane Co.; Crane Valve Group; Crane Valves.
- b. Crane Co.; Crane Valve Group; Jenkins Valves.
- c. Crane Co.; Crane Valve Group; Stockham Div.
- d. Hammond Valve.
- e. Milwaukee Valve Company.
- f. NIBCO INC.
- g. Red-White Valve Corporation.

2.9 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Tapping-Sleeve Assemblies:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
 - b. East Jordan Iron Works, Inc.
 - c. Flowserve.
 - d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
 - e. McWane, Inc.; Kennedy Valve Div.
 - f. McWane, Inc.; M & H Valve Company Div.
 - g. Mueller Co.; Water Products Div.
 - h. U.S. Pipe and Foundry Company.

2. Description: Sleeve and valve compatible with drilling machine.
 - a. Standard: MSS SP-60.
 - b. Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
 - c. Valve: AWWA, cast-iron, nonrising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.

- B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter. Valve Box shall comply with KAW requirements.
 1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

- C. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

2.10 CHECK VALVES

A. AWWA Check Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American AVK Co.; Valves & Fittings Div.
 - b. American Cast Iron Pipe Co.; American Flow Control Div.
 - c. APCO Williamette; Valve and Primer Corporation.
 - d. Crane Co.; Crane Valve Group; Crane Valves.
 - e. Crane Co.; Crane Valve Group; Stockham Div.
 - f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
 - g. McWane, Inc.; Kennedy Valve Div.
 - h. McWane, Inc.; M & H Valve Company Div.
 - i. Mueller Co.; Water Products Div.
 - j. NIBCO INC.
 - k. Watts Water Technologies, Inc.

2. Description: Swing-check type with resilient seat. Include interior coating according to AWWA C550 and ends to match piping.

- a. Standard: AWWA C508.
- b. Pressure Rating: 250 psig

B. UL/FMG, Check Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
- b. Crane Co.; Crane Valve Group; Stockham Div.
- c. Globe Fire Sprinkler Corporation.
- d. Kidde Fire Fighting.
- e. MATCO-NORCA, Inc.
- f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
- g. McWane, Inc.; Kennedy Valve Div.
- h. Mueller Co.; Water Products Div.
- i. NIBCO INC.
- j. Reliable Automatic Sprinkler Co., Inc.
- k. Tyco Fire & Building Products.
- l. United Brass Works, Inc.
- m. Victaulic Company of America.
- n. Viking Corporation.
- o. Watts Water Technologies, Inc.

2. Description: Swing-check type with pressure rating; rubber-face checks, unless otherwise indicated; and ends matching piping.

- a. Standards: UL 312 and FMG approved.
- b. Pressure Rating: 250 psig

2.11 DETECTOR CHECK VALVES

A. Detector Check Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. Ames Fire & Waterworks; a division of Watts Regulator Co.
- b. Badger Meter, Inc.
- c. FEBCO; SPX Valves & Controls.
- d. Globe Fire Sprinkler Corporation.
- e. McWane, Inc.; Kennedy Valve Div.
- f. Mueller Co.; Hersey Meters.
- g. Victaulic Company of America.
- h. Viking Corporation.
- i. Watts Water Technologies, Inc.

2. Description: Galvanized cast-iron body, bolted cover with air-bleed device for access to internal parts, and flanged ends. Include one-piece bronze disc with bronze bushings,

pivot, and replaceable seat. Include threaded bypass taps in inlet and outlet for bypass meter connection. Set valve to allow minimal water flow through bypass meter when major water flow is required.

- a. Standards: UL 312 and FMG approved.
 - b. Pressure Rating: 250 psig
 - c. Water Meter: AWWA C700, disc type, at least one-fourth size of detector check valve. Include meter, bypass piping, gate valves, check valve, and connections to detector check valve.
3. Description: Iron body, corrosion-resistant clapper ring and seat ring material, flanged ends, with connections for bypass and installation of water meter.
- a. Standards: UL 312 and FMG approved.
 - b. Pressure Rating: 250 psig.

2.12 CORPORATION VALVES

2.13 Manufacturers:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Amcast Industrial Corporation; Lee Brass Co.
 - b. Ford Meter Box Company, Inc. (The); Pipe Products Div.
 - c. Jones, James Company.
 - d. Master Meter, Inc.
 - e. McDonald, A. Y. Mfg. Co.
 - f. Mueller Co.; Water Products Div.
 - g. Red Hed Manufacturing & Supply.
- B. Service-Saddle Assemblies: Comply with AWWA C800. Include saddle and valve compatible with tapping machine.
1. Service Saddle: Copper alloy with seal and AWWA C800, threaded outlet for corporation valve.
 2. Corporation Valve: Bronze body and ground-key plug, with AWWA C800, threaded inlet and outlet matching service piping material.
 3. Manifold: Copper fitting with two to four inlets as required, with ends matching corporation valves and outlet matching service piping material.
- C. Curb Valves: Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.
- D. Service Boxes for Curb Valves: Similar to AWWA M44 requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately 3 inches in diameter.
1. Shutoff Rods: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.

2.14 WATER METERS

- A. Water meters will be furnished by utility company.

2.15 BACKFLOW PREVENTERS

- A. Double-Check, Backflow-Prevention Assemblies:
 1. Refer to MEP Plan P3.0.
 2. Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

2.16 WATER METER BOXES

- A. Description: Cast-iron body and cover for disc-type water meter, with lettering "WATER METER" in cover; and with slotted, open-bottom base section of length to fit over service piping.

2.17 CONCRETE VAULTS

- A. Description: Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C 857 and made according to ASTM C 858.
 1. Ladder: ASTM A 36/A 36M, steel or polyethylene-encased steel steps.
 2. Manhole: ASTM A 48/A 48M Class No. 35A minimum tensile strength, gray-iron traffic frame and cover.
 - a. Dimension: 24-inch minimum diameter, unless otherwise indicated.

2.18 FIRE HYDRANTS

- A. Dry-Barrel Fire Hydrants:
 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. American AVK Co.; Valves & Fittings Div.
 - b. American Cast Iron Pipe Co.; American Flow Control Div.
 - c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
 - d. American Foundry Group, Inc.
 - e. East Jordan Iron Works, Inc.
 - f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
 - g. McWane, Inc.; Kennedy Valve Div.
 - h. McWane, Inc.; M & H Valve Company Div.
 - i. Mueller Co.; Water Products Div.
 - j. Troy Valve; a division of Penn-Troy Manufacturing, Inc.

- k. U.S. Pipe and Foundry Company.
4. Description: Freestanding, with two 4 ½" outlets National Standard Hose Thread, 5-1/4-inch main valve, drain valve, and NPS 8 mechanical-joint inlet. Include interior coating according to AWWA C550. Hydrant shall have cast-iron body, compression-type valve opening against pressure and closing with pressure. Nut type cap 15/16" square with chains. 18" center of outlet to ground.
 - a. Standard: AWWA C502.
 - b. Pressure Rating: 250 psig
 - c. Color: red, and according to LFUCG guidelines.
 5. Certify and Service: The following companies have stated that they certify and service privately owned fire hydrants according to NFPA guidelines:
 - a. Brown Sprinkler Corporation
 - b. C&C Fire Sprinkler Systems and Inspections
 - c. Central Kentucky sprinkler, Inc.
 - d. Koorsen
 - e. Landmark Sprinkler Corp.
 - f. Simplex/Grinnell
 - g. Kenny Buehler/Private Contractor
 - h. American Fire & Security

2.19 FIRE DEPARTMENT CONNECTIONS

A. Fire Department Connections:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Elkhart Brass Mfg. Co., Inc.
 - b. Fire End & Croker Corporation.
 - c. Guardian Fire Equipment, Inc.
 - d. Kidde Fire Fighting.
 - e. Potter Roemer.
 - f. Reliable Automatic Sprinkler Co., Inc.
2. Description: Freestanding, with cast-bronze body, thread inlets according to NFPA 1963 and matching local fire department hose threads, and threaded bottom outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet; 18-inch- high brass sleeve; and round escutcheon plate.
 - a. Standard: UL 405.
 - b. Connections: Two NPS 2-1/2 inlets and one NPS 6 outlet.
 - c. Finish Including Sleeve: Polished bronze.
 - d. Escutcheon Plate Marking: "AUTO SPKR."
3. Lexington Fire Water Control Office Standards
 - a. Fire Department must be a standalone, 4 ½" male with National Standard Threads.
 - b. Connection must have strainer and cap.

- c. The height of the connection should be 17"-19" from the center of the connection to the finished grade.

2.20 ALARM DEVICES

- A. Alarm Devices, General: UL 753 and FMG approved, of types and sizes to mate and match piping and equipment.
- B. Water-Flow Indicators: Vane-type water-flow detector, rated for 250-psig working pressure; designed for horizontal or vertical installation; with 2 single-pole, double-throw circuit switches to provide isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal when cover is removed.
- C. Supervisory Switches: Single pole, double throw; designed to signal valve in other than fully open position.
- D. Pressure Switches: Single pole, double throw; designed to signal increase in pressure.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Refer to Section 02300 "Earth moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
- C. Do not use flanges or unions for underground piping.
- D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground water-service piping NPS 3/4 to NPS 3 shall be any of the following:
 1. Soft copper tube, ASTM B 88, Type K copper, pressure-seal fittings; and pressure-sealed joints.
 2. PVC, Schedule 40 pipe; PVC, Schedule 80 socket fittings; and solvent-cemented joints.
 3. Soft copper tube, [ASTM B 88, Type K (ASTM B 88M, Type A)] [ASTM B 88, Type L (ASTM B 88M, Type B)]; wrought-copper, solder-joint fittings; and brazed joints.
 4. Ductile-iron, [push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed] [mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical] [grooved-end pipe; ductile-iron-pipe appurtenances; and grooved] joints.
 5. PE, AWWA pipe; PE, AWWA fittings; and heat-fusion joints.

6. PVC, Schedule [40 pipe; PVC, Schedule 40] [80 pipe; PVC, Schedule 80] socket fittings; and solvent-cemented joints.
- F. Aboveground and Vault Water-Service Piping NPS 3/4 to NPS 3 shall be any of the following:
1. Hard copper tube, ASTM B 88, Type K wrought-copper, solder-joint fittings; and brazed joints.
- G. Aboveground and vault water-service piping NPS 4 to NPS 8 shall be any of the following:
1. Hard copper tube, [ASTM B 88, Type K; wrought-copper, solder-joint fittings; and brazed joints.
 2. Ductile-iron, grooved-end pipe; ductile-iron, grooved-end appurtenances; and grooved joints.
- H. Underground Fire-Service-Main Piping NPS 4 to NPS 12 shall be any of the following:
1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed mechanical-joint pipe; ductile-iron, mechanical-joint grooved joints.
 2. PVC, AWWA Class 200 pipe listed for fire-protection service; PVC Class 200 fabricated fittings; and gasketed joints.
 3. Fire service connections and fire hydrants shall have diameters and thread matching KAWC standards.
 4. Fire service connections shall be installed with a metal sign, with one inch raised letters.
- I. Aboveground and Vault Fire-Service-Main Piping NPS 4 to NPS 12 shall be ductile-iron, grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints.

3.3 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for NPS 3 (DN 80) and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 (DN 50) and smaller installation.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, metal resilient-seated gate valves with valve box.
 2. Underground Valves, NPS 4 and Larger, for Indicator Posts: UL/FMG, cast-iron, nonrising-stem gate valves with indicator post.
 3. Use the following for valves in vaults and aboveground:
 - a. Gate Valves, NPS 2 and Smaller: Bronze, nonrising rising stem.
 - b. Check Valves: AWWA C508 UL/FMG, swing type.

3.4 PIPING INSTALLATION

- A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main. All fittings may not be shown for clarity. It is the contractor's responsibility to include all necessary fittings in their bid. Unless otherwise noted. Bends shall be 45 degrees.

1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
 2. Install copper tube and fittings according to CDA's "Copper Tube Handbook."
- B. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
- C. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.
- D. Bury piping with depth of cover over top at least 30 inches , with top at least 12 inches below level of maximum frost penetration, and according to the following:
1. Under Driveways: With at least 36 inches cover over top.
 2. In Loose Gravelly Soil and Rock: With at least 12 inches additional bedding.
- E. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- F. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- G. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
- H. See Section 15140 "Domestic Water Piping" for potable-water piping inside the building.

3.5 JOINT CONSTRUCTION

- A. Make pipe joints according to the following:
1. Copper-Tubing, Pressure-Sealed Joints: Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer.
 2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
 3. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
 4. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
 5. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
 - a. Dielectric Fittings for NPS and Smaller: Use dielectric [unions.
 - b. Dielectric Fittings for NPS 2-1/2 to NPS 4 Use dielectric flanges [].
 - c. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.6 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:

1. Concrete thrust blocks.
2. Locking mechanical joints.
3. Set-screw mechanical retainer glands.
4. Bolted flanged joints.
5. Heat-fused joints.
6. Pipe clamps and tie rods.

B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
3. Fire-Service-Main Piping: According to NFPA 24.

C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.7 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.

C. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.

D. UL/FMG, Valves Other Than Gate Valves: Comply with NFPA 24.

E. MSS Valves: Install as component of connected piping system.

F. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.

3.8 DETECTOR-CHECK VALVE INSTALLATION

A. Install in vault.

B. Install for proper direction of flow. Install bypass with water meter, gate valves on each side of meter, and check valve downstream from meter.

C. Support detector check valves, meters, shutoff valves, and piping per plans and in accordance with KAW requirements.

3.9 WATER METER INSTALLATION

A. Install water meters, piping, and specialties according to utility company's written instructions.

3.10 ROUGHING-IN FOR WATER METERS

- A. Rough-in piping and specialties for water meter installation according to utility company's written instructions.

3.11 VACUUM BREAKER ASSEMBLY INSTALLATION

- A. Install pressure vacuum breaker assemblies of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.

3.12 BACKFLOW PREVENTER INSTALLATION

- A. Install backflow preventers of type, size, and capacity indicated. Refer to MEP plans. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
- B. Support NPS 2-1/2 and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.

3.13 WATER METER BOX INSTALLATION

- A. Install water meter boxes in paved areas flush with surface.
- B. Install water meter boxes in grass or earth areas with top 1/2 inches above surface.

3.14 CONCRETE VAULT INSTALLATION

- A. Install precast concrete vaults according to ASTM C 891.

3.15 PROTECTIVE ENCLOSURE INSTALLATION

- A. Install concrete base level and with top approximately 2 inches above grade.
- B. Install protective enclosure over valves and equipment.
- C. Anchor protective enclosure to concrete base.

3.16 FIRE HYDRANT INSTALLATION

- A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.
- B. Dry-Barrel Fire Hydrants: Install with valve below frost line. Provide for drainage.
- C. AWWA Fire Hydrants: Comply with AWWA M17.

- D. UL/FMG Fire Hydrants: Comply with NFPA 24.

3.17 FIRE DEPARTMENT CONNECTION INSTALLATION

- A. Install ball drip valves at each check valve for fire department connection to mains.

3.18 ALARM DEVICE INSTALLATION

- A. General: Comply with NFPA 24 for devices and methods of valve supervision. Underground valves with valve box do not require supervision.
- B. Supervisory Switches: Supervise valves in open position.
 1. Valves: Grind away portion of exposed valve stem. Bolt switch, with plunger in stem depression, to OS&Y gate-valve yoke.
 2. Indicator Posts: Drill and thread hole in upper-barrel section at target plate. Install switch, with toggle against target plate, on barrel of indicator post.
- C. Locking and Sealing: Secure unsupervised valves as follows:
 1. Valves: Install chain and padlock on open OS&Y gate valve.
 2. Post Indicators: Install padlock on wrench on indicator post.
- D. Pressure Switches: Drill and thread hole in exposed barrel of fire hydrant. Install switch.
- E. Water-Flow Indicators: Install in water-service piping in vault. Select indicator with saddle and vane matching pipe size. Drill hole in pipe, insert vane, and bolt saddle to pipe.
- F. Connect alarm devices to building fire alarm system. Wiring and fire-alarm devices are specified in Section 13852 "Digital, Addressable Fire-Alarm System" and Section 13853 "Zoned (DC Loop) Fire-Alarm System."

3.19 CONNECTIONS

- A. Connect water-distribution piping to interior [domestic water and fire-suppression piping].

3.20 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.
 1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- C. Prepare reports of testing activities.

3.21 IDENTIFICATION

- A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 312000 "Earth Moving."

3.22 CLEANING

- A. Clean and disinfect water-distribution piping as follows:
 - 1. Use purging and disinfecting procedure prescribed by Kentucky American Water.
- B. Prepare reports of purging and disinfecting activities.

END OF SECTION

22 11 16**DOMESTIC WATER PIPING SYSTEM****PART 1 PRODUCTS**

1.1 COMPONENTS

A. Copper:

1. Pipe:

a. Above-Grade: Meet requirements of ASTM B 88, Type L.

b. Below-Grade:

1) Meet requirements of ASTM B 88, Type K. **3/4 inch** minimum under slabs.a) **2 inches** And Smaller: Annealed soft drawn.b) **2-1/2 inches** And Larger: Hard Drawn.

2. Fittings: Wrought copper.

3. Connections:

a. Above-Grade:

1) Sweat copper type with 95/5 or 96/4 Tin-Antimony solder, Bridgit solder, or Silvabrite 100 solder. Use only lead-free solder.

2) Viega ProPress System

b. Below Grade:

1) Brazed using following type rods:

a) Copper to Copper Connections:

b) AWS Classification BCuP-4 Copper Phosphorus (6 percent silver).

c) AWS Classification BCuP-5 Copper Phosphorus (15 percent silver).

d) Copper to Brass or Copper to Steel Connections: AWS Classification BAg-5 Silver (45 percent silver).

e) Do not use rods containing Cadmium.

2) Brazing Flux:

a) Approved Products:

b) Stay-Silv white brazing flux by J W Harris.

c) High quality silver solder flux by Handy & Harmon.

3) Joints under slabs acceptable only if allowed by local codes.

B. Cross-Linked Polyethylene (PEX):

1. Pipe:

a. Certified with NSF International against NSF Standards 14 and 61 and NSF Protocol 171.

b. Copper tube size (CTS) outside dimensions and Standard Dimension Ratio (SDR) of 9.

c. Pressure rated for 160 psi at 73 deg F, 100 psi at 180 deg F, and 80 psi at 200 deg F.

d. Marked with Manufacturer's name, design pressure and temperature ratings, and third party certification stamp for NSF-PW.

e. Manufactured in accordance with Noveon Chemicals TempRite PEX's multilayer construction for potable water system service.

f. Approved Products:

- 1) Superpex by Bow.
 - 2) Ipex.
 - 3) Vanex Ultra by Vanguard Piping Systems.
2. Fittings: Everloc by Rehau.
 3. Hot water lines shall be insulated equal to or greater than R-3.
- C. Ball Valves:
1. Use ball valves exclusively unless otherwise specified. Ball valves shall be by single manufacturer from approved list below.
 2. Valves shall be two-piece, full port for 150 PSI SWP.
 - a. Operate with flow in either direction, suitable for throttling and tight shut-off. Full port, three-piece maintenance design.
 - b. Body: Bronze, 150 psig wsp at 350 deg F and 400 psig wog.
 - c. Seat: Bubble tight at 100 psig under water.
 3. Quality Standard: Nibco T585 or S585, S595
 4. Approved Manufacturers:
 - a. Hammond.
 - b. Milwaukee.
 - c. Nibco.
 - d. Watts.
 - e. Honeywell-Braukmann.
 - f. Stockham.
- D. Stop Valves:
1. Use ball valves only. No gate valves will be accepted.
 2. Approved Products:
 - a. Quality standard Watts Brass and Tubular BV890003.
- E. Hydrants:
1. Provide with integral anti-siphon device.
 2. Approved Products:
 - a. Josam: 71050.
 - b. J. R. Smith: 5609-QT.
 - c. Mifab: MHY-10
 - d. Wade: W-8600.
 - e. Watts Drainage: HY-420.
 - f. Woodford: 67.
 - g. Zurn: Z-1310.
- F. Sillcock with Integral Vacuum Breaker-Antisiphon
1. Approved Products
 - a. A.Y. McDonald Mfg. Co.: 2011
 - b. Nibco: Fig 85
 - c. American Valve: M72AS

1.2 MANUFACTURERS

- A. Contact Information:
1. Josam Inc., Michigan City, IN, 800-365-6726, BDeBello@josam.com
 2. J.R. Smith, Montgomery, AL , (334) 277-8520, <http://www.jrsmith.com/contact/index.htm>
 3. Hammond Valve, Prairie Du Sac, WI (800) 348-6544 or (608) 643-2977. www.hammondvalve.com
 4. Honeywell-Braukmann (Honeywell Ltd), Scarborough, ON (416) 293-8111. www.honeywell.ca/braukmann
 5. Jenkins Valves Inc, Bolingbrook, IL (800) 241-6560 or (630) 226-4900. www.cranvalve.com
 6. Milwaukee Valve Co, Milwaukee, WI (414) 744-5240. www.milwaukeevalve.com
 7. Mueller Co, Decatur, IL (217) 423-4471 www.muellerflo.com.
 8. Nibco Inc, Elkhart, IN (800) 642-5463 or (219) 295-3000. www.nibco.com
 9. Spence Engineering Co, Walden, NY (800) 398-2493 or (914) 778-5566. www.spenceengineering.com

10. Stockham Valves, Birmingham, AL (800) 786-2542 or (205) 592-6361. www.stockham.com
11. Watts Regulator Co, Andover, MA (978) 688-1811. www.wattsreg.com

PART 2 EXECUTION

2.1 INSTALLATION

- A. Below Grade:
 1. Install piping under slabs without joints where possible.
 2. Insulate water piping buried within building perimeter.
 3. Bury water piping **6 inches** minimum below bottom of slab and encase in **2 inches** minimum of sand.
- B. Locate cold water lines a minimum of **6 inches** from hot water line.

2.2 FIELD QUALITY CONTROL

- A. Site Tests: Before pipes are covered, test systems in presence of Architect at **125 psi** hydrostatic pressure for 4 hours and show no leaks. Disconnect equipment not suitable for **125 psig** pressure from piping system during test period.

2.3 CLEANING

- A. Sterilize potable water system with solution containing 200 parts per million minimum of available chlorine and maintaining pH of 7.5 minimum. Introduce chlorinating materials into system in manner approved by Architect. Allow sterilization solution to remain for 24 hours and open and close valves and faucets several times during that time.
- B. After sterilization, flush solution from system with clean water until residual chlorine content is less than 0.2 parts per million.
- C. Water system will not be accepted until negative bacteriological test is made on water taken from system. Repeat dosing as necessary until such negative test is accomplished.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

SECTION 22 13 13**EXTERIOR FACILITY SANITARY SEWERS**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipe and fittings.
 - 2. Nonpressure couplings.
 - 3. Expansion joints and deflection fittings.
 - 4. Cleanouts.
 - 5. Manholes.

1.3 DEFINITIONS

- A. PVC: Polyvinyl Chloride Pipe.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Expansion joints and deflection fittings.
 - 2. Pipe and fittings
- B. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.
- C. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewer system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
- D. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.
- E. Field quality-control reports.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage. In particular, the load shall be supported that the bottom rows of pipe are not damaged by crushing. Pipe shall be unloaded carefully and strung or stored as close to the final point of placement as is practical.

- C. Handle manholes according to manufacturer's written rigging instructions.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 1. Notify Engineer or Owner no fewer than two days in advance of proposed interruption of service.
 2. Do not proceed with interruption of service without Engineer's or Owner's written permission.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS FOR GRAVITY SEWER

- A. PVC Sewer Piping:
 1. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
 2. Fittings: ASTM D 3034, PVC with bell ends.
 3. Gaskets: ASTM F 477, elastomeric seals.
 4. Pipe shall be homogenous throughout and free from cracks, holes, foreign inclusions or other defects. The pipe shall be as uniform as commercially practical in color. The workmanship, pipe dimensions and tolerances, outside diameters, wall thickness, eccentricity, sustained pressures, marking and all other requirements of the Commercial Standards CS 256-63 shall be conformed within all respects.

2.2 PVC PIPE AND FITTINGS FOR FORCE MAIN SEWER

1. Pipe: ASTM D 2241, SDR 21 (220 PSI), PVC Type pressure rated pipe with bell and spigot ends for sealed joints. Cell class 12454 per ASTM D 1784.
2. Fittings: Pipe and fittings shall be manufactured as a system and be the product of one manufacturers.
3. Pipe and fittings shall conform to NSF International Standard 61 or the health effects portion of NSF Standard 14.
4. Gaskets: ASTM F477
5. Standard lengths shall be 20 feet and 12.5 feet plus/minus 1 inch. All pipe shall be marked with the manufacturer's name, production lot number, ASTM designation, PVC and nominal diameter.

2.3 DUCTILE-IRON, GRAVITY SEWER PIPE AND FITTINGS

- A. Pipe: ASTM A 746, for push-on joints.
- B. Standard Fittings: AWWA C110, ductile or gray iron, for push-on joints.
- C. Gaskets: AWWA C111, rubber.

- D. Ductile iron pipe shall conform to the latest AWWA Specifications C151 (ANSI A21-51) with standard thickness as designated in AWWA C150. Thickness class shall be as follows:

DIAMETER	PRESSURE CLASS
8" - 12"	350
14" - 30"	250

2.4 NONPRESSURE-TYPE TRANSITION COUPLINGS

A. Mechanical Joint Fittings:

1. Mechanical joints shall be bolted and of the stuffing box type and shall consist of a bell with exterior flange and interior recess for the sealing gasket, a pipe or fitting plain end, a sealing gasket, a follower gland, tee-head bolts and hexagon nuts.
2. Joints for all bends and fittings for buried service shall be mechanical joint type only (AWWA C111). Flanged joint pipe shall be used in vaults, pits and above ground service installation. Flanged joint pipe may not be used for buried service.

B. Nonpressure-Type, Rigid Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ANACO-Husky.
2. Description: ASTM C 1461, sleeve-type, reducing- or transition-type mechanical coupling, molded from ASTM C 1440, TPE material; with corrosion-resistant-metal tension band and tightening mechanism on each end.

2.5 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Josam Company.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.
 - d. Tyler Pipe.
 - e. Watts Water Technologies, Inc.
 - f. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.

2. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.6 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section; with separate base slab or base section with integral floor.
5. Riser Sections: 4-inch minimum thickness, of length to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
9. Steps: ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP; wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.
10. Adjusting Rings: Interlocking HDPE rings, with level or sloped edge in thickness and diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.
11. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.
12. Waterproof seal coating shall be applied to the exterior of all manholes.
13. Manholes over 12 feet deep shall utilize Class III concrete.

B. Manhole Frames and Covers:

1. Material: ASTM A 48/A 48M, Class 35 gray iron unless otherwise indicated.

C. Manhole Types:

1. Type "A" Manholes: The Type "A" manhole shall be a four foot diameter manhole five feet or more in depth, measured from the base of the cover frame to the lowest flowline elevation and shall be of eccentric cone top construction.
2. Type "AA" Manholes: The Type "AA" manhole shall be a five foot diameter manhole five feet or more in depth, measured from the base of the cover frame to the lowest flowline elevation and shall be of eccentric cone top construction.

3. Type "AAA" Manholes: The Type "AAA" manhole shall be a six foot diameter manhole five feet or more in depth, measured from the base of the cover frame to the lowest flowline elevation and shall be of eccentric cone top construction.
4. Type "B" Manholes: Type "B" manholes shall be a four foot diameter manhole five feet or less in depth, measured from the base of the cover frame to the lowest flowline elevation and shall be of flat slab top construction.
5. Type "D" Manholes: A drop pipe shall be provided for a sewer entering a manhole at an elevation of 25 inches or more above the manhole invert and shall be built as a part of the standard manhole. The pipe shall be laid as shown on the Drawings and encased with 3500 psi concrete from the drop stack to the reinforced base of the manhole.

2.7 CONCRETE

- A. General: Cast-in-place concrete complying with ACI 318, ACI 350/350R, and the following:
 1. Cement: ASTM C 150, Type II.
 2. Fine Aggregate: ASTM C 33, sand.
 3. Coarse Aggregate: ASTM C 33, crushed gravel.
 4. Water: Potable.
- B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.
 1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.
- C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.
 1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
 - a. Invert Slope: 1 percent through manhole.
 2. Benches: Concrete, sloped to drain into channel.
 - a. Slope: 4 percent.
- D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.
 1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.
- E. Concrete Cradle, Anchors or Encasement:
 1. Concrete cradle or encasement of sewer lines and/or fittings shall be placed where shown on the plans. Sewers on 19 percent slopes or greater shall be anchored securely with concrete anchors, spaced as follows:

- A) Not over 36 feet center to center on grades 19 percent and up to 35 percent.
 - B) Not over 24 feet center to center on grades 35 percent and up to 50 percent
 - C) Not over 16 feet center to center on grades 50 percent and over
2. Concrete shall be KYDOH Class "B" and shall be mixed sufficiently wet to permit it to flow under the pipe to form a continuous bed. In tamping concrete, care shall be taken not to disturb the grade or line of pipe or injure the joints.
 3. For this contract, concrete for pipe encasement and anchors is considered an incidental item included in the linear foot price of pipe.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Division 310 Section "Earth Moving."

3.2 PIPING INSTALLATION

- A. Contractor shall provide necessary leveling equipment to check the elevation of the flow line of the pipe as follows:

GRADE	FLOW LINE ELEVATION CHECK	ALLOWABLE ERROR
.004 - .008	Every 100 feet	± .03
.008 - .012	Every 150 feet	± .05
Above .012	Every 190 feet	± .07

- B. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- C. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- D. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- E. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

- F. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- G. Install gravity-flow, nonpressure, drainage piping according to the following:
 1. Install piping pitched down in direction of flow, at minimum slope of 1 percent unless otherwise indicated.
 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 3. Install piping with 36-inch minimum cover.
 4. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
- H. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure, drainage piping according to the following:
 1. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
 2. Join dissimilar pipe materials with nonpressure-type, rigid couplings.
- B. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - a. Shielded flexible or rigid couplings for pipes of same or slightly different OD.
 - b. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.4 MANHOLE INSTALLATION

- A. General: Install manholes complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Form continuous concrete channels and benches between inlets and outlet.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.
- E. Pipe entering and leaving manholes shall be installed a link seal compression device in accordance with ASTM d-2240, D412, s-395, d-297
- F. Visual Inspection/Test: The ENGINEER shall visually inspect the manhole barrel, in the presence of the CONTRACTOR, after CONTRACTOR completes the preparatory cleaning activities. If the Engineer's visual inspection reveals obvious defects such as a poorly formed invert, misaligned frame and lid, cracks, leakage, or if the inspection reveals that the CONTRACTOR has not

constructed the manhole plumb, the ENGINEER shall notify the CONTRACTOR and OWNER in writing of the manhole's failing the visual inspection. The CONTRACTOR shall subsequently repair or replace all defective materials and/or workmanship, necessary to meet the visual test requirements, at no additional cost to the OWNER.

- G. Leakage: The ENGINEER will direct the CONTRACTOR to conduct leakage tests if the manhole is located in an area of unusually high ground water, if the manhole is located within the limits of a stream course, or if, in the ENGINEER's opinion the manhole has not been constructed well. The CONTRACTOR shall subsequently conduct a leakage test in the presence of the ENGINEER. The leakage test shall be an exfiltration test conducted in accordance with ASTM C 969, Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines. The maximum allowable exfiltration rate shall be 0.1 gallon per foot of diameter, per foot of head, per hour. If the exfiltration rate exceeds this value, the CONTRACTOR shall make the necessary repairs, at no additional cost to the OWNER.

3.5 INSTALLATION OF FORCE MAINS

- A. General. Before any length of pipe is placed in the trench, make a careful inspection to see that no foreign material is in the pipe. In order to properly remove any foreign materials, a swab of necessary length is to be available at all times. All pipe shall be lowered carefully into the trench, properly aligned and properly jointed by use of suitable tools and equipment, in such manner as to prevent damage to protective coatings and linings. Excessive scratching of the exterior surface of the pipe will be cause for rejection of the pipe.

Under no circumstances shall pipeline materials be dropped or dumped into the trench. The pipe and fittings shall also be inspected for the purpose of determining if they are sound and free from cracks. Laying of pipe shall be commenced immediately after excavation is started. Pipe shall be laid with bell ends facing in the direction of laying.

When pipe laying is not in progress, the open ends of pipe shall be closed to prevent entrance of trench water into the line. Whenever water is excluded from the interior of the pipe, adequate backfill shall be deposited on the pipe to prevent floating. Any pipe which has floated shall be removed from the trench and installed properly. No pipe shall be laid in water or on frozen trench bottom or whenever the trench conditions or the weather are unsuitable for such work.

If any defective pipe and fittings shall be discovered after the pipeline is laid, they shall be removed and replaced with a satisfactory pipe or fitting without additional charge to the Owner. Open ends of unfinished pipelines shall be securely plugged or closed at the end of each day's work or when the line is left temporarily at any other time.

- B. Thrust Blocking and Anchorage. All angles or bends in the pipeline, either vertical or horizontal, shall be braced or anchored against the tendency of movement with concrete thrust blocking. Where joint harness is used, all component parts shall be stainless steel. Cost of installing concrete thrust blocking or joint harness materials shall be considered incidental to installing the line. Thrust blocks for plastic pipe will not be attached to couplings.
- C. Pipe Bedding. Standard Pipe Bedding. The standard pipe bedding shall be evenly spread fine granular earth material or bank run sand and gravel or dense graded aggregate as shown on the PLANS.
- D. Special Pipe Foundation. When ordered by the Engineer, yielding and mucking material in subgrade shall be removed below ordinary trench depth in order to prepare a proper bed for the pipe. In such locations, a special pipe foundation shall be constructed utilizing encasement class concrete.

- E. Standard Concrete Encasement. Concrete encasement of pipe shall be placed as directed by the Engineer. Concrete shall form a continuous bed under pipe. In tamping concrete, care should be taken not to disturb the grade or line of the pipe or injure the joints.
- F. Parallel Water and Sewer Lines. Water lines must, if possible, be located a minimum lateral distance of 10 feet from any existing or future sewer lines measured from outside diameters. Where water lines and sewer lines must be placed in the same trench, the water line must be located above the sewer line such that there is a minimum of 18" vertical distance between the outside of the water line and the outside of the sewer line.
- G. Crossing Water and Sewer Lines. Wherever sewer lines and water lines cross, it is desirable, if practical, that the sewer line be at least 24 inches below the water line. Where it is not practical to provide such a separation, care shall be taken to ascertain that the existing water line or existing sewer line is in good sound condition and that no evidence of joint leakage is known in that vicinity. If any such evidence does exist, expose the existing line at least 10 feet on each side of the water line crossing. The Owner will arrange for examining and correcting any defects in the existing lines. When the water line must be below or less than two feet above the sewer line, encase the water line five feet in each direction from the crossing.

3.6 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.7 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use Heavy-Duty, top-loading classification cleanouts in all areas.
- B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 12 by 12 by 12 inches deep. Set with tops 1 inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.8 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Division 220 Section "Sanitary Waste and Vent Piping."
- B. Make connections to existing piping and underground manholes.
 - 1. Make branch connections to underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

- a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
2. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.9 IDENTIFICATION

- A. Materials and their installation are specified in Division 312 Section "Earth Moving." Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
 1. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.10 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 1. Submit separate report for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 1. Do not enclose, cover, or put into service before inspection and approval.
 2. Prior to owner acceptance, piping systems shall be tested according to requirements of authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 4. Submit separate report for each test.
 5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:
 - a. Fill sewer piping with water. Test with pressure of at least 10-foot head of water, and maintain such pressure without leakage for at least 15 minutes.
 - b. Close openings in system and fill with water.
 - c. Purge air and refill with water.

