PROJECT MANUAL

PRIMARY SCHOOL ADDITION

JOHNSON COUNTY WESTSIDE SCHOOL DISTRICT
Hartman, Arkansas

Architecture Plus, Inc.
907 South 21st Street
Fort Smith, Arkansas 72901
Tel: (479) 783-8395 / Fax: (479) 783-0935
E-mail: craig@archplusinc.net
ARCHITECTS · INTERIOR DESIGNERS

PROJECT NO.: 19-68

July 31, 2024

SET NO.:

DOCUMENT 00 00 02 - PROJECT DIRECTORY

OWNER:
Johnson County Westside School District
1535 Rabbit Hill Road
Hartman, Arkansas 72840
Telephone: 479-846-4213
Fax.: 479-497-1991
Superintendent: Brad Kent
Email: bkent@westsiderebels.net

ARCHITECT:
Architecture Plus, Inc.
907 South 21st Street
Fort Smith, Arkansas 72901
Telephone: 479-783-8395
Fax: 479-783-0935
Principal-In-Charge: H. Craig Boone, AIA
Email: craig@archplusinc.net

STRUCTURAL ENGINEER
Myers Engineering, PLLC
2411 Fayetteville Road, Suite B
Van Buren, Arkansas 72956
Telephone: 479-474-4412
Fax: 479-474-4413
Project Engineer: Jason Myers, PE
Email: jason@myers-engr.com

MECHANICAL & ELECTRICAL ENG.
Engineering Elements, PLLC
2458 E. Joyce Blvd., #1
Fayetteville, AR 72703
Telephone: 479-695-1333
Fax: 479-251-0714
Project Engineer: Shane Lanning, PE, LEED AP
Email: slanning@eemep.com

CIVIL ENGINEER
Philip J. Leraris, PE, RLS
P.O. Box 11123
Fort Smith, Arkansas 72717
Telephone: 479-221-7506
Project Engineer: Phil Leraris
Email: pleraris@gmail.com

END OF DOCUMENT

TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS

DIVISION 2 – EXISTING CONDITIONS

SECTION 02 41 10 - Utility Demolition-Relocation
SECTION 02 41 13 - Selective Demolition

And as shown on the Drawings.

DIVISION 3 – CONCRETE

SECTION 03 30 00 - Cast-in-Place Concrete
SECTION 03 45 00 - Architectural Precast Concrete

And as shown on the Drawings.

DIVISION 4 – MASONRY

SECTION 04 10 00 - Masonry Mortar and Grout
SECTION 04 20 00 - Masonry (CMU and Brick)

And as shown on the Drawings.

DIVISION 5 – METALS

SECTION 05 40 00 - Cold Formed Metal Framing
SECTION 05 50 00 - Metal Fabrications
SECTION 05 51 50 Ladders

And as shown on the Drawings.

DIVISION 6 - CARPENTRY

SECTION 06 10 00 - Rough Carpentry
SECTION 06 40 00 - Architectural Woodwork (Cabinets)

And as shown on the Drawings.

DIVISION 7 - MOISTURE PROTECTION

SECTION 07 01 60 - Flashing and Sheet Metal
SECTION 07 13 20 - Self-Adhering Sheet Waterproofing System
SECTION 07 21 00 - Building Insulation
SECTION 07 42 00 - Preformed Metal Wall and Soffit Panels
SECTION 07 54 00 - PVC Thermoplastic Membrane Roofing
SECTION 07 70 00 - Roof Accessories
SECTION 07 84 00 - Firestopping
SECTION 07 92 00 - Sealants and Caulking

And as shown on the Drawings.

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SECTION 08 12 16 - Aluminum Entrances, Fixed Frames, & Windows
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SECTION 08 31 00 - Access Doors and Panels
SECTION 08 33 00 - Overhead Coiling Doors
SECTION 08 71 00 - Door Hardware
SECTION 08 80 00 - Glazing

And as shown on the Drawings.

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SECTION 09 50 00 - Concrete Slab Moisture Testing
SECTION 09 51 00 - Acoustical Ceiling
SECTION 09 62 40 - Modular Athletic Flooring
SECTION 09 65 00 - Resilient Flooring
SECTION 09 67 00 - Polymer Flooring Systems
SECTION 09 68 00 - Carpet
SECTION 09 77 20 - Decorative Fiberglass Reinforced Wall Panels (FRP)
SECTION 09 84 50 - Cementitious Wood Fiber Wall Panels
SECTION 09 90 00 - Painting

And as shown on the Drawings.

DIVISION 10 – SPECIALTIES

SECTION 10 90 00 - Miscellaneous Specialties

And as shown on the Drawings.

DIVISION 11 – EQUIPMENT

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SECTION 11 45 20 - Commercial Kitchen Equipment
SECTION 11 64 20 - Stage Curtains

And as shown on the Drawings.

DIVISION 12 – FURNISHINGS

SECTION 12 21 13 - Window Treatment
SECTION 12 49 40 - Roller Shades

And as shown on the Drawings.

DIVISION 13 - SPECIAL CONSTRUCTION

None or as shown on the Drawings

DIVISION 14 - CONVEYING SYSTEMS

SECTION 14 24 00 - Machine Room-Less Hydraulic Passenger Elevators

And as noted on the Drawings.

DIVISION 21 – FIRE SUPRESSION

SECTION 21 13 13 - Wet Pipe Sprinkler System

DIVISION 22 – PLUMBING

SECTION 22 07 19 - Plumbing Piping Insulation
SECTION 22 11 16 - Domestic Water Piping
SECTION 22 13 16 - Sanitary Waste and Vent Piping

And as shown on the Drawings.

DIVISION 23 – HEATING, VENTILATING, AND AIR-CONDITIONINGS (HVAC)

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SECTION 23 05 93 - Testing, Adjusting and Balancing for HVAC
SECTION 23 07 00 - HVAC Insulation
SECTION 23 11 23 - Natural Gas Piping
SECTION 23 31 13 - Metal Ductwork
SECTION 23 33 00 - Air Duct Accessories
SECTION 23 37 13 - Air Diffusers

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DIVISION 26 – ELECTRICAL

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SECTION 26 05 19 - Low Voltage Electrical Power Conductors and Cables
SECTION 26 05 26 - Grounding and Bonding
SECTION 26 05 33 - Raceway and Boxes for Electrical Systems
SECTION 26 24 16 - Panelboards
SECTION 26 27 26 - Wiring Devices
SECTION 26 51 19 - LED Interior Lighting

And as shown on the Drawings.

DIVISION 28 – ACCESS CONTROL

SECTION 28 46 21.11 - Addressable Fire Alarm System

DIVISION 31 – EARTHWORK

SECTION 31 05 13 - Earthwork
SECTION 31 10 00 - Clearing
SECTION 31 23 33 - Excavation, Trenching and Backfilling

DOCUMENT 00 31 32 – GEOTECHNICAL DATA

PART 1 - GENERAL

1.01 GEOTECHNICAL DATA

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.

B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, the Owner, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.

C. A geotechnical investigation report for Project, prepared by Building & Earth, 3165 Pine Woods Road, Springdale, Arkansas 72762 dated December 14, 2023 and Supplemental report dated July 26, 2024, are available for viewing as appended to this Document.

1. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from the data.
2. Any part using information described in the geotechnical report shall make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.

END OF DOCUMENT 00 31 32

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

3165 Pine Woods Road
Springdale, AR 72762
Ph: (479) 756-1555
www.BuildingAndEarth.com

July 26, 2024

Architecture Plus, Inc.
907 South 21st Street
Fort Smith, Arkansas 72901

Attention: Ms. Skye Reid, Associate, AIA

Subject: Letter Report of Subsurface Exploration
and Geotechnical Evaluation
JC Westside Supplemental Exploration
Hartman, Arkansas
Building & Earth Project No: BV240089

Dear Ms. Reid:

Building & Earth Sciences Inc. (Building & Earth) previously submitted report No BV230163, as well as Addendum No. 1 to this report on June 5, 2024, relating to design parameters for construction of site retaining walls. As requested by the structural engineer, via Architecture Plus, Inc., we are pleased to submit this letter report of supplemental exploration and evaluation of rock (foundation) conditions for site retaining walls at this project.

For this exploration, we returned to the project site and performed seven (7) test borings, four (4) of which were advanced along the southern building line where a new retaining wall is planned and three (3) of which were advanced along the northern building line.

Building & Earth advanced each boring to auger refusal, which was encountered at depths ranging between 1.5 and 7.1 feet below present grades. At the four (4) boring locations along the southern building line where the retaining wall will be located, a five (5) foot rock core was advanced below auger refusal depth to gain rock information for use in retaining wall foundation design.

GENERAL SUBSURFACE CONDITIONS

The subsurface within the subject property appears consist of a combination of residuum and weathered sandstone and sandstone on the Atoka Formation.

Existing Residuum

Existing residuum consisting of silty sand (SM), clayey sand (SC), and clayey gravels (GC) were encountered in all test borings beneath the topsoil or pavements and extended to the contact with weathered sandstone or sandstone of the Atoka Formation at depths ranging from 1.5 to 7 feet below present grades. These materials were generally brown, dark brown, yellowish brown, and yellow in color with relative densities ranging from very loose to very dense. Relative densities generally increased with depth below the surface and with increased rock fragments in the samples.

Moisture contents ranged from about 7% to 21%. Atterberg limits performed on select samples of the silty sand soils yielded liquid limit (LL) values of 19 and 20 and a plasticity index (PI) of 1. The samples also had a fines content (% passing a #200 sieve) of 33% and 43%.

Atoka Formation

Highly weathered sandstone, weathered sandstone, and sandstone of the Atoka Formation was encountered in all borings and was the termination layer in those borings. The top of the sandstone units was encountered generally between 1.5 and 7.0 feet below present grades.

In borings B-01 through B-04, a five (5) foot core run was advanced through the competent sandstone. The sandstone units yielded recovery values between 86% to 99% with RQD values between 15% to 55%. Compressive strength testing was also performed on two samples of the rock and yielded compressive strength values of 12,860 and 17,210 psi.

Retaining Wall Foundation Recommendations

Based on the conditions encountered during our field investigation and after our site preparation recommendations are implemented, the proposed retaining wall can be supported on conventional shallow foundations.

To provide a consistent bearing for all retaining wall foundations elements, we recommend all retaining wall foundations extended through the highly weathered sandstone and weathered sandstone and bear in competent sandstone rock, encountered at approximate elevations ranging from 452 to 457 feet. Foundations bearing in the recommended material can be designed using a maximum net allowable bearing pressure of 10 ksf.

Passive earth pressures of materials adjacent to the footings as well as bearing material friction at the base may be used to resist shear. The following table presents recommended friction coefficient and passive earth pressure values for the anticipated bearing materials. The structural engineer should use a factor of safety of at least 1.5 when sizing the foundations to resist shear loads using the below ultimate soil parameter values.

Material	Friction Coefficient	Equivalent Fluid Unit Weight for Passive Condition Lateral Earth Pressures (pcf)
New Structural Fill	0.55	450

Table 1: Soil Parameter Values Resisting Shear

For information relating to fluid pressures, friction angles, and retaining wall backfill provisions, please refer to Addendum No. 1 referenced earlier in this letter report.

Closing

All recommendations contained in the original geotechnical report referencing subgrade preparation, structural fill requirements, and geotechnical considerations remain valid unless specifically altered by this letter report.

We appreciate the opportunity to provide geotechnical consultation services for this project. If you have any questions regarding the information in this letter or need any additional information, please call us.

Respectfully Submitted,

BUILDING & EARTH SCIENCES, INC.
AR Certificate of Authorization NO. 569, Expiration Date 12/31/25

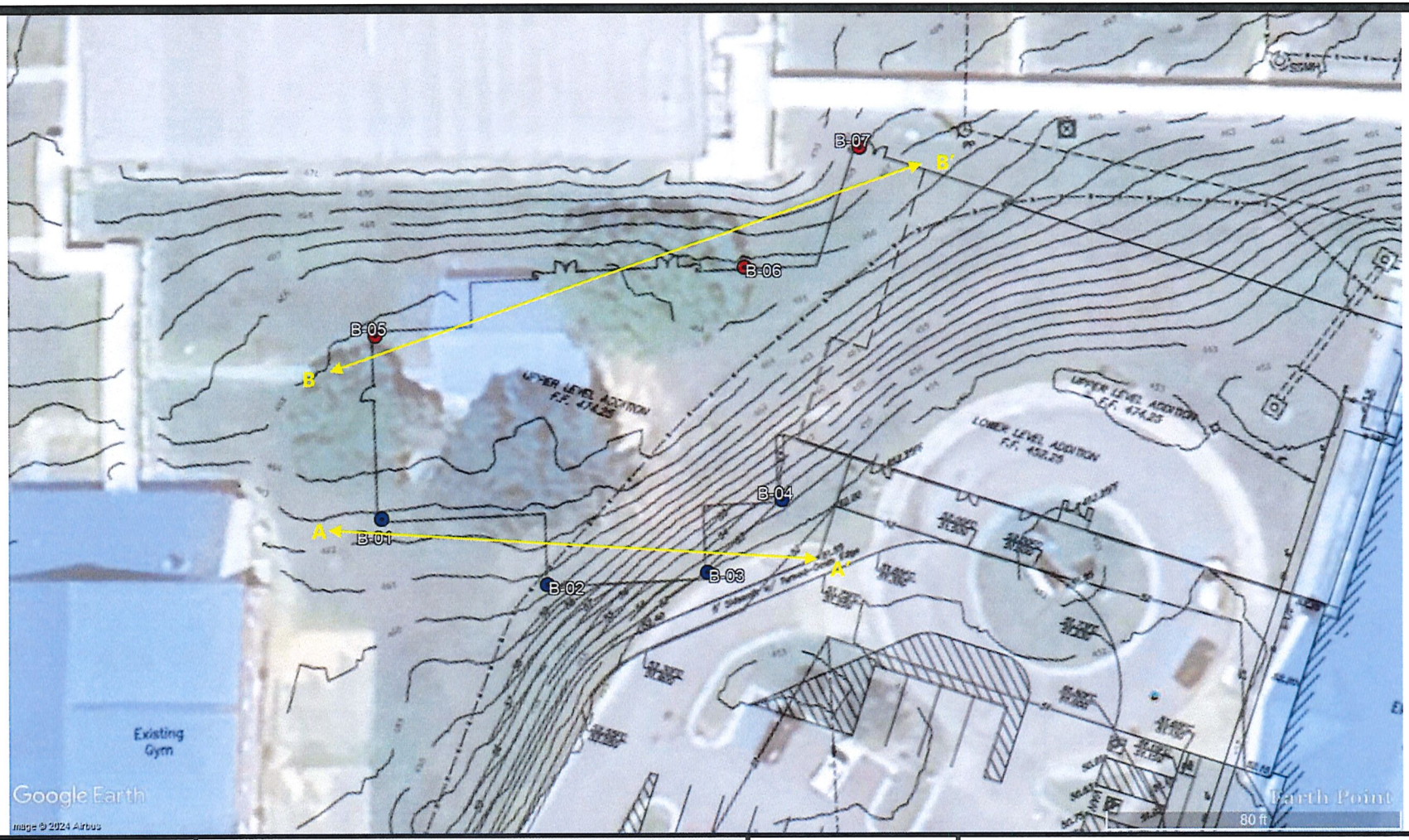
Jacob Gatling, P.G.
Geotechnical Department Manager

Joseph D. Vistad, P.E.
Branch Manager – Principal
AR: 18294

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 18294
JOSEPH D. VISTAD
7/26/2024

Attachments:

- Boring Location Plan
- Subsurface Profiles
- Supplemental Boring Logs



REFERENCE USED TO PRODUCE THIS DRAWING: Google Earth Satellite Imagery dated 08/02/2023 with overlay of Site Plan, undated.	**BORING LOCATION PLAN**		**DATE: 07/16/2024**
	PROJECT NO. BV240089	**PROJECT NAME / LOCATION:** JC Westside Supplemental Exploration Hartman, Arkansas	**SCALE:** As Shown

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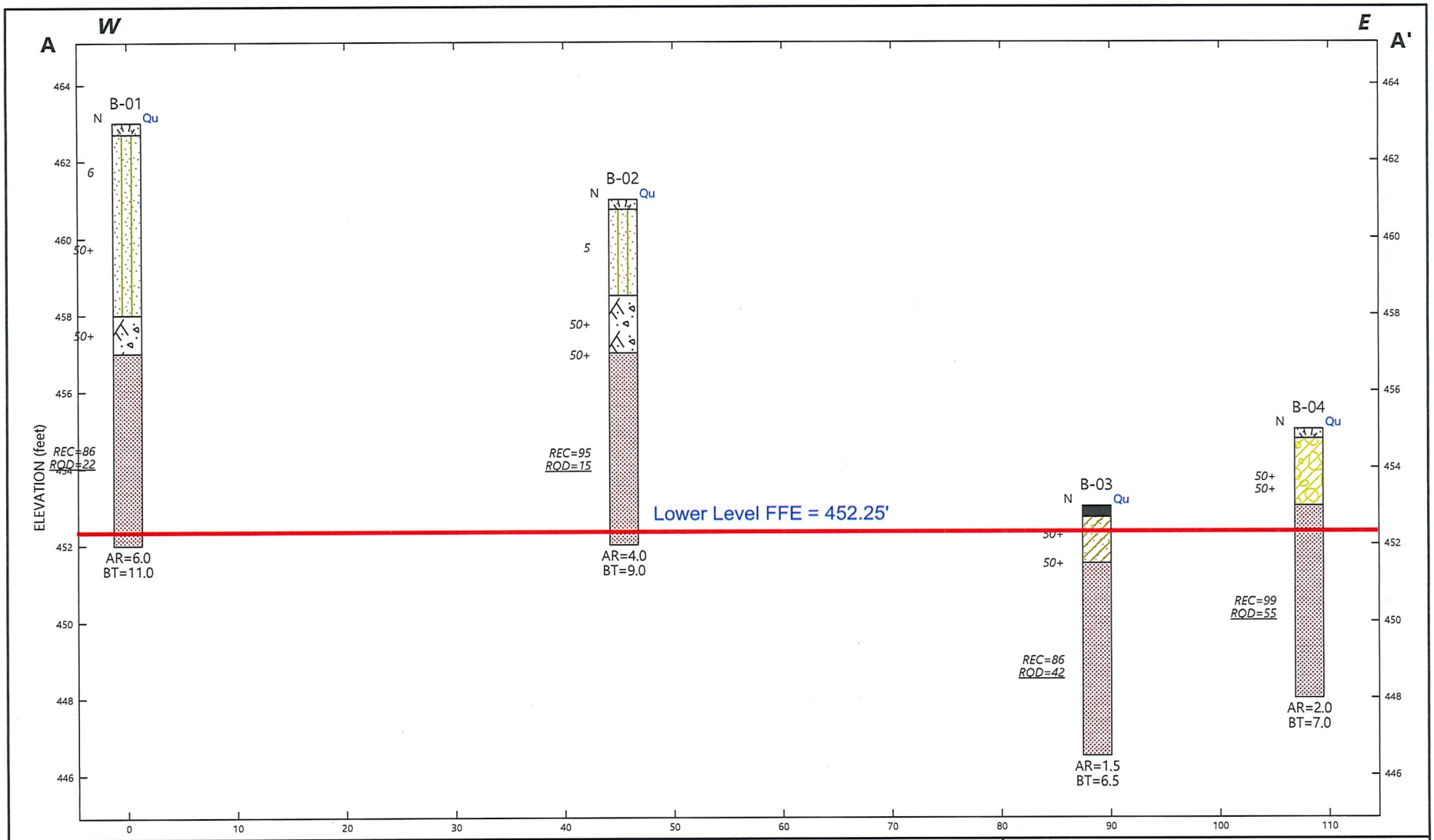

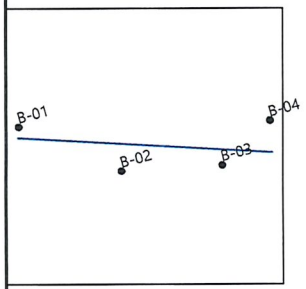

Site Map Scale 1 inch equals 80 feet

Key to Hatches

- Topsoil
- Sandstone
- USCS Clayey Gravel
- USCS Silty Sand
- Asphalt
- Weathered Rock
- USCS Clayey Sand

Legend

BT=Boring Termination, TPT=Test Pit Terminated
AR=Auger Refusal, ER=Excavation Refusal
N=Standard Penetration Test N-Value
Qu=Unconfined compressive strength estimate from pocket penetrometer test (tsf)
Water Level Reading at time of drilling.
Water Level Reading after drilling.

0 — 13
Horizontal Scale (feet)
Vertical Exaggeration: 3.5x

Building & Earth Sciences, Inc.
3165 Pine Woods Road, Springdale, AR 72762

JC Westside Supplemental Exploration
Hartman, AR

A-A': Subsurface Profile

PROJECT NO: BV240089	PLATE NO: A-1	DATE: 7/25/24

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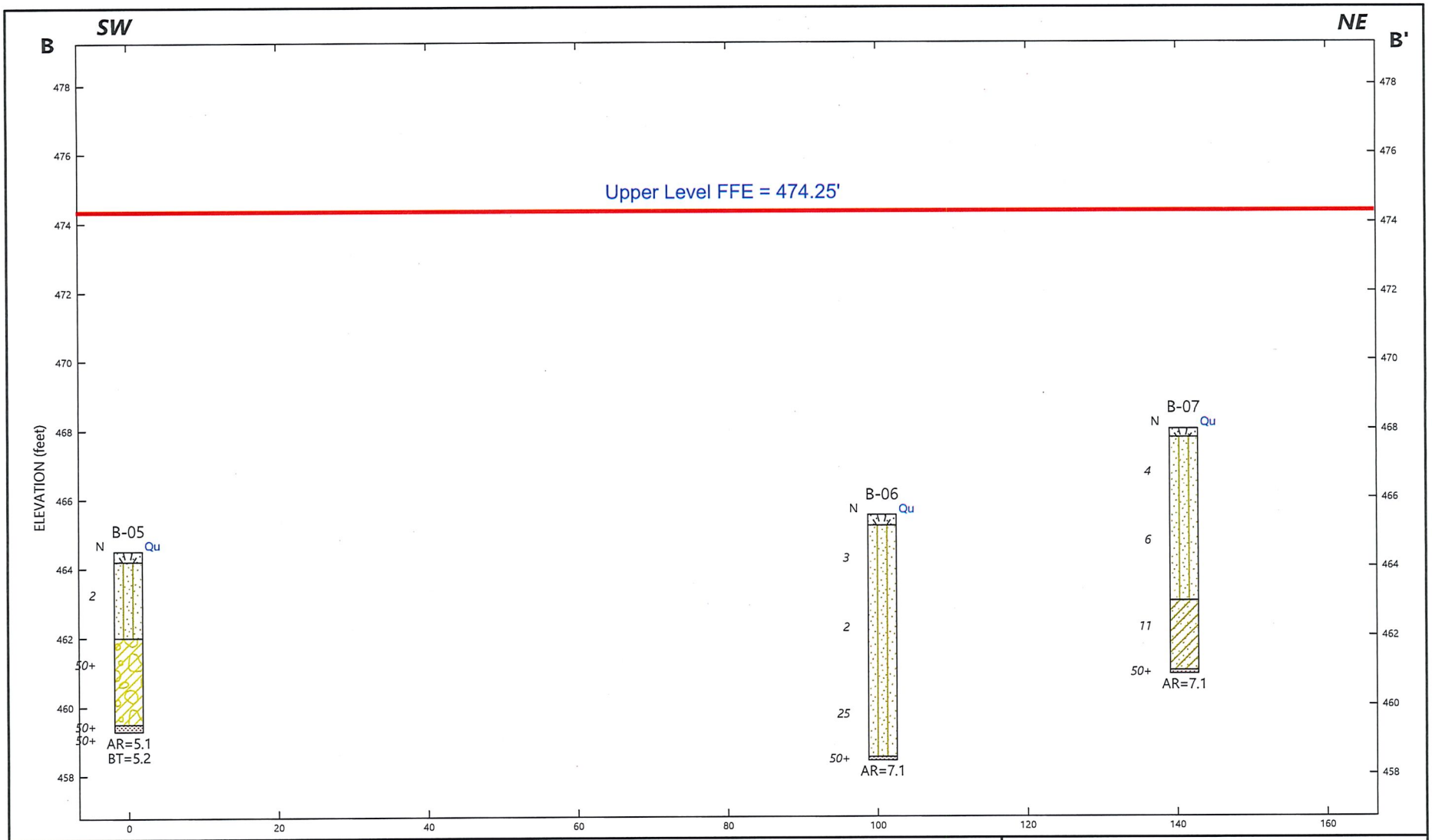
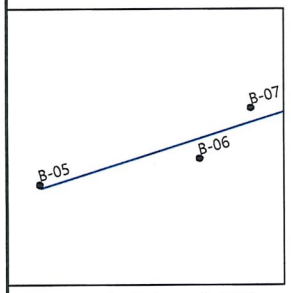
Geotechnical, Environmental, and Materials Engineers





Site Map Scale 1 inch equals 115 feet

Key to Hatches

- Topsoil
- Sandstone
- USCS Silty Sand
- USCS Clayey Sand
- USCS Clayey Gravel

Legend

BT=Boring Termination, TPT=Test Pit Terminated
AR=Auger Refusal, ER=Excavation Refusal
N=Standard Penetration Test N-Value
Qu=Unconfined compressive strength estimate from pocket penetrometer test (tsf)
Water Level Reading at time of drilling.
Water Level Reading after drilling.