- d. Disconnect water supply.
 - e. Test and inspect joints for leaks.
6. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
- a. Option: Test plastic gravity sewer piping according to ASTM F 1417.
 - b. Option: Test concrete gravity sewer piping according to ASTM C 924.
7. Manholes: Perform hydraulic test according to ASTM C 1244.
8. Force Mains: The Contractor will be required to test all pipelines and appurtenances with water at pressure class of pipe installed. The pipe shall be slowly filled with water, care being taken to expel all air from the pipes. If necessary, the pipe shall be tapped at high points to vent the air. Pressure at least equal to 150 PSI (or the operating pressure if higher) as measured at the point of lowest elevation shall be applied for not less than one hour and all pipes, fittings, valves, hydrants and joints shall be carefully examined for defects or leakage. Any observed leakage shall be corrected.
- a. The pipe pressure must be held at 150 PSI for one hour before beginning the test for leakage. No pipe shall be accepted unless or until the leakage, determined by this test, is less than 10 U.S. gallons over 24 hours, per mile, per inch nominal diameter of pipe. The leakage test shall be applied to the pipe for a period of not less than 4 hours.
 - b. The test shall be made between valves as far as practical in sections of pipe and shall, in general, be made within twelve working days of the completion of each section of line.
 - c. Furnish a suitable pump, pressure gauge and water meter or other appliance for measuring the amount of water pumped. The instrument used to measure leakage shall be tested for accuracy. Furnish all necessary labor and materials to make the test and to perform any work incidental thereto. Where it is impractical to test between the valves, temporarily place caps and plugs on the lines and test sections of the new line.
 - d. Wherever practicable, corporation stops and service lines shall be installed before testing. If these items are installed after the main is tested, then a visual inspection of the tap and service line must be permitted while under pressure before backfilling service line.
 - e. Where any section of the main is provided with concrete thrust blocking, the hydrostatic pressure test shall not be made until at least five days have elapsed after the concrete reaction blocking was installed. If high early strength cement is used in the reaction blocking, the hydrostatic pressure test shall not be made until at least two days have elapsed.
 - f. Should there be leakage over the allowable amount, the Contractor will be required to locate and repair the leaks and retest the section. It is suggested, but not required, that the Contractor have a geophone (underground listening device) on the job at the time of testing.
 - g. If the leakage of the section of pipeline being tested is below the allowable amount, but leakage is obvious due to water at the surface of the ground, or by listening the leak can be heard underground with a geophone, or any other means of determining a leak, the Contractor will be required to repair these leaks.
 - h. The Contractor shall furnish a meter or suction tank, pipe test plugs and by-pass piping and make all connections for conducting the above tests. The pumping equipment used shall be centrifugal pump, or other pumping equipment which will not place shock pressures on the pipeline. Power plunger or positive displacement pumps will not be permitted for use on closed systems for any purpose.

- i. Inspection of pipe laying shall in no way relieve the Contractor of the responsibility for stopping leakage or correcting poor workmanship.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.11 CLEANING

- A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION

22 33 33**ELECTRIC HOT WATER HEATERS****PART 1 PRODUCTS****1.1 MANUFACTURERS**

- A. Acceptable Manufacturer:
1. American Water Heater Co, Johnson City, TN (800) 288-1899 or (423) 283-8000. www.americanwaterheater.com
 2. Amtrol Inc, West Warwick, RI (401) 884-6300. www.amtrol.com
 3. A O Smith Water Products Co, Irving, TX (800) 527-1953
www.hotwater.com.
 4. Bradford-White Corp, Ambler, PA (800) 538-2020.
www.bradfordwhite.com
 5. Rheem / 1100 Abernathy Road, Suite 1700, Atlanta, GA 30328
www.rheem.com
 6. Richmond/ 1100 Abernathy Road, Suite 1700, Atlanta, GA 30328
 7. State Industries Inc, Ashland City, TN (800) 365-0024.
www.stateind.com
- B. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

1.2 ELECTRIC WATER HEATERS

- A. Electric type water heaters shall conform to UL 174 with dual heating elements. Each element shall be 4.5 KW. The elements shall be wired so that only one element can operate at a time.
- B. Water heater types and capacities shall be as indicated.
1. Each water heater shall have replaceable anodes.
 2. Each gas-fired water heater shall have controls with an adjustable range that includes 49 to 82 degrees C (120 to 180 degrees F). 120 to 180 degrees F.
 3. Thermal efficiencies will be as specified.

1.3 EXPANSION TANK

- A. A factory pre-charged expansion tank shall be installed on the cold water supply to each water heater.
1. Expansion tanks shall be specifically designed for use on potable water systems and shall be rated for 93 degrees C 200 degrees F water temperature and 1034 kPa 150 psi working pressure.
 2. The expansion tank size and acceptance volume shall be as indicated.

1.4 RELIEF VALVES

- A. All water heaters shall have a combination pressure and temperature (P&T) relief valve.
1. The pressure relief element of a P&T relief valve shall have adequate capacity to prevent excessive pressure buildup in the system when the system is operating at the maximum rate of heat input.
 2. The temperature element of a P&T relief valve shall have a relieving capacity which is at least equal to the total input of the heaters when operating at their maximum capacity.
 3. Relief valves shall be rated according to ANSI Z21.22.
 4. Relief valves for systems where the maximum rate of heat input is less than 59 kW (200,000 Btuh) 200,000 Btuh shall have 20 mm (3/4 inch) 3/4 inch minimum inlets, and 20 mm (3/4 inch) 3/4 inch outlets.

5. Relief valves for systems where the maximum rate of heat input is greater than 59 kW (200,000 Btuh) shall have 25 mm (1 inch) 1 inch minimum inlets, and 25 mm (1 inch) 1 inch outlets. The discharge pipe from the relief valve shall be the size of the valve outlet.

PART 2 EXECUTION

2.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

2.2 INSTALLATION

- A. Install according to NFPA 70 for electric water heaters.
 1. Storage water heaters that are not equipped with integral heat traps and having vertical pipe risers shall be installed with heat traps directly on both the inlet and outlet.
 - a. Circulating systems need not have heat traps installed.
 2. An acceptable heat trap may be a piping arrangement such as elbows connected so that the inlet and outlet piping make vertically upward runs of not less than 24 inches just before turning downward or directly horizontal into the water heater's inlet and outlet fittings.
 3. Commercially available heat traps, specifically designed by the manufacturer for the purpose of effectively restricting the natural tendency of hot water to rise through vertical inlet and outlet piping during standby periods may also be approved.
- B. Connections between ferrous and non-ferrous copper water pipe shall be made with dielectric unions.
 1. Dielectric waterways shall have temperature and pressure rating equal to or greater than that specified for the connecting piping.
 2. Waterways shall have metal connections on both ends suited to match connecting piping.
 3. Dielectric waterways shall be internally lined with an insulator specifically designed to prevent current flow between dissimilar metals.
 4. Dielectric flanges shall meet the performance requirements described herein for dielectric waterways.
 5. Connecting joints between plastic and metallic pipe shall be made with transition fitting for the specific purpose.

2.3 RELIEF VALVES

- A. No valves shall be installed between a relief valve and its water heater or storage tank.
- B. The P&T relief valve shall be installed where the valve actuator comes in contact with the hottest water in the heater. Whenever possible, the relief valve shall be installed directly in a tapping in the tank or heater; otherwise, the P&T valve shall be installed in the hot-water outlet piping.

2.4 EXPANSION TANK

- A. A pre-charged expansion tank shall be installed on the cold water supply between the water heater inlet and the cold water supply shut-off valve.
 1. The Contractor shall adjust the expansion tank air pressure, as recommended by the tank manufacturer, to match incoming water pressure.

2.5 PERFORMANCE OF WATER HEATING EQUIPMENT

- A. Standard rating condition terms are as follows:
 1. EF = Energy factor, overall efficiency, rating of .95 and UEF rating of .92
 2. ET = Thermal efficiency with 21 degrees C 70 degrees F delta T.
 3. EC = Combustion efficiency, 100 percent - flue loss when smoke = 0 (trace is permitted).
 4. SL = Standby loss in W/0.093 sq. m. W/sq. ft. based on 27 degrees C 80 degrees F delta T, or in percent per hour based on nominal 38 degrees

C 90 degrees F delta T.

5. HL = Heat loss of tank surface area.
 6. V = Storage volume in liters
- B. Storage capacity of 454 liters 120 gallons or less, and input rating of 12 kW or less: minimum energy factor (EF) shall be 0.95-0.00132V per 10 CFR 430.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

22 42 10PLUMBING FIXTURES**PART 1 PRODUCTS**

1.1 GENERAL

- A. Interior exposed pipe, valves, and fixture trim, including trim behind custom casework doors, shall be chrome plated.
- B. Do not use flexible water piping.
- C. Flow Control Fittings: Vandal proof type and fit faucet spout of fixture used. Flow shall be controlled as required by local codes.

1.2 MANUFACTURED UNITS

- A. Quality standard set by first fixture listed under Approved Products.
- B. Water Closets: See Schedule
 - 1. Seats:
 - a. Provide split front type with check hinge.
 - b. Approved Products:
 - 1) Standard And Handicap Accessible Fixtures:
 - a) Bemis: 1655-C.
 - b) Beneke Corporation: Series 527 – CH.
 - c) Church: No. 9500-C.
 - d) Kohler: K-4666-C.
 - e) Olsonite: 104.
 - f) Toto SC534.
 - 2. Supply Pipe And Stop:
 - a. Provide stuffing box and chrome plating.
 - b. Approved Products:
 - 1) Brass Craft: TCR 1912 DL-CP.
 - 2) Zurn: Z8804-LR-PC.
 - 3. Maximum 1.28 GPF
- D. Lavatories:
 - 1. Fixtures: See Schedule
 - a. Size: **15" diameter min.**
 - 2. Fittings:
 - a. Faucet and Drain:
 - 1) Provide flow control on each spout instead of aerator.
 - 2) Faucet should have average, flow rate less than 2.0gpm.
 - 3) Approved Products:
 - a) Delta
 - b) Kohler
 - c) Sloan
 - d) Speakman
 - e) T S Brass
 - f) Zurn
 - b. Supply pipes with stops:
 - 1) Provide stuffing box and chrome plating.
 - 2) Approved Products:
 - a) Brass Craft: TCR 1912 A-CP.
 - b) Zurn: Z8804 LR-PC.
 - c. Trap:
 - 1) 17 ga tube 'P' trap, chrome plated.
 - 2) Approved Manufacturers:
 - a) Dearborn.
 - b) Keeney Manufacturing.
 - c) Watts Drainage Brass And Tubular.

- d) Zurn Traps & Supplies.
- E. Handicap Accessible Lavatories:
 - 1. Self Supporting Fixture: See Schedule
 - a. 15" diameter min.
 - 2. Fittings:
 - a. Faucet And Drain:
 - 1) Approved Products:
 - a) Delta 520 WFMPU
 - b) Grohe
 - c) Kohler
 - d) Sloan
 - e) Speakman
 - f) T & S Brass
 - g) Zurn
 - b. Supply pipes with stops:
 - 1) Provide stuffing box and chrome plating.
 - 2) Approved Products:
 - a) Brass Craft: TCR 1912 A-CP.
 - b) Zurn: Z8804 LR-PC.
 - c. Traps:
 - 1) 17 ga tube 'P' trap, chrome plated.
 - 2) Approved Manufacturers:
 - a) Dearborn.
 - b) Keeney Manufacturing.
 - c) Watts Drainage Brass And Tubular
 - d) Zurn Traps & Supplies.
 - 3. Safety Covers:
 - a. Provide protection on water supply pipes and on trap.
 - b. Approved Products:
 - 1) Trapwrap by Brocar Products Inc.
 - 2) Pro Wrap by McGuire Products.
 - 3) Handy-Shield by Plumberex Specialty Products.
 - 4) Handi Lav-Guard by TrueBro.
 - 5) Zurn Traps & Supplies.
 - F. Laundry Sink:
 - 1. Fixture:
 - 1) Floor Model: See Schedule
 - 2. Fittings:
 - a. Supply:
 - 1) Mounting height of 42 inches.
 - 2) Provide 48 inch hose and clamp unless spout is threaded.
 - 3) Approved Products:
 - a) American Standard: 7502.140
 - b) Cambridge Brass
 - c) Chicago
 - d) Fiat.
 - e) Grohe
 - f) Kohler
 - g) Sloan
 - h) Speakman
 - i) T & S Brass
 - j) Zurn
 - b. Drain and Strainer:
 - 1) Approved Products:
 - a) American Standard: 7721.038.
 - b) Eljer
 - c) Kohler

- c. Trap: Cast iron, PVC, or ABS to match piping.

G. Kitchen Sinks:

1. Fixtures:
 - a. Self-rimming, 20 ga stainless steel, satin finish.
 - b. Approved Products:
 - 1) Two Compartment:
 - a) See Schedule ADA Compliant
 - b) 8" min. (Typical Unit)
 - c) 6" max. (Accessible Unit)
2. Fittings:
 - a. Provide flow control on each spout instead of aerator.
 - b. Supply:
 - 2) Approved Products Two-Compartment Sinks:
 - a) American Standard: 4175.203.
 - b) Cambridge Brass
 - c) Chicago
 - d) Delta
 - e) Eljer
 - f) Grohe
 - g) Kohler
 - h) Sloan
 - i) Speakman
 - j) T & S Brass
 - k) Zurn
 - c. Waste:
 - 1) Approved Products:
 - a) Elkay: LK-99.
 - b) Kohler
 - c) Zurn
 - d. Supply pipes with stops:
 - 1) Provide stuffing box and chrome plating.
 - 2) Approved Products:
 - a) Brass Craft: TCR 1912 A-CP.
 - b) Zurn: Z8804 LR-PC.
 - e. Trap:
 - 1) tube 'P' trap, chrome plated.
 - 2) Approved Products:
 - a) Dearborn.
 - b) Keeney Manufacturing.
 - c) Watts Drainage Brass And Tubular
 - d) Zurn Traps & Supplies.
3. Safety Covers(Accessible Units **only**):
 - a. Provide protection on water supply pipes and on trap.
 - b. Approved Products:
 - 1) Trapwrap by Brocar Products Inc.
 - 2) Pro Wrap by McGuire Products.
 - 3) Handy-Shield by Plumberex Specialty Products.
 - 4) Handi Lav-Guard by TrueBro.
 - 5) Zurn Traps & Supplies.

H. Drains And Drain Accessories:

1. Floor Drain FD-1:
 - a. Approved types with deep seal trap and chrome plated strainer.
 - b. Approved Products:
 - 1) Josam: 30000Z-5A with 88250 trap.
 - 2) J. R. Smith: 2010-A with 7222 trap.
 - 3) Mifab: F1100C

- 4) Wade: 1100 with 2450-T trap.
 - 5) Watts Drainage: FD-100-A5-3.
 - 6) Zurn: 415 with Z 1000 trap.
- I. Washer/Water Heater Pan
1. Provide pan for each washing machine and water heater on the second floor.
 2. Approved Products
 - a. Mustee 98 DURAPAN™
 - b. Oatley
- J. Cleanouts:
1. Furnish wall cleanouts with chrome wall cover and screw.
 2. Finish Floors:
 - a. Approved Products:
 - 1) Josam: 56010.
 - 2) J. R. Smith: 4023.
 - 3) Mifab: C1100R-1.
 - 4) Wade: W-6000.
 - 5) Watts Drainage: CO-200-R.
 - 6) Zurn: Z-1402.
 3. Resilient Flooring:
 - a. Approved Products:
 - 1) Josam: 56010-12.
 - 2) J. R. Smith: 4140.
 - 3) Mifab: C1100R-1-T.
 - 4) Wade: W-6000-T.
 - 5) Watts Drainage: CO-200-TS.
 - 6) Zurn: Z-1400-6.
 4. Finished Wall:
 - a. Approved Products:
 - 1) Josam: 58790.
 - 2) J. R. Smith: 4530.
 - 3) Mifab: C2462R-1.
 - 4) Wade: W8460R.
 - 5) Watts Drainage: CO-460-RD.
 - 6) Zurn: Z-1446.
 5. Exposed Drain Lines:
 - a. Approved Products:
 - 1) Josam: 58910.
 - 2) J. R. Smith: 4510.
 - 3) Mifab: C1462.
 - 4) Wade: W8560A.
 - 5) Watts Drainage: CO-460.
 - 6) Zurn: Z-1440-4.
 6. General Purpose:
 - a. Approved Products:
 - 1) Josam: 58900.
 - 2) J. R. Smith: 4400.
 - 3) Mifab: C1453.
 - 4) Wade: W8550A.
 - 5) Watts Drainage: CO-380.
 - 6) Zurn: Z-1440-4.
- K. Tub:
1. Fixture;
 - a. One piece fiberglass tub with integral grabs and seat.
 - b. Comply with UFAS.
 - c. 3 year limited warranty.
 - d. 27"x15" wood grain fold up seat (accessible units seat is to be permanently attached)

- e. Wood reinforcement for grab bars to meet HUD regulations.
 - f. Curtain rod 'U' cup holder pair.
 - g. Offset controls on accessible tub
2. Faucets (for Accessible units):
 - a. Hand held shower head with 60" hose and sliding bar.
 - b. Approved Products:
 - 1) See Schedule
 3. Faucets:
 - a. Approved Products:
 - 1) See Schedule
 4. Showerhead
 - a. Average flow rate of less than 2.0gpm.

1.3 MANUFACTURERS

A. Contact Information:

1. American Standard Plumbing, Piscataway, NJ (800) 442-1902 or (732) 980-3000 www.americanstandard.com.
2. Ancon by Watts Industries, Burlington, ON, Canada (905) 322-4090. www.wattscda.com
3. Bemis Manufacturing Co, Sheboygan Falls, WI (800) 558-7651 or (920) 467-4621. www.bemismfg.com
4. Beneke by Sanderson Plumbing Products, Columbus, MS (800) 647-1042 or (601) 328-4000. www.sppi.com
5. Brass Craft Manufacturing Co, Novi, MI (248) 305-6000 www.brasscraft.com.
6. Briggs Industries Inc, Tampa, FL (800) 627-4445 or (813) 878-0178. www.briggsplumbing.com
7. Brocar Products Inc, Cincinnati, OH (800) 827-1207 or (513) 861-6771. www.brocar.com
8. Cambridge Brass, Cambridge, ON (800) 724-3906 or (519) 621-5520. www.masco.com
9. Chicago Faucet Co, Des Plaines, IL (800) 323-5060 or (847) 803-5000. www.chicagofaucets.com
10. Church Seat Co, Sheboygan Falls, WI (800) 233-7328 or (920) 467-4621. www.bemismfg.com
11. Crane Plumbing, Evanston, IL (847) 864-9777 www.cranepumbing.com.
12. Dearborn Brass, Tyler, TX (800) 527-8443. www.dearbornbrass.com
13. Delta Faucet Co, Indianapolis, IN (317) 818-0396 www.deltafaucet.com.
14. Eljer Plumbingware, Dallas, TX (800) 898-4048 or (972) 560-2000 www.eljer.com.
15. Elkay Manufacturing Co, Oak Brook, IL (630) 574-8484. www.elkay.com
16. Fiat Products, Evanston, IL (847) 864-9777 www.cranepumbing.com.
17. GROHE America, Bloomingdale, IL (800) 301-3407 or (630) 582-7711 www.groheamerica.com.
18. Josam Co, Michigan City, IN (219) 872-5531. www.home.earthlink.net/~jchjosam/
19. Jay R. Smith Manufacturing Co, Montgomery, AL (334) 277-8520. www.jrsmith.com
20. Just Manufacturing Co, Franklin Park, IL (847) 678-5150. www.justsinks.com
21. Keeney Manufacturing Co, Newington, CT (800) 243-0526 or (860) 666-3342. www.keeneymfg.com

22. Kohler Co Plumbing Div, Kohler, WI (888) 361-8000 or (920) 457-4441. www.kohlerco.com
23. McGuire Manufacturing Co, Cheshire, CT (203) 699-1801.
24. Mifab Manufacturing Inc, Amherst, NY (800) 465-2736.
www.mifab.com
25. Mustee, E. L. & Sons, Inc., Brookpark, OH, 216.267.3100,
info@mustee.com
26. Olsonite Corp, Newnan, GA (800) 521-8266 or (770) 253-3930
www.olsonite.net.
27. Plumberex Specialty Products, Palm Springs, CA (800) 475-8629 or (760) 343-7363. www.plumberex.com
28. Powers Process Controls, Skokie, IL (800) 669-4217 or (847) 673-6700 www.powerscontrols.com.
29. Sloan Valve Co, Franklin Park, IL (800) 745-0800 or (847) 671-4300. www.sloanvalve.com
30. South Fork Manufacturing, Coalville, UT (801) 953-3001
31. Speakman Co, Wilmington, DE (302) 764-9100.
www.speakman.com
32. Stern-Williams Inc, Shawnee Mission, KS (913) 362-5635.
33. Taiko USA, Los Angeles, CA (800) 874-7822 or (213) 232-6688.
www.taikousa.com
34. T & S Brass & Bronze Works Inc, Travelers Rest, SC (800) 476-4103 or (864) 834-4102. www.tsbrass.com
35. TrueBro Inc, Ellington, CT (800) 340-5969 or (860) 875-2868.
www.truebro.com
36. Wade Div Tyler Pipe, Tyler, TX (800) 527-8478 or (903) 882-5511.
www.wadedrains.com
37. Watts Drainage: , North Carolina (828) 288-2179
www.wattsdrainage.com
38. Woodford Manufacturing Company, Colorado Springs, CO (800) 621-6032 or (719) 574-1101. www.watcomfg.com
39. Zurn Industries, Commercial Brass Op, Sanford, NC (800) 997-3876 or (919) 775-2255 www.zurn.com.
40. Zurn Industries, Plumbing Products, Erie, PA (814) 871-1261.
www.zurn.com
41. Zurn Traps & Supplies, North Grosvenordale, CT (800) 243-1830 or (860) 923-9533. www.zurn.com

PART 2 EXECUTION

2.1 INSTALLATION

- A. Install fixtures including traps and accessories with accessible stop or control valve in each hot and cold water branch supply line.
- B. Mounting:
 1. Self-Supporting Lavatories: Install using carriers.
- C. Make fixture floor connections with approved brand of cast iron floor flange, soldered or calked securely to waste pipe. Make joints between fixtures and floor flanges tight with approved fixture setting compound or gaskets. Calk between fixtures and wall and floor with sealant specified in Section 07 92 13 Elastomeric Joint Sealants. Point edges.

2.2 CLEANING

- A. Polish chrome finish at completion of Project.

END OF SECTION

DIVISION 23 - HVAC**23 05 00 COMMON WORK RESULTS FOR HVAC**

- 23 05 10 Common Work Results for HVAC
- 23 05 11 General Duct Requirements
- 23 07 13 Duct Insulation

23 07 00 HVAC INSULATION

- 23 07 19 HVAC Piping Insulation

23 21 00 HYDRONIC PIPING AND PUMPS

- 23 21 10 Condensate Drain Piping Systems

23 23 00 REFRIGERANT PIPING SYSTEMS

- 23 23 10 Refrigerant Piping Systems

23 31 00 HVAC DUCTS AND CASINGS

- 23 31 13 Metal Ducts
- 23 31 16 Non-Metal Ducts

23 33 00 AIR DUCT ACCESSORIES

- 23 33 10 Duct Accessories
- 23 33 13 Fire Dampers

23 34 00 HVAC FANS

- 23 34 10 Exhaust Fans

23 37 00 AIR OUTLETS AND INLETS

- 23 37 13 Diffusers, Registers, and Grilles

23 41 00 PARTICULATE AIR INFILTRATION

- 23 41 13 Air Filters

23 54 00 FURNACES

- 23 54 10 Air Handling Units

23 81 00 DECENTRALIZED HVAC EQUIPMENT

- 23 81 43 Air Source Heat Pump

THIS PAGE IS INTENTIONALLY BLANK

23 05 10COMMON WORK RESULTS FOR HVAC**PART 1 GENERAL**

1.1 SUBMITTALS

- A. Product Data:
1. Manufacturer's catalog data for each manufactured item.
 - a. Provide section in submittal for each type of item of equipment. Include Manufacturer's catalog data of each manufactured item and enough information to show compliance with Contract Document requirements. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
 - b. Include name, address, and phone number of each supplier.
- B. Shop Drawings:
1. Schematic control diagrams for each separate fan system, heating system, control panel, etc. Each diagram shall show locations of all control and operational components and devices. Mark correct operating settings for each control device on these diagrams.
 2. Diagram for electrical control system showing wiring of related electrical control items such as firestats, fuses, interlocks, electrical switches, and relays. Include drawings showing electrical power requirements and connection locations.
 3. Drawing of each temperature control panel identifying components in panels and their function.
 4. Other shop drawings required by Division 23 trade Sections.

1.2 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
1. Perform work in accordance with applicable provisions of Codes applicable to Project. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
 2. In case of differences between building codes, laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Notify Architect in writing of such differences before performing work affected by such differences.
- B. Identification:
1. Motor and equipment name plates as well as applicable UL labels shall be in place when Project is turned over to Owner.
 2. Materials shall bear Manufacturer's name and trade name.
 3. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Storage:
1. In addition to requirements specified in Division 01, stored material shall be readily accessible for inspection by Architect until installed.
 2. Store items subject to moisture damage, such as controls, in dry, heated spaces.
- B. Handling: Protect bearings during installation. Thoroughly grease steel shafts to prevent corrosion.

1.4 WARRANTY

- A. Guarantee heating, cooling, and plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
- B. Provide certificates of warranty for each piece of equipment made out in favor of Owner. Clearly record 'start-up' date of each piece of equipment on certificate.
- C. If mechanical sub-contractor with offices located more than **150 miles** from Project site is used, provide service / warranty work agreement for warranty period with local mechanical sub-contractor approved by Architect. Include copy of service / warranty agreement in warranty section of Operation And Maintenance Manual.

1.5 SYSTEM START-UP

- A. Off-Season Start-up:
 - 1. If Substantial Completion inspection occurs during heating season, schedule spring start-up of cooling systems. If inspection occurs during cooling season, schedule autumn start-up for heating systems.
 - 2. Notify Owner seven days minimum before scheduled start-up.
 - 3. Time will be allowed to completely service, test, check, and off-season start systems. During allowed time, train Owner's representatives in operation and maintenance of system.
 - 4. At end of off-season start-up, furnish Owner with letter confirming that above work has been satisfactorily completed.
- B. Preparations that are to be completed before start up and operation include, but are not limited to, following:
 - 1. Dry out electric motors and other equipment to develop and properly maintain constant insulation resistance.
 - 2. Make adjustments to insure that:
 - a. Equipment alignments and clearances are adjusted to allowable tolerances.
 - b. Nuts and bolts and other types of anchors and fasteners are properly and securely fastened.
 - c. Packed, gasketed, and other types of joints are properly made up and are tight and free from leakage.
 - d. Miscellaneous alignments, tightenings, and adjustments are completed so systems are tight and free from leakage and equipment performs as intended.
 - 3. Motors and accessories are completely operable.
 - 4. Inspect and test electrical circuitry, connections, and voltages to be properly connected and free from shorts.
 - 5. Adjust drives for proper alignment and tension.
 - 6. Make certain filters in equipment for moving air are new and of specified type.
 - 7. Properly lubricate and run-in bearings in accordance with Manufacturer's directions and recommendations.

1.6 OWNER'S INSTRUCTIONS

- A. Instruct building maintenance personnel in operation and maintenance of mechanical systems utilizing Operation And Maintenance Manual when so doing.
 - 1. Conduct instruction periods after Substantial Completion inspection when systems are properly working and before final payment is made. None of these instructional periods shall overlap another.

PART 2 PRODUCTS: Not Used**PART 3 EXECUTION**

3.2 EXAMINATION

- A. Site Inspection:
 1. Examine premises to understand conditions that may affect performance of work of this Division before submitting proposals for this work.
 2. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.
- B. Drawings:
 1. HVAC Drawings show general arrangement of piping, ductwork, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
 2. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Plumbing and Mechanical Drawings.
 3. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.
- C. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

3.3 PREPARATION

- A. Check that slots and openings provided under other Divisions through floors, walls, ceilings, and roofs are properly located. Perform cutting and patching caused by neglecting to coordinate with Divisions providing slots and openings at no additional cost to Owner.
- B. Changes Due To Equipment Selection:
 1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in Contract Documents, submit drawings, if requested by Architect, showing proposed installations.
 2. If proposed changes are approved, install equipment to operate properly and in harmony with intent of Contract Documents. Make incidental changes in piping, ductwork, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.
 3. Provide any additional motors, valves, controllers, fittings, and other additional equipment required for proper operation of the system resulting from selection of equipment, including all required changes in affected trades.
 4. Be responsible for the proper location of roughing-in and connections provided under other Divisions.

3.4 INSTALLATION

- A. Interface With Other Work:
 1. Electrical: Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.

2. Testing And Balancing:
 - a. Put mechanical systems into full operation and continue their operation during each working day of testing and balancing.
 - b. Make changes in pulleys, belts, fan speeds, and dampers or add dampers as required for correct balance as recommended by appropriate Sections of Division 13 and at no additional cost to Owner.
- B. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.
- C. Locating Equipment:
 1. Arrange pipes, ducts, and equipment to permit ready access to valves, cocks, unions, traps, filters, starters, motors, control components, and to clear openings of doors and access panels.
 2. Adjust locations of pipes, ducts, switches, panels, equipment, and fixtures to accommodate work to interferences anticipated and encountered.
 3. Install mechanical work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.
 4. Determine exact route and location of each pipe and duct before fabrication.
 - a. Right-Of-Way:
 - 1) Lines that pitch shall have right-of-way over those that do not pitch. For example, steam, steam condensate, and plumbing drains shall normally have right-of-way.
 - 2) Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.
 - b. Offsets, Transitions, and Changes in Direction:
 - 1) Make offsets, transitions, and changes in direction in pipes and ducts as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
 - 2) Furnish and install all traps, air vents, sanitary vents, and devices as required to effect these offsets, transitions, and changes in direction.
- D. Penetration Firestops: Install Penetration Firestop System appropriate for penetration at mechanical system penetrations through walls, ceilings, roofs, and top plates of walls.
- E. Sealants:
 1. Seal openings through building exterior caused by penetrations of elements of mechanical systems.
 2. Furnish and install acoustical sealant to seal penetrations through acoustically insulated walls and ceilings.

3.5 REPAIR / RESTORATION

- A. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
 1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown.
 2. Surface finishes shall exactly match existing finishes of same materials.
- B. Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

- 3.6 CLEANING
- A. Clean exposed piping, ductwork, equipment, and fixtures. Remove stickers from fixtures and adjust flush valves.
 - B. No more than one week before Final Inspection, flush out bearings and clean other lubricated surfaces with flushing oil. Provide best quality and grade of lubricant specified by Equipment Manufacturer.
 - C. Replace filters in equipment for moving air with new filters of specified type no more than one week before Final Inspection.
- 3.7 PROTECTION
- A. Do not operate pieces of equipment used for moving supply air without proper air filters installed properly in system.
 - B. After start-up, continue necessary lubrication and be responsible for damage to bearings while equipment is being operated up to Substantial Completion.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

GENERAL DUCT REQUIREMENTS**PART 1 - PRODUCTS**

- A. Duct Hangers:
 - 1. One inch 25 mm by 18 ga 1.27 mm galvanized steel straps or steel rods as shown on Drawings, and spaced not more than 96 inches 2 400 mm apart. Do not use wire hangers.
 - 2. Attaching screws at trusses shall be 2 inch 50 mm No. 10 round head wood screws. Nails not allowed.

PART 2 - EXECUTION**2.1 INSTALLATION**

- A. During installation, protect open ends of ducts by covering with plastic sheet tied in place to prevent entrance of debris and dirt.
- B. Make necessary allowances and provisions in installation of sheet metal ducts for structural conditions of building. Revisions in layout and configuration may be allowed, with prior written approval of Architect. Maintain required airflows in suggesting revisions.
- C. Hangers And Supports:
 - 1. Install pair of hangers close to each transverse joint and elsewhere as required by spacing indicated in table on Drawings.
 - 2. Install upper ends of hanger securely to floor or roof construction above by method shown on Drawings.
 - 3. Attach strap hangers to ducts with cadmium-plated screws. Use of pop rivets or other means will not be accepted.
 - 4. Where hangers are secured to forms before concrete slabs are poured, cut off flush all nails, strap ends, and other projections after forms are removed.
 - 5. Secure vertical ducts passing through floors by extending bracing angles to rest firmly on floors without loose blocking or shimming. Support vertical ducts, which do not pass through floors, by using bands bolted to walls, columns, etc. Size, spacing, and method of attachment to vertical ducts shall be same as specified for hanger bands on horizontal ducts.

2.2 CLEANING

- A. Clean interior of duct systems before final completion.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

23 07 13**DUCT INSULATION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install thermal wrap duct insulation on all supply air, return air, and exhaust ducts outside thermal envelope.
- B. Related Requirements:
 - 1. Section 23 3114: Low-Pressure Metal Ducts.
 - 2. Section 23 3300: Acoustic duct liner.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Manufacturer Contact List:
 - 1. CertainTeed St Gobain, Valley Forge, PA www.certainteed.com.
 - 2. Johns-Manville, Denver, CO www.jm.com.
 - 3. Knauf Fiber Glass, Shelbyville, IN www.knauffiberglass.com or Toronto, ON (416) 593-4322.
 - 4. Manson Insulation Inc, Brossard, QB www.isolationmanson.com.
 - 5. Owens-Corning, Toledo, OH or Owens-Corning Canada Inc, Willowdale, ON www.owenscorning.com.

2.2 MATERIALS

- A. Thermal Wrap Duct Insulation:
 - 1. Fiberglass with factory-laminated, reinforced aluminum foil scrim kraft facing

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Thermal Wrap Duct Insulation:
 - 1. Install insulation as follows:
 - a. Outside Building Insulation Envelope:
 - 1) **R-8 min.** on supply exhaust and return air ducts.
 - 2. Wrap insulation tightly on ductwork with circumferential joints butted and longitudinal joints overlapped minimum **2 inches (50 mm)**.
 - a. Do not compress insulation except in areas of structural interference. Minimum thickness at corners shall be **one inch (25 mm)** thick.
 - b. Remove insulation from lap before stapling.
 - c. Staple seams at approximately **16 inches (400 mm)** on center with outward clenching staples.
 - d. Seal seams with foil vapor barrier tape or vapor barrier mastic. Seal penetrations of facing to provide vapor tight system.
- B. Insulate outside of ceiling diffusers, diffuser drops, and duct silencers same as ductwork.

END OF SECTION

23 07 19**HVAC PIPING INSULATION****PART 1 PRODUCTS**

1.1 MATERIALS

- A. Flexible Foamed Pipe Insulation:
1. Thickness:
 - a. **1/2 inch** for **one inch** outside diameter and smaller pipe.
 - b. **3/4 inch** for **1-1/8 through 2 inch** outside diameter pipe.
 - c. **One inch** for **2-1/8 inches** outside diameter and larger pipe or two layers of **1/2 inch**.
 - d. **One inch** sheet for fittings as recommended by Manufacturer.
 2. Approved Products:
 - a. AP Armaflex by Armacell.
 - b. Rubatex.
- B. Joint Sealer:
1. Approved Products:
 - a. Armaflex 520 by Armacell.
 - b. BFG Construction Adhesive No. 105.
 - c. Rubatex R-373.
- C. Insulation Tape:
1. Approved Products:
 - a. Armaflex AP Tape by Armacell.
 - b. R-180-FS Tape by Rubatex.
- D. Exterior Finish:
1. Approved Products:
 - a. WB Armaflex Finish by Armacell.
 - b. Protective Coating 67x944 by Rubatex.

1.2 MANUFACTURERS

- A. Contact Information:
1. Armacell, Mebane, NC (800) 232-3341. www.armacell.com
 2. BFG Industries, West Columbia, SC (800) 845-2220 or (803) 796-1380.
 3. Rubatex, Roanoke, VA 782-2839 or (540) 561-6000. www.rbxcorp.com

PART 2 EXECUTION

2.1 INSTALLATION

- A. General:
1. Install insulation in snug contact with pipe and in accordance with Manufacturer's recommendations.
 - a. Insulate flexible pipe connectors.
 - b. Insulate thermal expansion valves with insulating tape.
 - c. Insulate fittings with sheet insulation and as recommended by Manufacturer.
 2. Slip insulation on tubing before tubing sections and fittings are assembled keeping slitting of insulation to a minimum.
 3. Do not install insulation on lines through clamp assembly of pipe support. Butt insulation up against sides of clamp assembly.
 4. Stagger joints on layered insulation. Seal joints in insulation.

5. Install insulation exposed outside building so 'slit' joint seams are placed on bottom of pipe.
 6. Paint exterior exposed insulation with two coats of specified exterior finish.
- B. System Requirements:
1. Condensing Units: Install insulation on above ground refrigerant suction piping and fittings, including thermal bulb, from thermal expansion valve.
 2. Split System Heat Pump Units: Install insulation on above ground refrigerant liquid and suction piping and fittings.

END OF SECTION

23 21 10**CONDENSATE DRAIN PIPING SYSTEMS****PART 1 PRODUCTS**

1.1 MATERIALS

A. Condensate Drains:

1. Schedule 40 PVC for condensate drains from furnace combustion chambers and furnace cooling coils.
2. 3 inch deep seal, vented water trap adjacent to cooling coil connection.