0 — 19
Horizontal Scale (feet)
Vertical Exaggeration: 4.5x

Building & Earth Sciences, Inc.
3165 Pine Woods Road, Springdale, AR 72762

JC Westside Supplemental Exploration
Hartman, AR

B-B': Subsurface Profile

PROJECT NO: BV240089	PLATE NO: B-1	DATE: 7/25/24

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LOG OF BORING

Designation: B-01

Sheet 1 of 1

1365 Pine Woods Road
Springdale, AR 72762
Office: (479) 756-1555
buildingandearth.com

PROJECT NAME: JC Westside Supplemental Exploration
PROJECT NUMBER: BV240089
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT USED: Geoprobe 7822DT
HAMMER TYPE: Automatic
BORING LOCATION: 35.434210/-93.616674

LOCATION: Hartman, AR
DATE DRILLED: 7/15/24
WEATHER: Clear/Sunny
ELEVATION: 463.0
DRILL CREW: Building & Earth
LOGGED BY: J. St. Pierre

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	N-Value / Qu (tsf) / Atterberg Limits / % Moisture	LAB DATA	SOIL DESCRIPTION	GRAPHIC	REMARKS
							0.3 TOPSOIL: ~3 inches — 462.7		
			S-01	4 4 2		Sample S-01 LL: 20 PL: 19 PI: 1 M: 13.6% F: 32.8%	SILTY SAND (SM): loose, brown, brownish yellow, low plasticity, moist, root fragments, minor ferrous staining, (RESIDUAL)		
460			S-02	2 10 50/3"		Sample S-02 M: 10.4%	very dense, sandstone fragments		
							5.0 — 458.0		
5			S-03	48 50/3"		Sample S-03 M: 4.4%	WEATHERED SANDSTONE: cemented, light brown, fractured, minor ferrous staining, (ATOKA)		
							6.0 — 457.0		
455			S-05	REC=86 RQD=22			SANDSTONE: well cemented, light brown, yellowish brown, fractured, weathered lenses, ferrous staining, (ATOKA)		
10							11.0 — 452.0		
							Auger Refusal at 6 feet. Boring Terminated at 11 feet.		Groundwater not encountered at time of drilling. Borehole backfilled on date drilled unless otherwise noted. Consistency/Relative Density based on correction factor for Automatic hammer.
450									

SAMPLE TYPE ☒ Split Spoon ▮ Rock Core

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)
% MOISTURE PERCENT NATURAL MOISTURE CONTENT
▽ GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING
▼ STABILIZED GROUNDWATER LEVEL

REC RECOVERY
RQD ROCK QUALITY DESIGNATION
UD UNDISTURBED
Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

LL: LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
PL: PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
PI: PLASTICITY INDEX

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LOG OF BORING

Designation: B-02

Sheet 1 of 1

1365 Pine Woods Road
Springdale, AR 72762
Office: (479) 756-1555
buildingandearth.com

PROJECT NAME: JC Westside Supplemental Exploration
PROJECT NUMBER: BV240089
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT USED: Geoprobe 7822DT
HAMMER TYPE: Automatic
BORING LOCATION: 35.434159/-93.616524

LOCATION: Hartman, AR
DATE DRILLED: 7/16/24
WEATHER: Clear/Sunny
ELEVATION: 461.0
DRILL CREW: Building & Earth
LOGGED BY: J. St. Pierre

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	N-Value / Qu (tsf) / Atterberg Limits / % Moisture	LAB DATA	SOIL DESCRIPTION	GRAPHIC	REMARKS
0	460		S-01	2 2 3		Sample S-01 M: 10.7%	0.3 ~2.5 inches (460.8) SILTY SAND (SM): loose, reddish brown, brown, low plasticity, moist, root fragments, (RESIDUAL)		
			S-02	18 31 50/4"	>>	Sample S-02 M: 6.1%	2.5 (458.5) HIGHLY WEATHERED SANDSTONE: poorly cemented to cemented, yellow, light brown, fragmented, ferrous staining, (ATOKA)		
			S-03	50/1"	>>		4.0 (457.0) SANDSTONE: well cemented, light brown, grayish brown, ferrous staining, weathered lenses, few fractures, mica, (ATOKA)		Rock compressive strength = 12,860 psi
5	455		S-04	REC=95 RQD=15					
							9.0 (452.0) Auger Refusal at 4 feet. Boring Terminated at 9 feet.		
10	450								Groundwater not encountered at time of drilling. Borehole backfilled on date drilled unless otherwise noted. Consistency/Relative Density based on correction factor for Automatic hammer.

SAMPLE TYPE ☒ Split Spoon ▮ Rock Core

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)
% MOISTURE PERCENT NATURAL MOISTURE CONTENT
▽ GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING
▼ STABILIZED GROUNDWATER LEVEL

REC RECOVERY
RQD ROCK QUALITY DESIGNATION
UD UNDISTURBED
Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

LL: LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
PL: PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
PI: PLASTICITY INDEX

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LOG OF BORING

Designation: B-03

Sheet 1 of 1

1365 Pine Woods Road
Springdale, AR 72762
Office: (479) 756-1555
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PROJECT NAME: JC Westside Supplemental Exploration
PROJECT NUMBER: BV240089
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT USED: Geoprobe 7822DT
HAMMER TYPE: Automatic
BORING LOCATION: 35.434168/-93.616378

LOCATION: Hartman, AR
DATE DRILLED: 7/15/24
WEATHER: Clear/Sunny
ELEVATION: 453.0
DRILL CREW: Building & Earth
LOGGED BY: J. St. Pierre

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	N-Value / Qu (tsf) / Atterberg Limits / % Moisture	LAB DATA	SOIL DESCRIPTION	GRAPHIC	REMARKS
0	453						0.3 ASPHALT: ~3 inches — 452.7		
							CLAYEY SAND (SC): very dense, brown, brownish yellow, low plasticity, moist, base fragments, (RESIDUAL)		
			S-01	50/5"		Sample S-01 M: 6.9%	1.5 — 451.5		
			S-02	50/0"			SANDSTONE: well cemented, gray, grayish brown, ferrous staining, few fractures, mica, (ATOKA)		
	450		S-03	REC=86 RQD=42					
5									
							6.5 — 446.5		
							Auger Refusal at 1.5 feet. Boring Terminated at 6.5 feet.		
	445								
10									
	440								

Groundwater not encountered at time of drilling.
Borehole backfilled on date drilled unless otherwise noted.
Consistency/Relative Density based on correction factor for Automatic hammer.

SAMPLE TYPE ☒ Split Spoon ▮ Rock Core

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)
% MOISTURE PERCENT NATURAL MOISTURE CONTENT
▽ GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING
▼ STABILIZED GROUNDWATER LEVEL

REC RECOVERY
RQD ROCK QUALITY DESIGNATION
UD UNDISTURBED
Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

LL: LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
PL: PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
PI: PLASTICITY INDEX

BUILDING & EARTH
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LOG OF BORING

Designation: B-04

Sheet 1 of 1

1365 Pine Woods Road
Springdale, AR 72762
Office: (479) 756-1555
buildingandearth.com

PROJECT NAME: JC Westside Supplemental Exploration
PROJECT NUMBER: BV240089
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT USED: Geoprobe 7822DT
HAMMER TYPE: Automatic
BORING LOCATION: 35.434222/-93.616310

LOCATION: Hartman, AR
DATE DRILLED: 7/16/24
WEATHER: Clear/Sunny
ELEVATION: 455.0
DRILL CREW: Building & Earth
LOGGED BY: J. St. Pierre

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	N-Value / Qu (tsf) / Atterberg Limits / % Moisture	LAB DATA	SOIL DESCRIPTION	GRAPHIC	REMARKS
	455						0.3 TOPSOIL: ~2.5 inches — 454.8		
			S-01	5		Sample S-01 M: 12.2%	CLAYEY GRAVEL (GC): very dense, brown, brownish yellow, moist, root fragments, sandstone fragments, ferrous staining, (RESIDUAL)		
			S-02	15 50/2" 50/1"			2.0 — 453.0		
							SANDSTONE: well cemented, gray, grayish brown, ferrous staining, few fractures, mica, (ATOKA)		Rock Compressive Strength = 17,210 psi
			S-03	REC=99 RQD=55					
5	450						7.0 — 448.0		
							Auger Refusal at 2 feet. Boring Terminated at 7 feet.		
10	445								Groundwater not encountered at time of drilling. Borehole backfilled on date drilled unless otherwise noted. Consistency/Relative Density based on correction factor for Automatic hammer.

SAMPLE TYPE ☒ Split Spoon ▮ Rock Core

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)
% MOISTURE PERCENT NATURAL MOISTURE CONTENT
▽ GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING
▼ STABILIZED GROUNDWATER LEVEL

REC RECOVERY
RQD ROCK QUALITY DESIGNATION
UD UNDISTURBED
Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

LL: LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
PL: PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
PI: PLASTICITY INDEX

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: B-05

Sheet 1 of 1

1365 Pine Woods Road
Springdale, AR 72762
Office: (479) 756-1555
buildingandearth.com

PROJECT NAME: JC Westside Supplemental Exploration
PROJECT NUMBER: BV240089
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT USED: Geoprobe 7822DT
HAMMER TYPE: Automatic
BORING LOCATION: 35.434348/-93.616679

LOCATION: Hartman, AR
DATE DRILLED: 7/15/24
WEATHER: Clear/Sunny
ELEVATION: 464.5
DRILL CREW: Building & Earth
LOGGED BY: J. St. Pierre

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	N-Value / Qu (tsf) / Atterberg Limits / % Moisture	LAB DATA	SOIL DESCRIPTION	GRAPHIC	REMARKS
0							0.3 TOPSOIL: ~3 inches — 464.2		
			S-01	3 1 1		Sample S-01 LL: 19 PL: 18 PI: 1 M: 14.5% F: 43.4%	SILTY SAND (SM): very loose, brownish yellow, brown, low plasticity, moist, root fragments, ferrous staining, (RESIDUAL)		
							2.5 — 462.0		
			S-02	24 13 50/4"		Sample S-02 M: 7.0%	CLAYEY GRAVEL (GC): very dense, yellowish brown, yellow, low plasticity, moist, ferrous staining, sandstone fragments and seams, (RESIDUAL)		
	460								
5			S-03 S-04	50/1" 50/1"		Sample S-03 M: 12.5%	5.0 — 459.5 5.2 — 459.3 SANDSTONE: well cemented, dark gray, light gray, (ATOKA)		
							Auger Refusal at 5.1 feet. Boring Terminated at 5.2 feet.		
	455								
10									

Groundwater not encountered at time of drilling.
Borehole backfilled on date drilled unless otherwise noted.
Consistency/Relative Density based on correction factor for Automatic hammer.

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)
% MOISTURE PERCENT NATURAL MOISTURE CONTENT
▽ GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING
▼ STABILIZED GROUNDWATER LEVEL
REC RECOVERY
RQD ROCK QUALITY DESIGNATION
UD UNDISTURBED
Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH
LL: LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
PL: PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
PI: PLASTICITY INDEX

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

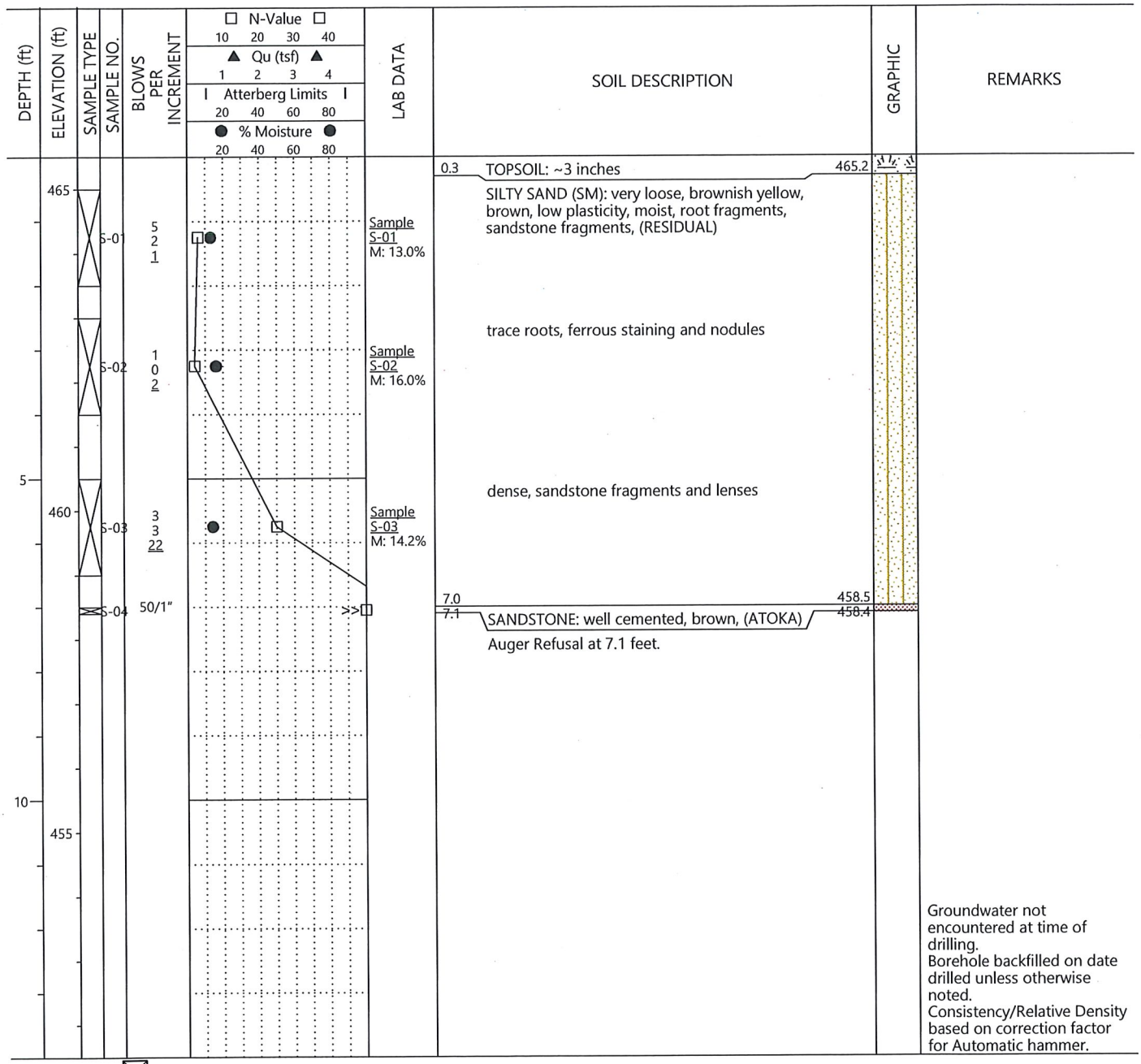
Designation: B-06

Sheet 1 of 1

1365 Pine Woods Road
Springdale, AR 72762
Office: (479) 756-1555
buildingandearth.com

PROJECT NAME: JC Westside Supplemental Exploration
PROJECT NUMBER: BV240089
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT USED: Geoprobe 7822DT
HAMMER TYPE: Automatic
BORING LOCATION: 35.434398/-93.616343

LOCATION: Hartman, AR
DATE DRILLED: 7/15/24
WEATHER: Clear/Sunny
ELEVATION: 465.5
DRILL CREW: Building & Earth
LOGGED BY: J. St. Pierre



SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)
% MOISTURE PERCENT NATURAL MOISTURE CONTENT
▽ GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING
▼ STABILIZED GROUNDWATER LEVEL

REC RECOVERY
RQD ROCK QUALITY DESIGNATION
UD UNDISTURBED
Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

LL: LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
PL: PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
PI: PLASTICITY INDEX

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: B-07

Sheet 1 of 1

1365 Pine Woods Road
Springdale, AR 72762
Office: (479) 756-1555
buildingandearth.com

PROJECT NAME: JC Westside Supplemental Exploration
PROJECT NUMBER: BV240089
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT USED: Geoprobe 7822DT
HAMMER TYPE: Automatic
BORING LOCATION: 35.434487/-93.616237

LOCATION: Hartman, AR
DATE DRILLED: 7/15/24
WEATHER: Clear/Sunny
ELEVATION: 468.0
DRILL CREW: Building & Earth
LOGGED BY: J. St. Pierre

DEPTH (ft)	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA	SOIL DESCRIPTION	GRAPHIC	REMARKS
0				0.3 TOPSOIL: ~2.5 inches, (RESIDUAL) 467.8		
	S-01	4 2 2	Sample S-01 M: 10.6%	SILTY SAND WITH GRAVEL (SM): very loose, brown, dark brown, low plasticity, moist, root fragments, sandstone fragments, (RESIDUAL)		
465	S-02	3 2 4	Sample S-02 M: 18.2%	loose, yellow, yellowish red		
5	S-03	6 5 6	Sample S-03 M: 20.8%	5.0 463.0 CLAYEY SAND (SC): medium dense, yellowish brown, low plasticity, moist, ferrous staining, (RESIDUAL)		
	S-04	50/1"		7.0 461.0 7.1 460.9 SANDSTONE: well cemented, light gray, (ATOKA) Auger Refusal at 7.1 feet.		
460						
10						
455						Groundwater not encountered at time of drilling. Borehole backfilled on date drilled unless otherwise noted. Consistency/Relative Density based on correction factor for Automatic hammer.

N-Value (10 20 30 40) ▲ Qu (tsf) ▲ (1 2 3 4) I Atterberg Limits I (20 40 60 80) ● % Moisture ● (20 40 60 80)

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)
% MOISTURE PERCENT NATURAL MOISTURE CONTENT
▽ GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING
▼ STABILIZED GROUNDWATER LEVEL
REC RECOVERY
RQD ROCK QUALITY DESIGNATION
UD UNDISTURBED
Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH
LL: LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
PL: PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
PI: PLASTICITY INDEX

Report of Subsurface Exploration and Geotechnical Evaluation
JC Westside Primary School Addition
Hartman, Arkansas
Building & Earth Project No.: BV230163

Prepared For:
Architecture Plus, Inc.

December 14, 2023

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

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Springdale, AR 72762
Ph: (479) 756-1555
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December 14, 2023

Architecture plus, Inc.
907 South 21t Street
Fort Smith, AR 72901

Attention: Ms. Skye Reid

Subject: Report of Subsurface Exploration and Geotechnical Evaluation
JC Westside Primary School Addition
Hartman, Arkansas
Building & Earth Project No: BV230163

Dear Ms. Reid:

Building & Earth Sciences, Inc. has completed the authorized subsurface exploration and geotechnical engineering evaluation for the JC Westside Primary School Addition located on the JC Westside Elementary School Campus in Hartman, Arkansas.

The purpose of this exploration and evaluation was to determine general subsurface conditions at the site and to address applicable geotechnical aspects of the proposed construction and site development. The recommendations in this report are based on a physical reconnaissance of the site and observation and classification of samples obtained from eight (8) test borings conducted at the site. Confirmation of the anticipated subsurface conditions during construction is an essential part of geotechnical services.

We appreciate the opportunity to provide consultation services for the proposed project. If you have any questions regarding the information in this report or need any additional information, please call us.

Respectfully Submitted,
BUILDING & EARTH SCIENCES, INC.
AR Certificate or Authorization NO. 569, Expiration Date 12/31/25

David Price
Field Professional II

Jacob Gatling, P.G.
Geotechnical
Department Manager

Joseph D. Vistad, P.E.
Branch Manager - Principal
AR: 18294
12/14/2023

Table of Contents

1.0 PROJECT & SITE DESCRIPTION

The subject site is located on the existing JC Westside Elementary School Campus at 193 School Street, Hartman, Arkansas. Information relative to the proposed site and the proposed development is listed in Table 1 below. Photographs depicting the current site condition are presented on the following page.

Development Item	Detail	Description
General Site	Size (Ac.)	~ 3.5
	Existing Development	Existing JC Westside Elementary School buildings with associated sidewalks, pavements, and utilities.
	Vegetation	Mostly manicured grass with few large trees.
	Slopes	Site slopes steeply down to the southeast with an elevation change of approximately 19 feet across our boring locations.
	Retaining Walls	None observed.
	Drainage	Site is well drained to southeast by a combination of natural surface drainage and existing stormwater structures.
	Cuts & Fills	Fills of up to 3 feet noted in areas near existing development.
Proposed Buildings	No. of Bldgs	One (1)
	Square Ft.	~ 31,000
	Stories	Single-story throughout the north portion of the addition, two-story at the south portion of the addition.
	Construction	Light gauge steel framed with CMU Block walls (assumed)
	Column Loads	Maximum of 125 kips (assumed)
	Wall Loads	Maximum of 5 kips (assumed)
	Preferred Foundation	Conventional Shallow foundations (assumed)
	Preferred Slab	Slab-on-grade (assumed)
	Retaining Walls	None planned
	Cuts & Fills	Cuts of up to 13 feet for bottom level – FFE 452.0 Cuts and fills of up to 7 feet for top level – FFE 467.0
Pavements	Traffic	Not Provided
	Standard Duty	Rigid and flexible pavement sections with assumed ESAL value of 75,000
	Heavy Duty	Rigid and flexible pavement sections with assumed ESAL value of 300,000

Table 1: Project and Site Description

Table 1 Reference: Site Plan, created by Architecture Plus, Inc., dated 9/21/23.

Table 1 Notes: (see following page)

1. ***If actual loading conditions exceed our anticipated loads, Building & Earth Sciences should be allowed to review the proposed structural design and its effects on our recommendations for foundation design.***
2. ***When a grading plan is finalized, Building & Earth should be allowed to review the plan and its effects on our recommendations.***

Figure 1: Southern site boundary looking north.

Figure 2: Sandstone of the Atoka Formation exposed at the surface.

2.0 SCOPE OF SERVICES

The authorized subsurface exploration was performed on November 29, 2023, in conformance with our proposal BV25279, dated November 8, 2023. Notice to proceed was provided by returning our signed contract documents on November 10, 2023.

The purpose of the geotechnical exploration was to determine general subsurface conditions at specific boring locations and to gather data on which to base a geotechnical evaluation with respect to the proposed construction. The subsurface exploration for this project consisted of eight (8) test borings. The site was drilled using an ATV-mounted Geoprobe 7822DT drill rig equipped with hollow stem augers and an automatic hammer for performing Standard Penetration Tests (SPT) to help evaluate the relative soil strength. Refer to the Appendix for a description of the drilling and sampling procedures.