PART 2 EXECUTION

2.1 INSTALLATION

A. Condensate Drains:

1. Support piping and protect from damage.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

23 23 10**REFRIGERANT PIPING SYSTEMS****PART 1 PRODUCTS**

1.1 COMPONENTS

- A. Refrigerant Piping:
 - 1. Meet requirements of ASTM B 280, hard drawn straight lengths. Soft copper tubing not permitted.
 - 2. Do not use pre-charged refrigerant lines.
- B. Refrigerant Fittings:
 - 1. Wrought copper with long radius elbows.
 - 2. Approved Manufacturers:
 - a. Mueller Streamline.
 - b. Nibco Inc.
 - c. Grinnell.
 - d. Elkhart.
- C. Suction Line Traps:
 - 1. Manufactured standard one-piece traps.
 - 2. Approved Manufacturers:
 - a. Mueller Streamline.
 - b. Nibco Inc.
 - c. Grinnell.
 - d. Elkhart.
- D. Connection Material:
 - 1. Brazing Rods in accordance with ANSI / AWS A5.8:
 - a. Copper to Copper Connections:
 - 1) Classification BCuP-4 Copper Phosphorus (6 percent silver).
 - 2) Classification BCuP-5 Copper Phosphorus (15 percent silver).
 - b. Copper to Brass or Copper to Steel Connections: Classification BAg-5 Silver (45 percent silver).
 - c. Do not use rods containing Cadmium.
 - 2. Flux:
 - a. Approved Products:
 - 1) Stay-Silv White Brazing Flux by J W Harris.
 - 2) High quality silver solder flux by Handy & Harmon.
- E. Valves:
 - 1. Expansion Valves:
 - a. For pressure type distributors, externally equalized with stainless steel diaphragm, and same refrigerant in thermostatic elements as in system.
 - b. Size valves to provide full rated capacity of cooling coil served. Coordinate selection with evaporator coil and condensing unit.
 - c. Approved Manufacturers:
 - 1) Alco.
 - 2) Henry.
 - 3) Mueller.
 - 4) Parker.
 - 5) Sporlan.
 - 2. Manual Refrigerant Shut-Off Valves:
 - a. Ball valves designed for refrigeration service and full line size.
 - b. Valve shall have cap seals.
 - c. Valves with hand wheels are not acceptable.
 - d. Provide service valve on each liquid and suction line at compressor.
 - e. If service valves come as integral part of condensing unit, additional service valves shall not be required.

- f. Approved Manufacturers:
 - 1) Henry.
 - 2) Mueller.
 - 3) Superior.
 - 4) Virginia.
- F. Filter-Drier:
 - 1. On lines 3/4 inch outside diameter and larger, filter-drier shall be replaceable core type with Schraeder type valve.
 - 2. On lines smaller than 3/4 inch outside diameter, filter-drier shall be sealed type using flared copper fittings.
 - 3. Size shall be full line size.
 - 4. Approved Manufacturers:
 - a. Alco.
 - b. Mueller.
 - c. Parker.
 - d. Sporlan.
 - e. Virginia.
- G. Sight Glass:
 - 1. Combination moisture and liquid indicator with protection cap.
 - 2. Sight glass shall be full line size.
 - 3. Sight glass connections and sight glass body shall be solid copper or brass, no copper-coated steel sight glasses allowed.
 - 4. Approved Product:
 - a. Alco AMI.
- H. Flexible Connectors:
 - 1. Designed for refrigerant service with bronze seamless corrugated hose and bronze braiding.
 - 2. Approved Products:
 - a. Vibration Absorber Model VAF by Packless Industries.
 - b. Vibration Absorbers by Virginia KMP Corp.
 - c. Anaconda 'Vibration Eliminators' by Universal Metal Hose.
 - d. Style 'BF' Spring-flex freon connectors by Vibration Mountings.

1.2 MATERIALS

- A. Refrigerant Piping Supports:
 - 1. Base, Angles, And Uprights: Steel meeting requirements of ASTM A 36.
 - 2. Securing Channels:
 - a. At Free-Standing Pipe Support:
 - 1) Acceptable Products:
 - a) P-1000 channels by Unistrut.
 - b) HS-158-12 channels by Hilti.
 - c) Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.
 - b. At Wall Support:
 - 1) Acceptable Products:
 - a) P-3300 channels by Unistrut.
 - b) HS-1316-12 channels by Hilti.
 - c) Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.
 - c. At Suspended Support:
 - 1) Acceptable Products:
 - a) P-1001 channels by Unistrut.
 - b) MS-41 channels by Hilti.
 - c) Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.
 - 3. Angle Fittings:
 - a. Acceptable Products:
 - 1) P-2626 90 degree angle by Unistrut.

- 2) MW2 angle by Hilti.
- 3) Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.
4. Pipe Clamps:
 - a. Acceptable Manufacturers:
 - 1) Hilti Cush-A-Clamp.
 - 2) Hydra-Zorb.
 - 3) Klo-Shure coupling
 - 4) ZSI Cush-A-Clamp.
 - 5) Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.
5. Protective Cover: 20 ga steel, hot-dipped galvanized to meet requirements of ASTM A 361, 1.25 oz/sq ft.

1.3 MANUFACTURERS

A. Contact Information:

1. Alco Controls Div, Maryland Heights, MO (314) 569-4500.
www.alcocontrols.com
2. Cush-A-Clamp by ZSI Manufacturing, Westland, MI (800) 323-7053 or (734) 467-1716. www.cushaclamp.com
3. Elkhart Products Corp, Elkhart, IN (219) 264-3181.
www.elkhartproducts.com
4. Grinnell Corp, Exeter, NH (888) 610-6101 or (630) 787-6100.
www.grinnell.com
5. Handy & Harmon Products Division, Fairfield, CT (800) 245-2728 or (203) 259-8321. www.handyharmon.com
6. J W Harris Co Inc, Cincinnati, OH (800) 733-4533 or (513) 891-2000.
www.jwharris.com
7. Henry Valve Co, Melrose Park, IL (800) 964-3679 or (708) 344-1100.
www.paulsenpartners.com/henry-valve/
8. Hilti Inc, Tulsa, OK (800) 879-8000 or (918) 252-6000. www.hilti.com
9. Hydra-Zorb Co, Auburn Hills, MI (248) 373-5151. www.hydra-zorb.com
10. Klo-Shure, Royal Oak, MI (248) 373-6250 www.klo-shure.com
11. Mueller Steam Specialty, St Pauls, NC (877) 831-9464 or (910) 865-8241.
www.muellersteam.com
12. Nibco Inc, Elkhart, IN (800) 642-5463 or (219) 295-3000. www.nibco.com
13. Packless Industries, Waco, TX (800) 347-4859 or (254) 666-7700.
www.packless.com
14. Parker Hannefin Corp, Cleveland, OH (216) 896-3000.
www.parker.com/cjg/
15. Sporlan Valve Co, Washington, MO (314) 239-1111.
16. Superior Refrigeration Products, Washington, PA (724) 225-8000.
www.superiorvalve.com
17. Unistrut Corp, Wayne, MI (800) 521-7730 or (313) 721- 4040.
www.unistrut.com
18. Universal Metal Hose, Chicago, IL (800) 638-4673 or (773) 277-0700.
www.universalmetalhose.com
19. Vibration Mountings & Controls, Bloomingdale, NJ (800) 569-8423 or (973) 838-1780. www.vmc-kdc.com
20. Virginia KMP Corp, Dallas, TX (800) 285-8567 or (214) 330-7731.
www.virginiakmp.com

PART 2 EXECUTION

2.1 INSTALLATION

A. Refrigerant Lines:

1. Install as high in upper mechanical areas as possible. Do not install underground or in tunnels.

2. Slope suction lines down toward compressor **one inch/10 feet**. Locate traps at vertical rises against flow in suction lines.
- B. Connections:
1. Refrigeration system connections shall be copper-to-copper, copper-to-brass, or copper-to-steel type properly cleaned and brazed with specified rods. Use flux only where necessary. No soft solder (tin, lead, antimony) connections will be allowed in system.
 2. Braze manual refrigerant shut-off valve, sight glass, and flexible connections.
 3. Circulate dry nitrogen through tubes being brazed to eliminate formation of copper oxide during brazing operation.
- C. Specialties:
1. Install valves and specialties in accessible locations. Install refrigeration distributors and suction outlet at same end of coil.
 2. Install thermostatic bulb as close to cooling coil as possible. Do not install on vertical lines.
 3. Install equalizing line in straight section of suction line, downstream of and reasonably close to thermostatic bulb. Do not install on vertical lines.
 4. Provide flexible connectors in each liquid line and suction line at both condensing unit and evaporator on systems larger than five tons. Anchor pipe near each flexible connector.
- D. Refrigerant Supports:
1. Support Spacing:
 - a. Piping 1-1/4 inch And Larger: 8 feet on center maximum.
 - b. Piping 1-1/8 inch And Smaller: 6 feet on center maximum.
 - c. Support each elbow.
 2. Isolate pipe from supports and clamps with Hydrozorb or Cush-A-Clamp systems.
 3. Run protective cover continuous from condensing units to risers or penetrations at building wall.
- 2.2 FIELD QUALITY CONTROL
- A. Make evacuation and leak tests in presence of Architect's Engineer after completing refrigeration piping systems. Positive pressure test will not suffice for procedure outlined below.
1. Draw vacuum on each entire system with two stage vacuum pump. Draw vacuum to 300 microns using micron vacuum gauge capable of reading from atmosphere to 10 microns. Do not use cooling compressor to evacuate system nor operate it while system is under high vacuum.
 2. Break vacuum with nitrogen and re-establish vacuum test. Vacuum shall hold for 30 minutes at 300 microns without vacuum pump running.
 3. Conduct tests at 70 deg F ambient temperature minimum.
 4. Do not run systems until above tests have been made and systems started up as specified. Inform Owner's Representative of status of systems at time of final inspection and schedule start-up and testing if prevented by outdoor conditions before this time.
 5. After testing, fully charge system with refrigerant and conduct test with Halide Leak Detector.
 6. Recover all refrigerant in accordance with applicable codes. Do not allow any refrigerant to escape to atmosphere.
- B. If it is observed that refrigerant lines are being or have been brazed without proper circulation of nitrogen through lines, all refrigerant lines installed up to that point in time shall be removed and replaced at no additional cost to Owner.

END OF SECTION

23 31 13**METAL DUCTS****PART 1 PRODUCTS**

1.1 COMPONENTS

- A. Sheet Metal:
1. Fabricate ducts, plenum chambers and casings of zinc-coated, lock-forming quality steel sheets meeting requirements of ASTM A 653, with G 60 coating.
- B. Ducts:
1. Round Duct:
 - a. Spiral Seam: **28 ga** minimum for ducts up to and including **14 inches** in diameter.
 - b. Longitudinal Seam:
 - 1) **28 ga** minimum for ducts up to and including **8 inches** in diameter.
 - 2) **26 ga** minimum for ducts over **8 inches** and up to **14 inches** in diameter.
- C. Duct Sealer For Interior Ducts:
1. Approved Products:
 - a. Duct Butter or Butter Tak by Cain Manufacturing Co Inc, Pelham, AL (800) 554-0342 or (205) 663-2200. www.cainmfg.com
 - b. DP 1010 by Design Polymerics, Fountain Valley, CA (800) 641-0808 or (714) 432-0600. www.designpoly.com
 - c. S2 by Duro Dyne, Farmingdale, NY (800) 899-3876 or (516) 249-9000 www.durodyne.com.
 - d. Versa Grip 102 by Hardcast Inc, Wylie, TX (800) 527-7092 or (972) 442-6545. www.hardcast.com
 - e. 15-325 by Kingco, King Adhesive Corp, St Louis, MO (800) 233-8171 or (314) 772-9953.
 - f. 44-41 by Mon-Eco Industries Inc, East Brunswick, NJ (800) 899-6326 or (908) 257-7942.
 - g. Airseal #11 by Polymer Adhesive Sealant Systems Inc, Irving, TX (888) 721-7325.
 - h. Multipurpose Duct Sealant by Trans-Continental Equipment Co.
 - i. Water Base Duct Sealer by United McGill Corp, Columbus, OH (800) 624-5535 or (614) 836-9981. www.unitedmcgillcorp.com
- D. Duct Sealer For Exterior Ducts:
1. Approved Products:
 - a. Hardcast Tape and RTA-50 adhesive by Hardcast Inc, Wylie, TX (800) 527-7092 or (972) 442-6545. www.hardcast.com

1.2 FABRICATION

- A. Ducts:
1. Straight and smooth on inside with joints neatly finished.
 2. Cross-break unlined ducts, duct panels larger than **48 inch** vertical and horizontal sheet metal barriers, duct offsets, and elbows, or bead **12 inches** on center.
 - a. Apply cross-breaking to sheet metal between standing seams or reinforcing angles.
 - b. Center of cross-break shall be of required height to assure surfaces being rigid.

3. Duct drops to diffusers shall be round, square, or rectangular to accommodate diffuser neck. Drops shall be same gauge as branch duct.
 - a. Seal joints air tight.
 - b. Externally insulate all ducts.

PART 2 EXECUTION

2.1 INSTALLATION

- A. Interface With Other Work: Reseal transverse joint duct leaks and seal longitudinal duct joint leaks discovered during air test and balance procedures, at no additional cost to Owner.
- B. Install internal ends of slip joints in direction of flow. Seal transverse and longitudinal joints air tight using specified duct sealer. Cover horizontal and longitudinal joints on exterior ducts with two layers of specified tape installed with specified adhesive.
- C. Securely anchor ducts and plenums to building structure with specified duct hangers attached with screws. Do not hang more than one duct from a duct hanger. Brace and install ducts so they shall be free of vibration under all conditions of operation.
- D. Ducts shall not bear on top of structural members.
- E. Paint ductwork visible through registers, grilles, and diffusers flat black.
- F. Properly flash where ducts protrude above roof.
- G. Under no conditions will pipes, rods, or wires be allowed to penetrate ducts.

END OF SECTION

23 31 16**NON-METAL DUCTS****PART 1 PRODUCTS**

1.1 COMPONENTS

A. Ducts:

1. Formable, flexible, circular duct which shall retain its cross-section, shape, rigidity, and shall not restrict airflow after bending.
2. Insulation: Nominal **1-1/2 inches**, 3/4 lb/cu ft density fiberglass insulation with air-tight, polyethylene or polyester core, sheathed in seamless vapor barrier jacket factory installed over flexible assembly.
3. Assembly, including insulation and vapor barrier, shall meet Class I requirement of NFPA 90A and be UL 181 rated, with flame spread of 25 or less and smoke developed rating of 50 or under.
4. Approved Products:
 - a. ANCO-FLEX 4625 by Anco Products Inc, Elkhart, IN (800) 837-2626 or (574) 213-5574. www.ancoproductsinc.com
 - b. PF/UPC #090 by Flex-Aire.
 - c. RJ-30 by Flexible Air Movers Inc.
 - d. M-KC by Thermaflex by Flexible Technologies, Abbeville, SC (864) 459-5441. www.wereflexible.com
 - e. Type 4m Insulated by Flexmaster USA Inc, Houston, TX (713) 462-7694 www.flexmasterusa.com or Flexmaster Canada, Ltd, Richmond Hill, ON (905) 731-9411.

B. Cinch Bands: Nylon, **3/8 inch** removable and reusable type.

PART 2 EXECUTION

2.1 INSTALLATION

- A. Install duct in fully extended condition free of sags and kinks, using **72 inch** maximum lengths.
- B. Make duct connections by coating exterior of duct collar for **3 inches** with duct sealer and securing duct in place over sheet metal collar with specified cinch bands.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

23 33 10**DUCT ACCESSORIES****PART 2 PRODUCTS****2.1 COMPONENTS**

- A. Flexible Equipment Connections:
1. 30 oz closely woven UL approved glass fabric, double coated with neoprene.
 2. Fire retardant, waterproof, air-tight, resistant to acids and grease, and withstand constant temperatures of **250 deg F**.
 3. Approved Products:
 - a. Cain: N-100.
 - b. Duro Dyne: MFN.
 - c. Dyn Air: CPN with G-90 galvanized off-set seam
 - d. Elgen: ZLN.
 - e. Ventfabrics: Ventglas.
 - f. Ductmate: ProFlex.
- B. Duct Access Doors:
1. Factory built insulated access door with hinges and sash locks. Construction shall be galvanized sheet metal, **24 ga** minimum.
 2. Fire and smoke damper access doors shall have minimum clear opening of **12 inches** square or larger as shown on Drawings.
 3. Approved Products:
 - a. Air Balance: Fire/Seal FSA 100.
 - b. Air-Rite: Model HAD-2.
 - c. Cesco: HDD.
 - d. Flexmaster: Spin Door.
 - e. Kees Inc: ADH-D.
 - f. Nailor: 085H-01.
 - g. Pottorff: 60-HAD.
 - h. Ruskin: ADH-24.
- C. Dampers And Damper Accessories:
1. Locking Quadrant Damper Regulators:
 - a. Approved Products:
 - 1) Duro Dyne: KS-38.
 - 2) Dyn Air: QPS-385
 - 3) Ventfabrics: Ventline 555.
 - 4) Young: No. 1.
 2. Concealed Ceiling Damper Regulators:
 - a. Approved Products:
 - 1) Cain.
 - 2) Duro Dyne.
 - 3) Metco Inc.
 - 4) Ventfabrics: 666 Ventlok.
 - 5) Young: 301.
 3. Volume Dampers:
 - a. Factory-manufactured **16 ga** galvanized steel, single blade and opposed blade type with **3/8 inch** axles and end bearings. Blade width **8 inches** maximum. Blades shall have **1/8 inch** clearance all around.
 - 1) Damper shall operate within acoustical duct liner.
 - 2) Provide channel spacer equal to thickness of duct liner.
 - b. Dampers above removable ceiling and in Mechanical Rooms shall have locking quadrant on bottom or side of duct. Otherwise, furnish with concealed ceiling damper regulator and cover plate.

- c. Approved Products:
 - 1) Air-Rite: Model CD-2.
 - 2) American Warming: VC-2-AA.
 - 3) Arrow: OBDAF-207.
 - 4) C & S: AC40.
 - 5) Cesco: AGO.
 - 6) Daniel: CD-OB.
 - 7) Greenheck: VCD-20.
 - 8) Pottorff: CD-42.
 - 9) Ruskin: MD-35.
 - 10) UTEMP: CD-OB.
- 4. Backdraft Dampers:
 - a. Backdraft blades shall be nonmetallic neoprene coated fiberglass type.
 - b. Stop shall be galvanized steel screen or expanded metal, **1/2 inch** mesh.
 - c. Frame shall be galvanized steel or extruded aluminum alloy.
 - d. Approved Products:
 - 1) Air-Rite: Model BDD-3.
 - 2) American Warming: BD-15.
 - 3) C & S: BD30.
 - 4) Cesco: FBD 101.
 - 5) Daniel: FBD-H/V.
 - 6) Pottorff: 50FBD.
 - 7) Ruskin: NMS2.
 - 8) UTEMP: BFEA.
- D. Branch Tap for Flexible Ductwork:
 - 1. Factory-manufactured rectangular-to-round 45 degree leading tap fabricated of **24 ga** zinc-coated lock-forming quality steel sheets meeting requirements of ASTM A 653, with G-90 coating.
 - 2. One inch wide mounting flange with die formed corner clips, pre-punched mounting holes, and adhesive coated gasket.
 - 3. Manual Volume Damper:
 - a. Single blade, **22 ga** minimum
 - b. **3/8 inch** minimum square rod with brass damper bearings at each end.
 - c. Heavy-duty locking quadrant on **1-1/2 inch** high stand-off mounting bracket attached to side of round duct.
 - 4. Approved Products:
 - a. ST-1HD by Air-Rite.
 - b. STO by Flexmaster.
 - c. HET by Sheet Metal Connectors.

2.2 MANUFACTURERS

- A. Contact Information:
 - 1. AGM Industries, Brockton, MA (800) 225-9990.
 - 2. Air Balance Inc, Holland, OH (419) 865-5000. www.air-balance.com
 - 3. Air Filter Inc, Baltimore, Md (800) 875-3442. www.afinc.com
 - 4. Air-Rite Manufacturing, Bountiful, UT (801) 295-2529.
 - 5. American Warming & Ventilating, Holland, OH (419) 865-5000
www.american-warming.com.
 - 6. Arrow United Industries, Wyalusing, PA (717) 746-1888
www.arrowunited.com.
 - 7. Cain Manufacturing Company Inc, Pelham, AL (800) 554-0342 or (205) 663-2200. www.cainmfg.com
 - 8. C & S Air Products, Montebello, CA (323) 889-6769.
 - 9. CertainTeed Corp, Valley Forge, PA (800) 233-8990 or (610) 341-7739 www.certainteed.com.

10. Cesco Products, Minneapolis, MN (888) 422-3726.
www.cescoproducts.com
11. Design Polymerics, Fountain Valley, CA (800) 641-0808 or (714) 432-0600. www.designpoly.com
12. Ductmate Industries Inc, East Monongahela, PA (800) 245-3188 or (412) 258-0500 www.ductmate.com or DuctmateCanada Ltd, Burlington, ON (800) 263-4541 or (905) 332-7678
13. Duro Dyne, Farmingdale, NY (800) 899-3876 or (516) 249-9000 www.durodyne.com or Duro Dyne Canada Inc, (514) 422-9760.
14. Dwyer Instruments Inc, Michigan City, IN (800) 872-9141 or (219) 879-8000. www.dwyer-inst.com
15. Dyn Air, Div Carlisle, LaChine, QB (800) 544-5535 www.dynair.ca
16. Flexmaster USA Inc, Houston, TX (713) 462-7694
www.flexmasterusa.com.
17. Greenheck Corp, Schofield, WI (715) 359-6171
www.greenheck.com.
18. Gripnail Corp, East Providence, RI (800) 474-7624 or (401) 431-1791. www.gripnail.com
19. Hardcast Inc, Div Carlisle, Wylie, TX (800) 527-7092 or (972) 442-6545. www.hardcast.com
20. Honeywell Inc, Minneapolis, MN (800) 328-5111 or (612) 952-2000
www.honeywell.com.
21. Industrial Acoustics Co, Bronx, NY (718) 931-8000.
www.industrialacoustics.com
22. Johns-Manville, Denver, CO (800) 654-3103 or (303) 978-2000.
www.jm.com
23. Kees Inc, Elkhart Lake, WI (920) 876-3391. www.kees.com
24. Kingco - King Adhesive Corp, St Louis, MO (800) 233-8171 or (314) 772-9953.
25. Knauf Fiber Glass, Shelbyville, IN (800) 825-4434 or (317) 398-4434
www.knauffiberglass.com.
26. Manson Insulation Inc, Brossard, BC Canada (800) 626-7661 or (450) 659-9101.
27. Metco Inc, Salt Lake City, UT (801) 467-1572.
28. Miracle Sealants + Abrasives Co, Irwindale, CA (800) 350-1901 or (626) 814-8988. www.miraclesealants.com
29. Mon-Eco Industries Inc, East Brunswick, NJ (800) 899-6326 or (908) 257-7942.
30. Nailor Industries Inc, Houston, TX (281) 590-1172. www.nailor.com
31. Omark Industries.
32. Owens Corning, Toledo OH (800) 438-7465 or (419) 248-8000
www.owenscorning.com.
33. Polymer Adhesive Sealant Systems Inc, Irving, TX (888) 721-7325.
34. Pottorff Company Inc, Montebello, CA (213) 728-0004.
35. Ruskin Manufacturing, Kansas City, MO (816) 761-7476
www.ruskin.com.
36. Sheet Metal Connectors Inc, Minneapolis, MN (612) 572-1100.
www.smconnectors.com
37. Techno Adhesive.
38. Titus, Richardson, TX (972) 699-1030 www.titus-hvac.com.
39. United McGill Corp, Columbus, OH (800) 624-5535 or (614) 836-9981. www.unitedmcgillcorp.com
40. Utemp Inc, Salt Lake City, UT (801) 978-9265.
41. Ventfabrics Inc, Chicago, IL (800) 621-1207 or (773) 775-4477.
www.ventfabrics.com
42. Young Regulator Co, Cleveland, OH (216) 663-5646.
www.youngregulator.com

2.3 FABRICATION

- A. Air Turns:
1. Permanently install vanes arranged to permit air to make abrupt turn without appreciable turbulence, in 90 degree elbows of above ground supply and return ductwork.
 2. Quiet and free from vibration when system is in operation.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Flexible Connections: Install flexible inlet and outlet duct connections to each furnace.
- B. Access Doors In Ducts:
1. Install at each manual outside air damper and at each motorized damper. Locate doors within **6 inches** of installed dampers.
 2. Install within **6 inches** of fire dampers and in Mechanical Room if possible. Install on side of duct that allows easiest access to damper.
- C. Dampers And Damper Accessories:
1. Install concealed ceiling damper regulators.
 - a. Paint cover plates to match ceiling tile.
 - b. Do not install damper regulators for dampers located directly above removable ceilings or in Mechanical Rooms.
 2. Provide each take-off with an adjustable volume damper to balance that branch.
 - a. Anchor dampers securely to duct.
 - b. Install dampers in main ducts within insulation.
 - c. Dampers in branch ducts shall fit against sheet metal walls, bottom and top of duct, and be securely fastened. Cut duct liner to allow damper to fit against sheet metal.
 - d. Where concealed ceiling damper regulators are installed, provide cover plate.

END OF SECTION

23 33 13**FIRE DAMPERS****PART 1 PRODUCTS**

1.1 MANUFACTURED UNITS

- A. Frame, 16 ga. galvanized steel, hat channel
 - 1. Mitered corners with reinforcing gussets
- B. Blades, triple-vee design
 - 1. 16 ga. galvanized steel
 - 2. Parallel construction, 5 1/2" centers
- C. Blade Axles, 1/2" plated steel
 - 1. Double bolted each end
 - 2. Hex or square friction fit or press fit axles are not acceptable
 - 3. Self-lubricating bearings of ionite bronze
 - 4. Zero maintenance linkage, mount out of air-stream
- D. Dampers shall be classified for Dynamic Closure against an airflow velocity of 2000 fpm at 4" w.g. static pressure differential (across closed damper).
- E. Each damper shall bear a UL 1 1/2 hr fire resistive rating label.
- F. Label with words containing the phrase "for use in dynamic systems".
 - 1. Dampers marked for static systems only are not acceptable.
- G. Provide each damper with a 165° fusible link.
- H. Upon closing the damper shall lock in closed position.
- I. Each damper will have a steel sleeve of length/gauge as filed verified by contractor.
 - 1. Manufacturer to provide retaining angles with each damper.
- J. Each damper to have an internal quadrant for setting and locking blades.
- K. Acceptable Manufacturer:
 - 1. Nailor
 - 2. Ruskin
 - 3. Lloyd
 - 4. Hart & Cooley
- L. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

PART 2 EXECUTION

2.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.
- B.

2.2 INSTALLATION

- A. Install according to manufacturers and/or responsible institutes instructions.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

23 34 10**EXHAUST FANS****PART 1 PRODUCTS**

1.1 MANUFACTURED UNITS

A. Ceiling Mounted Exhaust Fans:

1. Acoustically insulated housings. Sound level rating of 4.6 sones maximum for fan RPM and CFM listed on Drawings.
2. Include chatterproof integral back-draft damper with no metal-to-metal contact.
3. True centrifugal wheels.
4. Entire fan, motor, and wheel assembly shall be easily removable without disturbing housing.
5. Suitably ground motors and mount on rubber-in shear vibration isolators.
6. Provide wall or roof cap, as required.
7. Energy Star Compliant.

PART 2 EXECUTION

2.1 INSTALLATION

- A. Anchor fan units securely to structure or to curb.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

23 37 13DIFFUSERS, REGISTERS, AND GRILLES**PART 1 PRODUCTS**

1.1 MANUFACTURED UNITS

- A. Supply Grilles And Registers:
 - 1. Finish: Off-white baked enamel.
 - 2. Removable core.
 - 3. Approved Products:
 - a. Carnes : RVEA.
 - b. J & J: 2815.
 - c. Krueger: 5815.
 - d. Metal*Aire: 42C.
 - e. Nailor: 51RCD.
 - f. Price: LBMR/DV1.
 - g. Titus: 1707.
 - h. Tuttle & Bailey: VF5.
- B. Ceiling Return And Transfer Grilles:
 - 1. Finish: Off-white baked enamel.
 - 2. 1/2 inch 13 mm spacing.
 - 3. Approved Products:
 - a. Carnes: RSLA.
 - b. J & J: S90H.
 - c. Krueger: S85H.
 - d. Metal*Aire: SRH.
 - e. Nailor: 6155H.
 - f. Price: 535.
 - g. Titus: 355RL or 355 SL.
 - h. Tuttle & Bailey: T70D.
- C. High Side Wall Return Grilles:
 - 1. Finish: Off-white baked enamel.
 - 2. Approved Products:
 - a. Carnes: RHEA.
 - b. J & J: 2810.
 - c. Metal*Aire: 41C.
 - d. Krueger: 5810.
 - e. Nailor: 51RC.
 - f. Price: LBMR.
 - g. Titus: 1700.
 - h. Tuttle & Bailey: VF.
- D. Floor Return Grilles:
 - 1. Finish: Clear anodized.
 - 2. Approved Products:
 - a. Carnes: CCJB (with mitered corners welded on face and sanded).
 - b. J & J: 2500 with Frame 10.
 - c. Krueger: 1500F.
 - d. Metal*Aire: 2000F.
 - e. Nailor: 49-240-FN-MM.
 - f. Price: LBP-25B.
 - g. Titus: CT-540.
 - h. Tuttle & Bailey: LFD.
- E. Low Sidewall Return Grilles:
 - 1. Finish: Off-white baked enamel.
 - 2. 38 or 45 degree deflection.

3. Approved Products:
 - a. Carnes: RSHA.
 - b. J & J: S-590.
 - c. Krueger: S480H.
 - d. Metal*Aire: HD-RH.
 - e. Nailor: 6145H-HD.
 - f. Price: 90-L.
 - g. Titus: 33RL or 33RS.
 - h. Tuttle & Bailey: T110.

F. Ceiling Diffusers:

1. Finish: Off-white baked enamel.
2. Approved Products:
 - a. Carnes: SKSA.
 - b. J & J: R-1400.
 - c. Krueger: SH.
 - d. Metal*Aire: 5500S.
 - e. Nailor: 650OB.
 - f. Price: SMD-6.
 - g. Titus: TDC-6.
 - h. Tuttle & Bailey: MS.

1.2 MANUFACTURERS

A. Contact Information:

1. Carnes Co, Verona, MI (608) 845-6411. www.carnes.com
2. J & J Register, El Paso, TX (915) 852-9111.
3. Krueger Air System Components, Richardson, TX (972) 918-8269.
www.krueger-hvac.com
4. Metal*Aire by Metal Industries Inc, Clearwater, FL (813) 441-2651.
www.metalaire.com
5. Nailor Industries Inc, Houston, TX (281) 590-1172 www.nailor.com
or Weston, ON (416) 744-3300.
6. Titus, Richardson, TX (972) 699-1030. www.titus-hvac.com
7. Tuttle & Bailey, Richardson, TX (972) 497-0486.
www.tuttleandbailey.com

PART 2 EXECUTION

2.1 INSTALLATION

- A. Anchor securely into openings. Secure frames to ductwork by using four sheet metal screws, one per side. Level floor registers and anchor securely into floor.

2.2 ADJUSTING

- A. Set sidewall supply register blades at 15 degrees upward deflection.

END OF SECTION

23 41 13**AIR FILTERS****PART 1 PRODUCTS**

1.1 MANUFACTURED UNITS

A. Furnace Filters

1. **One inch** thick throw-away type as recommended by Furnace Manufacturer.

PART 2 EXECUTION

2.1 INSTALLATION

- A. Provide ample access for filter removal.

2.2 FIELD QUALITY CONTROL

A. Inspection

1. At date of Substantial Completion, air filters shall be new, clean, and approved by Architect's representative.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

23 54 10**AIR-HANDLING UNITS****PART 1 GENERAL**

- 1.1 SUBMITTALS
- A. See Section 01 33 23 Submittal Procedures for requirements.
 - 1. Manufacturers product data

PART 2 PRODUCTS

- 2.1 MANUFACTURERS
- A. Manufacturers
 - 1. Carrier Crop, Syracuse NY (800)227-7437
 - 2. Lennox Industries, Dallas TX (972) 497-5000
 - 3. York
 - 4. AMANA
 - 5. Trane
 - 6. Bryant
- 2.2 MANUFACTURED UNITS
- A. Furnaces
 - 1. Furnace to be Multi-Position, Variable-Speed Air Handler
 - 2. Factory assembled units, certified by ARI, complete with blower section, cased evaporator coil and ancillary electric resistance coils.
 - 3. Blower section shall consist of cabinet, blower, and motor.
 - a. Cabinet shall be cold rolled steel and have finish coat of baked-on enamel.
 - b. Blower shall be Class 1, full DIDW, statically and dynamically balanced.
 - 4. Automatic controls shall consist of;
 - a. Solid state type fan and thermal limit controls.
 - 5. Blower shall be driven by variable-speed direct driven DC motor.
 - B. Cooling Coil
 - 1. Cooling coil shall consist of heavy gauge steel cabinet with baked-on enamel finish to match furnace.
 - a. Coil shall have aluminum fins bonded to seamless copper tubing.
 - b. Coil shall be ARI rated.
 - 1). Provide drain pans with connections at one end.
 - c. Use thermal expansion valve compatible heat pump operation.
 - C. Electric Heaters
 - 1. Coil shall be an electric duct heater in accordance with UL 1995 and NFPA 70.
 - a. Coil shall be unit-mounted.
 - b. Coil shall be of the nickel chromium resistor, single stage, strip type.
 - c. Coil shall be provided with a built-in or surface-mounted high-limit thermostat interlocked electrically so that the coil cannot be energized unless the fan is energized.
 - d. Coil casing and support brackets shall match furnace case.
 - e. Coil shall be mounted to eliminate noise from expansion and contraction and be completely accessible for service.
 - f. Sequential operation shall be provided to control heaters.
 - D. Filter Rack
 - 1. Provide built-in filter rack for 1" permanent, washable filter.
 - E. Thermostat
 - 1. Provide programmable thermostat.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Isolate furnace from duct with canvas type connection.

3.2 FIELD QUALITY CONTROL

A. Manufacturer's Field Service

- 1. Furnace distributor's technical service representative shall
 - a. Check and measure temperature rise.
 - b. Check safety controls for proper operation.
- 2. In addition, furnace distributor's technical service representative shall start up, check out, and adjust furnaces using equipment check-out sheet provided by Manufacturer.
 - a. Complete and sign all items on sheet.

END OF SECTION

23 81 43**AIR SOURCE HEAT PUMPS****PART 1 GENERAL**

1.1 SUBMITTALS

- A. See Section 01 33 23 Submittal Procedures for requirements.
- B. Manufacturers product data and cut sheets.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Acceptable Manufacturers
 - 1. Carrier Crop, Syracuse NY (800)227-7437
 - 2. Lennox Industries, Dallas TX (972) 497-5000
 - 3. York
 - 4. AMANA
 - 5. Trane
 - 6. Bryant
- B. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

2.2 MANUFACTURED UNITS

- A. Heat Pump shall be a factory assembled unit consisting of:
 - 1. Outdoor coil
 - 2. Propeller type fans arranged for vertical discharge
 - 3. Refrigerant circuit with filter-dryer
 - 4. Hermetically sealed compressor
 - a. crankcase heater
 - b. internal overload protection
 - c. pressure relief valve
 - 5. Contain equipment in a weather resistant outer casing.
 - a. Casing shall be provided with easily removable panels for access to all parts of the equipment.
 - 6. Defrost controls, and necessary tubing, piping, controls, control circuits, and required accessories shall be provided.
 - 7. Provide factory installed, solid core liquid line filter-drier.
- B. Unit shall be certified as complying with provisions of ARI 210/240, ARI 270, ARI 340/360, and UL 1995, as applicable.
 - 1. Minimum EER shall be as indicated on the drawings, in accordance with ARI 210/240 (2006) Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment.
 - 2. Rating shall be at unit maximum speed.
 - 3. Refrigerant shall be non-CFC.
 - 4. Equipment vibration isolation shall be as recommended by the equipment manufacturer.
 - 5. SEER 15
 - 6. HSPF 9

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

3.2 INSTALLATION

- A. Install according to manufacturers and/or responsible intitutes instructions.