The boring locations were determined in the field by a representative of our staff using a handheld GPS unit. As such, the boring locations shown on the Boring Location Plan attached to this report should be considered approximate.

The samples recovered during our site investigation were visually classified and specific samples were selected by the project engineer for laboratory analysis. The laboratory analysis consisted of:

Test	ASTM	No. of Tests
Natural Moisture Content	D2216	17
Atterberg Limits	D4318	4
Material Finer Than No. 200 Sieve by Washing	D1140	3

Table 2: Scope of Laboratory Tests

The results of the laboratory analysis are presented on the enclosed Boring Logs and in tabular form in the Appendix of this report. Descriptions of the laboratory tests that were performed are also included in the Appendix.

The information gathered from the exploration was evaluated to determine a suitable foundation type for the proposed structure. The information was also evaluated to help determine if any special subgrade preparation procedures will be required during the earthwork phase of the project.

The results of the work are presented within this report that addresses:

- Site geology.
- Summary of existing surface conditions.
- A description of the subsurface conditions encountered at the boring locations.
- A description of the groundwater conditions observed in the boreholes during drilling. Long-term monitoring was not included in the scope of work.
- Presentation of field and laboratory test results.
- Site preparation considerations including material types to be expected at the site, treatment of any encountered unsuitable soils, excavation considerations, and surface drainage.
- Recommendations to be used for foundation design, including appropriate foundation types, bearing pressures, and depths.
- Presentation of expected total and differential settlements, and recommendations to reduce the expected movements, if appropriate.
- Recommendations to be used for design of slabs-on-grade, including modulus of subgrade reaction.
- Seismic Site Classification per IBC 2021 based on ReMi field data.
- Compaction requirements and recommended criteria to establish suitable material for structural backfill.

Recommended typical minimum flexible and rigid pavement sections based on assumed traffic loading conditions.

3.0 GEOTECHNICAL SITE CHARACTERIZATION

The following discussion is intended to create a general understanding of the site from a geotechnical engineering perspective. It is not intended to be a discussion of every potential geotechnical issue that may arise, nor to provide every possible interpretation of the conditions identified. The following conditions and subsequent recommendations are based on the assumption that significant changes in subsurface conditions do not occur between boreholes. However, anomalous conditions can occur due to variations in existing fill that is present at the site, and the geologic conditions at the site, and it will be necessary to evaluate the assumed conditions during site grading and foundation installation.

3.1 Geology

According to the Geologic Map of Arkansas, published by the Arkansas Geological Commission and the United States Geological Survey, as well as the subsurface information we encountered, the site appears to be underlain by the Atoka Formation.

The Arkansas Geological Commission describes the Atoka Formation as follows:

> A sequence of marine, mostly tan to gray silty sandstones and grayish-black shales. Some rare calcareous beds and siliceous shales are known. This unit has the largest areal extent of any of the Paleozoic formations in the state. It is the surface rock of the Boston Mountains and dominates the exposures in the Arkansas River Valley and the frontal Ouachita Mountains. It is also present in the southern part of the Ouachita Mountains. In the Arkansas River Valley and the frontal Ouachita Mountains, the Atoka Formation has been subdivided into upper, middle, and lower lithic members based on regionally mappable shale or sandstone intervals.
>
> The unit locally contains discontinuous streaks of coal and coaly shale in the Boston Mountains and Arkansas River Valley. Fossil plants, generally poorly preserved, are common throughout the section. Poorly preserved invertebrate fossils are much less common than plant fossils, but have been reported from several horizons. Trace fossils are relatively common in the Atoka Formation. The formation is conformable with the Bloyd Shale in the Boston Mountains and with the Johns Valley Shale in the Ouachita Mountains. The unit may be up to 25,000 feet in thickness in the Ouachita Mountains, although only large incomplete sections are known.

3.2 Existing Surface Conditions

At the time of our exploration the site was occupied by Westside Elementary School. Structures included classroom, administration, and cafeteria buildings, as well as asphalt driveways and parking areas. A large playground area was also observed in the footprint of the proposed building. Markings for underground water utilities were noted running generally north to south through the central portion of the site east. Additionally, underground gas utility markings were noted running east to west near the southern site boundary.

The site generally slopes steeply down to the southeast with elevation change of approximately 19 feet across our boring locations according to elevation information in the provided site plan. The site is well drained to the southeast by a combination of natural surface drainage and existing stormwater structures.

Asphalt was encountered at the surface in borings B-02 and P-01 and was approximately 4 inches in thickness.

Topsoil was encountered at the surface in all remaining boring locations with a thickness of approximately 3 to 4 inches. Topsoil thickness could vary in unexplored portions of the site, particularly around the base of existing trees. For this report, topsoil is defined as the soil horizon which contains the root mat of the noted light vegetation (grass and weeds). No testing has been performed to verify that soils meet any requirement of "topsoil".

3.3 Subsurface Conditions

A generalized stratification summary has been prepared using data from the test borings and is presented in the table below. The stratification depicts the general soil/rock conditions and stratum types encountered during our field investigation.

Stratum No.	Noted Thickness	Description	Relative Density / Rock Hardness	Lab Testing Data
1	2.2 to 3.0' (1)	**Existing Fill Material –** Silty Sand (SM), Clayey Sand with Gravel (SC), and Silty Gravel (GM)	Loose to medium dense to 1.5 to 2.5'. Dense to very dense below	*General Moisture Content Range: 7% to 12%* *Atterberg Limits: SC: LL=28, PI=9* *Fine Content: SC: 25%*
2	2.7 to 6.0' (2)	**Sandy Residuum** – Silty Sand (SM) with varying amounts of gravel, Silty Clayey Sand (SC-SM)	Medium dense to very dense	*General Moisture Content Range: 8% to 21%* *Atterberg Limits: SC-SM: LL=27, PI=6 SM: Non-plastic* *Fine Content: 40%*
3	1.2 to 2.2 (3)	**Gravelly Residuum –** Silty Gravel (GM) with varying amounts of sand	Very dense	*General Moisture Content Range: 4% to 8%* *Atterberg Limits: Non-plastic* *Fine Content: 16%*
4	Termination Layer (4)	**Atoka Formation –** Weathered Sandstone	Cemented to well cemented	*General Moisture Content Range: 3% to 8%*

Table 3: Stratification Summary

Notes:

(1) Encountered in borings B-02, B-06, and P-01 to depths of up to 3.3 feet below present grades.

(2) Encountered in borings B-01, B-02, and B-03 at depth ranging from beneath the topsoil to the contact with weathered sandstone of the Atoka Formation or auger refusal.

(3) Encountered in borings B-04, B-05, and P-02 at depths ranging from beneath the topsoil to the contact with weathered sandstone of the Atoka formation or auger refusal depth.

(4) Weathered sandstone of the Atoka Formation was the termination layer in borings B-01, B-02, B-04, and P-01 at depths ranging from 2.0 to 11 feet below present grades. Although not encountered in our sampling in the remaining borings, sandstone of the Atoka Formation was likely the auger refusal material encountered.

Subsurface profiles have also been prepared based on the data obtained at the specific boring locations are presented in the Appendix. For specific details on the information obtained from individual test borings, please refer to the Boring Logs included in the Appendix.

The ground surface elevations of the borings indicated in this report were estimated based on topographic information in the provided site plan, and as such should be considered approximate.

3.3.1 AUGER REFUSAL

Auger refusal is the drilling depth at which the borehole can no longer be advanced using soil drilling procedures. Auger refusal can occur on boulders, buried debris or bedrock. Coring is required to sample the material below auger refusal. Sampler refusal is encountered when the standard penetration test (SPT) returns fifty (50) hammer blows for 6 inches of penetration or less. Auger and/or sampler refusal was encountered in the following borings at the depths indicated below.

Boring No.	Auger Refusal Depth (ft)	Sampler Refusal Depth (ft)
B-01	5.5	3.5 – 50/3" 5.0 – 50/6"
B-02	11.0	1.5 – 50/3" 8.5 – 50/5" 11.0 – 50/0"
B-03	3.0	2.5 – 50/6"
B-04	2.0	1.5 – 50/1" 2.0 – 50/1"
B-05	2.5	1.0 – 50/1" 2.5 – 50/0"
B-06	3.3	3.0 – 50/4"
P-01	2.6	2.5 – 50/4"
P-02	1.5	1.0 – 50/1" 1.5 – 50/0"

Table 4: Auger and Sampler Refusal Depths

3.3.2 GROUNDWATER

Groundwater was encountered at a depth of 2 feet below present grades in boring P-01 during our subsurface exploration. The water levels reported are accurate only for the time and date that the borings were drilled. Long term monitoring of the boreholes was not included as part of our subsurface exploration. The borings were backfilled the same day that they were drilled.

Although moisture contents were relatively low at the time of our exploration, due to the shallow rock depth encountered at the site, there is a moderate to high probability of perched water conditions forming on top of the rock units during and following rainy periods.

3.3.3 SEISMIC SITE CLASSIFICATION

ReMi testing was performed to determine the Seismic Site Classification of the building addition area. The seismic array run was positioned across the center of the proposed addition, in a southwest-northeast orientation. The array run consisted of 12 geophone receivers and was approximately 289 feet long. The location of the array run appears on the Boring Location Plan. Results of ReMi testing are presented below.

Basis of Evaluation	Site Classification
2015 International Building Code (IBC) and ASCE 7-16, Chapter 20	B
The Geogiga Surface Plus refraction microtremor (ReMi) method was used to determine the Seismic Site Class of the building area. Geogiga Seismic Surface Plus ReMi Vs9.3 software uses data from conventional seismograph and S-wave geophones to estimate average shear wave velocities and one and two-dimensional shear wave profiles to a depth of 100 feet below the existing site grades. These velocities are used to classify a building site with the Site Class A through E designation. The average shear wave velocity (V_s) in the upper 100 feet was 2,761 feet per second (ft/s). The results of the shear wave velocity analysis are attached.	

Table 5: Seismic Site Classification

4.0 SITE DEVELOPMENT CONSIDERATIONS

According to the provided grading plan, the proposed addition has two finished floor elevations. The northern portion of the building will require cuts and fills of up to 7 feet to achieve design grades and the southern portion of the building will require cuts of up to 13 feet to achieve design grades.

Based on our evaluation of the subsurface soil information, and the anticipated foundation loads, it appears that construction with a conventional shallow foundation system is feasible. The site development recommendations outlined below are intended for development of the site to support construction with a conventional shallow foundation system. ***If a different type of foundation system is preferred, Building & Earth should be allowed to review the site development recommendations to verify that they are appropriate for the preferred foundation system.***

The primary geotechnical concerns for this project are:

- Existing fill materials were encountered in the upper 2.5 to 3.3 feet in three (3) of the eight (8) test borings.
- Existing development across the site including buildings, pavements, and utilities.
- Moisture sensitive silty sands and gravels were encountered across the site. These soils are prone to losing strength and stability with fluctuations in soil moisture content.
- Weathered rock materials of the Atoka Formation were encountered across the site at depths ranging from 1.5 to 8.5 feet below present grades. Auger refusal was also encountered at all test boring locations at depths ranging from 1.5 to 11 feet below present grades. The contractor should anticipate the need for rock excavation within portions of the planned building addition.
- Due to the presence of shallow rock units encountered across the site, there is a moderate to high potential for development of perched water conditions during rainy periods and for higher groundwater levels during those periods.

Recommendations addressing the site conditions are presented in the following sections.

4.1 Initial Site Preparation

All topsoil, vegetation, trees, roots, asphalt, pavements, building components, and any other deleterious materials should be removed from the proposed construction areas. Approximately 2 to 6 inches of topsoil was observed in the borings; however, topsoil and pavements could extend to greater depths in unexplored areas of the site. The geotechnical engineer or their designated representative should observe demolition and stripping operations to evaluate that all unsuitable materials are removed from locations for proposed construction.

At the time of our exploration, underground utility markings for water and gas, as well as overhead powerlines were present across the site. It is likely that underground utilities are present within the planned construction areas. All utilities should be removed and/or rerouted outside of the proposed addition footprint and the excavations backfilled in accordance with the requirements outlined in the *Structural Fill* section of this report.