END OF SECTION

DIVISION 26 - ELECTRICAL**26 05 00 COMMON WORK RESULTS FOR ELECTRICAL**

- 26 05 15 Common Work Results for Electrical
- 26 05 19 Conductors and Cables
- 26 05 26 Grounding and Bonding for Electrical Systems
- 26 05 33 Raceway and Conduit
- 26 05 34 Boxes

26 24 00 SWITCHBOARDS AND PANELBOARD

- 26 24 16 Panel Boards

26 27 00 LOW-VOLTAGE DISTRIBUTION EQUIPMENT

- 26 27 10 Electrical Utility Services
- 26 27 26 Wiring Devices
- 26 27 27 Wiring Connections

26 28 00 LOW-VOLTAGE CIRCUIT PROTECTIVE DEVICES

- 26 28 16 Enclosed Switches and Circuit Breakers

26 51 00 INTERIOR LIGHTING

- 26 51 13 Interior Lighting Fixtures, Lamps, and Ballasts

26 52 00 EMERGENCY LIGHTING

- 26 52 10 Emergency and Exit Lighting

26 56 00 EXTERIOR LIGHTING

- 26 56 16 Exterior Lighting

THIS PAGE IS INTENTIONALLY BLANK

26 05 15**COMMON WORK RESULTS FOR ELECTRICAL****PART 1 GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 1. General electrical system requirements and procedures.
 2. Perform excavating and backfilling work required by work of this Division as described in Contract Documents.
 3. Make electrical connections to equipment provided under other Sections.
 4. Furnish and install Penetration Firestop Systems at electrical system penetrations as described in Contract Documents.
- B. Products Supplied But Not Installed Under This Section:
 1. Anchor bolts and templates for equipment bases only.

1.2 SUBMITTALS

- A. Product Data:
 1. Provide following information for each item of equipment:
 - a. Catalog Sheets.
 - b. Assembly details or dimension drawings.
 - c. Installation instructions.
 - d. Manufacturer's name and catalog number.
 - e. Name of local supplier.
 2. Furnish such information for following equipment:
 - a. Wiring devices.
 - b. Disconnects.
 - c. Panelboards.
 - d. Motor starters.
 - e. Lighting fixtures, poles, and associated control equipment.
 - f. Emergency lighting packs.
 - g. Signal bell system equipment.
 - h. Sound Reinforcement.
 - i. Heating cable equipment.
 3. Do not purchase equipment before approval of product data.
- B. Shop Drawings:
 1. Submit on Panelboards.
 2. Indicate precise equipment to be used, including all options specified. Indicate wording and format of nameplates where applicable. Submit in three-ring binder with hard cover.

1.3 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
 1. NEC and local ordinances and regulations shall govern unless more stringent requirements are specified.
 2. Material and equipment provided shall meet standards of NEMA or UL and bear their label wherever standards have been established and label service is available.

1.4 OWNER'S INSTRUCTIONS

- A. Provide competent instructor for three days to train maintenance personnel in operation and maintenance of electrical equipment and systems. Factory

representatives shall assist this instruction as necessary. Schedule instruction period at time of final inspection.

PART 2 PRODUCTS: Not Used

PART 3 EXECUTION

3.1 EXAMINATION

- A. Confirm dimensions, ratings, and specifications of equipment to be installed and coordinate these with site dimensions and with other Sections.

3.2 INSTALLATION

- A. General:
1. Locations of electrical equipment shown on Drawings are approximate only. Field verify actual locations for proper installation.
 2. Coordinate electrical equipment locations and conduit runs with those providing equipment to be served before installation or rough-in.
 - a. Notify Architect of conflicts before beginning work.
 - b. Coordinate locations of power and lighting outlets in mechanical rooms and other areas with mechanical equipment, piping, ductwork, cabinets, etc, so they will be readily accessible and functional.
 3. Work related to other trades which is required under this Division, such as cutting and patching, trenching, and backfilling, shall be performed according to standards specified in applicable Sections.
- B. Mounting Heights:
1. Unless otherwise indicated, mount center of outlets or boxes at following heights above finish floor:
 - a. Temperature Control Junction Boxes: As indicated on Drawings.
 - b. Thermostats: As indicated on Drawings.
 - c. Remote Temperature Sensors: **56 inches** to top.
 - d. Condensing Unit Disconnects: Top same height as top of unit.
 - e. Other Motor Disconnects: **60 inches**.
 - f. Distribution Panels: **72 inches** to top.
 - g. Receptacles: **18 inches**.
 - h. Wall Switches: **42 inches**.
 - i. Wall-Mounted Exit Lights: **90 inches**.
 - j. Emergency Lighting Units: **60 inches**.
 - k. Sound / Satellite / TV Distribution System Components: As indicated on Drawings.
 - l. Electric Water Cooler Outlets: Mount so outlet and cord are hidden by water cooler.
 - m. Motor controls: **60 inches**.
 - n. Telephone / Data Terminal Boards: **72 inches**.
 - o. Telephones (wall type): **48 inches**.
 - p. Telephones (desk type): **18 inches**.
 2. Refer special conditions to Architect before rough-in and locate outlet under his direction.
- C. Install Penetration Firestop System appropriate for penetration at electrical system penetrations through walls, ceilings, and top plates of walls.

3.3 FIELD QUALITY CONTROL

- A. Site Tests
1. Test systems and demonstrate equipment as working and operating properly. Notify Architect before test. Rectify defects at no additional cost to Owner.

- B. Measure current for each phase of each motor under actual final load operation, i.e. after air balance is completed for fan units, etc. Record this information along with full-load nameplates current rating and size of thermal overload unit installed for each motor.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

26 05 19**CONDUCTORS AND CABLES****PART 1 PRODUCTS**

1.1 COMPONENTS

- A. Line Voltage Conductors:
1. Copper with AWG sizes as shown:
 - a. Minimum size shall be No. 12 except where specified otherwise.
 - b. Conductor size No. 8 and larger shall be stranded.
 2. Insulation:
 - a. Standard Conductor Size No. 10 And Smaller: 600V type THWN or XHHW (75 deg C).
 - b. Standard Conductor Size No. 8 And Larger: 600V Type THW, THWN, or XHHW (75 deg C).
 - c. Higher temperature insulation as required by NEC or local codes.
 3. Colors:
 - a. 208Y / 120 V System:
 - 1) Black: Phase A.
 - 2) Red: Phase B.
 - 3) Blue: Phase C.
 - 4) Green: Ground.
 - 5) White: Neutral.
 - b. 480Y / 277 Volt System:
 - 1) Brown: Phase A.
 - 2) Orange: Phase B.
 - 3) Yellow: Phase C.
 - 4) Neutral: Gray.
 - 5) Ground: Green.
 - c. Conductors size No. 10 and smaller shall be colored full length. Tagging or other methods for coding of conductors size No. 10 and smaller not allowed.
 - d. For feeder conductors larger than No. 10 at pull boxes, gutters, and panels, use painted or taped band or color tag color-coded as specified above.
- B. Cord Sets For Ranges: Three pole, 4 wire grounding, 125/250V, NEMA 14-50P plug, 48 inch cord length minimum.

PART 2 EXECUTION

2.1 INSTALLATION

- A. General:
1. Conductors and cables shall be continuous from outlet to outlet.
 2. Do not use direct burial cable.
- B. Line Voltage Conductors (Over 70 Volts):
1. Install conductors in raceway except where specifically indicated otherwise. Run conductors of different voltage systems in separate conduits.
 2. Route circuits at own discretion, however, circuiting shall be as shown in Panel Schedules. Group circuit homeruns to panels as shown on Drawings.
 3. Neutrals:

- a. On three-phase, 4-wire systems, do not use common neutral for more than three circuits.
 - b. On single-phase, 3-wire systems, do not use common neutral for more than two circuits.
 - c. Run separate neutrals for each circuit where specifically noted on Drawings.
 - d. Where common neutral is run for two or three home run circuits, connect phase conductors to breakers in panel which are attached to separate phase legs so neutral conductors will carry only unbalanced current. Neutral conductors shall be of same size as phase conductors unless specifically noted otherwise.
4. Pulling Conductors:
 - a. Do not pull conductors into conduit until raceway system is complete and cabinets and outlet boxes are free of foreign matter and moisture.
 - b. Do not use heavy mechanical means for pulling conductors.
 - c. Use only listed wire pulling lubricants.
- C. Low Voltage Cables (70 Volts or Less):
1. In inaccessible, concealed spaces, run cables in raceway. In accessible, unfinished areas, cables may be run exposed without raceway.
 2. Run exposed cables parallel to or at right angles to building structure lines. Do not run exposed cables on floors or in such a way that they obstruct access to, operation of, or servicing of equipment. Keep cables 6 inches minimum from hot water pipes.
 - a. Support cables every 3 feet with permanent clips, straps, staples, or tie wraps approved for application and which will not cause cables to be pinched or deformed.
 - b. Securely attach clips and straps with nails or screws. Do not use wire or tape to support cables.
 3. Bundle only cables of same systems together.
 4. Pulling Conductors:
 - a. Do not pull conductors into conduit until raceway system is complete and cabinets and outlet boxes are free of foreign matter and moisture.
 - b. Do not use heavy mechanical means for pulling conductors.
 - c. Use only listed wire pulling lubricants.

END OF SECTION

26 05 26**GROUNDING & BONDING FOR ELECTRICAL SYSTEMS****PART 1 PRODUCTS**

1.1 COMPONENTS

- A. Size materials as shown on Drawings and in accordance with applicable codes.
- B. Grounding And Bonding Jumper Conductors
 - 1. Copper with green insulation or bare.
- C. Make grounding conductor connections to ground rods and water pipes using approved bolted clamps listed for such use.
- D. Service Grounding Connections And Cable Splices:
 - 1. Make by exothermic process.
 - 2. Approved Products:
 - a. 'Cadweld' by Erico Products Inc, Solon, OH (440) 248-0100.
www.erico.com
 - b. 'Thermoweld' by Brundy, Norwalk, CT (203) 838-4444.

PART 2 EXECUTION

2.1 INSTALLATION

- A. Interface With Other Work: Coordinate with Section 03313 in installing grounding conductor and placing concrete. Do not allow placement of concrete before Architect's inspection of grounding conductor installation.
- B. Grounding conductors and bonding jumper conductors shall be continuous from terminal to terminal without splice. Provide grounding for following.
 - 1. Electrical service, its equipment and enclosures.
 - 2. Conduits and other conductor enclosures.
 - 3. Neutral or identified conductor of interior wiring system.
 - 4. Main panelboard, power and lighting panelboards.
 - 5. Non-current-carrying metal parts of fixed equipment such as motors, starter and controller cabinets, instrument cases, and lighting fixtures.
- C. Grounding connection to main water supply shall be accessible for inspection and made within **6 inches** of point of entrance of water line to building. Provide bonding jumpers across water meter and valves to assure electrical continuity.
- D. Provide concrete-encased electrode system by embedding **20 feet** minimum of No. 2/0 bare copper conductor in concrete footing, **2 inches** minimum below concrete surface. Extend No. 2/0 copper conductor to main panel as shown on Drawings.
- E. Ground identified common conductor of electrical system at secondary side of main transformer supplying building. Ground identified grounded (neutral) conductor of electrical system on supply side of main service disconnect.
- F. Pull grounding conductors in non-metallic raceways, in flexible steel conduit exceeding **72 inches** in length, and in flexible conduit connecting to mechanical equipment.
- G. Provide grounding bushings on all feeder conduit entrances into panelboards and equipment enclosures.
- H. Bond conduit grounding bushings to enclosures with minimum #10 AWG conductor.
- I. Connect equipment grounds to building system ground.
 - 1. Use same size equipment grounding conductors as phase conductors up through #10 AWG.

2. Use NEC Table 250-95 for others unless noted otherwise in Drawings.
 - J. On motors, connect ground conductors to conduit with approved grounding bushing and to metal frame with bolted solderless lug.
 - K. Do not bond neutral conductor of emergency generator set to set frame at generator location.
 - L. Ground cabinet of transformers to conduit and ground wires, if installed. Bond transformer secondary neutral conductor to cabinet.
- 2.2 FIELD QUALITY CONTROL
- A. Inspections: Notify Architect for inspection two days minimum before placing concrete over grounding conductor.

END OF SECTION

26 05 33**RACEWAY AND CONDUIT****PART 1 GENERAL**

1.1 SUMMARY

- A. Includes But Not Limited To:
1. Quality of material and installation procedures for raceway and fittings used on Project but furnished under other Divisions.
 2. Furnish and install raceway and conduit used on Project not specified to be installed under other Divisions.

1.2 RELATED SECTIONS

- A. Documents affecting work in this Section include, but are not limited to, the General Conditions, Supplementary Conditions and Division 01 General Requirements of these Specifications.
1. Division 23 HVAC
 2. Section 26 05 15 Common Work Results for Electrical.
 3. Section 26 21 05 Underground Electrical Utility Power Systems

PART 2 PRODUCTS

2.1 COMPONENTS

- A. Raceway And Conduit:
1. Size: **3/4 inch** for exterior underground and audio / visual use and **1/2 inch** elsewhere, unless indicated otherwise.
 2. Types: Usage of each type is restricted as specified below by product.
 - a. Galvanized rigid steel or galvanized intermediate metal conduit (IMC) is allowed for use in all areas. Where in contact with earth or concrete, wrap buried galvanized rigid steel and galvanized IMC conduit and fittings completely with vinyl tape.
 - b. Galvanized Electrical Metallic Tubing (EMT), Flexible Steel Conduit, And Metal-Clad Cable (Type MC):
 - 1) Allowed for use only in indoor dry locations where it is:
 - a) Not subject to damage.
 - b) Not in contact with earth.
 - c) Not in concrete.
 - 2) Flexible steel conduit or metal-clad cable required for final connections to indoor mechanical equipment.
 - c. Schedule 40 Polyvinyl Chloride (PVC) Conduit: Allowed for use only underground or below concrete with galvanized rigid steel or IMC elbows and risers.
 - d. Listed, Liquid-Tight Flexible Metal Conduit:
 - 1) Use in outdoor final connections to mechanical equipment, length not to exceed **36 inches**.
 - e. Pre-wired **3/8 Inch** Flexible Fixture Whips: Allowed only for connection to recessed lighting fixtures, lengths not to exceed **72 inches**.
 - f. Electrical Non-Metallic Tubing (ENT): Allowed for use only as a raceway for low voltage cables in concealed or inaccessible, indoor, dry locations.
 3. Prohibited Raceway Materials:
 - a. Aluminum conduit.
 - b. Armored cable type AC (BX) cable.

- B. Raceway And Conduit Fittings:
1. Rigid Steel Conduit And IMC: Threaded and designed for conduit use.
 2. EMT:
 - a. Compression type.
 - b. Steel set screw housing type.
 3. PVC Conduit:
 - a. PVC type. Use PVC adapters at all boxes.
 - b. PVC components, (conduit, fittings, cement) shall be from same Manufacturer.
 4. Flexible Steel Conduit: Screw-in type.
 5. Liquid-tight Flexible Metal Conduit: Sealtite type.
 6. Expansion fittings shall be equal to OZ Type AX sized to raceway and including bonding jumper.
 7. Prohibited Fitting Materials:
 - a. Crimp-on, tap-on, indenter type fittings.
 - b. Cast set-screw fittings for EMT.
 - c. Spray (aerosol) PVC cement.

2.2 MANUFACTURERS

- A. Contact Information:
1. Square D, Palatine, IL (800) 847-7500 or (847) 397-2600.
www.squared.com
 2. Walker Division of Wiremold Co, Williamstown, WV (800) 240-2601 or (304) 375-1000. www.wiremold.com
 3. Wiremold Co, West Hartford, CT (800) 621-0049 or (860) 233-6251.
www.wiremold.com

PART 3 EXECUTION

3.1 INSTALLATION

- A. Interface With Other Work:
1. Coordinate with Division 23 for installation of raceway for control of mechanical equipment.
 2. Install pull wires in raceways installed under this Section where conductors or cables are to be installed under other Divisions.
 3. Furnish and install main telephone service raceway to comply with telephone company requirements.
- B. General:
1. Conceal raceways within ceilings, walls, and floors, except at Contractor's option, conduit may be exposed on walls or ceilings of mechanical equipment areas and above acoustical panel suspension ceiling systems. Install exposed raceway runs parallel to or at right angles to building structure lines.
 2. Keep raceway runs **6 inches** minimum from hot water pipes.
 3. Make no more than four quarter bends, 360 degrees total, in any conduit run between outlet and outlet, fitting and fitting, or outlet and fitting.
 - a. Make bends and offsets so conduit is not injured and internal diameter of conduit is not effectively reduced.
 - b. Radius of curve shall be at least minimum indicated by NEC.
 4. Cut conduit smooth and square with run and ream to remove rough edges. Cap raceway ends during construction. Clean or replace raceway in which water or foreign matter have accumulated.

5. Install insulated bushings on each end of raceway **1-1/4 inches** in diameter and larger, and on all raceways where low voltage cables emerge. Install expansion fittings where raceways cross building expansion joints.
- C. Raceway Support:
1. Securely support raceway with approved straps, clamps, or hangers, spaced as required.
 2. Do not support from mechanical ducts or duct supports without Architect's written approval. Securely mount raceway supports, boxes, and cabinets in an approved manner by:
 - a. Expansion shields in concrete or solid masonry.
 - b. Toggle bolts on hollow masonry units.
 - c. Wood screws on wood.
 - d. Metal screws on metal.
- D. Bend PVC conduit by hot box bender and, for PVC **2 inches** in diameter and larger, expanding plugs. Apply PVC adhesive only by brush.
- E. Installation In Framing:
1. Do not bore holes in joists or beams outside center 1/3 of member depth or within **24 inches** of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width.
 2. Holes shall be **one inch** diameter maximum.
- F. Underground Raceway And Conduit:
1. Bury underground raceway installed outside building **24 inches** deep minimum.
 2. Bury underground conduit in planting areas **18 inches** deep minimum. It is permissible to install conduit directly below concrete sidewalks, however, conduit must be buried **18 inches** deep at point of exit from planting areas.
- G. Prohibited Procedures:
1. Use of wooden plugs inserted in concrete or masonry units for mounting raceway, supports, boxes, cabinets, or other equipment.
 2. Installation of raceway that has been crushed or deformed.
 3. Use of torches for bending PVC.
 4. Spray applied PVC cement.
 5. Boring holes in truss members.
 6. Notching of structural members.
 7. Supporting raceway from ceiling system support wires.
 8. Nail drive straps or tie wire for supporting raceway.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

26 05 34**BOXES****PART 1 PRODUCTS**

1.1 MATERIALS

- A. Outlet Boxes:
1. Galvanized steel of proper size and shape are acceptable for all systems. Where metal boxes are used, provide following:
 - a. Provide metal supports and other accessories for installation of each box.
 - b. Equip ceiling and bracket fixture boxes with fixture studs where required.
 - c. Equip outlets in plastered, paneled, and furred finishes with plaster rings and extensions to bring box flush with finish surface.
 2. Plastic boxes may be used only in low voltage systems where conductors are not installed in conduit.
 3. HVAC Instrumentation And Control:
 - a. Boxes for thermostats shall be 4 inches square with raised single device cover.
- B. Air / Vapor Barrier Back Boxes: Pre-molded polyethylene fitting between framing members and inhibiting air / vapor infiltration and exfiltration around recessed outlet boxes.

1.2 MANUFACTURERS

- A. Contact Information:
1. B-Line, Highland, IL (800) 280-7994 or (618) 654-2184.
www.blinc.com
 2. Hubbell Incorporated, Milford, CT (800) 255-1031 or (203) 882-4800
www.hubbell-wiring.com or Hubbell Canada Inc, Pickering, ON (905) 839-4332.
 3. Steel City, Div Thomas & Betts, Memphis, TN (800) 888-0211 or (901) 252-8000 www.tnb.com or Thomas & Betts Ltd, Iberville, PQ (450) 347-5318.
 4. Thomas & Betts,
 5. Walker Systems Inc, Williamstown, WV (800) 240-2601 or (304) 375-1000 www.wiremold.com or Walker Systems Inc / Wiremold Canada Inc, Fergus, ON (519) 843-4332.

PART 2 EXECUTION

2.1 EXAMINATION

- A. Confirm dimensions, ratings, and specifications of materials to be installed and coordinate these with site dimensions and with other Sections.

2.2 INSTALLATION

- A. Interface With Other Work:
1. Before rough-in, verify locations of boxes with work of other trades to insure that they are properly located for purpose intended.
 - a. Coordinate location of outlets adjacent to or in millwork with Division 06 before rough-in. Refer conflicts to Architect and locate outlet under his direction.

- B. General:
1. Boxes shall be accessible and installed with approved cover.
 2. Do not locate device boxes that are on opposite sides of framed walls in the same stud space. In other wall construction, do not install boxes back to back.
 3. Locate boxes so pipes, ducts, or other items do not obstruct outlets.
 4. Install outlets flush with finished surface and level and plumb.
 5. Support switch boxes larger than two-gang with side brackets and steel bar hangers in framed walls.
- C. Location:
1. Install boxes at door locations on latch side of door, unless explicitly shown otherwise on Drawings. Verify door swings shown on electrical drawings with architectural drawings, and report discrepancies to Architect before rough-in. Distance of box from jamb shall be within **6 inches** of door jamb.
 2. Arrange boxes for ceiling light fixtures symmetrically with respect to room dimensions and structural features.
 3. Properly center boxes located in walls with respect to doors, panels, furring, trim and consistent with architectural details. Where two or more outlets occur, space them uniformly and in straight lines with each other, if possible.
- D. At time of substantial completion, install blank plates on uncovered outlet boxes that are for future use.
- E. Install air / vapor barrier back boxes behind outlet boxes that penetrate vapor barrier.

END OF SECTION

26 24 16**PANELBOARDS****PART 1 PRODUCTS**

1.1 EQUIPMENT

- A. Main Panelboard:
1. Minimum integrated equipment short circuit rating of 22,000 amperes.
 2. Multi-pole breakers shall be common trip.
 3. Enclosures:
 - a. NEMA / CEMA Type 1.
 4. Minimum dimensions of **36 inches** wide by **8 inches** deep.
 5. Rated for use as service entrance equipment.
 6. Make provisions for future breakers where spaces are indicated on Drawings.
 7. Approved Products:
 - a. Type PRL4B by Cutler-Hammer.
 - b. Spectra Series by General Electric.
 - c. Type P5 by Siemens.
 - d. I-Line by Square D.
- B. Lighting And Distribution Panelboards:
1. Minimum integrated equipment short circuit rating of 10,000 amperes.
 2. Plug-on or bolt-on breakers. Multi-pole breakers shall be common trip.
 3. Cabinets shall be locking type with no exposed latches or screws when door is closed. Key panels alike and provide minimum of three keys.
 4. Breakers shall have Arc-Fault Circuit Interrupter protection (AFCI) where installed in dwelling units.
 5. Minimum dimensions of **20 inches** wide by **5-3/4 inches** deep.
 6. Use equipment from same manufacturer as main panelboard.
 7. Approved Products:
 - a. Type PRL1a by Cutler-Hammer.
 - b. Type AL or AQ by General Electric.
 - c. Type P1 by Siemens.
 - d. NQOD by Square D.

1.2 MANUFACTURERS

- A. Contact Information:
1. Cutler-Hammer Inc, Pittsburgh, PA (800) 525-2000
www.ch.cutler-hammer.com.
 2. General Electric Industrial Systems, Charlotte, NC (800) 431-7867.
www.ge.com/industrialsystems/
 3. Siemens Energy & Automation, Alphrata, GA (800) 964-751-2000 or (770) 751-2000 www.sea.siemens.com.
 4. Square D Co, Palatine, IL (800) 847-7500 or (847) 397-2600
www.squared.com.

PART 2 EXECUTION

2.1 INSTALLATION

- A. Label panelboards and each breaker in main panelboard with **1/16 inch** thick laminated plastic composition material with contrasting color core. Engraved letters shall be **1/4 inch** high.

- B. Provide typewritten circuit schedules in lighting and distribution panelboards to identify panelboard and load served by each branch breaker.

2.2

PROTECTION

- A. Protect panelboards and interior components from paint, gypsum board compound, dirt, dust, and other foreign matter during construction.

END OF SECTION

26 27 10**ELECTRICAL UTILITY SERVICES****PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Work included in but not limited to this section
 - 1. Furnish and install service as described in Contract Documents and as required by local serving agency.
 - 2. Complete cost of service.

1.2 RELATED SECTIONS:

- A. Section 03 30 53 Cast-in-Place Concrete.
- B. Section 26 05 15 Common Work Results for Electrical.
- C. Local utility shall furnish and install primary underground service including transformer, conductors, current transformers, metering conductors, and meter.

PART 2 PRODUCTS: Not Used**PART 3 EXECUTION**

3.1 INSTALLATION

- A. Interface With Other Work: Coordinate with serving agency on all items, especially service entrance fittings, meter sockets, and current transformer (C/T) boxes where required.

END OF SECTION

THIS PAGE IS INTENTIONALY BLANK

26 27 26**WIRING DEVICES****PART 1 PRODUCTS****1.1 GENERAL**

- A. Faces shall be nylon where available.
- B. Devices of single type shall be from same Manufacturer.
- C. Devices are listed as white. Use white devices on light colored walls and brown on dark walls.

1.2 MANUFACTURED UNITS**A. Switches:**

- 1. Rectangular Face Designer Style:
 - a. Approved Products:
 - 1) 20 AMP, single pole:
 - a) Cooper: DECB120W.
 - b) Hubbell: HBL2121WA.
 - c) Leviton: 5621-2W.
 - d) Pass & Seymour: 2621-W.
 - h) .
 - 2) Three Way:
 - a) Cooper: DECB320W.
 - b) Hubbell: HBL2123WA.
 - c) Leviton: 5623-2W.
 - d) Pass & Seymour: 2623-W.
- 2. Standard:
 - a. Approved Products:
 - 1) 20 AMP, single pole for furnace disconnect:
 - a) Cooper: 2221W.
 - b) Hubbell: HBL1221-WA.
 - c) Pass & Seymour: PS20AC1-W.
 - d) Leviton: 1221-2W
- 3. Exhaust Fan Timer Switches:
 - a. Rest Rooms and Mother's Room:
 - 1) 0-15 minute, no hold position.
 - 2) Approved Products:
 - a) Intermatic: FD15MWC.
 - b) Paragon: SWD15M-W.
 - c) Tork: A515MW.

B. Receptacles:

- 1. Rectangular Face Designer Style:
 - a. 15 AMP, specification grade, back and side wired, self grounding.
 - b. Approved Products:
 - 1) Cooper: 6262W.
 - 2) Hubbell: HBL2152WA.
 - 3) Leviton: 16252-W.
 - 4) Pass & Seymour: 26252-W.
- 2. Range Receptacle:
 - a. Three pole, four wire grounding, 125 / 250 V, NEMA 14-50R, 50 AMP complete with plate.
 - b. Approved Products:
 - 1) Cooper: 1258.
 - 2) Hubbell: HBL9450A.
 - 3) Leviton: 279.

- 4) Pass & Seymour: 3894.
3. Ground Fault Circuit Interrupter (GFCI):
 - a. 15 AMP, specification grade.
 - b. Approved Products:
 - 1) Cooper: GF15W.
 - 2) Hubbell: GF5252WA.
 - 3) Leviton: 8599-W.
 - 4) Pass & Seymour: 1594-W.
- C. Telephone Jacks:
 1. Desk Type:
 - a. 4 conductor, screw terminals, voice grade.
 - b. Approved Products:
 - 1) Cooper: 3532-4W.
 - 2) Leviton: 40249-W.
 - 3) Pass & Seymour: TPTE1-W.
 - 4) Suttle: 625B4-4-85.
 2. Wall Type:
 - a. 4 conductor, screw terminals, voice grade.
 - b. Approved Products:
 - 1) Cooper: 3521-4W.
 - 2) Leviton: 40257-W.
 - 3) Pass & Seymour: WMTE14-W.
 - 4) Suttle: 630AC4-85.
 3. Module Type:
 - a. For use in data faceplates.
 - b. 8 conductor, punch-down, voice grade.
 - c. Approved Product:
 - 1) Siemon: MX3-F-U4-02
- D. Data Jacks:
 1. For use in data faceplates.
 2. 8 conductor, punch-down T568B wiring configuration, CAT 5e.
 3. Approved Products:
 - a. Flat Jack: Siemon MX5-F02
 - b. Angled Jack: Siemon MX5-02
- E. Plates:
 1. Standard Cover Plates:
 - a. All Areas:
 - 1) Nylon or high impact resistant thermoplastic.
 - 2) Color shall match wiring device.
 - b. All Other: Stainless Steel.
 - c. Ganged switches shall have gang plates.
 - d. Approved Products:
 - 1) Cooper.
 - 2) Hubbell.
 - 3) Leviton.
 - 4) Pass & Seymour.
 2. Data Faceplates:
 - a. Include blank inserts to fill unused module openings.
 - b. Standard Wall Type:
 - 1) Single Gang, 4 Modules
 - 2) Approved Product:
 - a) Siemon MX-FP-S-04-02
 - b) Equal as approved by Architect before use. See Section 01600.
 - c. Tamper-Proof Wall Type:
 - 1) Single Gang, 6 Modules
 - 2) Approved Product:
 - a) Siemon MX-FP-S-06-02

- b) Equal as approved by Architect before use. See Section 01600.
- 3. Weatherproof In-Use Receptacle Covers:
 - a. NEMA 3R rated.
 - b. Cast aluminum..
 - c. Compatible with GFCI receptacles.
 - d. Complete with weather resistant gaskets and stainless steel screws.
 - e. Approved Products:
 - 1) Hubbell: WP26M, horizontal; WP26MH, vertical.
 - 2) Intermatic: WP1010HMC, horizontal; WP1010MC, vertical.
 - 3) Red Dot: CKMG, horizontal; CKMGV, vertical.
- F. Data Patch Panel:
 - 1. Panel:
 - a. Meet requirements of TIA / EIA 568 Standard
 - b. CAT 5e, 48 ports groups in eight 6-port modules, T568B wiring configuration, 19 inch width.
 - c. Approved Products:
 - 1) Cooper: 5548
 - 2) Leviton: 5G548-U48
 - 3) Ortronics: OR-851004038
 - 4) Suttle: 2-7032-48
 - 2. Mounting Bracket:
 - a. Hinged, wall mounted, 19 inches wide by 5 inches deep
 - b. Approved Products:
 - 1) Cooper: 5549-2
 - 2) Leviton: 49251-W62
 - 3) Ortronics: OR-604004068
 - 4) Suttle: 103B1

1.3 MANUFACTURERS

- A. Contact Information:
 - 1. Cooper Wiring Devices, Long Island City, NY (800) 441-3177 or (718) 937-8000. www.cooperwiringdevices.com
 - 2. Hubbell Inc, Milford, CT (800) 255-1031 or (203) 882-4800 www.hubbell-wiring.com.
 - 3. Hunt Control Systems Inc, Fort Collins, CO (970) 484-9048 www.huntdimming.com
 - 4. Intermatic Inc, Spring Grove, IL (815) 675-2321. www.intermatic.com
 - 5. Leviton Manufacturing Co, Little Neck, NY (800) 824-3005 or (718) 229-4040 www.leviton.com.
 - 6. Lightolier, Fall River, MA (800) 217-7722 or (508) 679-8131 www.lightolier.com.
 - 7. Lutron Electronics Co Inc, Coopersburg, PA (800) 523-9466 or (610) 282-3800. www.lutron.com
 - 8. Mytech Corp, Austin, TX (888) 698-3242 or (512) 450-1100. www.lightswitch.com
 - 9. Novitas Inc, Culver City, CA (310) 568-9600. www.novitas.com
 - 10. Ortronics, New London, CT (877) 599-5393 or (860) 445-3800 www.ortronics.com
 - 11. Paragon Electric Co Inc, Two Rivers, WI (920) 763-1161. www.icca.invensys.com/paragon
 - 12. Pass & Seymour, Syracuse, NY (800) 776-4035 or (315) 468-6211 www.passandseymour.com.
 - 13. Red Dot, Boston, MA (617) 361-1710.
 - 14. Siemon Company, Watertown, CT (860) 945-4395 www.siemon.com

15. Suttle, Hector, MN (800) 852-8662 or (320) 848-6711.
www.suttleonline.com
16. Tork Inc, Mount Vernon, NY (914) 664-3542. www.tork.com
17. Unenco Electronics Inc, Alameda, CA (800) 227-0452 or (510) 337-1000. www.unenco.com
18. Watt Stopper Inc, Santa Clara, CA (800) 879-8585 or (408) 988-5331. www.wattstopper.com

PART 2 EXECUTION

2.1 INSTALLATION

- A. Install devices flush with walls, straight, and solid to box.
- B. Label dimmer switch groupings with **1/16 inch** thick laminated plastic composition material with contrasting color core. Engraved letter shall be **1/4 inch** high.

END OF SECTION

26 27 27**WIRING CONNECTIONS****PART 1 PRODUCTS**

1.1 COMPONENTS

- A. Standard Connectors:
 - 1. Conductors No. 8 And Smaller: Steel spring wire connectors.
 - 2. Conductors Larger Than No. 8: Pressure type terminal lugs.
 - 3. Connections Outside Building: Watertight steel spring wire connections with waterproof, non-hardening sealant.
- B. Terminal blocks for tapping conductors:
 - 1. Terminals shall be suitable for use with 75 deg C copper conductors.
 - 2. Acceptable Products:
 - a. LBA363106 by Square D Co, Palatine, IL (800) 847-7500 or (847) 937-2600. www.squared.com
 - b. 16323 by Bussman Div of Cooper Industries, St Louis, MO (800) 937-4600 or (314) 394-2877. www.bussman.com
 - c. Equal as approved by Architect before bidding.

PART 2 EXECUTION: Not Used**END OF SECTION**

THIS PAGE IS INTENTIONALLY BLANK

26 28 16**ENCLOSED SWITCHES AND CIRCUIT BREAKERS****PART 1 PRODUCTS****1.1 EQUIPMENT**

- A. Disconnects:
1. Heavy-duty quick-make, quick-break type, non-fused unless indicated otherwise.
 2. Provide interlock to prevent opening of door when switch is in ON position.
 3. Provide means to lock switch in OFF position with padlock.
 4. Disconnects for motor circuits shall be horsepower rated
 5. Disconnects For Furnace Units: (If not internal)
 1. Provide manual starter with thermal overload relay. Provide overload relay to match motor full load amps.
 2. Enclosures:
 - a. Interior: NEMA / CEMA Type 1.
 - b. Exterior: NEMA / CEMA Type 3R.
 3. Fuses:
 - a. Fuse fused disconnects with dual-element time delay fuses and equip with rejection type fuse holders.
 - b. Fuses on Project shall be from single manufacturer.
 - c. Approved Manufacturers:
 - 1) Bussman Circuit Components, Chicago, IL (800) 937-6246 or (708) 867-4600. www.bussman.com
 - 2) Edison Fusegear Inc, Des Peres, MO (314) 391-3443.
 - 3) GEC Alstom Electrical Equipment Corp, Hawthorne, NJ (800) 678-9322 or (201) 869-7777.
 - 4) Ferraz Shawmut, Newburyport, MA (978) 462-6662. www.ferrazshawmut.com
 - 5) Littelfuse Inc, Des Plaines, IL (800) 227-0029 or (847) 824-1188. www.littelfuse.com
 4. Approved Manufacturers:
 - a. Same as Manufacturer of Project's main panelboard.

PART 2 EXECUTION**2.1 INSTALLATION**

- A. Label disconnects to indicate equipment served, such as Condensing Unit CU-1. Use **1/16 inch** thick laminated plastic composition material with contrasting color core. Engraved letters shall be **1/4 inch** high. Attach labels with screws.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

26 51 13**INTERIOR LIGHTING FIXTURES, LAMPS, AND BALLASTS****PART 1 PRODUCTS****1.1 EQUIPMENT**

- A. Lighting Fixtures:
 - 1. Acceptable Products:
 - a. See Fixture Schedule on Drawings for acceptable manufacturers and models.
 - b. Luminaires shall meet Energy Star
 - c. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.
- B. Fluorescent Ballasts:
 - 1. Magnetic for 430 mA, T12 lamps.
 - a. UL listed and labeled.
 - b. HPF, RS, P rated with CBM certification and sound rating A.
 - c. Energy saving type.
 - d. Ballast voltage matching system voltage.
 - e. Approved Products:
 - 1) Mark III by Advance.
 - 2) Universal Watt Reducer SLH by MagneTek.
 - 2. Electronic solid state for 265mA, T8 lamps.
 - a. UL listed and labeled.
 - b. Minimum power factor of 90 percent.
 - c. Maximum total harmonic distortion of 20 percent.
 - d. Operation of lamps at normal light output and in compliance with Lamp Manufacturer's recommendations.
 - e. Audible noise level lower than quietest CBM certified ballast for same application.
 - f. Transient protection in accordance with ANSI 62.41-1984.
 - g. Comply with FCC Rules Part 18, 15J.
 - h. Maximum crest factor of 1.7.
 - i. Five year full replacement warranty including labor allowance for replacement.
 - j. Ballast voltage to match system voltage.
 - k. Approved Manufacturers:
 - 1) Advance.
 - 2) Howard Industries.
 - 3) Universal Lighting Technologies.
 - 4) Osram / Sylvania.
- C. Lamps:
 - 1. Approved Manufacturers:
 - a. Osram / Sylvania.
 - b. General Electric.
 - c. North American Philips.

1.2 MANUFACTURERS

- A. Fixtures: When several lighting fixtures are specified by name for one use on Drawings, select any one of those specified. Do not mix fixtures from different manufacturers specified for one use.
- B. Specification Items:
 - 1. Advance Transformer Co, Rosemont, IL (800) 322-2086 or (847) 390-5000. www.advancetransformer.com
 - 2. General Electric Lighting, East Cleveland, OH (800) 327-0097 or (216) 266-2121 www.ge.com/lighting/.

3. Howard Industries, Laurel, MS (800) 956-3456 or (601) 422-0033.
www.howard-ballast.com
 4. Motorola Lighting Co, Buffalo Grove, IL (800) 654-0089 or (847) 215-6300 www.mot.com/ies/mli.
 5. Novitas Inc, Culver City, CA (310) 568-9600. www.novitas.com
 6. Osram Sylvania, Danvers, MA (800) 544-4828 or (978) 777-1900
www.sylvania.com.
 7. Philips Lighting Co, Somerset, NJ (800) 631-1259 or (732) 563-3000
www.lighting.philips.com.
 8. Universal Lighting Technologies, Nashville, TN (800) 624-6383 or (615) 316-5100. www.universalballast.com
 9. Venture Lighting International, Solon, OH (800) 451-2606 or (440) 248-3510. www.venturelighting.com
 10. Watt Stopper Inc, Santa Clara, CA (800) 879-8585 or (408) 988-5331. www.wattstopper.com
- C. Scheduled Lighting Fixtures:
1. Alumilite, Norcross, GA (770) 923-2500.
 2. Betalight by SRB Technologies, Winston-Salem, NC (800) 552-0098 or (336) 659-2610. www.srbtechnologies.com
 3. Columbia Lighting Inc, Spokane, WA (509) 924-7000.
www.columbia-ltg.com
 4. Daybrite Div Thomas Lighting, Tupelo, MS (601) 842-7212
www.thomaslighting.com.
 5. Devine Lighting, Div Hubbell Lighting Inc, North Kansas City, MO (800) 826-5496 or (816) 221-9440.
 6. Eagle Electric Manufacturing Co, Long Island City, NY (800) 366-6789 or (718) 937-8000 www.eagle-electric.com.
 7. Emergi-Lite, St Mathews, SC (803) 874-1260. www.emergi-lite.com
 8. Gardco, San Leandro, CA (800) 227-0758 or (510) 357-6900
www.gardcolighting.com or Markham, ON (905) 294-9570.
 9. General Electric Lighting Systems, Hendersonville, NC (800) 305-1372 or (828) 693-2000 www.ge.com/lighting/.
 10. HADCO, Littlestown, PA (717) 359-7131. www.hadcolighting.com
 11. Halo Lighting, Elk Grove Village, IL (847) 956-8400
www.cooper.com/brands/halo/.
 12. Isolite Corp, Berwyn, PA (800) 888-5483 or (610) 647-8200.
www.isolite.com
 13. Kirlin Co, Detroit, MI (313) 259-6400. www.lightsearch.com/kirlin/
 14. LAM Lighting Systems, Santa Ana, CA (800) 732-5213 or (714) 549-9765. www.jjilightinggroup.com
 15. Leviton Manufacturing Co, Little Neck, NY (800) 824-3005 or (718) 229-4040 www.leviton.com.
 16. Lightolier Inc, Fall River, MA (800) 217-7722 or (508) 679-8131
www.lightolier.com.
 17. Lithonia Lighting, Conyers, GA (770) 922-9000 www.lithonia.com or Lithonia Lighting Canada, Lachine, PQ (514) 639-3571.
 18. Lumark Lighting, Vicksburg, MS (601) 638-1522.
www.cooperlighting.com/brands/lumark/
 19. Manning Lighting, Sheboygan, MI (920) 458-2184.
www.manningltg.com
 20. McPhilben Emergency Lighting, Tupelo, MS (601) 842-7212
www.thomaslighting.com/mcphilben/.
 21. Metalux Lighting, Americus, GA (912) 924-8000
www.cooperlighting.com/brands/metalux 0.
 22. Moldcast Lighting Co, Div AA Lighting, San Leandro, CA (714) 562-3500. www.moldcast.com
 23. Omega, Div Thomas Lighting, Los Angeles, CA (323) 726-1800.
www.thomaslighting.com/omega/

24. Original Cast Lighting, St Louis, MO (314) 863-1895.
www.theocl.com
25. Pearce Lighting Manufacturing Div, Indianapolis, IN (800) 732-7235 or (317) 924-5115. www.pearcelighting.com
26. Permex, Pasadena, CA (626) 795-9238.
27. Prescolite, San Leandro, CA (510) 562-3500. www.prescolite.com
28. Prudential Lighting Corp, Los Angeles, CA (213) 746-0360.
www.prulite.com
29. Shaper Lighting, Richmond, CA (510) 234-2370.
www.shaperlighting.com
30. Shield Source America, Cromwell, CT (800) 664-1405 or (705) 743-6146.
31. Sterner Lighting Systems Inc, Eden Prairie, MN (800) 328-7480 or (612) 906-7300.
32. St Louis Antique Lighting Co, St Louis, MO (314) 863-1414.
www.traditional-building.com/brochure.stlouis.htm
33. Visa Lighting Corp, Milwaukee, WI (800) 788-8472 or (414) 354-8600. www.visalighting.com
34. Wide-Lite, San Marcos, TX (512) 392-5821. www.wide-lite.com

1.3 SOURCE QUALITY CONTROL

- A. Fixtures shall be fully assembled complete with necessary wiring, sockets, lamps, reflectors, ballasts, auxiliaries, plaster frames, recessing boxes, hangers, supports, lenses, diffusers, and other accessories essential for complete working installation.

PART 2 EXECUTION

2.1 INSTALLATION

- A. Interface With Other Work:
 1. In mechanical equipment rooms, coordinate locations of light fixtures with equipment locations to provide proper room illumination without obstruction. Suspend fixtures that must be mounted below pipes, ducts, etc, with chains or other Architect approved method.
- B. Where fluorescent fixtures are shown installed end to end, provide suitable connectors or collars to connect adjoining units to appear as a continuous unit.
- C. Where recessed fixtures are to be installed, provide openings, plaster rings, etc, of exact dimensions for such fixtures to be properly installed. Coordinate fixture installation with ceiling type and thickness. Terminate circuits for recessed fixtures in an extension outlet box near fixture and connect with specified flexible conduit.
- D. Do not locate incandescent fixtures in closet or storage areas within **18 inches** and fluorescent fixtures within **6 inches** of shelves.

2.2 ADJUSTMENT

- A. Repair scratches or nicks on exposed surfaces of fixtures to match original undamaged conditions.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

26 52 10**EMERGENCY AND EXIT LIGHTING****PART 1 PRODUCTS****1.1 EQUIPMENT**

- A. Battery Packs:
1. General:
 - a. Batteries shall be long life nickel cadmium type.
 - b. Complete with charging indicator light and test switch.
 - c. Factory-installed in lighting fixture, or capable of being field-installed to same standards.
 2. Standard Linear Fluorescent Fixtures:
 - a. Shall operate one lamp of fluorescent lighting fixture at approximately 600 lumens initially and 60 percent minimum of initial lumens after 90 minutes.
 - b. Charger shall be capable of full recharge in 24 hours.
- B. Exit Signs:
1. Exit sign construction will be flame-rated, UV stable thermoplastic in textured white finish.
 2. Exit face will provide 6" high letters with 3/4" stroke and snap-in, chevron type directional arrows.
 3. Exit sign design will allow universal 120/277VAC, 60 Hz operation.
 - a. Normal AC illumination will be provided by 6 red or green high-output LEDs consuming less than 3 watts at 120 or 277VAC.
 - 1). Normal LED lamp life will be in excess of 20 years.
 4. Exit letters will provide twice the lumen output and 10 times the illumination uniformity required by 1998 UL specifications.
 5. Exits will be universal single/double face)and provided with all necessary components for wall, ceiling or end mounting applications.
 - a. Mounting canopies will be provided with all models and will be of identical construction and color to match the exit frame.
 6. Exits will be designed to mount to 3 1/2" or 4" octagon, 4" square or standard plaster rings.
 7. Emergency exit models will be achieved through a factory installed fully automatic emergency operation module.
 - a. All emergency module components will mount inside the exit housing and will include a solid-state constant current type battery charger, a maintenance-free nickel-cadmium battery, an AC-On indicator light and a test switch.
 - b. The unit charger will be capable of recharging the battery within acceptable UL time standards.
 - c. The emergency operation module must be capable of providing a minimum of 2 hours of emergency operation.
 8. Exit signs must comply with all UL 924, (UL Damp Location) and NFPA 101 Life Safety Code requirements.
- C. Emergency Lighting Units And Remote Lighting Heads:
1. Shall operate indicated number of lamps for 90 minutes of emergency operation.
 2. Sealed, maintenance free, lead calcium type battery.
 3. Painted steel housing and complete with power indicator light and test switch.
 4. Lamps shall be 12 Watt, 12 Volts in metal housing designed for wet locations and with mounting plate that allows full vertical and horizontal adjustment of lamps.

5. Acceptable Products:
 - a. Sure-Lites / Cooper Lighting, Elk Grove, IL (847) 956-8400.
www.cooperlighting.com
 - 1) No Lamp Unit: XR12208-0-SD.
 - 2) Remote Two Lamp Lighting Head: 12T-12-DWWH.
 - b. Lithonia Lighting, Conyers, GA (770) 922-9000.
www.lithonia.com
 - 1) No Lamp Unit: ELT50WRO.
 - 2) Remote Two Lamp Lighting Head: ELAWTNXH1212.

PART 2 EXECUTION

2.1 INSTALLATION

- A. Battery Packs:
 1. General:
 - a. Wire so unit can be tested with lights on.
 - b. Wire so lamps in normal mode are switched off with other lighting in area. Connect unit to unswitched conductor of normal lighting circuit.
 2. Recessed Downlight Fluorescent Fixtures: If indicator light and test switch cannot be installed within fixture, install on plate adjacent to fixture.
 3. Other Fluorescent Fixtures: Install in ballast channel of fixture with charging indicator light and test switch mounted on fixture end, or visible and accessible through lens.
- B. Emergency Lighting Units:
 1. Aim lamps to maximize lighting of first 50 feet of egress path.
 2. Wire so lamps are normally off and operate upon loss of normal building power.
 3. Connect units to un-switched conductor of normal lighting circuit.

END OF SECTION

26 56 16**EXTERIOR LIGHTING****PART 1 PRODUCTS****1.1 EQUIPMENT**

- A. Exterior Fixtures:
1. Finish shall meet requirements of AAMA 603.8 for baked-on organic coating, AAMA 605.2 high performance organic coating, or AAMA Architectural Class I anodizing as necessary to provide specified color.
 2. Color shall be Manufacturer's standard , black as selected by Architect before bidding.
 3. Acceptable Products:
 - a. As indicated on Fixture Schedule. Do not mix fixtures from different manufacturers for one use.
 - b. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25
- B. Parking Area Poles:
1. Designed for wind loading required for Project location as determined by Architect.
 2. Aluminum hinged base type with matching aluminum anchor bolt cover secured to base.
 3. Include hand hole with cover at pole base.
 4. Finish And Color: Match parking area fixtures.
- C. Exterior Lighting Control:
1. Time Switch:
 - a. Standard 24-hour dial time switch, 120 volts, NEMA 1 enclosure.
 - b. Approved Products:
 - 1) Intermatic: T101.
 - 2) Paragon: 4001-00.
 - 3) Tork: 1101.
 2. Photo Cell:
 - a. 120 volts.
 - b. Approved Products:
 - 1) Intermatic: K4121.
 - 2) Paragon: CW201-00.
 - 3) Tork: 2101.
 3. Lighting Contactor:
 - a. 120 volt coil, 20 amps, 2 pole, NEMA 1 enclosure.
 - b. By same manufacturer as main panelboard.
 - c. Approved Products:
 - 1) Cutler Hammer: CN35.
 - 2) General Electric: CR260L-21CA22.
 - 3) Siemens: CLH1B4212A803.
 - 4) Square D: Class 8903, Type LG-20.

1.2 MANUFACTURERS

- A. Contact Information:
1. Cutler-Hammer Inc, Pittsburgh, PA (800) 525-2000
www.ch.cutlerhammer.com.
 2. General Electric Industrial Systems, Charlotte, NC (800) 431-7867
www.ge.com/industrialsystems/.
 3. Intermatic Inc, Spring Grove, IL (815) 675-2321.
www.intermatic.com

4. Paragon Electric Co Inc, Two Rivers, WI (920) 793-1161
www.paragonelectric.com.
5. Siemens Energy & Automation, Alphrata, GA (800) 964-4114 or (770) 751-2000. www.sea.siemens.com
6. Square D Co, Palatine, IL (800) 847-7500 or (847) 397-2600
www.squared.com.
7. Tork Inc, Mount Vernon, NY (914) 664-3542. www.tork.com

PART 2 EXECUTION

2.1 INSTALLATION

- A. Interface With Other Work: Coordinate location of anchor bolts and conduit in concrete bases so pole will be properly mounted and centered on base.
- B. Install hinged light pole bases so poles can be completely lowered to ground without obstruction out into parking area.
- C. Lighting Control:
 1. Install time switches, manual bypass switches, and contactor inside building to control parking area and building exterior lighting. Label each component to identify lighting controlled, I.E. 'AREA LIGHTING' or 'BUILDING LIGHTING.' Label with **1/16 inch 1.5 mm** thick laminated plastic composition material with contrasting color core. Engraved letters shall be **1/4 inch 6 mm** high.
 2. Locate photocell outside building under soffit and away from any light source and direct sunlight.
 3. Wire photocell and time switch in series for photo cell ON, time switch OFF operation.

END OF SECTION

DIVISION 27 - COMMUNICATION

27 05 00 COMMON WORK RESULTS FOR COMMUNICATIONS

27 05 10 Telephone Systems

27 05 14 Cable TV Premises Distribution System

THIS PAGE IS INTENTIONALLY BLANK

27 05 10**TELEPHONE SYSTEMS****PART 1**
1.1**GENERAL**
SUBMITTALS

- A. See Section 01 33 23 Submittal Procedures for requirements
 - 1. Product Data
 - a. Telecommunications cabling
 - b. Telecommunications outlet/connector assemblies
 - c. Connector blocks

PART 2**PRODUCTS**

2.1

COMPONENTS

- A. Telephone outlet box shall be single device outlet box as specified in Section 26 05 34 Boxes.
- B. Telephone jacks and plates shall be as specified in Section 26 27 26 Wiring Devices
- C. Building Telephone System Cable
 - 1. CAT 5e, 24 AWG, solid copper, four pair, UTP, yellow cable jacket.
 - 2. Meet requirements of TIA / EIA 568 Standard.
- D. Backboards
 - 1. Provide void-free, interior grade plywood 3/4 inch thick 4 by 8 feet as indicated.
 - 2. Backboards shall be fire rated.
 - 3. Backboards shall be provided on a minimum of two walls in the telecommunication spaces. Do not cover the fire stamp on the backboard.
- E. Open Cable
 - 1. Cabling that is not run in a raceway as defined by NFPA 70. This refers to cabling that is "open" to the space in which the cable has been installed and is therefore exposed to the environmental conditions associated with that space.
 - 2. Connector Blocks
 - a. Provide insulation displacement connector (IDC) Type 66 for Category 5e systems. Provide blocks for the number of cables terminated on the block plus 15 percent spare.

2.2

GROUNDING AND BONDING PRODUCTS

- A. Provide in accordance with UL 467, TIA J-STD-607-A, and NFPA 70. Components shall be identified as required by TIA/EIA-606-A. Provide ground rods, bonding conductors, and grounding busbars as required.

PART 3**EXECUTION**

3.1

INSTALLATION

- A. Install cable from terminal board to each telephone outlet unless indicated otherwise on Drawings.
- B. Terminate cables at each outlet with specified modular telephone jack assembly.
- C. Leave adequate slack cable at terminal board for termination of each cable run.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

27 05 14**CABLE TELEVISION PREMISES DISTRIBUTION SYSTEM****PART 1 GENERAL****1.1 SUBMITTALS**

- A. See Section 01 33 23 Submittal Procedures for requirements.
- B. Shop Drawings
 - 1. Cable Television Premises Distribution System
 - a. Detail drawings including a complete list of equipment and material.
 - b. Detail drawings shall contain complete wiring and schematic diagrams and other details required to demonstrate that the system has been coordinated and will function properly as a system.
 - c. Drawings shall include vertical riser diagrams, equipment rack and panel details, elevation drawings of telecommunications closet walls, outlet face plate details for each outlet configuration, and descriptions and types of cables, conduits, and cable trays, if used.
 - d. Drawings shall show proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including clearance for maintenance and operation.

PART 2 PRODUCTS**2.1 MATERIALS**

- A. Acceptable Manufacturer:
 - 1. Materials and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products and shall be the manufacturer's latest standard design that has been in satisfactory use for at least one year prior to installation.
 - 2. Materials and equipment shall conform to the respective publications and other requirements specified below and to the applicable requirements of NFPA 70.

2.2 COAXIAL CABLE

- A. Coaxial cable shall be RG-6/U, quad shield.
 - 1. Cable shall be label-verified.
 - 2. Cable jacket shall be factory marked at regular intervals identifying cable type.
 - 3. Cable shall be rated CMP, CMR, or CMG per NFPA 70.
 - 4. Interconnecting cables shall be cable assemblies consisting of RG-6/U coaxial cable with male connectors at each end, provided in lengths determined by equipment locations as shown.

2.3 OUTLETS

- A. Cable television outlets, including wall outlet plates, shall be equipped with a female connector to accept the connecting coaxial cable from the user's television set.
 - 1. Faceplates provided shall be ivory impact resistant plastic.

2.4 OUTLET BOXES

- A. Electrical boxes for cable television outlets shall be 4-11/16 inch square by 2-1/8 inches deep with minimum 3/8 inch deep single or two gang plaster ring as shown.
 - 1. Conduits shall be minimum 1 inch.

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

3.2 INSTALLATION

- A. System components and appurtenances shall be installed in accordance with NFPA 70, manufacturer's instructions and as shown.
 - 1. Necessary interconnections, services, and adjustments required for a complete cable television distribution system, ready to connect to external television signal sources, shall be provided.
 - 2. Penetrations in fire-rated construction shall be firestopped in accordance with Section 07 84 13 Penetration Firestopping.
 - 3. Conduits, outlets, raceways, and wiring shall be installed in accordance with Section 26 05 33 Raceway & Conduit.
 - 4. Cables and outlets shall be individually labeled and marked.
 - 5. Cables shall not be installed in the same cable tray, utility pole compartment, or floor trench compartment with ac power cables.
 - 6. Cables not installed in conduit or wireways shall be properly secured and neat in appearance and, if installed in plenums or other spaces used for environmental air, shall comply with NFPA 70 requirements for this type of installation.

3.3 CABLE INSTALLATION

- A. The rated cable pulling tension shall not be exceeded.
- B. Cable shall not be stressed such that twisting, stretching or kinking occurs.
- C. Cable shall not be spliced.
- D. Cable not in a wireway shall be suspended a minimum of 8 inches above ceilings by cable supports no greater than 60 inches apart.
- E. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
 - 1. Placement of cable parallel to power conductors shall be avoided, if possible; a minimum separation of 12 inches shall be maintained when such placement cannot be avoided.
- F. Cables shall be terminated unless shown otherwise.
- G. Minimum bending radius shall not be exceeded during installation or once installed.
- H. Cable ties shall not be excessively tightened such that the transmission characteristics of the cable are altered.
- I. Riser cable support intervals shall be in accordance with manufacturer's recommendations.

3.4 OUTLETS

- A. Faceplates
 - 1. Each faceplate shall be labeled with its function and a unique number to identify the cable run.
- B. Cables
 - 1. Cables shall have a minimum of 150 mm 6 inches of slack cable loosely coiled into the cable television outlet boxes.
- C. Pull Cords
 - 1. Pull cords shall be installed in conduits serving the cable television premises distribution system which do not initially have cable installed.

3.5 TERMINATIONS

- A. Cables and conductors shall sweep into termination areas; cables and conductors shall not bend at right angles.
 - 1. Manufacturer's minimum bending radius shall not be exceeded.

- B. Coaxial cables shall be terminated with appropriate connectors as required.
- C. Cable shield conductor shall be grounded to communications ground at only one point and shall not make electrical contact with ground anywhere else.

3.6 GROUNDING

- A. The cable television distribution system ground shall be installed in the cable television entrance facility and in any auxiliary closet identified. Equipment racks shall be connected to the electrical safety ground.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

DIVISION 28 ELECTRONIC SAFETY AND SECURITY

28 31 00 FIRE DETECTION AND ALARM

28 31 10 Fire Detection and Alarm System



28 31 10**FIRE DETECTION AND ALARM SYSTEMS****PART 1 GENERAL****1.1 SYSTEM DESCRIPTION**

- A. Automatic fire alarm system consisting of control panel, power supplies, alarm initiating devices, notification appliances, and off-site communicating devices.
 - 1. System shall be non-coded, zoned or addressable, and monitored for integrity of conductors.
- B. Class B (Style B) initiating device circuits and Class A (Style Z) notification appliance circuits including end-of-line devices.
- C. Performance Requirements:
 - 1. Operation of manual station or automatic activation of any smoke detector, heat detector, or sprinkler flow device shall:
 - a. Cause system notification appliances to operate.
 - b. Indicate zone in alarm on control panel.
 - c. Initiate off-site alarm notification system.
 - d. Indicate zone or device in alarm on remote annunciator.
 - 2. System shall return to normal when operated device is returned to normal and control panel is manually reset, except alarms may be silenced as specified below.
 - 3. Alarm may be silenced by switch in control panel.
 - a. Ring Back Feature: When silenced, this shall not prevent the resounding of subsequent alarms if another zone should alarm.
 - 4. When alarms are silenced, zone indicating red LEDs on control panel and remote annunciator shall remain indicated until operated device is returned to normal and control panel is manually reset.
 - 5. Green pilot LED, or other visual annunciation, shall normally be on indicating that system is receiving normal power. In addition, failure of normal power be annunciated.
 - 6. Trouble alarm and annunciation, operating together, shall signal trouble condition.
 - a. Following conditions shall signal trouble condition:
 - 1) Failure of normal power.
 - 2) Opens or short circuits on indicating circuits.
 - 3) Disarrangements in system wiring.
 - 4) Control panel circuit board removal.
 - 5) Ground faults.
 - b. Trouble silencing switch shall silence trouble alarm, but visual annunciation shall remain on until system is restored to normal. As ring-back feature, trouble alarm shall resound as reminder to return silencing switch to normal position.
 - 7. Supervisory LED, separate from trouble LED, and alarm, operating together, shall signal operation of supervisory device, such as control valve tamper, low air pressure, and low temperature switches. Alarm silence switch shall operate in same manner as trouble alarm.

1.2 SUBMITTALS

- A. Shop Drawings:
 - 1. Prepared by authorized factory representative and including:
 - a. Single line diagram of actual system. Typical riser diagrams are not acceptable.
 - b. Complete wiring diagrams.

- c. Manufacturer's original catalog data and descriptive information on each piece of equipment to be used.
- B. Quality Assurance / Control: Certificate of completion, from Manufacturer's Representative, in accordance with NFPA 72 requirements.
- C. Closeout:
 - 1. Operations And Maintenance Manual Data:
 - a. Modify and add to requirements of Section 01700 as follows:
 - 1) Provide operating and maintenance instructions for each item of equipment. Provide instruction manual from Manufacturer that explains what is to be done in event of various indications.
 - 2) Include copy of approved shop drawings.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. System shall meet approval of authority having jurisdiction (AHJ). NEC and local ordinances and regulations shall govern unless more stringent requirements are specified.
 - 2. Equipment, devices, and cable shall be UL or Factory Mutual listed for use in fire alarm systems.

1.4 OWNER'S INSTRUCTIONS

- A. Instruct Owner's representative in proper operation and maintenance procedures.

PART 2 PRODUCTS

2.1 COMPONENTS

- A. Equipment and accessories furnished under this Specification shall be standard products of single manufacturer, or include written statement by Control Panel Manufacturer confirming compatibility of components and inclusion of these components under system warranty.
- B. Control Panel:
 - 1. Listed under UL Standard 864.
 - 2. Solid-state modular design with flush or semi-flush mounting.
 - 3. Control functions shall be behind locked door with annunciating devices visible through door. Single key shall operate all keyed functions in system. Provide three keys.
 - 4. Each zone shall be electrically supervised in accordance with wiring style specified.
 - 5. Provide integral surge protection.
 - 6. Make provisions for connection to off-site alarm notification system. Provide separate dry contacts for alarm and supervisory/trouble alarms.
 - 7. Power Supply:
 - a. Provide indication of normal power supply.
 - b. Loss of normal power shall activate trouble alarm.
 - c. Meet requirements of and size in accordance with UL Standard 1481 and NFPA 72.
 - d. Include standby batteries, charger, and automatic transfer equipment.
 - 8. Visual Annunciation:
 - a. Separate indication on each zone for alarm, trouble, or supervisory conditions.
 - b. Visual indication shall be by LED lights or other easily identifiable method.

- c. On zoned system, permanently custom label zones by zone name, not number.
- d. Fault or trouble condition on any zone shall not affect any other zone.
- 9. Audible Horn Alarm Annunciation:
 - a. Provide separate and distinct alarm signals for alarm and trouble conditions.
 - b. Alarm signal shall also operate strobe lights, if specified.
 - c. Provide alarm silence switches at control panel.
 - d. Trouble alarm shall be horn integral to control panel.
 - e. Supervisory alarm may be same audible alarm as trouble alarm, but with separate visual annunciation.
- C. Off-Site Alarm Notification System
 - 1. Provide two telephone lines from telephone terminal board to fire alarm control panel.
 - 2. Contractor will provide dialer system equipment.
 - 3. Owner will arrange for monitoring connection contract.
- D. Alarm Initiating Devices:
 - 1. Smoke Detectors:
 - a. Photoelectric type.
 - b. Listed under UL Standard 268.
 - c. Provide visual indication of alarm on unit when normally pulsed supervisory LED glows continuously.
 - 2. Heat Detectors:
 - a. Non-settable 200 deg F fixed temperature.
 - b. Provide visible indication that device has operated.
 - c. Listed under UL Standard 521.
 - 3. Manual Fire Alarm Boxes:
 - a. Non-coded and double-action requiring two actions to initiate alarm. Breakable glass type is not approved.
 - b. Box shall mechanically latch when actuated and require key to reset. Key shall match control panel door lock.
 - c. Provide STI Lexan covers.
- E. Notification Appliances:
 - 1. Combination Horn / Strobe:
 - a. Wall mounted flush or semi-flush.
 - b. Non-coded audible output of 90 dB minimum at 10 feet.
 - c. Integrally mounted flashing light unit with block letters 'FIRE.' Minimum light intensity of 75 candela and flash rate between one and three Hertz.
 - d. Listed under UL Standards 464 and 1971.
- F. Accessory Devices:
 - 1. Door Hold / Release Devices: Electrically operated magnetic devices that hold doors open until released by main control panel.
 - 2. Notification Appliance Protective Devices: Provide wire guard covers for appliances installed in Cultural Center.

2.2 ACCEPTABLE MANUFACTURERS

- A. Contact Information:
 - 1. Bosch Security Systems, Fairport, NY (800) 538-5807.
www.radionicsinc.com
 - 2. Cerebrus Pyrotronics, Florham Park, NJ (973) 593-2600.
www.cerbpyro.com
 - 3. Digital Monitoring Products, Springfield, MO (800) 641-4282.
www.dmp.com
 - 4. Edwards Systems Technology, Sarasota, FL (800) 226-2333 or (941) 793-4200. www.est.net
 - 5. Faraday Inc, Tecumseh, MI (517) 423-2111.

6. Mirtone, Sarasota, FL (800) 232-6593. www.mirtone.com
 7. Notifier, Northford, CT (800) 454-9779 or (203) 484-7161. www.notifier.com
 8. Silent Knight Security Systems, Maple Grove, MN (800) 446-6444 or (612) 493-6400. www.silentknight.com
 9. Simplex, Westminister, MA (800) 221-7336 or (978) 731-2500. www.simplexnet.com
- B. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install fire alarm and detection systems as indicated, in accordance with Equipment Manufacturer's written instructions, and complying with applicable portions of NEC, NFPA, and NECA's 'Standard of Installation.'
1. Mounting Heights:
 - a. Unless otherwise indicated, mount center of outlets or boxes at following heights above finish floor:
 - 1) Control Panel: **72 inches**.
 - 2) Wall-Mounted Horn / Strobe: Such that the entire lens is not less than **80 inches** and not greater than **96 inches** above finished floor.
 - 3) Wall-Mounted Strobe: **80 inches** or **6 inches** below ceiling, whichever is lower.
 - 4) Manual pull stations: A minimum of **42 inches** and a **maximum of 48 inches** measured vertically from the floor level to the activating handle.
 2. Locate fire alarm manual stations **24 inches** minimum away from any light switch.
 - 3.
 - B. Identification:
 1. Label zone indicators on control unit indicating location and type of initiating device, i.e., CORRIDOR SMOKE, VALVE TAMPER, AIR SYSTEM SMOKE, etc. Labels shall be engraved plastic laminate, or other permanent labeling system as supplied by Control Unit Manufacturer.
 2. Post copy of wire identification list inside fire alarm panel door or other area accessible to fire alarm service personnel.
 3. Print location of circuit disconnecting means inside panel.
 - C. Conductors:
 1. Install conductors in conduit.
 2. Fire alarm system conductors from different zones may be combined in common conduit. Make certain that raceway size and wire quantity, size, and type is suitable for equipment supplied and is within NEC standards. Label pull and junction boxes 'FIRE ALARM.'
 3. Install conductors and make connections to water flow switches, valve tamper switches, low air pressure switches, and duct smoke detectors.
 4. Loop wires through each device on zone for proper supervision. Tee-taps not permitted.
 5. Minimum conductor size shall be 14 AWG unless otherwise specified.
 - D. Do not install ceiling mounted detectors within **36 inches** of air discharge grilles. Do not install manual fire alarm boxes close to light switches. Coordinate with other trades as required.

3.2 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service:
 - 1. Provide factory-trained representative to perform complete system testing in presence of Owner's representative and local fire department personnel upon completion of installation.
 - a. Test each initiating and annunciating device for proper operation, except fixed temperature heat detectors.
 - b. Test operation of trouble annunciation on each circuit. Perform complete testing of control panel functions.

3.3 PROTECTION

- A. Provide dust protection for installed smoke detectors until finish work is completed and building is ready for occupancy.
- B. Protect conductors from cuts, abrasion and other damage during construction.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

DIVISION 31 - EARTHWORK

31 00 00 EARTHWORK

31 00 10 General Site Work Requirements

31 05 00 COMMON WORK RESULTS FOR EARTHWORK

31 05 10 Earthwork

31 11 00 CLEARING AND GRUBBING

31 10 10 Site Clearing

31 20 00 EARTH MOVING

31 20 10 Earth Moving

31 22 00 GRADING

31 22 13 Rough Grading

31 22 16 Fine Grading

31 22 20 Excavation and Fill

31 25 00 EROSION AND SEDIMENTATION CONTROLS

31 25 10 Erosion & Sedimentation Control

31 31 00 SOIL TREATMENT

31 31 16 Termite Control

31 31 19 Vegetation Control

THIS PAGE IS INTENTIONALLY BLANK

31 00 10**GENERAL SITE WORK REQUIREMENTS****PART 1 EXECUTION****1.1 EXAMINATION**

- A. Prior to installation, examine each piece to verify that all are proper in all respects.
- B. Site Verification of Conditions
 - 1. Contact USA (Underground Service Alert) to arrange for utility location services 48 hours minimum prior to performing any work on site.
 - 2. Pothole to verify location of existing various underground facilities at sufficient locations to assure that there does not exist any conflict with the proposed work exists and sufficient clearance is available to avoid damage to existing facilities.
 - 3. Notify Architect by phone or fax within 24 hours upon discovery of conflicts or problems with existing facilities. Follow telephone or fax notification with letter and diagrams indicating conflict or problem and give sufficient measurements and details to evaluate problem.

1.2 PREPERATION

- A. Protection
 - 1. Spillage:
 - a. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways.
 - b. Remove spillage and sweep, wash or otherwise clean project, streets and highways.
 - 2. Dust Control:
 - a. Take the necessary precautions to prevent dust nuisance both on site and adjacent to public and private properties.
 - b. Correct or repair damage caused by dust.
 - 3. Erosion Control:
 - a. Take precautions necessary to prevent erosion and transportation of soil downstream, to adjacent properties, and into on-site or off-site drainage systems.
 - b. Develop, install and maintain an erosion control plan if required by law.
 - c. Repair and correct damage caused by erosion.
 - 4. Existing Plants & Features: Do not damage tops, trunks and roots of existing trees and shrubs on site which are intended to remain. Do not use heavy equipment within branch spread. Interfering branches may be removed only with permission of Architect. Do not damage other plants and features which are to remain.
- B. If specified precautions are not taken or corrections and repairs made promptly, Owner may take such steps as may be deemed necessary and deduct costs of such from monies due to Contractor. Such action or lack of action on Owner's part does not relieve Contractor from responsibility for proper protection of the Work.

1.3 REPAIR/RESTORATION

- A. Adjust existing covers, boxes and vaults to grade.
- B. Replace broken or damaged covers, boxes and vaults.
- C. Independently confirm size, location and number of covers, boxes and vaults which require adjustment.

- 1.4 FIELD QUALITY CONTROL
- A. Notify the Architect 24 hours, minimum, prior to intended resumption of grading or compacting if work has been interrupted by weather, scheduling or other reason.
 - B. The Owner reserves the right to require additional testing to reaffirm suitability of completed work including compacted soils which have been exposed to adverse weather conditions.

END OF SECTION

31 05 10**EARTHWORK****PART 1 PRODUCTS****1.1 MATERIALS**

- A. Backfill At Footings, Foundations, Trenches, & Sitework Concrete -
 - 1. Well graded material free from debris, organic material, stones over 6 inches diameter, frozen materials, brick, lime, concrete, and other material which would prevent adequate performance of backfill.
 - 2. Fill shall conform to AASHTO Spec M-145, A-1-A, A-1-B, A-2-4, or A-2-5 granular, non-plastic material.
 - 3. 90 percent minimum of fill shall be smaller than 1-1/2 inch in any direction.
- B. Pipe Bedding -
 - 1. Sand -
 - a. Clean, well graded, particle size 0.2 to 2.0 mm
 - 2. Other approved cohesionless material.
- C. Imported Topsoil -
 - 1. Fertile, loose, friable soil meeting following criteria -
 - a. Chemical Characteristics -
 - 1) Acidity/alkalinity range - pH 5.5 to 7.7
 - 2) Soluble Salts - less than 2.0 mmhos/cm
 - 3) Sodium Absorption Ratio (SAR) - less than 3.0
 - 4) Organic Matter - greater than 2 percent
 - 5) Nitrogen (NO³N) - greater than 48 ppm
 - 6) Phosphorus (P) - greater than 11 ppm
 - 7) Potash (K) - greater than 130 ppm
 - 8) Iron (Fe) - greater than 5.0 ppm
 - b. Physical Characteristics -
 - 1) Gradation as defined by USDA triangle of physical characteristics.
 - Sand - 15 to 60 percent
 - Silt - 10 to 70 percent
 - Clay - 5 to 30 percent
 - 2) Clean and free from toxic minerals and chemicals, noxious weeds, weed seeds, rocks larger than 1-1/2 inch in any dimension, and other objectionable materials.
 - 3) Soil shall not contain more than 2 percent of particles over measuring 2.0 mm in largest size.

PART 2 EXECUTION**2.1 EXAMINATION**

- A. Prior to installation, examine each piece to verify that all are proper in all respects.
- B. Carefully examine site with Architect prior to beginning of work of this Section to pre-plan procedures for making cuts, placing fills, and other necessary work.
- C. Before making cuts, determine areas needing fill and organize to most efficiently place fill.

2.2 PREPARATION:

- A. Protection -
 - 1. Protect trunks and roots of existing trees on site which are intended to remain. Do not use heavy equipment within branch spread. Interfering branches may be removed only with permission of Architect.
 - 2. Protect other plants and features which are to remain.
 - 3. When existing grade around plants is higher than new finish grade, perform regrading by hand. Do not expose or damage shrub or tree roots.

2.3 SITE CLEARING:

- A. Tree & Brush Removal -
 1. Cut off trees, shrubs, brush, and vegetative growth 12 inches maximum above ground.
 2. Do not pull up or rip out roots of trees that are to remain. If excavation through roots is required, excavate by hand and cut roots with sharp axe. Make clean, smooth, sloping cuts.
 3. Cut roots 6 inches or larger in diameter only with Architect's written permission.
- B. Grubbing -
 1. Grub out stumps and roots 12 inches minimum below original ground surface, except as follows -
 - a. Under buildings, remove roots one inch and larger entirely.
 - b. Entirely remove roots of plants which normally sprout from roots, as identified by Architect.
- C. Stripping -
 1. Strip existing vegetation layer from areas of site to receive buildings, landscaping, or paving and remove from site prior to stripping topsoil for storage and reuse.
 2. After stripping vegetation layer, strip existing topsoil store on site for later use.
- D. Remove slabs, pipes, buried debris, and miscellaneous items as directed or otherwise required.