During demolition and removal of existing development at the site, the contractor should anticipate foundations and buried structures, utilities, and fill materials to be present. Further evaluation of these areas should be performed after demolition and prior to construction.

Materials disturbed during clearing operations should be stabilized in place or, if necessary, undercut to undisturbed materials and backfilled with properly compacted, approved structural fill.

During site preparation activities, the contractor should identify borrow source materials that will be used as structural fill and provide samples to the testing laboratory so that conformance to the *Structural Fill* requirements outlined below and appropriate moisture-density relationship curves can be determined.

4.2 Moisture Sensitive Soils

Moisture sensitive silty sands and gravels were encountered near the surface across the site during the subsurface exploration. These soils will degrade if allowed to become saturated. Therefore, not allowing water to pond by maintaining positive drainage and temporary dewatering methods (if required) is important to help avoid degradation and softening of the soils.

The contractor should anticipate some difficulty during the earthwork phase of this project if moisture levels are moderate to high during construction. Increased moisture levels will further soften the subgrade and the soils may become unstable under the influence of construction traffic. Accordingly, construction during wet weather conditions should be avoided, as this could result in soft and unstable soil conditions that would require ground modification, such as in place stabilization or undercutting.

4.3 Thorough Evaluation of Existing Fill Materials

Existing fill materials were encountered in the upper 2.5 to 3.3 feet in three (3) of the eight (8) borings and are likely present in other areas of the site, particularly beneath existing structures. The owner and design team need to understand that there is a risk the fill may contain soft soils, organics, debris, over-sized rock fragments, or other unsuitable materials that could not be reasonably deduced from the widely spaced borings.

The presence of unforeseen conditions, such as those described above, could result in variable and unpredictable settlement resulting in formation of voids below structural elements such as grade supported slabs. As a minimum, we recommend evaluating the exposed fill materials after initial site preparation by means of proofrolling with a tandem-axle, rubber-tired vehicle weighing 20 to 25 tons.

The proofrolling will aid in identifying unstable/soft areas, which will need to be delineated and require further evaluation. Test pits should be excavated within the delineated areas of concern to evaluate the conditions of the fill below exposed subgrade. If any soft/loose soils, organic materials, debris, over-sized rock fragments, or any other unsuitable materials are encountered, these unsuitable materials must be removed full depth from the proposed building area and pavement areas and replaced with low plasticity structural fill.

4.4 Subgrade Evaluation

We recommend the project geotechnical engineer, or their designated representative evaluate the subgrade after the site is prepared. Some unsuitable or unstable areas may be present in unexplored areas of the site. All areas that will require fill or that will support structures should be carefully proofrolled with a heavy (20- to 25-ton minimum), tandem axle truck at the following times.

- After an area has been stripped, and undercut as required, prior to the placement of any fill.
- After grading an area to the finished subgrade elevation in a building or pavement area.
- After areas have been exposed to any precipitation, and/or have been exposed for more than 48 hours.

Some instability may exist during construction, depending on climatic and other factors immediately preceding and during construction. If any soft or otherwise unsuitable soils are identified during the proofrolling process, they must be undercut or stabilized prior to fill placement, pavement construction, or floor slab construction. All unsuitable material identified during construction shall be removed and replaced in accordance with the *Structural Fill* section of this report.

4.5 Structural Fill

Requirements for structural fill on this project are as follows:

Soil Type	USCS Classification	Property Requirements	Placement Location
Imported Lean Clay, Clayey Sand, Clayey Gravel or Shale	CL, SC, GC	LL<40, PI<20, γ_d>100 pcf, P200>15%, Maximum 3" particle size in any dimension	**Low Plasticity Structural Fill** to be used for construction of building pads and below pavements
Onsite Silty Sand, Silty Clayey Sand, Clayey Sand	SM, SC-SM, SC	Same as above	***Likely suitable*** for placement as low plasticity structural fill in building pads and pavements (5)

Table 6: Structural Fill Requirements

Table 6 Notes:

1. All structural fill should be free of vegetation, topsoil, and any other deleterious materials. The organic content of materials to be used for fill should be less than 3 percent.
2. LL indicates the soil Liquid Limit; PI indicates the soil Plasticity Index; P200 indicates the percent of material by weight that passes the #200 sieve; γ_d indicates the maximum dry density as defined by the density standard outlined in the table below.
3. Laboratory testing of the soils proposed for fill must be performed in order to verify their conformance with the above recommendations.
4. Any fill to be placed at the site should be reviewed by the geotechnical engineer.
5. Based on review of the laboratory tests and visual classification, onsite residual soils exhibit non-plastic to low plasticity characteristics. If onsite residual soils are to be used for structural fill, bulk samples of the material should be provided prior to construction for laboratory analysis to determine suitability.

Placement requirements for structural fill are as follows:

Specification	Requirement
Lift Thickness	Maximum loose lift thickness of 8 to 12 inches, depending on type of compaction equipment used.
Density	98% of the standard Proctor (ASTM D698) maximum dry density.
Moisture	2% below to 2% above the optimum moisture content as determined by ASTM D698. *(If locally available shale fill materials are used as structural fill, moisture contents should range from 0 to +4% of the optimum moisture content as determined by ASTM D698)*
Density Testing Frequency	**Building areas**: One test per 2,500 square feet (SF) per lift with a minimum of three tests performed per lift. **Pavement areas**: One test per 5,000 SF per lift with a minimum of three test per lift. **Utility trenches**: One test per 150 linear feet per lift with a minimum of two tests performed per lift.

Table 7: Structural Fill Placement Requirements

4.6 Excavation Considerations

All excavations performed at the site should follow OSHA guidelines for temporary excavations. Excavated soils should be stockpiled according to OSHA regulations to limit the potential cave-in of soils.

4.6.1 Difficult Excavation

Auger refusal was encountered at all test boring locations at depths ranging from 1.5 to 11 feet below present grades. Auger refusal material should be anticipated above the planned subgrade elevation and/or during utility installation. The silty gravels and sands likely contain oversized sandstone fragments (cobbles and boulders) as well as seams and layers of more competent sandstone that cannot be accurately sampled using standard penetration test (SPT) methods.

The depth that weathered rock and rock can be excavated is a function of the material, the equipment used, the skill of the operator, the desired rate of removal and other factors. Large earthmoving equipment in good working condition can be expected to excavate the existing fills and residuum, and can typically rip weathered rock; however, difficult excavation should be anticipated as competent sandstone seams, boulders, and cobbles will likely be encountered. The contractor should review the site conditions and determine the excavation techniques needed. *Rock excavation techniques should be anticipated below the identified auger refusal depths.*

4.6.2 Perched Water

Although groundwater was not encountered at the time of our exploration, the presence of shallow rock units encountered across the site indicates there is a high risk of developing perched water during rainy periods.

Perched water could be encountered during construction, particularly during undercutting operations or utility installation. It should be noted that fluctuations in the water level could occur due to seasonal variations in rainfall. The contractor must be prepared to remove groundwater, or perched water, seepage from excavations if encountered during construction. Excavations extending below groundwater levels will require dewatering systems (such as sump pumps or trench drains). The contractor should evaluate the most economical and practical dewatering method.

4.7 Utility Trench Backfill

All utility trenches must be backfilled and compacted in the manner specified above for structural fill. It may be necessary to reduce the lift thickness to 4 to 6 inches to achieve compaction using hand-operated equipment.

At the perimeter wall crossings, we recommend that clay soils or a flowable fill be used to backfill the utility trench. The clay or flowable fill will act as a relatively impermeable plug reducing the risk of water migration from the outside into the interior of the building. The plug should be at least 36 inches wide and should extend below the perimeter walls to provide for a proper seal.

We recommend utility trenches be completed at all foundation crossings prior to the construction of shallow foundations. Once constructed, soils which support shallow foundations must be protected from undermining by utility excavation or any other means.

4.8 Landscaping and Drainage Consideration

The potential for soil moisture fluctuations within building areas and pavement subgrades should be reduced to lessen the potential of subgrade movement. Site grading should include positive drainage away from buildings and pavements. Excessive irrigation of landscaping poses a risk of saturating and softening soils below shallow footings and pavements, which could result in settlement of footings and premature failure of pavements.

4.9 Wet Weather Construction

Excessive movement of construction equipment across the site during wet weather may result in ruts, which will collect rainwater, prolonging the time required to dry the subgrade soils.

During rainy periods, additional effort will be required to properly prepare the site and establish/maintain an acceptable subgrade. The difficulty will increase in areas where clay or silty soils are exposed at the subgrade elevation. Grading contractors typically postpone grading operations during wet weather to wait for conditions that are more favorable. Contractors can typically disk or aerate the upper soils to promote drying during intermittent periods of favorable weather. When deadlines restrict postponement of grading operations, additional measures such as undercutting and replacing saturated soils or stabilization can be utilized to facilitate placement of additional fill material.

5.0 FOUNDATION RECOMMENDATIONS

Specific structural loading conditions were not known at the time of this report. For the purposes of this report, we assume that the individual column loads will be less than 50 kips and wall loads will be less than 5 kips per linear foot. ***If these assumptions concerning structural loading are incorrect, our office should be contacted, such that our recommendations may be reviewed and revised as appropriate.***

5.1 Shallow Foundations

Structural loading conditions were not available at the time of this report. The analysis and recommendations in this report assume individual column loads will be less than 125 kips and wall loads will be less than 5 kips per linear foot. ***If actual structural loading conditions exceed our assumed values, our office should be contacted, such that our recommendations can be reviewed.***

Based on the conditions encountered during our field investigation and after our site preparation and grading recommendations are implemented, the proposed building can be supported on conventional shallow foundations.

Due to the risk of differential settlement occurring between foundation elements bearing within new structural fill, existing residual soils, and the intact weathered sandstone unit, we recommend all footings bear on residual soils or at least 12 inches of new structural fill material. Sandstone exposed in the bottom of footing excavations should be undercut at least 12 inches below design bearing elevation to allow for placement of structural fill below the bottom of footing. Foundations bearing in the recommended structural fill and residual materials can be designed using a net allowable soil bearing pressure of 3,000 psf.

As an alternative, all shallow foundations may be extended to bear in the weathered sandstone or underlying auger refusal material (assumed to be competent sandstone). Shallow foundations bearing in the weathered or competent sandstone units may be designed using a net allowable bearing pressure of 5,000 psf. ***As noted previously, shallow foundations shall not bear in a combination of rock and soils materials.***

Even though computed footing dimensions may be less, column footings should be at least 24 inches wide and strip footings should be at least 18 inches wide. These dimensions facilitate hand cleaning of footing subgrades disturbed by the excavation process and the placement of reinforcing steel. They also reduce the potential for localized punching shear failure. ***All exterior footings should bear at least 24 inches below the adjacent exterior grade.***

Total settlement of footings designed and constructed as recommended above is estimated to be 1 inch or less. Differential settlement is estimated to be less than ½ inch between any two points spaced 40 feet along footing lines or across floor slabs.

The following items should be considered during the preparation of construction documents and foundation installation:

- The geotechnical engineer of record should observe the exposed foundation bearing surfaces prior to concrete placement to verify that the conditions anticipated during the subsurface exploration are encountered.
- All bearing surfaces must be free of soft or loose soil prior to placing concrete.
- Concrete should be placed the same day the excavations are completed and bearing materials verified by the engineer. If the excavations are left open for an extended period, or if the bearing surfaces are disturbed after the initial observation, then the bearing surfaces should be reevaluated prior to concrete placement.

- Water should not be allowed to pond in foundation excavations prior to concrete placement or above the concrete after the foundation is completed.
- Wherever possible, the foundation concrete should be placed "neat", using the sides of the excavations as forms. Where this is not possible, the excavations created by forming the foundations must be backfilled with suitable structural fill and properly compacted.
- Grades around the building pad should be sloped to drain away from the building foundations.
- Roof drains should be routed away from the foundation subgrade materials.

6.0 FLOOR SLABS

Site development recommendations presented in this report should be followed to provide for subgrade conditions suitable for support of grade supported slabs. Floor slabs will be supported on newly placed and compacted low plasticity structural fill.

We recommend floor slabs for the proposed structure be supported on a minimum four-inch layer of ½-inch up to 1½-inch, free-draining, gap-graded gravel, such as AASHTO No. 57 stone, with no more than 5 percent passing the ASTM No. 200 sieve. The purpose of this layer is to help distribute concentrated loads and act as a capillary break for moisture migration through the subgrade soil. This gravel material should be consolidated in-place with vibratory equipment. The surface of these bases should be choked off with finer material. A clean fine-graded material with a least 10 to 30 % of particles passing a No. 100 sieve but not contaminated with clay, silt or organic material is recommended. With the gravel material, such as AASHTO No. 57 stone, a modulus of subgrade reaction of 150 pci can be used in the design of a grade-supported building floor slab.

We recommend a minimum 10-mil thick vapor retarder meeting ASTM E 1745, Class C requirements be placed directly below the slab-on-grade floors. A higher quality vapor retarder (Class A or B) may be used if desired to further inhibit the migration of moisture through the slab-on-grade and should be evaluated based on the floor covering and use. The vapor retarder should extend to the edge of the slab-on-grade floors and should be sealed at all seams and penetrations. The slab should be appropriately reinforced (if required) to support the proposed loads.

7.0 PAVEMENT CONSIDERATIONS

Specific traffic information was not provided to us at the time of preparing this report. We have assumed standard duty pavements for parking stalls will be subjected to passenger cars, pick-up trucks, and occasional light delivery box trucks with 18-kip Equivalent Single Axle Loads (ESALs) of 75,000. It is anticipated that heavy duty pavements will be subjected to light delivery box truck, school bus, and garbage truck traffic with ESALs of 300,000.

It has been our experience that parking lots experience a certain level of wear and stress greater than roadways designed for similar traffic volumes. Therefore, parking lots are typically designed using the AASHTO method and adjusted based on experience. If the owner would like Building & Earth to assess other likely traffic volumes, we will gladly review other options.

Based on the materials encountered at the boring locations and after our recommendations for site preparation are implemented, flexible pavements recommendations have been based on an estimated California Bearing Ratio (CBR) of 4.

We recommend a CBR test be performed prior to starting construction. Rigid pavement recommendations have been based on an estimated modulus of subgrade reaction, k, of 100 pounds per cubic inch. We have assumed a concrete elastic modulus (Ec) of 3.1 X 10^6 psi, and a concrete modulus of rupture (S'c) of 600 psi.

In addition, we have assumed the following design parameters:

Design Criteria	Value
Design life (Years)	20
Terminal Serviceability	2.0
Reliability	85%
Initial Serviceability	4.2 (Flexible), 4.5 (Rigid)
Standard Deviation	0.45(Flexible), 0.35(Rigid)

Table 8: Assumed Design Parameters

All subgrade, base and pavement construction operations should meet minimum requirements of the *Arkansas Department of Transportation (ArDOT) Standard Specifications for Highway Construction, 2014 edition unless otherwise noted in this report.* The applicable sections of the specifications are identified as follows:

Material	Specification Section
Portland Cement Concrete Pavement	501
Bituminous Asphalt Wearing Layer	407
Bituminous Asphalt Binder Layer	406
Mineral Aggregate Base Materials	303

Table 9: ArDOT Specification Sections

Note: (see following page)

1. Design and use of Marshall mixes shall be as specified in section 404 of the AHTD Standard Specification Edition of 1996. Superpave mixes shall be specified in section 404 of the AHTD Standard Specifications, latest edition.

7.1 Flexible Pavement

The following flexible pavement sections are based on the design parameters presented above: `

Minimum Recommended Thickness (in)		Material
Light Duty	Heavy Duty	
3.5	4.0[1]	HMAC Surface Course
--	--	HMAC Binder Course
6.0	8.0	Class 7 Aggregate Base Course

Table 10: Recommended Flexible Pavement Sections

Notes:

1. To be placed and compacted in maximum 2-inch lifts.

7.2 Rigid Pavement

Minimum Recommended Thickness (in)		Material
Standard Duty	Heavy Duty	
5.0	6.0	Portland Cement Concrete, f'_c=3,500 psi
4.0	4.0	Class 7 Aggregate Base Course

Table 11: Rigid Pavement Recommendations

For access drive approaches, trash compactor pads, loading areas, and other pavement areas that are frequently subject to high traffic loads with frequent braking and turning of wheels, consideration should be given to using a rigid pavement section comprised of seven (7) inches of Portland cement concrete over six (6) inches of crushed aggregate base course.

The concrete should be protected against moisture loss, rapid temperature fluctuations, and construction traffic for several days after placement. All pavements should be sloped for positive drainage. We suggest that a curing compound be applied after the concrete has been finished.

Although not referenced in the ArDOT specifications, based on our experience with project sites in this region and anticipated traffic loads, we recommend Portland cement concrete should have a minimum 28-day compressive strength of 3,500 psi, maximum slump of 4 inches, and air content of 5 to 7 percent.

For rigid pavements, we recommend a jointing plan be developed to control cracking and help preclude surficial migration of water into the base course and subgrade. If a jointing plan includes a widely spaced pattern (spacing typically greater than 30 times the slab thickness), consideration should be given to include steel reinforcement in rigid pavements, per Section 3.4 of the American Association of State Highway and Transportation Officials (AASHTO) Guide for Design of Pavement Structures 1993, and Section 3.8 of the American Concrete Institute (ACI) Guide for the Design and Construction of Concrete Parking Lots. Additionally, we recommend the joints be sealed in order to further preclude surficial moisture migration into the underlying supporting soils.

7.3 Pavement Drainage

All pavements should be sloped, approximately ¼ inch per foot, to provide rapid surface drainage. Water allowed to pond on or adjacent to the pavement could saturate the subgrade and cause premature deterioration of the pavements as a result of loss of strength and stability. Periodic maintenance of the pavement should be anticipated. This should include sealing of cracks and joints and maintaining proper surface drainage to avoid ponding of water on or near the pavement areas.

7.4 Pavement Maintenance

Preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement. Maintenance consists of both localized maintenance (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.

8.0 SUBGRADE REHABILITATION

The subgrade soils often become disturbed during the period between initial site grading and construction of surface improvements. The amount and depth of disturbance will vary with soil type, weather conditions, construction traffic, and drainage.

The engineer should evaluate the subgrade soil during final grading to verify that the subgrade is suitable to receive pavement and/or concrete slab base materials. The final evaluation may include proofrolling or density tests.

Subgrade rehabilitation can become a point of controversy when different contractors are responsible for site grading and building construction. The construction documents should specifically state which contractor will be responsible for maintaining and rehabilitating the subgrade. Rehabilitation may include moisture conditioning and re-compacting soils. When deadlines or weather restrict grading operations, additional measures such as undercutting and replacing saturated soils or chemical stabilization can often be utilized.

9.0 CONSTRUCTION MONITORING

Field verification of site conditions is an essential part of the services provided by the geotechnical consultant. In order to confirm our recommendations, it will be necessary for Building & Earth personnel to make periodic visits to the site during site grading. Typical construction monitoring services are listed below.

- Periodic observations and consultations by a member of our engineering staff during site development
- Continuous monitoring during structural fill placement
- Field density test during structural fill placement
- Observations and verification of the bearing surface exposed after foundation excavation
- Continuous monitoring during drilled pier excavation and installation
- Reinforcing steel inspections
- Molding and testing of concrete cylinders
- Continuous monitoring during pavement installation

10.0 CLOSING AND LIMITATIONS

This report was prepared for Architecture Plus, Inc., for specific application to the JC Westside Primary School Addition project located in Hartman, Arkansas. The information in this report is not transferable. This report should not be used for a different development on the same property without first being evaluated by the engineer.

The recommendations in this report were based on the information obtained from our field exploration and laboratory analysis. The data collected is representative of the locations tested. Variations are likely to occur at other locations throughout the site. Engineering judgment was applied in regards to conditions between borings. It will be necessary to confirm the anticipated subsurface conditions during construction.

This report has been prepared in accordance with generally accepted standards of geotechnical engineering practice. No other warranty is expressed or implied. In the event that changes are made, or anticipated to be made, to the nature, design, or location of the project as outlined in this report, Building & Earth must be informed of the changes and given the opportunity to either verify or modify the conclusions of this report in writing, or the recommendations of this report will no longer be valid.

The scope of services for this project did not include any environmental assessment of the site or identification of pollutants or hazardous materials or conditions. If the owner is concerned about environmental issues Building & Earth would be happy to provide an additional scope of services to address those concerns.

This report is intended for use during design and preparation of specifications and may not address all conditions at the site during construction. Contractors reviewing this information should acknowledge that this document is for design information only.

An article published by the Geoprofessional Business Association (GBA), titled *Important Information About Your Geotechnical Report*, has been included in the Appendix. We encourage all individuals to become familiar with the article to help manage risk.

Appendix Table of Contents

GEOTECHNICAL INVESTIGATION METHODOLOGIES

The subsurface exploration, which is the basis of the recommendations of this report, has been performed in accordance with industry standards. Detailed methodologies employed in the investigation are presented in the following sections.

DRILLING PROCEDURES – STANDARD PENETRATION TEST (ASTM D1586)

At each boring location, soil samples were obtained at standard sampling intervals with a split-spoon sampler. The borehole was first advanced to the sample depth by augering and the sampling tools were placed in the open hole. The sampler was then driven 18 inches into the ground with a 140-pound automatic hammer free-falling 30 inches. The number of blows required to drive the sampler each 6-inch increment was recorded. The initial increment is considered the "seating" blows, where the sampler penetrates loose or disturbed soil in the bottom of the borehole.

The blows required to penetrate the final two (2) increments are added together and are referred to as the Standard Penetration Test (SPT) N-value. The N-value, when properly evaluated, gives an indication of the soil's strength and ability to support structural loads. Many factors can affect the SPT N-value, so this result cannot be used exclusively to evaluate soil conditions.

The SPT testing was performed using a drill rig equipped with an automatic hammer. Automatic hammers mechanically control the height of the hammer drop, and doing so, deliver higher energy efficiency (90 to 99 % efficiency) than manual hammers (60 % efficiency) which are dropped using a manually operated rope and cathead system. Because historic data correlations were developed based on use of a manual hammer, it is necessary to adjust the N-values obtained using an automatic hammer to make these correlations valid. Therefore, an energy correction factor of 1.3 was applied to the recorded field N-values from the automatic hammer for the purpose of our evaluation. The N-values discussed or mentioned in this report and shown on the boring logs are recorded field values.

Samples retrieved from the boring locations were labeled and stored in plastic bags at the jobsite before being transported to our laboratory for analysis. The project engineer prepared Boring Logs summarizing the subsurface conditions at the boring locations.

ReMi® TESTING

Refraction Micrometer (ReMi®) testing was performed to determine the Seismic Site Class. The seismic array run was positioned east to west across the approximate center of the planned warehouse footprint and consisted of 12 geophone receivers. The array run was approximately 288 feet long running north and south, with the borings positioned in the center of the array.

BORING LOG DESCRIPTION

Building & Earth Sciences, Inc. used the gINT software program to prepare the attached boring logs. The gINT program provides the flexibility to custom design the boring logs to include the pertinent information from the subsurface exploration and results of our laboratory analysis. The soil and laboratory information included on our logs is summarized below:

DEPTH AND ELEVATION

The depth below the ground surface and the corresponding elevation are shown in the first two columns.

SAMPLE TYPE

The method used to collect the sample is shown. The typical sampling methods include Split Spoon Sampling, Shelby Tube Sampling, Grab Samples, and Rock Core. A key is provided at the bottom of the log showing the graphic symbol for each sample type.

SAMPLE NUMBER

Each sample collected is numbered sequentially.

BLOWS PER INCREMENT, REC%, RQD%

When Standard Split Spoon sampling is used, the blows required to drive the sampler each 6-inch increment are recorded and shown in column 5. When rock core is obtained the recovery ration (REC%) and Rock Quality Designation (RQD%) is recorded.