2.4 PERFORMANCE:

- A. Site Tolerances -
 1. Maximum variation from indicated grades shall be 1/10 of one foot.
 2. Make proper allowance for final finish grades of parking lot and planting areas as described in Contract Documents.
- B. If soft spots, water, or other unusual excavating conditions are encountered, stop work and notify Architect.

2.5. EXCAVATING, BACKFILLING & COMPACTING:

- A. Excavating -
 1. Excavate as necessary for proper placement of work.
 - a. Bottom of excavations to receive footings shall be undisturbed soil.
 - b. Probe bottoms of footing excavations with a hand held auger to expose pockets of soft or otherwise unsuitable materials.
 - c. Remove any unsuitable materials discovered by probing, and fill as described below.
 - d. Remove vegetation and deleterious material and remove from site.
 2. Excavate trenches for site utilities to a depth sufficient to provide indicated minimum coverage over buried lines as follows -
 - a. Water lines - 54"
 - b. Sewer lines - 30"
 - c. Electrical lines - 24"
 3. If unusual excavating conditions are encountered, stop work and notify Architect.
 4. Excavation Carried Deeper Than Required -
 - a. Under Footings - Fill with concrete specified for footings.
 - b. Under Slabs - Use specified compacted backfill material.
 - c. Under Paving - Use compacted base material specified in Section 02 500.
 - d. Site Utility Trenches - Use compacted native material.
- B. Backfilling -
 1. Around Buildings & Structures -
 - a. Slope grade away from building.
 - b. Hand backfill when close to building or where damage to building might result.
 2. Site Utilities -
 - a. Provide bedding surface for piping with a firm foundation of uniform density throughout the entire length of pipe.
 - b. Bed pipes carefully in a foundation of specified material accurately shaped

and rounded to conform to lower 1/4 of the outside perimeter of the pipe.

- c. Tamp bedding when necessary.
- d. Place remaining backfill consisting of on-site soil in 12 inch maximum layers compacted as specified.

C. Compacting -

1. General -

- a. Do not use puddling or jetting to consolidate fill areas.
- b. If site material will not compact to specified density or it is suspected that it will not, remove and replace with material specified in PRODUCT section above.

2. Sub-Grade -

a. Under Slabs -

- 1) Moisture condition soil to uniform moisture content between optimum and 2 percent over optimum, and maintain until concrete or paving is placed.
- 2) Mechanically tamp 8 inches deep to 98 percent minimum of relative compaction.

b. Under Asphalt Concrete Driveways & Parking Areas -

- 1) Moisture condition soil to uniform moisture content between optimum and 2 percent over optimum, and maintain until concrete or paving is placed.
- 2) Mechanically tamp 8 inches deep to 95 percent minimum of standard proctor maximum dry density.

c. Landscape Areas -

- 1) Compact to 85 percent relative compaction to within 12 inches of finished grade elevation.

3. Base & Backfill -

a. Site Utility Trenches -

- 1) Consolidate sand slurry backfill using vibrating or other means.
- 2) Moisture condition remaining backfill to plus or minus 2 percent of optimum moisture and compact to 90 percent minimum relative compaction to within 12 inches of finish grade.

b. Under Slabs, Driveways, & Parking Areas - Place in 8 inch maximum layers, dampen (do not soak), and mechanically tamp to 95 percent minimum of maximum density as established by ASTM D 1557.

c. Under Concrete Site Elements & Around Foundation Walls - Place in 8 inch maximum layers, dampen (do not soak), and mechanically tamp to 90 percent minimum of maximum density as established by ASTM D 1557.

d. Other Backfills - Place other fills in 12 inch layers and compact to 90 percent relative compaction.

2.6. FINISH GRADING:

- A. During preliminary grading, dig out weeds from planting areas by their roots and remove from site.
- B. Remove from site rocks larger than 1-1/2 inches in size and foreign matter such as building rubble, wire, cans, sticks, concrete, etc, before placing top soil.
- C. Redistribute existing top soil stored on site.
- D. Drainage -
 - 1. Slope grade away from building for 12 feet minimum from walls at slope of 1/2 inch per ft minimum unless otherwise noted. High point of finish grade at building foundation shall be 6 inches minimum below finish floor level.
 - 2. Direct surface drainage in manner indicated on Drawings by molding surface to facilitate natural run-off of water. Fill low spots and pockets with top soil and grade to drain properly.

2.7 CLEANING:

- A. Remove from site trees, shrubs, uprooted stumps, vegetative layer, and surface debris and dispose of legally.
- B. Do not bury cuttings, stumps, roots, and other vegetative matter or burnt waste material on site.

- 2.8 REPAIR/RESTORATION:
- A. Damage to other portions of the Work due to work of this Section shall be repaired at no additional cost to Owner. On new work, damage shall be repaired by original installer.
- 2.9 FIELD QUALITY CONTROL:
- A. Testing -
 - 1. Test each lift to determine that adequate compaction is achieved.
 - 2. Should any test indicate less than required compaction, scarify and recompact as directed.
 - B. Repeat operations and testing until specified density is achieved.
 - C. If site material will not compact to specified density or it is suspected that it will not, remove and replace with material specified in PRODUCT section above.

END OF SECTION

SECTION 31 10 10**SITE CLEARING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

1. Protecting existing trees and grass to remain.
2. Removing existing trees, shrubs, groundcovers plants and grass.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing and removal of storm drainage utilities.
7. Temporary erosion and sedimentation control measures.

- B. Related Sections include the following:

1. Division 01 Section "Temporary Facilities and Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities.
2. Division 01 Section "Execution" for verifying utility locations and for recording field measurements.
3. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.
4. Division 23 Section "Turf and Grasses and Plants" for finish grading including preparing and placing planting soil mixes and testing of topsoil material.
5. Division 21, Division 22, Division 23, Division 26, Division 27, and Division 28 Sections for removal of site utilities except storm sewers.

1.3 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

- A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.
- B. Record drawings, according to Division 01 Section "Project Record Documents," identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.
- C. Storm Water Pollution Prevention Plan: Submit prior to beginning construction and maintain on-site, and available for regular review by the Architect the following:
 1. Copy of the Notice of Intent (NOI).
 2. Copy of the Site Grading Permit.
 3. Copy of the SWPP along with related written documents.
 4. Maintenance Log Book in conformance with the requirements indicated.

1.6 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- D. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earth Moving."
 - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction and the Storm Water Pollution Prevention Drawings (SWPP).
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE PROTECTION

- A. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.
 - 1. Do not store construction materials, debris, or excavated material within fenced area.
 - 2. Do not permit vehicles, equipment, or foot traffic within fenced area.
 - 3. Maintain fenced area free of weeds and trash.
- B. Do not excavate within tree protection zones, unless otherwise indicated.
- C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

1. Cover exposed roots with burlap and water regularly.
2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
3. Coat cut faces of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
4. Backfill with soil as soon as possible.

D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.

1. Employ an arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
2. Replace trees that cannot be repaired and restored to full-growth status, as determined by Architect.

3.4 UTILITIES

A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.

B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

C. Removal of underground utilities is included in Division 21, Division 22, Division 23, Division 26, Division 27, and Division 28 Sections covering site utilities.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
4. Use only hand methods for grubbing within tree protection zone.
5. Chip removed tree branches and dispose of off-site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and non-soil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Limit height of topsoil stockpiles to 72 inches.
 - 2. Do not stockpile topsoil within tree protection zones.
 - 3. Dispose of excess topsoil as specified for waste material disposal.
 - 4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
 - 2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

3.8 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

SECTION 31 20 10**EARTH MOVING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes the following:
1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns, and grasses.
 2. Excavating and backfilling for buildings and structures.
 3. Drainage course for slabs-on-grade.
 4. Subbase course for concrete walks and pavements.
 5. Subbase and base course for asphalt paving.
 6. Subsurface drainage backfill for walls and trenches.
 7. Excavating and backfilling for utility trenches.
 8. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.
- B. Related Sections include the following:
1. Refer to full Geotechnical Report included at end of Specifications, Dated August 3, 2021 and performed by Solid Ground Consulting Engineers, PLLC of Richmond, KY. for additional reference and information. "Recommendations" pages 15-23 from Geotechnical Report supersedes information in this section.
 2. Division 01 Section "Unit Prices" for unit-price rock excavation and authorized additional excavation provisions.
 3. Division 01 Sections "Construction Progress Documentation" and "Photographic Documentation" for recording pre-excavation and earthwork progress.
 4. Division 01 Section "Special Inspections" for earth moving testing required by authorities having jurisdiction.
 5. Division 01 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities.
 6. Division 03 Section "Cast-in-Place Concrete" for vapor retarder beneath the slab-on-grade.
 7. Divisions 21, 22, 23, 26, 27, and 28 Sections for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.
 8. Division 31 Section "Site Clearing" for temporary erosion and sedimentation control measures, site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
 9. Division 31 Section "Dewatering" for lowering and disposing of ground water during construction.
 10. Division 31 Section "Excavation Support and Protection" for shoring, bracing, and sheet piling of excavations.
 11. Division 31 Section "Drilled Shafts" for excavation of shafts and disposal of surplus excavated material.
 12. Division 32 Section "Turf and Grasses" for finish grading, including preparing and placing topsoil and planting soil for lawns.
 13. Division 33 Section "Sub-drainage" for drainage of foundations slabs-on-grade walls.

1.3 UNIT PRICES

- A. Unit prices for earthwork are included in the "Form of Proposal."
- B. Rock Measurement: Volume of rock actually removed, measured in original position, but not to exceed the following. Unit prices for rock excavation include replacement with approved materials.
 1. 24 inches outside of concrete forms other than at footings.
 2. 12 inches outside of concrete forms at footings.
 3. 6 inches outside of minimum required dimensions of concrete cast against grade.
 4. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 5. 6 inches beneath bottom of concrete slabs-on-grade.
 6. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

1.4 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
 2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Rock: Rock material in beds, ledges, un-stratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
 1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,090 lbf and stick-crowd force of not less than 18,650 lbf; measured according to SAE J-1179.
 2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp flywheel power and developing a minimum of 48,510-lbf breakout force with a general-purpose bare bucket; measured according to SAE J-732.
- I. Rock: Rock material in beds, ledges, un-stratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by an independent geotechnical testing agency, according to ASTM D 1586.

- J. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- K. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- L. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- M. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.5 SUBMITTALS

- A. Product Data: For the following:
 1. Geotextile.
 2. Controlled low-strength material, including design mixture.
- B. Samples: 12-by-12-inch Sample of subdrainage geotextile.
- C. Special Inspections Reports: For record purposes; from Special Inspector.
- D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
 1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
 2. Laboratory compaction curve according to ASTM D 698 for each on-site and borrow soil material proposed for fill and backfill.
- E. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

1.6 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.
- B. Preexcavation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
- C. Special Inspector Qualifications: Comply with Division 01 Section "Special Inspections."

1.7 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
 1. Notify Architect not less than five days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without Architect's written permission.
 3. Contact utility-locator service for area where Project is located before excavating.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, CL, GP, GM, SW, SP, and SM, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups. This also includes material deemed as Fat Clay.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.
- J. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.
- K. Impervious Fill: Clay capable of compacting to a dense state.

2.2 GEOTEXTILES

- A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
 - 1. Survivability: Class 2; AASHTO M 288.
 - 2. Grab Tensile Strength: 157 lbf; ASTM D 4632.
 - 3. Sewn Seam Strength: 142 lbf; ASTM D 4632.
 - 4. Tear Strength: 56 lbf; ASTM D 4533.
 - 5. Puncture Strength: 56 lbf; ASTM D 4833.
 - 6. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
 - 7. Permittivity: 0.2 per second, minimum; ASTM D 4491.
 - 8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

- B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 2; AASHTO M 288.
 2. Grab Tensile Strength: 247 lbf; ASTM D 4632.
 3. Sewn Seam Strength: 222 lbf; ASTM D 4632.
 4. Tear Strength: 90 lbf; ASTM D 4533.
 5. Puncture Strength: 90 lbf; ASTM D 4833.
 6. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
 7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
 8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 CONTROLLED LOW-STRENGTH MATERIAL

- A. Controlled Low-Strength Material: Low-density, self-compacting, flowable concrete material as follows:
1. Portland Cement: ASTM C 150, Type II or III.
 2. Fly Ash: ASTM C 618, Class C or F.
 3. Normal-Weight Aggregate: ASTM C 33, 3/4-inch nominal maximum aggregate size.
 4. Foaming Agent: ASTM C 869.
 5. Water: ASTM C 94/C 94M.
 6. Air-Entraining Admixture: ASTM C 260.
- B. Produce low-density, controlled low-strength material with the following physical properties:
1. As-Cast Unit Weight: 36 to 42 lb/cu. ft. at point of placement, when tested according to ASTM C 138/C 138M.
 2. Compressive Strength: 100 psi, when tested according to ASTM C 495.
- C. Produce conventional-weight, controlled low-strength material with 100 psi compressive strength when tested according to ASTM C 495.

2.4 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
1. Red: Electric.
 2. Yellow: Gas, oil, steam, and dangerous materials.
 3. Orange: Telephone and other communications.
 4. Blue: Water systems.
 5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 31 Section "Site Clearing."

- C. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section "Site Clearing," during earthwork operations.
- D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
 2. Install a dewatering system, specified in Division 31 Section "Dewatering," to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

- A. DO NOT USE EXPLOSIVES**

3.4 EXCAVATION, GENERAL

- A. **Unclassified Excavation:** Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms other than at footings.
 - b. 12 inches outside of concrete forms at footings.
 - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. 6 inches beneath bottom of concrete slabs on grade.
 - f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
 1. Clearance: 12 inches each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
 2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
 3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.
 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.8 SUBGRADE INSPECTION

- A. Notify Architect and Special Inspector when excavations have reached required subgrade.
- B. If Architect and Special Inspector determine that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades. Proof roll in presence of approved Geotechnical Testing Agency.
 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
 2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Approved Geotechnical Testing Agency and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect and Approved Geotechnical Testing Agency without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 3,000 psi, may be used when approved by Architect.
 - 1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for Record Documents.
 - 3. Testing and inspecting underground utilities.
 - 4. Removing concrete formwork.
 - 5. Removing trash and debris.
 - 6. Removing temporary shoring and bracing, and sheeting.
 - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
 - 8. Receiving permission from Architect or Structural Engineer.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."
- D. Provide concrete unit masonry blocking to support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit on all sides with a minimum of 4 inches of concrete before backfilling or placing roadway subbase.
- E. Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.
 - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- F. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the utility pipe or conduit.
- G. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
- H. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- I. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.

- J. Install detectable warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 1. Under grass areas, use satisfactory soil material.
 2. Under walks and service area pavements, use satisfactory soil material.
 3. Under steps and ramps, use satisfactory soil material or engineered fill.
 4. Under building slabs, use satisfactory soil material, engineered fill, or quarry screenings. Review the Geotechnical Report by S&ME for further recommendations under slab.
 5. Under footings and foundations, use satisfactory soil material or engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
 1. For all structures, including building slabs, and pavements, scarify and recompact top 8 inches of existing subgrade and each layer of backfill or fill soil material at 98 percent underneath structure and a minimum of 10 feet (3.048 m) beyond structure footprint.
 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 98 percent.
 3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
 4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.16 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 1. Provide a smooth transition between adjacent existing grades and new grades.
 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 1 inch.
 2. Walks: Plus or minus 1/2 inch.
 3. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.17 SUBSURFACE DRAINAGE

- A. Subdrainage Pipe: Specified in Division 33 Section "Subdrainage."
- B. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches of filter material, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698 with a minimum of two passes of a plate-type vibratory compactor.
- C. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with 1 layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698 with a minimum of two passes of a plate-type vibratory compactor.
 2. Place and compact impervious fill over drainage backfill in 6-inch- thick compacted layers to final subgrade.

3.18 SUBBASE AND BASE COURSES

- A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase and base course under pavements and walks as follows:
1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 2. Place base course material over subbase course under hot-mix asphalt pavement.
 3. Shape subbase and base course to required crown elevations and cross-slope grades.
 4. Place subbase and base course 6 inches or less in compacted thickness in a single layer.
 5. Place subbase and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 6. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

3.19 DRAINAGE COURSE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 2. Place drainage course 6 inches or less in compacted thickness in a single layer.
 3. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

3.20 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than 3 tests.
 - 2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet or less of wall length, but no fewer than 2 tests.
 - 3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 tests.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.21 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Architect or Geotechnical Testing Agency; reshape and re-compact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Transport surplus satisfactory and unsatisfactory soil to designated storage areas on Owner's property. Spread soil as directed by Architect.
 - 1. Remove waste material, including trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

ROUGH GRADING**PART 1 - PRODUCTS**

1.1 MATERIALS

- A. Materials used for fill shall be as specified for backfill in Section 31 22 20.

PART 2 - EXECUTION

2.1 PREPARATION

- A. Before making cuts, remove topsoil over areas to be cut and filled that was not previously removed by stripping specified in Section 31 11 10. Stockpile this additional topsoil with previously stripped topsoil.

2.2 PERFORMANCE

- A. Site Tolerances:
1. Maximum variation from required grades shall be **1/10 of one foot 28 mm**.
 2. To allow for final finish grades of parking lot and planting areas, rough grade elevations before placing topsoil are:
 - a. Sod Areas: **7 inches 175 mm** below top of walk or curb.
 - b. Seeded Areas And Ground Cover Areas: **6 inches 150 mm** below top of walk or curb.
 - c. Shrub Areas: **15 inches 375 mm** below top of walk or curb.
- B. When existing grade around existing plants to remain is higher than new finish grade, perform regrading by hand. Do not expose or damage shrub or tree roots.
- C. Compact fills as specified in Section 31 22 20.
- D. If soft spots, water, or other unusual and unforeseen conditions affecting grading requirements are encountered, stop work and notify Architect.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

31 22 16**FINE GRADING****PART 1 - EXECUTION**

1.1 EXAMINATION

- A. Do not commence work of this Section until grading tolerances specified in Section 31 22 13 are met.

1.2 PREPARATION

- A. Protection: Protect utilities and site elements from damage.
- B. Surface Preparation:
 1. Before grading, dig out weeds from planting areas by their roots and remove from site. Remove rocks larger than **1-1/2 inches 38 mm** in size and foreign matter such as building rubble, wire, cans, sticks, concrete, etc.
 2. Remove imported paving base material present in planting areas down to natural subgrade or other material acceptable to Architect.
 3. Limit use of heavy equipment to areas no closer than **6 feet 1800 mm** from building or other permanent structures

1.3 PERFORMANCE

- A. Site Tolerances:
 1. Maximum variation from required grades shall be **1/10 of one foot 28 mm**.
 2. To allow for final finish grades of parking lot and planting areas, fine grade elevations before placing topsoil are:
 - a. Sod Areas: **7 inches 175 mm** below top of walk or curb.
 - b. Seeded Areas And Ground Cover Areas: **6 inches 150 mm** below top of walk or curb.
 - c. Shrub Areas: **15 inches 375 mm** below top of walk or curb.
- B. Do not expose or damage existing shrub or tree roots.
- C. Redistribute approved existing topsoil stored on site as a result of work of Section 31 11 10. Remove organic material, rocks and clods greater than **1-1/2 inch 38 mm** in any dimension, and other objectionable materials.
- D. Slope grade away from building for **12 feet 3600 mm** minimum from walls at slope of **1/2 inch in 12 inches 13 mm in 300 mm** minimum unless otherwise noted. Direct surface drainage in manner indicated on Drawings by molding surface to facilitate natural run-off of water. Fill low spots and pockets with specified fill material and grade to drain properly.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

31 22 20**EXCAVATION AND FILL****PART 1 - GENERAL**

1.1 DEFINITIONS

- A. Relative Compaction: Ratio of field dry density as determined by ASTM D 2922 and ASTM D 3017 or 2216, and laboratory maximum dry density as determined by ASTM D 1557.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Site Material: Existing excavated material on site is suitable for use as fill and backfill to meet Project requirements.
- B. Imported Fill / Backfill:
1. Well graded material conforming to ASTM D 2487 free from debris, organic material, frozen materials, brick, lime, concrete, and other material which would prevent adequate performance of backfill.
 - a. Under Building Footprint And Paved Areas: Fill shall comply with soil classification groups CL, SC or GC. Fill may not contain stones over 6 inches 150 mm diameter and 90 percent minimum of fill shall be smaller than 1-1/2 inch 38 mm in any direction.
 - b. Material shall have a Plastic Index (PI) less than 20 and a Standard Proctor maximum dry density of least 100 pcf.
 - c. Engineer classification and standard Proctor tests shall be performed on all potential borrow soils and evaluated by Geotechnical Engineer prior to use.
 - d. Under Landscaped Areas:
 - 1) Fill more than 36 inches 900 mm below finish grade shall comply with soil classification groups GW, GP, GM, SW, SP, or SM. Fill may not contain stones over 6 inches 150 mm diameter and 90 percent minimum of fill shall be smaller than 1-1/2 inch 38 mm in any direction.
 - 2) Fill less than 36 inches 900 mm below finish grade shall comply with soil classification groups SW, SP, SM, or SC. Fill may not contain stones larger than 1-1/2 inches 38 mm in any direction and 90 percent minimum of fill shall be smaller than 3/8 inch 4.7 mm in any direction.
- C. Excavatable Slurry Fill / Backfill:
1. Contain maximum of 94 lbs of cement per yard 56 kg of cement per cu m of slurry fill / backfill.
 2. Minimum stable air content of 20 percent, Darafill dosage as necessary.
 3. Maximum water content of 36 gallons per yard 225 L per cu m of backfill.
 4. Maximum compressive strength of 150 psi at 28 days.
 5. Acceptable Products:
 - a. Darafill by W R Grace & Co, Cambridge MA (800) 354-5414. www.gcp-grace.com
 - b. Equal as approved by Architect before use. See Section 01600.
- D. Engineered Fill:
1. One to two feet of large diameter crushed stone (KDHOT No. 2 or No. 3).

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Carefully examine site and available information to determine type soil to be encountered. Discuss problems with Architect before proceeding with work.

3.2 PREPARATION

- A. Protection of Existing Utilities:
 - 1. Protect existing utilities identified in Contract Documents during excavation.
 - 2. If existing utility lines not identified in Contract Documents are encountered, contact Architect before proceeding.
- B. Before placing fill, base, or finish work, prepare sub-grade as follows:
 - 1. Do not place fill or base over frozen sub-grade.
 - 2. Under Building Slabs / Pads, Concrete Site Elements, And Portland Cement Concrete Driveways And Parking Areas: Scarify sub-grade **6 inches 150 mm** deep, moisture condition to uniform moisture content of between optimum and 4 percent over optimum, and mechanically tamp **6 inches 150 mm** deep to 90 percent minimum of relative compaction.
 - 3. Under Asphalt Concrete Driveways And Parking Areas: Scarify sub-grade **6 inches 150 mm** deep, moisture condition to uniform moisture content between optimum and 4 percent over optimum, and mechanically tamp to 95 percent minimum of standard. Proctor maximum dry density.
 - 4. Landscape Areas: Compact sub-grade to 85 percent relative compaction.

3.3 PERFORMANCE

- A. Excavation:
 - 1. Building Footings And Foundations:
 - a. Excavate as necessary for proper placement and forming of footings and foundations.
 - b. Bottom of excavations to receive footings shall be undisturbed soil.
 - c. Footing excavations that encounter bedrock shall be undercut a minimum of 12 inches below the proposed bearing elevations and back filled with compacted dense-graded aggregate (DGA) or lean clay.
 - d. Footings that encounter bedrock shall be evaluated by geotechnical engineer prior to placement of any material to verify bearing capacity can be achieved.
 - e. Excavation Carried Deeper Than Required:
 - 1) Under Footings: Fill with concrete specified for footings.
 - 2) Under Slabs: Use specified compacted backfill material.
 - 2. Pavement And Concrete Site Elements:
 - a. Excavate as necessary for proper placement and forming of concrete site elements and pavement structure. Remove vegetation and deleterious material and remove from site.
 - b. Backfill over-excavated areas with compacted base material specified in Sections under 02700 heading.
 - c. Remove and replace exposed material that becomes soft or unstable.
 - 3. Utility Trenches:
 - a. Unless otherwise indicated, excavation shall be open cut. Short sections of trench may be tunneled if pipe or duct can be safely and properly installed and backfill can be properly tamped in tunnel sections and if approved by Architect.
 - b. Excavate to proper alignment, depth, and grade. Excavate to sufficient width to allow adequate space for proper installation and inspection of utility piping.

- c. If trenches are excavated deeper than required, backfill until trench bottom is proper depth with properly compacted native material.
 - d. Pipe **4 Inches 100 mm** In Diameter Or Larger:
 - 1) Grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil at every point along its length.
 - 2) Except where rock is encountered, take care not to excavate below depths indicated.
 - a) Where rock excavations are required, excavate rock with minimum over-depth of **4 inches 100 mm** below required trench depths.
 - b) Backfill over-depths in rock excavation and unauthorized over-depths with loose, granular, moist earth, thoroughly compacted.
 - 3) Whenever wet or unstable soil incapable of properly supporting pipe, as determined by Architect, occurs in bottom of trench, remove soil to depth required and backfill trench to proper grade with coarse sand, fine gravel, or other suitable material acceptable to Architect.
 - 4. If unusual excavating conditions are encountered, stop work and notify Architect.
- B. Fill / Backfill:
- 1. General:
 - a. Around Buildings And Structures: Slope grade away from building as specified in Section 31 05 10. Hand backfill when close to building or where damage to building might result.
 - b. Site Utilities:
 - 1) In Landscape Areas: Use backfill consisting of on-site soil.
 - 2) Under Pavement And Concrete Site Elements: Extend excavatable slurry fill / backfill to elevation of subgrade. Do not place base material until excavatable slurry fill / backfill has cured 72 hours.
 - c. Do not use puddling or jetting to consolidate fill areas.
 - 2. Compacting:
 - a. Fill / Backfill And Base:
 - 1) Under Building Slabs or Pads: Place in **8 inch** maximum layers, dampen (do not soak), and mechanically tamp to 98 percent minimum of standard Proctor maximum dry density as established by ASTM D 698. With moisture content with 2 percent of optimum to 3 percent wet of optimum.
 - 2) Under Driveways, And Parking Areas: Place in **8 inch** maximum layers, dampen (do not soak), and mechanically tamp to 95 percent minimum of standard Proctor maximum dry density as established by ASTM D 1557. With moisture content with 2 percent of optimum to 3 percent wet of optimum.
 - 3) Under Concrete Site Elements And Around Foundation Walls: Place in **8 inch 200 mm** maximum layers, dampen but do not soak, and mechanically tamp to 95 percent minimum of maximum density as established by ASTM D 698.
 - 4) Under Landscape Areas: Place in **8 inch** maximum layers, dampen but do not soak, and mechanically tamp to 92 percent minimum of maximum density as established by ASTM D 1557.
 - 5) Utility Trenches:
 - a) Site: Place fill in **12 inch 300 mm** layers and moisture condition to plus or minus 2 percent of optimum moisture content. Compact fill to 90 percent minimum relative compaction to within **12 inches 300 mm** of finish grade. Compact fill above **12 inches 300 mm** to 85 percent relative compaction.
 - b) Under Slabs: Place fill in **6 inch 150 mm** layers, moisture condition to plus or minus 2 percent of optimum moisture content, and compact to 95 percent minimum relative compaction to within **4 inches 100 mm** of finish grade. Final **4 inches 100 mm** of fill shall be granular base as specified in Section 02316.
 - 6) Fill Slopes: Compact by rolling or using sheepsfoot roller.
 - 7) Backfill Under Footings: Not allowed.
 - 8) Other Backfills: Place other fills in **12 inch 300 mm** layers and compact to 90 percent relative compaction.

3.4 REPAIR / RESTORATION

- A. Repair damage to other portions of the Work resulting from work of this Section at no additional cost to Owner. On new work, arrange for damage to be repaired by original installer.

3.5 CLEANING

- A. Debris and material not necessary for Project are property of Contractor and are to be removed before completion of Project. However, if material necessary for Project is hauled away, replace with specified fill / backfill material.

END OF SECTION

31 25 10

EROSION & SEDIMENTATION CONTROL

PART 1 EXECUTION

1.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.
- B. Verify conditions contained in the Erosion Control Plan

1.2 INSTALLATION

- A. Install according to Erosion Control Plan and/or responsible intitutes instructions.

1.3 PROTECTION

- A. Maintain Erosion Control through-out the entirety of the Project.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

31 31 16**TERMITE CONTROL****PART ONE - GENERAL**

1.1 QUALITY ASSURANCE:

- A. Qualifications - Use of specified chemicals is restricted to certified applicators, or persons under their direct supervision, and only for those uses covered by certified applicator's certification.
- B. Regulatory Requirements
 - 1. This specification covers more than one chemical and, therefore, is not specific in all aspects of handling and usage.
 - 2. Requirements for application by certified applicators presumes that Manufacturer's requirements and those of federal, state, and local regulatory agencies shall be met.
 - 3. Nothing in Contract Documents shall be construed as allowing circumvention of above requirements.

1.2 WARRANTIES:

- A. Furnish written warranty which includes
 - 1. Chemical concentration and application rates comply with Contract Documents, Chemical Manufacturer's recommendations, and applicable governmental regulations. Warranty shall state concentrations and rates of application used.
 - 2. Effectiveness of treatment against subterranean termite infestation is guaranteed for five years minimum from acceptance date of Project.

PART TWO - PRODUCTS

2.1 MATERIALS:

- A. Acceptable Products
 - 1. Chlorpyrifos (Trade Name - Dursban TC)
 - 2. Permethrin (Trade Names - Dragnet, Torpedo).

2.2 MIXES:

- A. Unless recommended differently by Manufacturer, mix solution by using two gallons of chemical (0.5 percent Active Ingredients) to 98 gallons of water.

PART THREE - EXECUTION

3.1 PREPARATION:

- A. Do not apply emulsion until location of air ducts, vents, water, and sewer lines are known and identified. Take extreme caution to avoid contamination of these structural elements and airways.
- B. Protection
 - 1. Allow no disturbance of treated soil between application of poison and placing of concrete. Reapply soil treatment solution to areas disturbed by subsequent excavation, other construction activities, or heavy rain following application.
 - 2. Protect neighboring property, water sources, and personnel on site from contamination.
 - a. Use anti-backflow equipment or procedures.
 - b. Do not treat soil beneath structures that contain wells or cisterns.
 - c. Take extreme care to avoid runoff. Do not treat soil that is water-saturated or frozen.
 - 3. Maintain, on job site, empirical name of chemical, Manufacturer's precautions, and phone numbers of proper authorities to notify in case of spillage or other accident.

3.2 APPLICATION:

- A. Apply one of specified chemicals as water emulsion at concentrations and volume specified. If impervious soils make reduction in volume of solution necessary, increase percentage of toxicant used in proportion to insure same amount of insecticide be used per linear or square foot.
- B. Preconstruction Treatment
 - 1. Provide unbroken vertical and horizontal chemical barrier to termite entry.
 - 2. For Slab-on-Grade Construction -
 - a. One gal per 10 sq ft as overall treatment under slab and attached porches.
 - b. 4 gals per 10 lin ft along inside and outside of exterior foundation walls, both sides of interior partition foundation walls, and around utility services and other features that will penetrate slab.
 - c. 2 gals per 10 lin ft in voids of unit masonry foundation walls or piers.
- C. Postconstruction Treatment
 - 1. Use sub-slab injection, rodding, or trenching with low-pressure spray. Do not make an overall broadcast application of chemical in crawl space or on any soil beneath plenum air space. Do not extend below tops of footings.
 - 2. For Slab-on-Grade Construction -
 - a. One gal per 10 sq ft as overall treatment under slab and attached porches.
 - b. 4 gals per 10 lin ft along inside and outside of exterior foundation walls, both sides of interior partition foundation walls, and around utility services and other features that will penetrate slab.
 - c. 2 gals per 10 lin ft in voids of unit masonry foundation walls or piers.

3.3 FIELD QUALITY CONTROL:

- A. Inspection
 - 1. Notify Architect two working days prior to application of chemicals.
 - 2. Deliver chemicals to site in Manufacturer's original, unopened containers and mix to specified concentration in Architect's presence.
- B. Site Tests
 - 1. Have applicable governmental agency test application for amount of chemical applied. Submit test results to Architect.
 - 2. Samples provided under Article 1.2, C, 3 above will be submitted to laboratory analysis by Architect if requested by Owner in accordance with General Conditions Section 16.

3.4 PROTECTION

- A. Allow 12 hours for drying after application before resuming construction activities. Post signs in areas of application warning of poison application. Remove signs when areas with application are covered by other construction.

END OF SECTION

VEGETATION CONTROL

PART ONE - PRODUCTS

1.1 MATERIALS:

- A. Approved Product -
 - 1. Treflan EC by DowElanco Products Co, Indianapolis, IN

PART TWO- EXECUTION

2.1 PREPARATION:

- A. Protection -
 - 1. Take necessary precautions to protect adjoining property and areas designated for planting on building site.

2.2 APPLICATION:

- A. Apply in accordance with Manufacturer's directions at 4 gal/acre.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

DIVISION 32 - EXTERIOR IMPROVEMENTS**32 05 00 COMMON WORK RESULTS FOR EXTERIOR IMPROVEMENTS**

- 32 05 10 General Landscaping Requirements
- 32 05 33 General Planting Requirements
- 32 05 35 Lawn Maintenance

32 11 00 BASE COURSES

- 32 11 23 Granular Base

32 12 00 ASPHALT PAVING

- 32 12 16 Asphalt Paving

32 13 00 RIGID PAVING

- 32 13 13 Cast-in-Place Concrete Site Elements
- 32 13 14 Concrete Paving
- 32 13 73 Concrete Paving Joint Sealants

32 17 00 PAVING SPECIALTIES

- 32 17 13 Parking Bumpers
- 32 17 23 Pavement Markings

32 31 00 FENCES AND GATES

- 32 31 29 Wood Fence

32 91 00 PLANTING PREPARATION

- 32 91 13 Soil Preparation
- 32 91 20 Plant Maintenance

32 92 00 TURF AND GRASSES

- 32 92 10 Turf and Grasses
- 32 92 23 Lawn Sodding

32 93 00 PLANTS

- 32 93 10 Plants

THIS PAGE IS INTENTIONALLY BLANK

32 05 10**GENERAL LANDSCAPING REQUIREMENTS****PART 1 GENERAL**

1.1 SUBMITTALS

- A. Proposed materials list.
- B. Close-Out Submittals -
 - 1. Operation & Maintenance Data -
 - a. See Section 01 78 10 Execution and Closeout.
 - b. Written instructions on maintenance requirements for final 60 days of 90 day guarantee period not covered by maintenance provisions specified in Section 32 91 20 Plant Maintenance.
 - c. Copies of specified warranties.

PART 2 EXECUTION

2.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

2.2 PREPARATION:

- A. Protection -
 - 1. Take special care and preparation in work to avoid conditions which will create hazards. Post signs and barricade as necessary.
 - 2. Provide adequate means for protection from damage through excessive erosion, flooding, heavy rains, and the like. Repair or replace damaged areas as directed by Architect.

2.3 CLEANING & ADJUSTMENTS:

- A. During the Work -
 - 1. Remove excess waste materials and keep lawn areas clear.
 - 2. Take all reasonable precautions to prevent damage to structures, plants, and grasses.
 - 3. Thoroughly clean-up each area of work at completion of planting in that area.
- B. At Completion -
 - 1. Remove all debris, rubbish, trash, sub-soil and waste materials from site.
 - 2. Hose clean all walks, drives and paving soiled by planting operations

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

GENERAL PLANTING REQUIREMENTS**PART 1 - GENERAL****1.1 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver packaged materials in containers showing weight, analysis, and name of Manufacturer. Protect materials from deterioration during delivery and while stored at site.
- B. Deliver sod, plants, trees, and shrubs in healthy and vigorous condition and store in location on site where they will not be endangered and where they can be adequately watered and kept in healthy and vigorous condition.

1.2 SEQUENCING

- A. Do not plant trees and shrubs until major construction operations are completed. Do not commence landscaping work until work of Sections 02312 and 02813 has been completed and approved.
- B. Coordinate installation of planting materials during normal planting seasons for each type of plant material required.

1.3 EXAMINATION

- A. Inspect site and Contract Documents to become thoroughly acquainted with locations of irrigation, ground lighting, and utilities. Repair damage to these and other items adjacent to landscaping caused by work of this Section or replace at no additional cost to Owner.