SOIL DATA

Column 6 is a graphic representation of four different soil parameters. Each of the parameters use the same graph, however, the values of the graph subdivisions vary with each parameter. Each parameter presented on column 6 is summarized below:

- N-value- The Standard Penetration Test N-value, obtained by adding the number of blows required to drive the sampler the final 12 inches, is recorded . The graph labels range from 0 to 50.
- Qu – Unconfined Compressive Strength estimate from the Pocket Penetrometer test in tons per square foot (tsf). The graph labels range from 0 to 5 tsf.
- Atterberg Limits – The Atterberg Limits are plotted with the plastic limit to the left, and liquid limit to the right, connected by a horizontal line. The difference in the plastic and liquid limits is referred to as the Plasticity Index. The Atterberg Limits test results are also included in the Remarks column on the far right of the boring log. The Atterberg Limits graph labels range from 0 to 100%.
- Moisture – The Natural Moisture Content of the soil sample as determined in our laboratory.

SOIL DESCRIPTION

The soil description prepared in accordance with ASTM D2488, Visual Description of Soil Samples. The Munsel Color chart is used to determine the soil color. Strata changes are indicated by a solid line, with the depth of the change indicated on the left side of the line and the elevation of the change indicated on the right side of the line. If subtle changes within a soil type occur, a broken line is used. The Boring Termination or Auger Refusal depth is shown as a solid line at the bottom of the boring.

GRAPHIC

The graphic representation of the soil type is shown. The graphic used for each soil type is related to the Unified Soil Classification chart. A chart showing the graphic associated with each soil classification is included.

REMARKS

Remarks regarding borehole observations, and additional information regarding the laboratory results and groundwater observations.

SOIL CLASSIFICATION METHODOLOGY

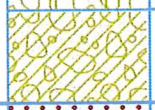
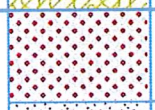
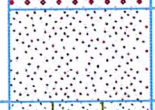
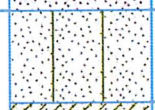
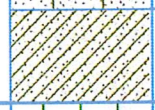
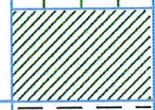
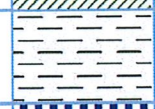
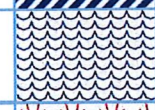
Major Divisions			Symbols: Lithology	Symbols: Group	Group Name & Typical Description
Coarse Grained Soils More than 50% of material is larger than No. 200 sieve size	**Gravel and Gravelly Soils** More than 50% of coarse fraction is larger than No. 4 sieve	**Clean Gravels** (Less than 5% fines)		**GW**	Well-graded gravels, gravel – sand mixtures, little or no fines
				**GP**	Poorly-graded gravels, gravel – sand mixtures, little or no fines
		Gravels with Fines (More than 12% fines)		**GM**	Silty gravels, gravel – sand – silt mixtures
				**GC**	Clayey gravels, gravel – sand – clay mixtures
	Sand and Sandy Soils More than 50% of coarse fraction is smaller than No. 4 sieve	**Clean Sands** (Less than 5% fines)		**SW**	Well-graded sands, gravelly sands, little or no fines
				**SP**	Poorly-graded sands, gravelly sands, little or no fines
		Sands with Fines (More than 12% fines)		**SM**	Silty sands, sand – silt mixtures
				**SC**	Clayey sands, sand – clay mixtures
Fine Grained Soils More than 50% of material is smaller than No. 200 sieve size	**Silts and Clays** Liquid Limit less than 50	**Inorganic**		**ML**	Inorganic silts and very find sands, rock flour, silty or clayey fine sands or clayey silt with slight plasticity
				**CL**	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		Organic		**OL**	Organic silts and organic silty clays of low plasticity
	Silts and Clays Liquid Limit greater than 50	**Inorganic**		**MH**	Inorganic silts, micaceous or diatomaceous fine sand, or silty soils
				**CH**	Inorganic clays of high plasticity
		Organic		**OH**	Organic clays of medium to high plasticity, organic silts
Highly Organic Soils				**PT**	Peat, humus, swamp soils with high organic contents

Table 1: Soil Classification Chart (based on ASTM D2487)

SOIL CLASSIFICATION METHODOLOGY

Building & Earth Sciences classifies soil in general accordance with the Unified Soil Classification System (USCS) presented in ASTM D2487. Table 1 and Figure 1 exemplify the general guidance of the USCS. Soil consistencies and relative densities are presented in general accordance with Terzaghi, Peck, & Mesri's (1996) method, as shown on Table 2, when quantitative field and/or laboratory data is available. Table 2 includes Consistency and Relative Density correlations with N-values obtained using either a manual hammer (60 percent efficiency) or automatic hammer (90 percent efficiency). The *Blows Per Increment* and *SPT N-values* displayed on the boring logs are the unaltered values measured in the field. When field and/or laboratory data is not available, we may classify soil in general accordance with the Visual Manual Procedure presented in ASTM D2488.

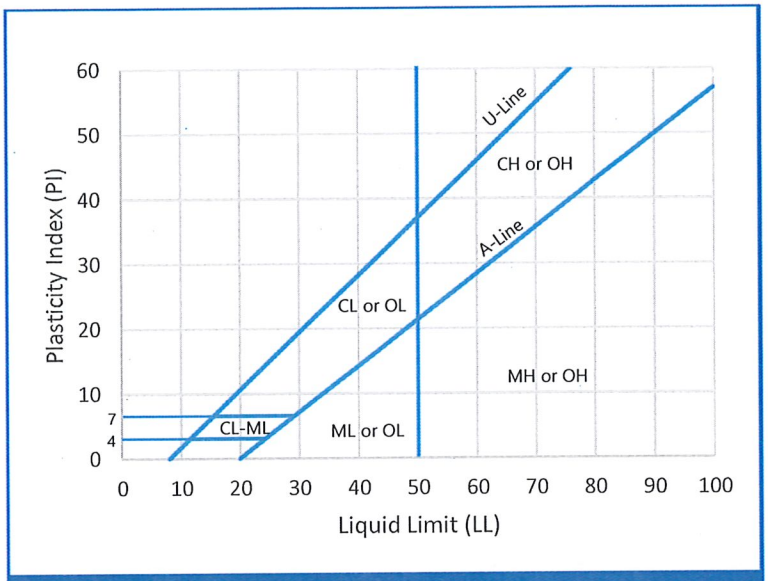


Figure 1: Plasticity Chart (based on ASTM D2487)

Non-cohesive: Coarse-Grained Soil			Cohesive: Fine-Grained Soil			
SPT Penetration (blows/foot)		Relative Density	SPT Penetration (blows/foot)		Consistency	Estimated Range of Unconfined Compressive Strength (tsf)
Automatic Hammer*	Manual Hammer		Automatic Hammer*	Manual Hammer		
			< 2	< 2	Very Soft	< 0.25
0 - 3	0 - 4	Very Loose	2 - 3	2 - 4	Soft	0.25 – 0.50
3 - 8	4 - 10	Loose	3 - 6	4 - 8	Medium Stiff	0.50 – 1.00
8 - 23	10 - 30	Medium Dense	6 - 12	8 - 15	Stiff	1.00 – 2.00
23 - 38	30 - 50	Dense	12 - 23	15 - 30	Very Stiff	2.00 – 4.00
> 38	> 50	Very Dense	> 23	> 30	Hard	> 4.00

Table 2: Soil Consistency and Relative Density (based on Terzaghi, Peck & Mesri, 1996)

* - Modified based on 80% hammer efficiency

	Standard Penetration Test ASTM D1586 or AASHTO T-206		Dynamic Cone Penetrometer (Sower DCP) ASTM STP-399
	Shelby Tube Sampler ASTM D1587		No Sample Recovery
	Rock Core Sample ASTM D2113		Groundwater at Time of Drilling
	Auger Cuttings		Groundwater as Indicated

Table 1: Symbol Legend

Soil	Particle Size	U.S. Standard
Boulders	Larger than 300 mm	N.A.
Cobbles	300 mm to 75 mm	N.A.
Gravel	75 mm to 4.75 mm	3-inch to #4 sieve
Coarse	75 mm to 19 mm	3-inch to ¾-inch sieve
Fine	19 mm to 4.75 mm	¾-inch to #4 sieve
Sand	4.75 mm to 0.075 mm	#4 to #200 Sieve
Coarse	4.75 mm to 2 mm	#4 to #10 Sieve
Medium	2 mm to 0.425 mm	#10 to #40 Sieve
Fine	0.425 mm to 0.075 mm	#40 to #200 Sieve
Fines	Less than 0.075 mm	Passing #200 Sieve
Silt	Less than 5 µm	N.A.
Clay	Less than 2 µm	N.A.

Table 2: Standard Sieve Sizes

N-Value 	Standard Penetration Test Resistance calculated using ASTM D1586 or AASHTO T-206. Calculated as sum of original, field recorded values.	Atterberg Limits  PL LL	A measure of a soil's plasticity characteristics in general accordance with ASTM D4318. The soil Plasticity Index (PI) is representative of this characteristic and is bracketed by the Liquid Limit (LL) and the Plastic Limit (PL).
Qu 	Unconfined compressive strength, typically estimated from a pocket penetrometer. Results are presented in tons per square foot (tsf).	% Moisture	Percent natural moisture content in general accordance with ASTM D2216.

Table 3: Soil Data

Hollow Stem Auger	Flights on the outside of the shaft advance soil cuttings to the surface. The hollow stem allows sampling through the middle of the auger flights.
Mud Rotary / Wash Bore	A cutting head advances the boring and discharges a drilling fluid to support the borehole and circulate cuttings to the surface.
Solid Flight Auger	Flights on the outside bring soil cuttings to the surface. Solid stem requires removal from borehole during sampling.
Hand Auger	Cylindrical bucket (typically 3-inch diameter and 8 inches long) attached to a metal rod and turned by human force.

Table 4: Soil Drilling Methods

Descriptor	Meaning
Trace	Likely less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

Table 5: Descriptors

Manual Hammer	The operator tightens and loosens the rope around a rotating drum assembly to lift and drop a sliding, 140-pound hammer falling 30 inches.
Automatic Trip Hammer	An automatic mechanism is used to lift and drop a sliding, 140-pound hammer falling 30 inches.
Dynamic Cone Penetrometer (Sower DCP) ASTM STP-399	Uses a 15-pound steel mass falling 20 inches to strike an anvil and cause penetration of a 1.5-inch diameter cone seated in the bottom of a hand augered borehole. The blows required to drive the embedded cone a depth of 1-3/4 inches have been correlated by others to N-values derived from the Standard Penetration Test (SPT).

Table 6: Sampling Methods

Non-plastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be re-rolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be re-rolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

Table 7: Plasticity

Dry	Absence of moisture, dusty, dry to the touch.
Moist	Damp but no visible water.
Wet	Visible free water, usually soil is below water table.

Table 8: Moisture Condition

Stratified	Alternating layers of varying material or color with layers at least ½ inch thick.
Laminated	Alternating layers of varying material or color with layers less than ¼ inch thick.
Fissured	Breaks along definite planes of fracture with little resistance to fracturing.
Slickensides	Fracture planes appear polished or glossy, sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
Homogeneous	Same color and appearance throughout.

Table 9: Structure

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KEY TO HATCHES

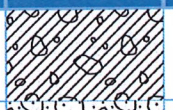
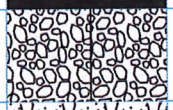
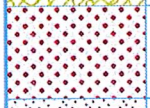
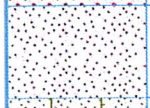
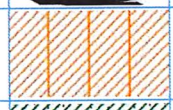
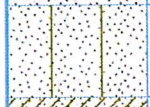
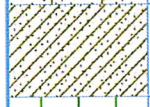
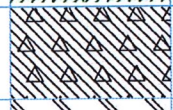
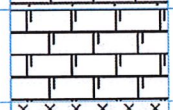
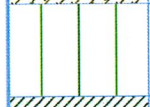
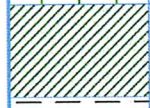
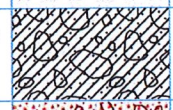
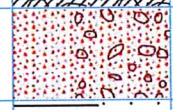
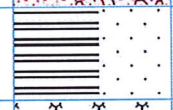
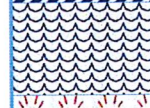
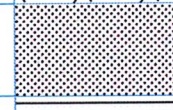
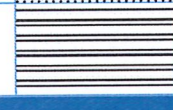