1.4 PREPARATION

- A. Before proceeding with work, verify dimensions and quantities. Report variations between Drawings and site to Architect before proceeding with landscape work.
 - 1. Plant totals are for convenience of Contractor only and are not guaranteed. Verify amounts shown on Drawings.
 - 2. All planting indicated on Drawings is required unless indicated otherwise.
- B. Protection:
 - 1. Take care in performing landscaping work to avoid conditions that will create hazards. Post signs or barriers as required.
 - 2. Provide adequate means for protection from damage through excessive erosion, flooding, heavy rains, etc. Repair or replace damaged areas.
 - 3. Keep site well drained and landscape excavations dry.

1.5 INSTALLATION

- A. Hand excavate as required.
- B. Maintain grade stakes until parties concerned mutually agree upon removal.

- C. When conditions detrimental to plant growth are encountered, such as rubble fill or adverse drainage conditions, notify Architect before planting.

1.6 FIELD QUALITY CONTROL

- A. Inspection: Architect will inspect landscaping installation approximately 2 weeks before Substantial Completion. Replace landscaping that is dead or appears dead as directed by Architect within 10 days of notification and before Substantial Completion.

1.7 ADJUSTING

- A. Replace damaged plantings at no additional cost to Owner.

1.8 CLEANING

- A. Immediately clean up soil or debris spilled onto pavement and dispose of deleterious materials.

1.9 PROTECTION

- A. Protect planted areas against traffic or other use immediately after planting is completed by placing adequate warning signs and barricades.
- B. Provide adequate protection of planted areas against trespassing, erosion, and damage of any kind. Remove this protection after Architect has accepted planted areas.

END OF SECTION

32 05 35**LAWN MAINTENANCE****PART 1 GENERAL****1.1 PERFORMANCE****A. General:**

1. Before beginning maintenance period, plants shall be in at least as sound, healthy, vigorous, and in approved condition as when delivered to site, unless accepted by Architect in writing at final landscape inspection
2. Maintain landscaping from completion of landscape installation to 30 days after Substantial Completion Meeting.
3. Replace landscaping that is dead or appears unhealthy or non-vigorous as directed by Architect at end of maintenance period. Make replacements within 10 days of notification. Lawn that does not live and has to be replaced shall be guaranteed and maintained an additional 30 days from date of replacement.

B. Seeded Lawn:

1. Seeded lawn areas will not be accepted as complete and 30 day maintenance period will not begin until uniform stand of grass at least **3 inches** tall has been obtained.
2. After grass is established and **3 inches** tall, mow lawn areas at least weekly to a height of **2 inches**. During this period, perform work necessary to maintain a full, even stand of grass.
3. At end of 30 days of maintenance period, fertilize lawns with 16-16-8 at rate recommended by Fertilizer Manufacturer.
4. Apply weed killers as necessary in order to obtain weed free lawn. Apply weed killer in accordance with manufacturer's instructions during calm weather when air temperature is between **50 and 80 deg F**.

C. Sodded Lawn:

1. Maintain sodded lawn areas until lawn complies with specified requirements and throughout maintenance period.
2. Water sodded areas in sufficient quantities and at required frequency to maintain sub-soil immediately under sod continuously moist **3 to 4 inches** deep.
3. Cut grass first time when it reaches **3 inches** high. Continue to mow at least once each week throughout maintenance period. Remove clippings.
4. Apply weed killer as necessary to maintain weed-free lawn. Apply weed killer in accordance with manufacturer's instructions during calm weather when air temperature is between **50 and 80 deg F**.
5. At end of 30 day maintenance period, fertilize lawns with 16-16-8 at rate recommended by Fertilizer Manufacturer.

D. Trees, Shrubs And Plants:

1. Maintain by pruning, cultivating, and weeding as required for healthy growth.
2. Restore planting basins.
3. Tighten and repair stake and guy supports and reset trees and shrubs to proper grades or vertical positions as required.

4. Spray as required to keep trees and shrubs free of insects and disease.
5. Provide supplemental water by hand as needed in addition to water from sprinkling system.

END OF SECTION

32 11 23

GRANULAR BASE

PART 1 PRODUCTS

1.1 GRANULAR BASE

- A. Gravel
 - 1. 1/4 inch minimum to one inch maximum well-graded, clean gravel or crushed rock.
- B. Crushed Stone
 - 1. KYDOT #53 crushed stone. (KYDOT #304 aggregate base)

PART 2 EXECUTION

2.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

2.2 INSTALLATION

- A. Place 4 inches minimum of gravel over compacted sub-grade, level, and compact as specified

2.3 PROTECTION

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

SECTION 32 12 16**ASPHALT PAVING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Hot-mix asphalt paving.
 - 2. Cutting and patching.
 - 3. Pavement-marking paint.
- B. Related Sections:
 - 1. Division 31 Section "Earth Moving" for aggregate subbase and base courses.

1.3 DEFINITION

- A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
 - 1. Job-Mix Designs: For each job mix proposed for the Work.
- B. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
 - 1. Each paving fabric, 12 by 12 inches minimum.
 - 2. Each pattern and color of precut marking material.
- C. Qualification Data: For qualified manufacturer and Installer.
- D. Material Certificates: For each paving material, from manufacturer.
- E. Material Test Reports: For each paving material.

1.5 SYSTEM DESCRIPTION

- A. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements of standard specifications of state or local DOT.
 - 1. Standard Specification: Kentucky Department of Highways (KYDOH), "Standard Specification for Road and Bridge Construction", current edition.
 - 2. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which Project is located.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 - 1. Tack Coat: Minimum surface temperature of 60 deg F.
 - 2. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials and 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Coarse Aggregate: KYDOH Section 805, sound; angular crushed stone, crushed gravel, or properly cured, crushed blast-furnace slag.
- C. Fine Aggregate: KYDOH Section 804, sharp-edged natural sand or sand prepared from stone, gravel, properly cured blast-furnace slag, or combinations thereof.
- D. Mineral Filler: KYDOH Section 804, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

- A. Asphalt Binder: KYDOH Section 806.
- B. Asphalt Cement: KYDOH Section 806.
- C. Tack Coat: KYDOH Section 806, emulsified asphalt of suitable grade and consistency for application.
- D. Water: Potable.

2.3 AUXILIARY MATERIALS

- A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.
- B. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, with drying time of less than 45 minutes.
 - 1. Color: White and blue, as indicated.

2.4 MIXES

- A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:
 - 1. Provide Highway Design Mix CLIII 0.38A PG64-22.
 - 2. Provide the maximum allowable recycled asphalt content as permitted by the KYDOH Standard Specifications for the applicable mix.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph.
 - 2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.
- D. Verify that utilities and other items requiring a cut and installation beneath the asphalt surface have been completed and that asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of imprinted asphalt.

3.2 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd..
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- C. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.3 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
 - 1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.
- C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd..
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.4 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Place hot-mix asphalt surface course in single lift.
 - 2. Spread mix at minimum temperature of 250 deg F.
 - 3. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
 - 4. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
 - 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.5 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 1. Clean contact surfaces and apply tack coat to joints.
 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.6 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 1. Average Density: 96 percent of reference laboratory density according to ASTM D 6927 or AASHTO T 245, but not less than 94 percent nor greater than 100 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.7 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - 1. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course: 1/4 inch.
 - 2. Surface Course: 1/8 inch.
 - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.8 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to age for 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

3.9 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

END OF SECTION

32 13 13**CAST-IN-PLACE CONCRETE SITE ELEMENTS****PART 1 PRODUCTS**

1.1 MATERIALS

- A. Formwork;
 - 1. Meet requirements specified in Section 03 11 13 Cast-in-Place Concrete Formwork.
- B. Granular Base -
 - 1. Road base type gravel or crushed rock, graded as follows -

<u>Sieve</u>	<u>% by Weight Passing Sieve</u>
1"	100
3/4"	85 - 100
#4	45 - 60
#10	30 - 50
#200	5 - 10 (non-plastic)
- C. Expansion Joints -
 - 1. Manufactured commercial fiber type meeting requirements of ASTM D 1751 and 1/2 inch thick.
 - 2. Acceptable Products -
 - a. Flexcell by Celotex Building Products Div, Tampa, FL (813) 873-1700
 - b. Conflex by Masonite Building & Industrial Products Group, Chicago, IL (800) 257-7885
 - c. Sealtight by W R Meadows Inc, Elgin, IL (800) 342-5976
- C. Concrete
 - 1. Meet requirements specified in Section 03 30 53 Cast-in-Place Concrete for exterior concrete.

PART 2 EXECUTION

2.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

2.2 PREPARATION:

- A. Compacting -
 - 1. General -
 - a. Do not use puddling or jetting to consolidate fill areas.
 - b. If site material will not compact to specified density or it is suspected that it will not, remove and replace with material specified in PRODUCT section above.
 - 2. Sub-Grade -
 - a. Under Slabs -
 - 1) Moisture condition soil to uniform moisture content between optimum and 2 percent over optimum, and maintain until concrete or paving is placed.
 - 2) Mechanically tamp 8 inches deep to 98 percent of standard proctor maximum dry density.
 - b. Under Asphalt Concrete Driveways & Parking Areas -
 - 1) Moisture condition soil to uniform moisture content between optimum and 2 percent over optimum, and maintain until concrete or paving is placed.
 - 2) Mechanically tamp 8 inches deep to 95 percent minimum of standard proctor dry density.
 - 3. Base & Backfill -
 - a. Site Utility Trenches -

- 1) Consolidate sand slurry backfill using vibrating or other means.
- 2) Moisture condition remaining backfill to plus or minus 2 percent of optimum moisture and compact to 90 percent minimum relative compaction to within 12 inches of finish grade.
- b. Under Slabs, Driveways, & Parking Areas - Place in 8 inch maximum layers, dampen (do not soak), and mechanically tamp to 95 percent minimum of maximum density as established by ASTM D 698.
- c. Under Concrete Site Elements & Around Foundation Walls - Place in 8 inch maximum layers, dampen (do not soak), and mechanically tamp to 98 percent minimum of maximum density as established by ASTM D 698.
- d. Other Backfills - Place other fills in 12 inch layers and compact to 90 percent relative compaction

2.2 INSTALLATION

- A. Granular Base -
 1. Place 4 inches minimum of granular base, level, and compact as specified.
- B. Joints -
 1. Align joints of sidewalk and curb & gutter.
 2. Expansion & Contraction Joints -
 - a. Spacing -
 - 1) Sidewalks & Curbs - 50 feet on center.
 - b. Install so top of expansion joint material is 1/4 inch below finished surface of concrete.
 - c. No expansion joint required between curbs and walks parallel to curb.
 - d. Provide expansion joint at end of walks perpendicular to and terminating at curb.
 3. Scored Control Joints -
 - a. Spacing -
 - 1) Curbs - 10 feet on center.
 - 2) Sidewalks - 5 feet on center.
 - b. Control joints shall be approximately one quarter of concrete thickness.
- C. Finish -
 1. Curb, Gutter, Sidewalks, & Stairs -
 - a. Medium broom finish.
 - b. Round edges including edges formed by expansion joints.
 - c. Remove edger marks.
 2. Point up voids with cement mortar, 1:2 mix, and rub exposed surface with carborundum to smooth, even surface.
- D. Special Requirements -
 1. Form vertical surfaces full depth. Do not allow concrete to flow out from under forms in any degree.
 2. Sidewalks, Exterior Stairs, & Landings -
 - a. Slope to drain.
 - 1) Slope sidewalks with transverse slope of 1/4 inch per ft in direction of intended drainage.
 - 2) Slope sidewalks away from building 3 percent minimum.
 - b. Dusting with cement not permitted.

2.3 FIELD QUALITY CONTROL:

- A. Tests, Inspection -
 1. To allow Architect's verification of grades and elevations, notify Architect 3 days minimum prior to placing concrete for specified concrete site elements.

END OF SECTION

SECTION 32 13 14
CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes exterior cement concrete pavement for the following:
1. Curbs.
 2. Walkways.
- B. Related Sections include the following:
1. Division 31 Section "Earth Moving" for subgrade preparation, grading, and subbase course.
 2. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants of joints in concrete pavement and at isolation joints of concrete pavement with adjacent construction.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Qualification Data: For manufacturer and testing agency.
- D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
- E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
1. Cementitious materials.
 2. Steel reinforcement and reinforcement accessories.
 3. Admixtures.

4. Curing compounds.
5. Applied finish materials.
6. Bonding agent or epoxy adhesive.
7. Joint fillers.

F. Field quality-control test reports.

G. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.

C. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

D. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Obtain Architect's approval of mockups before starting construction.
4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.
5. Demolish and remove approved mockups from the site when directed by Architect.
6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:
 - a. Contractor's superintendent.
 - b. Concrete pavement subcontractor.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
1. Use flexible or curved forms for curves with a radius 100 feet or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- C. Plain Steel Wire: ASTM A 82, galvanized.
- D. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.
- E. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.
- F. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- G. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:
1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:
 - 1. Portland Cement: ASTM C 150, Type I, gray. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class F.
- B. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate, uniformly graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar pavement applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
 - 1. Available Products:
 - a. Axim Concrete Technologies; Cimfilm.
 - b. Burke by Edeco; BurkeFilm.
 - c. ChemMasters; Spray-Film.
 - d. Conspec Marketing & Manufacturing Co., Inc.; Aquafilm.
 - e. Dayton Superior Corporation; Sure Film.
 - f. Euclid Chemical Company (The); Eucobar.
 - g. Kaufman Products, Inc.; Vapor Aid.
 - h. Lambert Corporation; Lambco Skin.

- i. L&M Construction Chemicals, Inc.; E-Con.
- j. MBT Protection and Repair, ChemRex Inc.; Confilm.
- k. Meadows, W. R., Inc.; Sealtight Evapre.
- l. Metalcrete Industries; Waterhold.
- m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
- n. Sika Corporation, Inc.; SikaFilm.
- o. Symons Corporation; Finishing Aid.
- p. Vexcon Chemicals, Inc.; Certi-Vex EnvioAssist.

E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

1. Available Products:

- a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
- b. Burke by Edoko; Aqua Resin Cure.
- c. ChemMasters; Safe-Cure Clear.
- d. Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.
- e. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
- f. Euclid Chemical Company (The); Kurez DR VOX.
- g. Kaufman Products, Inc.; Thinfilm 420.
- h. Lambert Corporation; Aqua Kure-Clear.
- i. L&M Construction Chemicals, Inc.; L&M Cure R.
- j. Meadows, W. R., Inc.; 1100 Clear.
- k. Nox-Crete Products Group, Kinsman Corporation; Resin Cure E.
- l. Symons Corporation; Resi-Chem Clear.
- m. Tamms Industries Inc.; Horncure WB 30.
- n. Unitex; Hydro Cure 309.
- o. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.

2.6 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

1. If an asphaltic fiber joint filler is utilized, provide an acceptable polyethylene bond breaker tape where joint sealant is indicated.

B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to requirements, and as follows:

1. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

C. Chemical Surface Retarder: Water-soluble, liquid-set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.

1. Available Products:

- a. Burke by Edeco; True Etch Surface Retarder.
- b. ChemMasters; Exposee.
- c. Conspec Marketing & Manufacturing Co., Inc.; Delay S.
- d. Euclid Chemical Company (The); Surface Retarder S.

- e. Kaufman Products, Inc.; Expose.
- f. Metalcrete Industries; Surfard.
- g. Nox-Crete Products Group, Kinsman Corporation; Crete-Nox TA.
- h. Scofield, L. M. Company; Lithotex.
- i. Sika Corporation, Inc.; Rugasol-S.
- j. Vexcon Chemicals, Inc.; Certi-Vex Envioset.

2.7 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 4500 psi.
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
 - 1. Air Content: 6 percent plus or minus 1.5 percent for 1-1/2-inch nominal maximum aggregate size.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use high-range, high-range, water-reducing and retarding admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
- F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals.
 - 1. Fly Ash or Pozzolan: 15 percent.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.
 - 1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.
 - 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
 - 2. Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less than 15 tons.
 - 3. Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch require correction according to requirements in Division 31 Section "Earth Moving."
- C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
 2. Provide tie bars at sides of pavement strips where indicated.
 3. Butt Joints: Use epoxy bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
 5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
1. Locate expansion joints at intervals of 50 feet, unless otherwise indicated.
 2. Extend joint fillers full width and depth of joint.
 3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows to match jointing of existing adjacent concrete pavement:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
 3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

- E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site.
- F. Do not add water to fresh concrete after testing.
- G. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- H. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- I. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.
 - 1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.
- J. Screed pavement surfaces with a straightedge and strike off.
- K. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- L. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

M. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
 2. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.9 PAVEMENT TOLERANCES

- A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/4 inch.
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.10 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

SECTION 32 13 73**CONCRETE PAVING JOINT SEALANTS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Expansion and contraction joints within cement concrete pavement.
 - 2. Joints between cement concrete and asphalt pavement.
- B. Related Sections include the following:
 - 1. Division 07 Section "Joint Sealants" for sealing nontraffic and traffic joints in locations not specified in this Section.
 - 2. Division 32 Section "Asphalt Paving" for constructing joints between concrete and asphalt pavement.
 - 3. Division 32 Section "Concrete Paving" for constructing joints in concrete pavement.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Verification: For each type and color of joint sealant required. Install joint-sealant samples in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- D. Qualification Data: For Installer.
- E. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sealants.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Submit not fewer than 5 pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
 - 5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- D. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing of current sealant products within a 36-month period preceding the Notice to Proceed with the Work.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 for testing indicated, as documented according to ASTM E 548.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - 2. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 3. When joint substrates are wet or covered with frost.
 - 4. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 5. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Landscape Architect from manufacturer's full range.

2.3 COLD-APPLIED JOINT SEALANTS

- A. Multicomponent Jet-Fuel-Resistant Sealant for Concrete: Pourable, chemically curing elastomeric formulation complying with the following requirements for formulation and with ASTM C 920 for type, grade, class, and uses indicated:
1. Urethane Formulation: Type M; Grade P; Class 12-1/2; Uses T, M, and, as applicable to joint substrates indicated, O.
 - a. Products:
 - 1) Pecora Corporation; Urexpan NR-300.
 2. Coal-Tar-Modified Polymer Formulation: Type M; Grade P; Class 25; Uses T and, as applicable to joint substrates indicated, O.
 - a. Products:
 - 1) Meadows, W. R., Inc.; Sealtight Gardox.
 3. Bitumen-Modified Urethane Formulation: Type M; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.
 - a. Products:
 - 1) Tremco Sealant/Waterproofing Division; Vulkem 202.
- B. Single-Component Jet-Fuel-Resistant Urethane Sealant for Concrete: Single-component, pourable, coal-tar-modified, urethane formulation complying with ASTM C 920 for Type S; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.
1. Products:
 - a. Sonneborn, Div. of ChemRex, Inc.; Sonomeric 1.

- C. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.
 - 1. Products:
 - a. Crafcoc Inc.; RoadSaver Silicone.
 - b. Dow Corning Corporation; 888.

- D. Type SL Silicone Sealant for Concrete and Asphalt: Single-component, low-modulus, neutral-curing, self-leveling silicone sealant complying with ASTM D 5893 for Type SL.
 - 1. Products:
 - a. Crafcoc Inc.; RoadSaver Silicone SL.
 - b. Dow Corning Corporation; 890-SL.

- E. Multicomponent Low-Modulus Sealant for Concrete and Asphalt: Proprietary formulation consisting of reactive petropolymer and activator components producing a pourable, self-leveling sealant.
 - 1. Products:
 - a. Meadows, W. R., Inc.; Sof-Seal.

2.4 HOT-APPLIED JOINT SEALANTS

- A. Elastomeric Sealant for Concrete: Single-component formulation complying with ASTM D 3406.
 - 1. Products:
 - a. Crafcoc Inc.; Superseal 444/777.
 - b. Meadows, W. R., Inc.; Poly-Jet 3406..

2.5 JOINT-SEALANT BACKER MATERIALS

- A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.
- B. Round Backer Rods for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- C. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.
- D. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

2.6 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of backer materials.
 2. Do not stretch, twist, puncture, or tear backer materials.
 3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses provided for each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealants from surfaces adjacent to joint.
 - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.
- G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

3.4 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

END OF SECTION

32 17 13**PARKING BUMPERS****PART ONE - PRODUCTS**

1.1 MANUFACTURED UNITS:

- A. Parking Bumpers -
 - 1. Precast concrete 3000 psi with cast openings for pins and chamfered edges. Free from pits and rock pockets.
 - a. Cement - ASTM C150, Type II
 - b. Aggregates - ASTM C33
 - c. Reinforcing Steel - ASTM A615, Grade 60. Two bars #3 minimum, full length of bumper.
 - d. Caulking Compound - As specified in Section 07 920 for sidewalks.
 - 2. 6 ft commercial plastic parking bumper
 - a. gray
 - b. 3 fasteners per block
 - c. 100% recycled HDPE plastic
- B. Pins - Galvanized steel pipe 3/4 inch diameter, 24 inches long.

PART TWO - EXECUTION

2.1 INSTALLATION:

- A. Install level with paving and aligned with sidewalks.
- B. Recess anchoring pins 1/2 inch below top of bumper. Caulk hole to top of bumper.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

SECTION 32 17 23**PAVEMENT MARKINGS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes painted markings applied to asphalt pavement.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to marking pavement including, but not limited to, the following:
 - a. Pavement aging period before application of pavement markings.
 - b. Review requirements for protecting pavement markings, including restriction of traffic during installation period.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include technical data and tested physical and performance properties.
- B. Shop Drawings: For pavement markings.
 - 1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
 - 2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.
- C. Samples: For each exposed product and for each color and texture specified; on rigid backing, 8 inches square.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of EKV for pavement-marking work.
 - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for alkyd materials and 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Aexcel Inc.
 - 2. Benjamin Moore & Co.
 - 3. Color Wheel Paints & Coatings.
 - 4. Columbia Paint & Coatings.
 - 5. Conco Paints.
 - 6. Coronado Paint; Division of INSL-X Products Corporation.
 - 7. Diamond Vogel Paints.
 - 8. Dunn-Edwards Corporation.
 - 9. Ennis Traffic Safety Solutions, Inc.
 - 10. Frazee Paint.
 - 11. General Paint.
 - 12. Kwal Paint.
 - 13. M.A.B. Paints.
 - 14. McCormick Paints.
 - 15. Miller Paint.
 - 16. Parker Paint Mfg. Co. Inc.
 - 17. PPG Industries.
 - 18. Pratt & Lambert.
 - 19. Rodda Paint Co.
 - 20. Rohm and Haas Company; a subsidiary of The Dow Chemical Company.
 - 21. Scott Paint Company.
 - 22. Sherwin-Williams Company (The).

2.2 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes.
 - 1. Color: All colors as indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- C. Allow paving to age for a minimum of 3 days before starting pavement marking.
- D. Sweep and clean surface to eliminate loose material and dust.

- F. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
 - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond the stencil. Apply paint so that it cannot run beneath the stencil.
 - 2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal.

3.3 PROTECTING AND CLEANING

- A. Protect pavement markings from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

32 31 29**WOOD FENCE****PART 1 PRODUCTS**

1.1 MATERIALS

- A. Acceptable Manufacturer:
 - 1. Any properly certified or marked specified lumber.
- B. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25.
- C. Lumber
 - 1. All lumber to be kiln dried, pressure treated, #1 Southern Yellow Pine.
 - a. Posts and rails to be 4X4
 - b. Slats to be 1X6
- D. Hardware
 - 1. Hinges shall be heavy duty, 12" tee type, .140 ga. with ball bearings.
 - a. Construct of steel with zinc plated finish for corrosion resistance.
 - 2. Latch shall be heavy duty adjustable, left or right hand interchangeable, Zinc coated steel.
 - a. Designed for flush stockade-type gates with spacing between post and gate.
 - b. Hole punched in release lever for rigging cord release from opposite side.
 - c. Release lever is 1/2" steel by 7-3/4" long
 - 1) May be locked with padlock
 - 3. Cane bolt shall be 1/2" Ø steel, galvanized, with hanging brackets and strike plate.
 - 4. Gate wheel shall be heavy duty, galvanized finish.
 - a. Wheel 4"Ø x 1 1/4" of hard rubber
 - b. Non-swiveling
 - c. Single piece mounting plate
 - d. Spring loaded for max. 2 1/2" travel.
 - 5. All products to be installed with manufacturers recommended fasteners.

PART 2 EXECUTION

2.1 EXAMINATION

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

2.2 INSTALLATION

- A. Install according to manufacturers and/or responsible intitutes instructions.
- B. Construct according to elevations and details shown on the Construction Documents

2.3 PROTECTION

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

32 91 13**SOIL PREPARATION****PART 1 PRODUCTS****1.1 MANUFACTURERS**

- A. Acceptable Products:
 - 1. Soil Conditioners & Application Rates -
 - a. Provide one of following at 4 cu yds per 1000 sq ft -
 - 1) Sphagnum Peat Moss
 - 2) 'Nutri Mulch'
 - 3) 'Nutri-Mend'
 - 4) 'Soil Pep'
 - 5) EPA Class 'A' co-compost with SAR less than 3.0, EC less than 4.0, and CN ratio of 15 to 25:1 passing through 1/2 inch mesh screen.
- B. Substitutions: Only during bidding
- C. Requests for substitutions will be considered in accordance with provisions of Section 00 43 25 Substitution Request Form.

PART 2 EXECUTION**2.1 EXAMINATION**

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

2.2 GENERAL SOIL PREPARATION:

- A. Site Tolerances -
 - 1. Finish grade of planting areas prior to planting and after addition of soil additives shall be specified distances below top of adjacent pavement of any kind -
 - a. Sodded Areas - 2 inches below
 - b. Seeded Areas - One inch below
- B. Add specified chemical soil amendments at specified rates. Roto-till or otherwise mix amendments evenly into top 4 inches of topsoil.
 - 1. Incorporate and leach chemical soil amendments which require leaching, such as gypsum, within such time limits that soil is sufficiently dry to allow proper application of fertilizer and soil conditioners.
- C. Apply fertilizers and soil conditioners over lawn and planting areas. Rototill fertilizer and soil conditioner into top 4 inches of top soil until homogeneous mixture results.

2.3 FIELD QUALITY CONTROL:

- A. Inspections
 - 1. Notify Architect two working days minimum prior to roto-tilling in any soil additive.

2.4 CLEANING:

- A. Upon completion of planting operation, clear site of debris, superfluous materials and equipment, all of which shall be entirely removed from premises.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

32 91 20**PLANT MAINTENANCE****PART ONE - PRODUCTS**

1.1 MATERIALS:

- A. Fertilizer -
 - 1. 16-16-8 by manufacturers specified elsewhere this Section.

PART TWO - EXECUTION

2.1 PERFORMANCE

- A. General
 - 1. Maintain landscaping from completion of landscape installation to 30 days after Substantial Completion Meeting. If Substantial Completion Meeting occurs between October 1st and April 1st, then maintenance period shall extend to May 1st.
 - 2. Provide at least one gardener on site for one hour per day on at least every other day during maintenance period.
- B. Seeded Lawn
 - 1. Seeded lawn areas will not be accepted as complete and 30 day maintenance period will not begin until uniform stand of grass at least 3 inches tall has been obtained.
 - 2. After grass is established and 3 inches tall, mow lawn areas at least weekly to a height of 2 inches. During this period, perform work necessary to maintain a full, even stand of grass.
 - 3. At end of 30 days of maintenance period, fertilize lawns with 16-16-8 at rate recommended by Fertilizer Manufacturer.
 - 4. Apply weed killers as necessary in order to obtain weed free lawn.

2.2 FIELD QUALITY CONTROL

- A. Inspection
 - 1. Architect will inspect landscaping installation approximately 2 weeks prior to Substantial Completion. Replace landscaping that is dead or appears dead as directed by Architect within 10 days of notification and prior to Substantial Completion.
 - 2. Lawn which does not live and has to be replaced shall be guaranteed and maintained an additional 30 days from date of replacement.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

SECTION 32 92 10
TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sodding.
2. Lawn renovation.
3. Erosion-control material(s).

B. Related Sections:

1. Division 31 Section "Site Clearing" for topsoil stripping and stockpiling.
2. Division 31 Section "Earth Moving" for excavation, filling and backfilling, and rough grading.

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- C. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.
- D. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
1. Certification of each seed mixture for turfgrass sod, identifying source, including name and telephone number of supplier.

- C. Qualification Data: For qualified landscape Installer.
- D. Product Certificates: For soil amendments and fertilizers, from manufacturer.
- E. Material Test Reports: For existing surface soil.
- F. Samples for Verification: For each of the following:
 - 1. Erosion Control Blanket: 12 by 12 inches.
 - 2. Turf Reinforcement Mat: 12 by 12 inches.
- G. Planting Schedule: Indicating anticipated planting dates for each type of planting.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn and meadow establishment.
 - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
 - 2. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
 - 1. Report suitability of topsoil for lawn growth. State-recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.
- D. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.
- B. Sod: Harvest, deliver, store, and handle sod according to requirements in TPI's "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in its "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

1.7 PROJECT CONDITIONS

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Planting: March 1st – April 30th.
 2. Fall Planting: September 1st – October 15th.
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.8 MAINTENANCE SERVICE

- A. Initial Lawn Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:
1. Seeded Lawns: 60 days from date of Project Substantial Completion.
 - a. When initial maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.
 2. Sodded Lawns: 60 days from date of Project Substantial Completion.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

- A. Turfgrass Sod: Certified, complying with TPI's "Specifications for Turfgrass Sod Materials" in its "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, netless, and capable of vigorous growth and development when planted.
- B. Turfgrass Species: Sod of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:
1. Full Sun: Blend of three "fine blade turf type" Tall Fescue cultivars acceptable to the Architect.

2.2 TOPSOIL

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 2 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.
1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
 - a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from bogs or marshes.

2.3 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural limestone containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 1. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.

2.4 PLANTING ACCESSORIES

- A. Selective Herbicides: EPA registered and approved, of type recommended by manufacturer for application.

2.5 FERTILIZER

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.6 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

2.7 EROSION-CONTROL MATERIALS

- A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.
- B. Turf Reinforcement Mat: North American Green P550 or a closely similar product acceptable to the Architect.

2.8 PLANTING SOIL MIX

- A. Planting Soil Mix: Topsoil mixed with the following soil amendments and fertilizers in the following quantities:
 1. Weight of Lime per 1000 Sq. Ft.: As determined by Soil Test.
 2. Weight of Sulfur per 1000 Sq. Ft.: As determined by Soil Test..
 3. Weight of Commercial Fertilizer per 1000 Sq. Ft.: As determined by Soil Test.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect grade stakes set by others until directed to remove them.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 LAWN PREPARATION

- A. Limit lawn subgrade preparation to areas to be planted.
- B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
 - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
 - b. Mix lime with dry soil before mixing fertilizer.
 - 2. Spread planting soil mix to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
 - a. Spread approximately 1/2 the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil mix.
 - b. Reduce elevation of planting soil to allow for soil thickness of sod.
- C. Unchanged Subgrades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
 - 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 - 2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture.
 - a. Apply fertilizer directly to surface soil before loosening.

3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
 - E. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
 - F. Before planting, restore areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

- A. Prepare area as specified in "Lawn Preparation" Article.
- B. For erosion-control blanket and turf reinforcement mat, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.
- C. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SODDING

- A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
 1. Lay sod across angle of slopes exceeding 1:3.
 2. Anchor sod on slopes exceeding 1:6 with wood pegs spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.
- C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.6 LAWN RENOVATION

- A. Renovate existing lawn.
- B. Renovate existing lawn damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish lawn where settlement or washouts occur or where minor regrading is required.
 2. Provide new topsoil as required.
- C. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury in soil.
- D. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.
- E. Mow, dethatch, core aerate, and rake existing lawn.
- F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
- G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.
- H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.
- I. Apply soil amendments and initial fertilizers required for establishing new lawns and mix thoroughly into top 4 inches of existing soil. Provide new planting soil to fill low spots and meet finish grades.
- J. Apply seed and protect with straw mulch as required for new lawns.
- K. Water newly planted areas and keep moist until new lawn is established.

3.7 LAWN MAINTENANCE

- A. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn. Provide materials and installation the same as those used in the original installation.
1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
- B. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches.
1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 2. Water lawn with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
- C. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
1. Mow grass to a height of 2 to 3 inches.

- D. Lawn Postfertilization: Apply fertilizer after initial mowing and when grass is dry.
 - 1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to lawn area.

3.8 SATISFACTORY LAWNS

- A. Lawn installations shall meet the following criteria as determined by Architect:
 - 1. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
 - 2. Satisfactory Sodded Lawn: At end of maintenance period, a healthy, well-rooted, even-colored, viable lawn has been established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Use specified materials to reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

3.9 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris, created by lawn work, from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after lawn is established.
- C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION

32 92 23**LAWN SODDING****PART 1 GENERAL****1.1 DELIVERY, STORAGE, AND HANDLING**

- A. Cut and lift sod by method acceptable to Architect. Cut sod in pieces approximately 3/4 to one inch thick. Roll or fold sod so it may be lifted and handled without breaking or tearing and without loss of soil.
- B. Schedule deliveries to coincide with topsoil operations and laying. Keep storage at job site to minimum without causing delays.
 - 1. Deliver, unload, and store sod on pallets within 24 hours of being lifted.
 - 2. Do not deliver small, irregular or broken pieces of sod.

1.2 PROJECT CONDITIONS

- A. During wet weather, allow sod to dry sufficiently to prevent tearing during lifting and handling. During dry weather, protect sod from drying before installation. Water as necessary to insure vitality and to prevent excess loss of soil in handling. Sod which dries out before installation will be rejected.

PART 2 PRODUCTS**2.1 CERTIFIED SOD**

- A. Superior sod grown from certified, high quality, seed of known origin or from plantings of certified grass seedlings or stolons.
 - 1. Assure satisfactory genetic identity and purity.
 - 2. Assure over-all high quality and freedom from noxious weeds or an excessive amount of other crop and weedy plants at time of harvest.
- B. Sod shall be composed of two varieties minimum of Kentucky Bluegrass.

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Prior to installation, examine each piece to verify that all are proper in all respects.

3.2 PREPARATION

- A. Protection
 - 1. Take care and preparation in work to avoid conditions which will create hazards. Post signs or barriers as required.
 - 2. Provide adequate means for protection from damage through excessive erosion, flooding, heavy rains, etc. Repair or replace damaged areas.
 - 3. Keep site well drained and landscape excavations dry.
- B. Surface Preparation
 - 1. Seven days maximum prior to sodding -
 - a. Loosen area 4 inches deep, dampen thoroughly, and cultivate to properly break up clods and lumps.
 - b. Rake area to remove clods, rocks, weeds, roots, and debris.
 - c. Grade and shape area to receive sod to bring surface to true uniform planes free from irregularities and to provide drainage and proper slope to catch basins.

- d. After lawn areas have been prepared, take no heavy objects over them except lawn rollers.
- e. After preparation of lawn areas and with top soil in semi-dry condition, roll lawn planting areas in two directions at approximately right angles with water ballast roller weighing 100 to 300 lbs according to soil type.
- f. Rake or scarify and cut or fill irregularities that develop as required until area is true and uniform, free from lumps, depressions, and irregularities.

3.2 INSTALLATION

A. Site Tolerances

Final grade of soil after sodding of lawn areas is complete shall be one inch below top of adjacent pavement of any kind.

B. Laying of Sod

- 1. Lay sod during growing season. Sodding during dry summer period, at freezing temperatures, or over frozen soil is not acceptable.
- 2. Lay sod within 36 hours of being lifted.
- 3. Lay sod in rows with joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with a sharp knife.
- 4. Lay sod flush with adjoining existing sodded surfaces.

C. After Sodding Is Complete

- 1. Roll horizontal surface areas in two directions perpendicular to each other.
- 2. Repair and re-roll areas with depressions, lumps, or other irregularities. Heavy rolling to correct irregularities in grade will not be permitted.
- 3. Water sodded areas immediately after sod laying to obtain moisture penetration through sod into top 4 inches of topsoil.

3.3 FIELD QUALITY CONTROL

A. Inspection

- 1. Sodded areas will be accepted at final inspection if -
 - a. Sodded areas are properly established.
 - b. Sod is free of bare and dead spots and without weeds.
 - c. No surface soil is visible when grass has been cut to height of 2 inches.
 - d. Sodded areas have been mowed a minimum of twice.
- 2. Areas sodded after November 1st will be accepted following spring (May 1st) approximately one month after start of growing season if specified conditions have been met.

3.4 ADJUSTING

- A. Replace damaged areas at no additional cost to Owner.

3.5 CLEANING

- A. Immediately clean up any soil or debris spilled onto pavement and dispose of all deleterious materials.

3.6 PROTECTION

- A. Protect sodded areas against traffic or other use immediately after sodding is completed by placing adequate warning signs and barricades.

- B. Provide adequate protection of sodded areas against trespassing, erosion, and damage of any kind. Remove this protection after sodded areas have been accepted by Architect.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

SECTION 32 93 10**PLANTS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Trees
2. Shrubs
3. Perennials
4. Groundcovers
5. Vines

B. Related Sections:

1. Division 31 Section "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
2. Division 31 Section "Earth Moving" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
3. Division 32 Section "Turf and Grasses" for lawn.
4. Division 33 Section "Subdrainage" for below-grade drainage of landscaped areas, paved areas, and wall perimeters.

1.3 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Burlapped Stock: Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than sizes indicated; wrapped, tied, rigidly supported, and drum laced as recommended by ANSI Z60.1.
- C. Clump: Where three or more young trees were planted in a group and have grown together as a single tree having three or more main stems or trunks.
- D. Container-Grown Stock: Healthy, vigorous, well-rooted exterior plants grown in a container with well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of exterior plant required.
- E. Finish Grade: Elevation of finished surface of planting soil.
- F. Multi-Stem: Where three or more main stems arise from the ground from a single root crown or at a point right above the root crown.

- G. Planting Soil: Native or imported topsoil, mixed with soil amendments.
- H. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.
- I. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each of the following:
 - 1. Edging materials and accessories, of manufacturer's standard size, to verify color selected.
- C. Qualification Data: For qualified landscape Installer.
- D. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
 - 1. Manufacturer's certified analysis for standard products.
 - 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- E. Material Test Reports: For existing surface soil and imported topsoil.
- F. Planting Schedule: Indicating anticipated planting dates for exterior plants.
- G. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants.
 - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
 - 1. Report suitability of topsoil for plant growth. State-recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.
- D. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."

1. Selection of exterior plants purchased under allowances will be made by Architect, who will tag plants at their place of growth before they are prepared for transplanting.
- E. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches above the ground for trees up to 4-inch caliper size, and 12 inches above the ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.
- F. Observation: Architect may observe trees and shrubs either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality. Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
1. Notify Architect of sources of planting materials seven days in advance of delivery to site.
- G. Preinstallation Conference: Conduct conference at Project site.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Deliver exterior plants freshly dug.
1. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.
- B. Do not prune trees and shrubs before delivery except as approved by Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery and handling.
- C. Handle planting stock by root ball.
- D. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants and trees in shade, protect from weather and mechanical damage, and keep roots moist.
1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
 2. Do not remove container-grown stock from containers before time of planting.
 3. Water root systems of exterior plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.
- 1.7 PROJECT CONDITIONS
- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
1. Spring Planting: March 1st to May 15th.
 2. Fall Planting: October 15th to December 1st.

- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed according to manufacturer's written instructions and warranty requirements.
- C. Coordination with Lawns: Plant trees and shrubs after finish grades are established and before planting lawns unless otherwise acceptable to Architect.
 - 1. When planting trees and shrubs after lawns, protect lawn areas and promptly repair damage caused by planting operations.

1.8 WARRANTY

- A. Special Warranty: Installer's standard form in which Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, abuse by Owner, or incidents that are beyond Contractor's control.
 - b. Structural failures including plantings falling or blowing over.
 - c. Faulty operation of tree stabilization and edgings.
 - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Periods from Date of Substantial Completion:
 - a. Trees and Shrubs: Three years.
 - b. Ground Cover and Perennial Plants: One year.
 - 3. Include the following remedial actions as a minimum:
 - a. Remove dead exterior plants immediately. Replace immediately unless required to plant in the succeeding planting season.
 - b. Replace exterior plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - c. A limit of one replacement of each exterior plant will be required except for losses or replacements due to failure to comply with requirements.
 - d. Provide extended warranty for replaced plant materials, warranty period equal to original warranty period.

1.9 MAINTENANCE SERVICE

- A. Initial Maintenance Service for Trees, Shrubs, Ground Cover and Plants: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until plantings are acceptably healthy and well established, but for not less than 60 days past the date of Project Substantial Completion.

PART 2 - PRODUCTS

2.1 TREE AND SHRUB MATERIAL

- A. General: Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
- B. Provide trees and shrubs of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.
- C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- D. Label each tree and shrub with securely attached, waterproof tag bearing legible designation of botanical and common name.
- E. If formal arrangements or consecutive order of trees or shrubs is shown, select stock for uniform height and spread, and number label to assure symmetry in planting.

2.2 SHADE AND FLOWERING TREES

- A. Type 1 or Type 2 (Slower Growth) Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required.
 - 1. Provide balled and burlapped trees.
 - 2. Branching Height: One-half of tree height.
- B. Small Upright Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:
 - 1. Stem Form: Single trunk or multi-trunk clump as indicated.
 - 2. Provide balled and burlapped trees.
- C. Small Spreading Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:
 - 1. Stem Form: Single trunk or multi-stem clump as indicated.
 - 2. Provide balled and burlapped trees.

2.3 DECIDUOUS SHRUBS

- A. Form and Size: Shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.
 - 1. Shrub sizes indicated are sizes after pruning.
 - 2. Provide balled and burlapped or container-grown shrubs as indicated.

3. Provide balled and burlapped trees.

2.4 GROUND COVER PLANTS

- A. Ground Cover: Provide ground cover of species indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1 and the following requirements:

2.5 PLANTS

- A. Perennials: Provide healthy, field-grown plants from a commercial nursery, of species and variety shown or listed, complying with requirements in ANSI Z60.1.

2.6 TOPSOIL

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth. Stones shall not exceed 10% by volume.

1. Topsoil Source: Import topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from bogs or marshes.

2.7 INORGANIC SOIL AMENDMENTS

- A. Aluminum Sulfate: Commercial grade, unadulterated.

2.8 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1/2-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

- B. Peat: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with a pH range of 3.4 to 4.8.

- C. Manure: Well-rotted, composted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.9 FERTILIZER

- A. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.10 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
 1. Type: Shredded hardwood mulch.

2.11 TREE STABILIZATION MATERIALS

- A. Stakes and Guys:
 1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
 2. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or compression springs.

2.12 MISCELLANEOUS PRODUCTS

- A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
- B. Trunk-Wrap Tape: Two layers of crinkled paper cemented together with bituminous material, 4-inch-wide minimum, with stretch factor of 33 percent.

2.13 PLANTING SOIL MIX

- A. Planting Soil Mix: Mix topsoil with the following soil amendments and fertilizers in the following quantities:
 1. Ratio of Loose Compost to Topsoil by Volume: 1:4.
 2. Ratio of Loose Peat to Topsoil by Volume: 1:4.
 3. Weight of Aluminum Sulfate per 1000 Sq. Ft.: As recommended by soil test.
 4. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: As recommended by soil test.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive exterior plants for compliance with requirements and conditions affecting installation and performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before planting. Make minor adjustments as required.
- D. Lay out exterior plants at locations directed by Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.
- E. Trunk Wrapping: Inspect tree trunks for injury, improper pruning, and insect infestation; take corrective measures required before wrapping. Wrap trees of 2-inch caliper and larger with trunk-wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling.
- F. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
 - 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- G. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 PLANTING BED ESTABLISHMENT

- A. Loosen subgrade of planting beds to a minimum depth of 4 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
 - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
 - b. Mix lime with dry soil before mixing fertilizer.
 - 2. Spread planting soil mix to a depth of 12 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
 - a. Spread approximately one-half the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil mix.
- B. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
- C. Before planting, restore planting beds if eroded or otherwise disturbed after finish grading.

3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Pits and Trenches: Excavate circular pits with sides sloped inward. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation.
 - 1. Excavate approximately three times as wide as ball diameter for balled and burlapped stock.
- B. Subsoil removed from excavations may not be used as backfill.
- C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
 - 1. Hardpan Layer: Drill 6-inch- diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.
- D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.
- E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE AND SHRUB PLANTING

- A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1.
- B. Set balled and burlapped stock plumb and in center of pit or trench with top of root ball flush with adjacent finish grades.
 - 1. Remove burlap and wire baskets from tops of root balls and partially from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 - 2. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
- C. Set container-grown stock plumb and in center of pit or trench with top of root ball flush with adjacent finish grades.
 - 1. Carefully remove root ball from container without damaging root ball or plant.
 - 2. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
- D. Organic Mulching: Apply 2-inch minimum thickness of organic mulch extending 12 inches beyond edge of planting pit or trench. Do not place mulch within 3 inches of trunks or stems.
- E. Trunk Wrapping: Inspect tree trunks for injury, improper pruning, and insect infestation; take corrective measures required before wrapping. Wrap trees of 2-inch caliper and larger with trunk-wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling.

3.6 TREE AND SHRUB PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.
- B. Prune, thin, and shape trees and shrubs according to standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character.

3.7 TREE STABILIZATION

- A. Trunk Stabilization: Unless otherwise indicated, provide trunk stabilization as follows:
 1. Upright Staking and Tying: Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip-out. Use a minimum of 2 stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend dimension shown above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
 2. Use 2 stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper; 3 stakes for trees less than 14 feet high and up to 4 inches in caliper. Space stakes equally around trees.
 3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

3.8 PLANTING BED MULCHING

- A. Mulch backfilled surfaces of planting beds and other areas indicated. Provide mulch ring around trees in lawn areas.
 1. Organic Mulch: Apply 2-inch minimum thickness of organic mulch, and finish level with adjacent finish grades. Do not place mulch against plant stems.

3.9 EDGING INSTALLATION

- A. Aluminum Edging: Install aluminum edging where indicated according to manufacturer's written instructions. Anchor with aluminum stakes spaced approximately 36 inches apart, driven below top elevation of edging.

3.10 PLANT MAINTENANCE

- A. Tree and Shrub Maintenance: Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, adjusting and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease. Restore or replace damaged tree wrappings.
- B. Ground Cover and Plant Maintenance: Maintain and establish plantings by watering, weeding, fertilizing, mulching, and other operations as required to establish healthy, viable plantings.

3.11 CLEANUP AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.
- B. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

3.12 DISPOSAL

- A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK
THIS PAGE IS INTENTIONALLY BLANK

THIS PAGE IS INTENTIONALLY BLANK

DIVISION 33 - UTILITIES

33 11 00 WATER UTILITY DISTRIBUTION PIPING

33 11 19 Water Distribution

33 31 00 SANITARY SEWAGE PIPING

33 31 13 Sanitary Sewage Systems

33 41 00 STORM UTILITY DRAINAGE PIPING

33 41 10 Storm Utility Drainage Piping

33 46 00 SUBDRAINAGE

33 46 16 Subdrainage

THIS PAGE IS INTENTIONALLY BLANK

DOMESTIC WATER SUPPLY**PART 1 - PRODUCTS****1.1 MATERIALS**

- A. Pipe: Schedule 40 PVC pipe for underground water lines
- B. Water Meter: As required by local agency furnishing water.

PART 2 - EXECUTION**2.1 INSTALLATION**

- A. Excavate and backfill as specified in Section 31 22 20 with following additional requirements:
 - 1. Runs shall be as close as possible to those shown on Drawings.
 - 2. Excavate to required depth.
 - 3. Bottom of trenches shall be hard. Tamp as required.
 - 4. Remove debris from trench before laying pipe.
 - 5. Do not cut trenches near footings without consulting Architect.
 - 6. Excavate trenches so outside pipe will be **12 inches 300 mm** minimum below frost line or **24 inches 600 mm** minimum below finish grade, whichever is deeper.
 - 7. Backfill only after pipe lines have been tested and inspected, and approved by Architect.
- B. Install piping system so it may contract and expand freely. Completely eliminate cross connections, backflow, and water hammer.
- C. Install shut-off valve at meter.

2.2 FIELD QUALITY CONTROL

- A. Site Tests
 - 1. Sterilization And Negative Bacteriological Test:
 - a. Sterilize potable water system with solution containing 200 parts per million minimum of available chlorine and maintaining a pH of 7.5 minimum. Introduce chlorinating materials into system in manner approved by Architect. Allow sterilization solution to remain for 24 hours and open and close valves and faucets several times during that time.
 - b. After sterilization, flush solution from system with clean water until residual chlorine content is less than 0.2 parts per million.
 - c. Water system will not be accepted until negative bacteriological test is made on water taken from system. Repeat dosing as necessary until such negative test is accomplished.
 - 2. Pressure Test: Before covering pipes, test system in presence of Architect or governing agency at 100 psi hydrostatic pressure for two hours and show no leaks.

2.3 CLEANING

- A. Remove excess earth from site or place as directed by Architect.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

33 31 13**SANITARY SEWAGE SYSTEMS****PART 1 - GENERAL****1.1 QUALITY ASSURANCE**

- A. Regulatory Requirements: Install cleanouts in accordance with local governing authority and State codes.

PART 2 - PRODUCTS**2.1 COMPONENTS**

- A. PVC:
 - 1. SDR-35 solid wall plastic pipe and fittings meeting requirements of ASTM D 3034 or ASTM F789.
 - 2. Gasket joint gravity sewer pipe and fittings meeting requirements of ASTM D 3034 or ASTM F 789. Joints shall be integral wall and elastomeric gasket.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Before installation, inspect pipe for defects and cracks. Do not use defective, damaged, or unsound pipe.

3.2 PREPARATION

- A. Excavate and backfill as specified in Section 02315 with following additional requirements:
 - 1. Runs shall be as close as possible to those shown on Drawings.
 - 2. Excavate to required depth and grade to obtain fall required.
 - 3. Bottom of trenches shall be hard. Tamp as required.
 - 4. Remove debris from trench before laying pipe.
 - 5. Do not cut trenches near footings without consulting Architect.
 - 6. Excavate trenches so outside pipe will be **12 inches 300 mm** minimum below frost line or **18 inches 450 mm** minimum below finish grade, whichever is deeper.

3.3 INSTALLATION

- A. General:
 - 1. When work is not in progress, close open ends of pipe and fittings so no trench water, soil, or other substances will enter pipes or fittings.
 - 2. Keep trenches free from water until pipe jointing material has set. Do not lay pipe when condition of trench or weather is unsuitable for such work.
 - 3. Trench width at top of pipe:
 - a. Minimum: **18 inches 450 mm** or diameter of pipe plus **one foot 300 mm**, whichever is greater.

- b. Maximum: Outside diameter of pipe plus **two feet 600 mm**.
- B. Placing And Laying of Underground Pipe:
1. Deflections from straight line or grade, as required by vertical curves, horizontal curves, or offsets, shall not exceed **6/D inches per linear foot 12 500/D mm per m** of pipe where D represents nominal diameter of pipe expressed in **inches mm**
 2. Deflections to be determined between center lines extended of two connecting pipes.
 3. If alignment requires deflection in excess of these limitations, provide special bends or sufficient number of shorter lengths of pipe to provide angular deflections within limits approved by Architect.
 4. Laying:
 - a. Pipe laying shall proceed up-grade with spigot ends of bell-and-spigot pipe pointing in direction of flow.
 - b. Lay each pipe true to line and grade and in such manner as to form close concentric joint with adjoining pipe and to prevent sudden offsets of flow line.
 - c. As work progresses, clear interior of pipe of dirt and superfluous materials. Where cleaning after laying is difficult because of small pipe, keep suitable swab or drag in pipe and pull forward past each joint immediately after jointing has been completed.
 5. Make joints between pipe and other types of pipe with standard manufactured adapters and fittings.
 6. Valve, plug, or cap, as directed by Architect, where pipe ends are left for future connections.
- C. Thermoplastic Pipe And Fittings:
1. Install in accordance with Manufacturer's recommendations and ASTM D 2321.
 2. Stabilize unstable trench bottoms.
 3. Bed pipe true to line and grade with continuous support from firm base.
 - a. Bedding depth: **4 to 6 inches 100 to 150 mm**.
 - b. Material and compaction to meet ASTM standard noted above.
 4. Excavate bell holes into bedding material so pipe is uniformly supported along its entire length. Blocking to grade pipe is forbidden.
 5. Piping and joints shall be clean and installed according to Manufacturer's recommendations. Break down contaminated joints, clean seats and gaskets and reinstall.
 6. Do not use back hoe or power equipment to assemble pipe.
 7. Initial backfill shall be **12 inches 300 mm** above top of pipe with material specified in referenced ASTM standard.
 8. Minimum cover over top of pipe:
 - a. **36 inches 900 mm** before allowing vehicular traffic over pipe.
 - b. **48 inches 1 200 mm** before use of compaction equipment other than hand or impact tampers.

3.4 FIELD QUALITY CONTROL

- A. Failure to install joints properly shall be cause for rejection and replacement of piping system.

END OF SECTION

SECTION 33 41 10**STORM UTILITY DRAINAGE PIPING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes gravity-flow, nonpressure storm drainage outside the building, with the following components:
 - 1. Special fittings for expansion and deflection.
 - 2. Stormwater inlets.
 - 3. Pipe and fittings.
 - 4. Nonpressure transition couplings.
 - 5. Cleanouts.
 - 6. Drains.
 - 7. Stormwater inlets
 - 8. Trench Drains
 - 9. Junction boxes
 - 10. Pipe outlets.
 - 11. Downspout boot with integral cleanout

1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. EPDM: Ethylene-propylene-diene-monomer rubber.
- C. HDPE: High density polyethylene pipe
- D. FRP: Fiberglass-reinforced plastic.
- E. PE: Polyethylene plastic.
- F. PVC: Polyvinyl chloride plastic.
- G. TPE: Thermoplastic elastomer.

1.4 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water. Pipe joints shall be at least silttight, unless otherwise indicated.

1.5 SUBMITTALS

- A. Product Data: For the following:
 - 1. Special pipe fittings.
 - 2. Drains.
- B. Shop Drawings: For the following:
 - 1. Yard Inlets, Catch basins. Include plans, elevations, sections, details, and frames, covers, and grates.
- C. Field quality-control test reports.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic drainage structures, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle stormwater inlets according to manufacturer's written rigging instructions.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Architect no fewer than two days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of service without Architect's written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.

2.3 PE PIPE AND FITTINGS

- A. Corrugated PE Drainage Pipe and Fittings NPS 10 and Smaller: AASHTO M 252M, Type S, with smooth waterway for coupling joints.
 - 1. Available Manufacturers:
 - a. ADS (Advanced Drainage Systems)
 - 2. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.
 - 3. Soiltight Couplings: AASHTO M 252M, corrugated, matching tube and fittings.
 - 4. Corrugated PE Pipe and Fittings NPS 12 to NPS 48: AASHTO M 294M, Type S, with smooth waterway for coupling joints.
 - 5. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.
 - 6. Soiltight Couplings: AASHTO M 294M, corrugated, matching pipe and fittings.
- B. Corrugated PE Pipe and Fittings NPS 56 and NPS 60: AASHTO MP7, Type S, with smooth waterway for coupling joints.
 - 1. Available Manufacturers:
 - a. ADS (Advanced Drainage Systems)
 - 2. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.
 - 3. Soiltight Couplings: AASHTO MP7, corrugated, matching pipe and fittings.

2.4 PVC PIPE AND FITTINGS

- A. PVC Pressure Pipe: AWWA C900, Class 150, for gasketed joints and using ASTM F 477, elastomeric seals.
 - 1. Fittings NPS 4 to NPS 8: PVC pressure fittings complying with AWWA C907, for gasketed joints and using ASTM F 477, elastomeric seals.
 - 2. Fittings NPS 10 and Larger: Ductile-iron, compact fittings complying with AWWA C153, for push-on joints and using AWWA C111, rubber gaskets.
- B. PVC Water-Service Pipe and Fittings: ASTM D 1785, Schedule 40 pipe, with plain ends for solvent-cemented joints with ASTM D 2466, Schedule 40, socket-type fittings.
- C. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.
- D. PVC Sewer Pipe and Fittings, NPS 18 and Larger: ASTM F 679, T-1 wall thickness, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.
- E. PVC Profile Gravity Sewer Pipe and Fittings: ASTM F 794 pipe, with bell-and-spigot ends; ASTM D 3034 fittings, with bell ends; and ASTM F 477, elastomeric seals.

2.5 CONCRETE PIPE AND FITTINGS

- A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76.
 - 1. Bell-and-spigot or tongue-and-groove ends and gasketed joints with ASTM C 443, rubber gaskets
 - 2. Class III, Wall B.

2.6 NONPRESSURE TRANSITION COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
 - 1. For Concrete Pipes: ASTM C 443, rubber.
 - 2. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
 - 3. For Fiberglass Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - 4. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - 5. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- C. Shielded, Flexible Couplings:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cascade Waterworks Mfg.
 - b. Dallas Specialty & Mfg. Co.
 - c. Mission Rubber Company; a division of MCP Industries, Inc.
 - 2. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

2.7 CLEANOUTS

- A. Cast-Iron Cleanouts:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.
 - d. Tyler Pipe.
 - e. Watts Water Technologies, Inc.
 - f. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.

2. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, polished bronze cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
3. Top-Loading Classification(s): Heavy Duty.
4. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.8 STORMWATER INLETS

- A. Catch Basin: Precast or cast-in-place basin and heavy duty grate and frame, size as indicated.
- B. Yard Inlet: Nyloplast "Drain Basin", size as indicated with heavy duty cast iron grate and frame or approved similar product.

2.9 TRENCH DRAINS

- A. Fabricated polymer concrete trench drain system with internal ½% slope. Galvanized steel rail, heavy duty traffic rating for drain and frame and lockable grate (tamper proof). Basis of Design product is ACO KlassikDrain 300. Subject to requirements provide the Basis of Design product or approved equivalent product from one of the following:
 1. Jay R. Smith Manufacturing Company
 2. ABT, Inc.
- B. 12" internal width.
- C. Provide Owner with two cleaning tools and two sets of keys for locks.

2.10 PIPE OUTLETS

- A. Head Walls: KYDOH Sloped and Flared, size as indicated with precast or cast-in-place basin conforming with KYDOH Standard Drawing or RDH-020-03.
- B. Turf Reinforcement Basin: Dense web of interlocking multi-lobed polypropylene threads, chemical and UV stabilized against degradation, with no bio-degradable components.

2.11 DOWNSPOUT BOOT WITH INTEGRAL CLEANOUT

Downspout Boot with Integral Cleanout: Carbon Steel for 6x6 (or other size as indicated on Drawings) angular downspout, with factory powdercoat finish in color to be selected by Architect. Downspout boot to have integral cleanout. Rubber adapter as needed to provide transition from downspout boot to storm pipe. Basis of Design J.R. Hoe and Sons, Inc. A series angular downspout boot or equivalent product.

2.12 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318, ACI 350/350R, and the following:
 1. Cement: ASTM C 150, Type II.
 2. Fine Aggregate: ASTM C 33, sand.
 3. Coarse Aggregate: ASTM C 33, crushed gravel.
 4. Water: Potable.
- B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING APPLICATIONS

- A. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
 1. Use pressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.
 - a. Shielded flexible or rigid couplings for same or minor difference OD pipes.
 - b. Unshielded, increaser/reducer-pattern, flexible or rigid couplings for pipes with different OD.
 - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
 2. Use pressure-type pipe couplings all joints.
- B. Special Pipe Fittings: Use for pipe expansion and deflection. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
- C. Gravity-Flow, Nonpressure Sewer Piping: Use any of the following pipe materials for each size range:
 1. NPS 2: PVC Schedule 40, water-service pipe; PVC Schedule 40, water-service-pipe fittings; and solvent-cemented joints.
 2. NPS 3: Ductile-iron pressure pipe; ductile-iron standard or compact fittings; gaskets; and gasketed joints.
 3. NPS 3: PVC Schedule 40, water-service pipe; PVC Schedule 40, water-service-pipe fittings; and solvent-cemented joints.
 4. NPS 4: Ductile-iron pressure pipe; ductile-iron standard or compact fittings; gaskets; and gasketed joints.
 5. NPS 4: PVC pressure pipe, PVC pressure fittings, gaskets, and gasketed joints.
 6. NPS 6 to NPS 8: Ductile-iron pressure pipe; standard- or compact-pattern, ductile-iron fittings; gaskets; and gasketed joints.
 7. NPS 6 to NPS 8: PVC pressure pipe, PVC pressure fittings, gaskets, and gasketed joints.
 8. NPS 10 and NPS 12: Ductile-iron pressure pipe; standard- or compact-pattern, ductile-iron fittings; gaskets; and gasketed joints.
 9. NPS 10 to NPS 24: PVC pressure pipe; compact-pattern, ductile-iron fittings; gaskets; and gasketed joints.

3.3 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.
- F. Install gravity-flow, nonpressure drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope as indicated on drawings.
 - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
 - 3. Install piping with 12-inch minimum cover.
 - 4. Install PE corrugated sewer piping according to CPPA's "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings."
 - 5. Install PVC cellular-core piping according to ASTM D 2321 and ASTM F 1668.
 - 6. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
 - 7. Install PVC profile gravity sewer piping according to ASTM D 2321 and ASTM F 1668.
 - 8. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

3.4 PIPE JOINT CONSTRUCTION

- A. Basic pipe joint construction is specified in Division 33 Section "Common Work Results for Utilities." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.
- B. Join gravity-flow, nonpressure drainage piping according to the following:
 - 1. Join corrugated PE piping according to CPPA 100 and the following:
 - a. Use silttight couplings for Type 2, silttight joints.
 - 2. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric gasket joints.
 - 3. Join PVC profile gravity sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
 - 4. Join dissimilar pipe materials with pressure-type flexible or rigid couplings.
- C. Join dissimilar pipe materials with pressure-type couplings.

3.5 CATCH BASIN INSTALLATION

- A. Construct catch basins to sizes and shapes indicated.
- B. Set frames and grates to elevations indicated.

3.6 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use Heavy-Duty, top-loading classification cleanouts in all areas.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 12 by 12 by 12 inches deep. Set with tops 1 inch above surrounding earth grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.7 DRAIN INSTALLATION

- A. Install type of drains in locations indicated.
 - 1. Use Heavy-Duty, top-loading classification drains in all areas.
- B. Embed drains in 4-inch minimum concrete around bottom and sides.
- C. Fasten grates to drains if indicated.
- D. Set drain frames and covers with tops flush with pavement surface.
- E. Assemble trench sections with flanged joints.
- F. Embed trench sections in 4-inch minimum concrete around bottom and sides.

3.8 STORMWATER INLET AND OUTLET INSTALLATION

- A. Construct inlets, head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Set frames and grates to elevations indicated.
- C. Place turf reinforcement mat or channel lining as indicated.
- D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
- E. Construct energy dissipaters at outlets, as indicated.

3.9 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318/318R.

3.10 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Division 22 Section "Storm Drainage Piping Specialties."
1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall, unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
 4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- B. Connect to sediment interceptors specified in Division 22 Section "Sanitary Waste Interceptors."

3.11 IDENTIFICATION

- A. Materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.12 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
1. Submit separate reports for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.

- e. Exfiltration: Water leakage from or around piping.
 - 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 - 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
- 1. Do not enclose, cover, or put into service before inspection and approval.
 - 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 - 4. Submit separate report for each test.
 - 5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
 - b. Option: Test plastic piping according to ASTM F 1417.
 - c. Option: Test concrete piping according to ASTM C 924.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.13 CLEANING

- A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

END OF SECTION

33 46 16**SUBDRAINAGE****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes subdrainage systems for the following:
 1. Foundations.
 2. Underslab.
 3. Infiltration Trenches

1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. HDPE: High-density polyethylene plastic.
- C. PE: Polyethylene plastic.
- D. PP: Polypropylene plastic.
- E. CPT: Corrugated polyethylene tubing
- F. Subdrainage: Drainage system that collects and removes subsurface or seepage water.

1.4 SUBMITTALS

- A. Product Data: For the following:
 1. Perforated-wall pipe and fittings.
 2. Solid-wall pipe and fittings.
 3. French drain stone material
 4. Geotextile filter fabrics.
- B. Approval of waterproofing manufacturer's service agent for use of drainage panels against and for waterproofing membrane protection.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS

- A. Refer to the "Piping Applications" Article in Part 3 for applications of pipe, tube, fitting, and joining materials.

2.3 PERFORATED-WALL PIPES AND FITTINGS

A. Perforated PE Pipe and Fittings:

1. NPS 6 and Smaller: ASTM F 405 or AASHTO M 252, Type CP; corrugated, for coupled joints.
2. NPS 8 and Larger: ASTM F 667; AASHTO M 252, Type CP; or AASHTO M 294, Type CP; corrugated; for coupled joints.
3. Couplings: Manufacturer's standard, band type.

2.4 SOLID-WALL PIPES AND FITTINGS

A. ABS Sewer Pipe and Fittings: ASTM D 2751.

1. Solvent Cement: ASTM D 2235.
2. Gaskets: ASTM F 477, elastomeric seal.

B. PE Drainage Tubing and Fittings: AASHTO M 252, Type S, corrugated, with smooth waterway, for coupled joints.

1. Couplings: AASHTO M 252, corrugated, band type, matching tubing and fittings.

C. PE Pipe and Fittings: AASHTO M 294, Type S, corrugated, with smooth waterway, for coupled joints.

1. Couplings: AASHTO M 294, corrugated, band type, matching tubing and fittings.

2.5 SPECIAL PIPE COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant metal tension band and tightening mechanism on each end.

1. Sleeve Materials:
 - a. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - b. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
2. Unshielded Flexible Couplings: Elastomeric sleeve with **stainless-steel shear ring and** corrosion-resistant metal tension band and tightening mechanism on each end.
3. Shielded Flexible Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant metal tension band and tightening mechanism on each end.

2.6 CLEANOUTS

A. Cast-Iron Cleanouts: ASME A112.36.2M; with round-flanged, cast-iron housing; and secured, scoriated, Medium-Duty Loading class, cast-iron cover. Include cast-iron ferrule and countersunk, brass cleanout plug.

2.7 DRAINAGE CONDUITS

A. Single-Pipe Drainage Conduits: Prefabricated geocomposite with perforated corrugated core molded from HDPE complying with ASTM D 3350 and wrapped in geotextile filter fabric.

1. Available Manufacturers:
 - a. Advanced Drainage Systems.
 - b. Or approved equal
2. Nominal Size: 12 inches high by approximately 1 inch thick.

- a. Minimum In-Plane Flow: 30 gpm at hydraulic gradient of 1.0 when tested according to ASTM D 4716.
- 3. Nominal Size: 18 inches high by approximately 1 inch thick.
 - a. Minimum In-Plane Flow: 45 gpm at hydraulic gradient of 1.0 when tested according to ASTM D 4716.
- 4. Filter Fabric: Nonwoven, PP geotextile.
- 5. Fittings: HDPE with combination NPS 4 and NPS 6 outlet connection.
- 6. Couplings: Corrugated HDPE band.

2.8 SOIL MATERIALS

- A. Backfill, drainage course, impervious fill, and satisfactory soil materials are specified in Division 31 Section "Earth Moving."

2.9 GEOTEXTILE FILTER FABRICS

- A. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. when tested according to ASTM D 4491.
 - 1. Structure Type: woven, monofilament or multifilament.
 - 2. Style(s): Flat and Sock.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.
- B. If subdrainage is required for landscaping, locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.3 PIPING APPLICATIONS

- A. Underground Subdrainage Piping:
 - 1. Perforated PE pipe and fittings, couplings, and coupled joints.
 - 2. Perforated PVC sewer pipe and fittings for loose, bell-and-spigot joints.
 - 3. Strip drain

3.4 CLEANOUT APPLICATIONS

- A. In Underground Subdrainage Piping:
 - 1. At Grade in Earth: Cast iron cleanouts.
 - 2. At Grade in Paved Areas: Cast-iron cleanouts.
- B. In Underslab Subdrainage Piping:
 - 1. In Equipment Rooms and Unfinished Areas: Cast-iron cleanouts.
 - 2. In Finished Areas: Copper-alloy cleanouts.

3.5 FOUNDATION DRAINAGE INSTALLATION

- A. Place impervious fill material on subgrade adjacent to bottom of footing after concrete footing forms have been removed. Place and compact impervious fill to dimensions indicated, but not less than 6 inches deep and 12 inches wide.
- B. Place impervious fill on subgrade adjacent to bottom of footing and compact to dimensions indicated, but not less than 6 inches deep and 12 inches wide after concrete footing forms have been removed.
- C. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- D. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.
- E. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with tape and adhesive.
- F. Install drainage piping as indicated in Part 3 "Piping Installation" Article for foundation subdrainage.
- G. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.
- H. After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.
- I. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.
- J. Place layer of flat style over top of drainage course, overlapping edges at least 4 inches.
- K. Install vertical drainage panels as follows:
 - 1. Coordinate placement with other drainage materials.
 - 2. Lay perforated drainage pipe at base of footing. Install as indicated in Part 3 "Piping Installation" Article. Do not install aggregate.
 - 3. Separate 4 inches of fabric at beginning of roll and cut away 4 inches of core. Wrap fabric around end of remaining core.
 - 4. Wrap bottom of panel around drainage pipe.
 - 5. If additional panels are required on same row, cut away 4 inches of installed panel core, install new panel against installed panel, and overlap new panel with installed panel fabric.
 - 6. If additional rows of panels are required, overlap lower panel with 4 inches of fabric.
 - 7. Cut panel as necessary to keep top 12 inches below finish grade.
 - 8. For inside corners, bend panel. For outside corners, cut core to provide 3 inches for overlap.
- L. Do not use drainage panels as protection for waterproof membrane unless approved by factory-authorized service representative of waterproofing membrane manufacturer. Submit approval if so used.
- M. Place initial backfill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

3.6 UNDERSLAB DRAINAGE INSTALLATION

- A. Excavate for underslab drainage system after subgrade material has been compacted but before drainage course has been placed. Include horizontal distance of at least 6 inches between drainage pipe and trench walls. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.
- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.
- D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive and tape.
- E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for underslab subdrainage.
- F. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.
- G. After satisfactory testing, cover drainage piping with drainage course to elevation of bottom of slab, and compact and wrap top of drainage course with flat-style geotextile filter fabric.
- H. Install horizontal drainage panels as follows:
 - 1. Coordinate placement with other drainage materials.
 - 2. Lay perforated drainage pipe at inside edge of footings.
 - 3. Place drainage panel over drainage pipe with core side up. Peel back fabric and wrap fabric around pipe. Locate top of core at bottom elevation of floor slab.
 - 4. Butt additional panels against other installed panels. If panels have plastic flanges, overlap installed panel with flange.

3.7 INFILTRATION BASIN INSTALLATION

- A. Excavate for basin drainage system after subgrade material has been compacted but before drainage course has been placed. Grade bottom of basin excavations to required slope, and compact to firm, solid bed for drainage system.
- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.
- D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive and tape.
- E. Install drainage piping as indicated in Part 3 "Piping Installation".
- F. Add drainage course to width of at least 6 inches on each side and to top of pipe to perform tests.
- G. After satisfactory testing, cover drainage piping with drainage course to elevation of bottom of slab, and compact and wrap top of drainage course with flat-style geotextile filter fabric.

3.8 PIPING INSTALLATION

- A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.
 - 1. Foundation Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 24" unless otherwise indicated.
 - 2. Lay perforated pipe with perforations down.
 - 3. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.
- B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.
- C. Install ABS piping according to ASTM D 2321.
- D. Install PE piping according to ASTM D 2321.

- E. Install PVC piping according to ASTM D 2321.
- F. Install strip drain per manufacturer's written recommendations.

3.9 PIPE JOINT CONSTRUCTION

- A. Join PE pipe, tubing, and fittings with couplings for soil-tight joints according to AASHTO's "Standard Specifications for Highway Bridges," Division II, Section 26.4.2.4, "Joint Properties."
- B. Join perforated, PE pipe and fittings with couplings for soil-tight joints according to AASHTO's "Standard Specifications for Highway Bridges," Division II, Section 26.4.2.4, "Joint Properties"; or according to ASTM D 2321.
- C. Join PVC pipe and fittings according to ASTM D 3034 with elastomeric seal gaskets according to ASTM D 2321.
- D. Join perforated PVC pipe and fittings according to ASTM D 2729, with loose bell-and-spigot joints.
- E. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.10 CLEANOUT INSTALLATION

- A. Cleanouts for Foundation Subdrainage:
 1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
 2. In vehicular-traffic areas, use NPS 4 cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 18 by 18 by 12 inches in depth. Set top of cleanout flush with grade. Cast-iron pipe may also be used for cleanouts in nonvehicular-traffic areas.
 3. In nonvehicular-traffic areas, use NPS 4 PVC pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 12 by 12 by 4 inches in depth. Set top of cleanout plug 1 inch above grade.
- B. Cleanouts for Underslab Subdrainage:
 1. Install cleanouts and riser extensions from piping to top of slab. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
 2. Use NPS 4 cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout flush with top of slab.

3.11 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.

3.12 FIELD QUALITY CONTROL

- A. Testing: After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

3.13 CLEANING

- A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION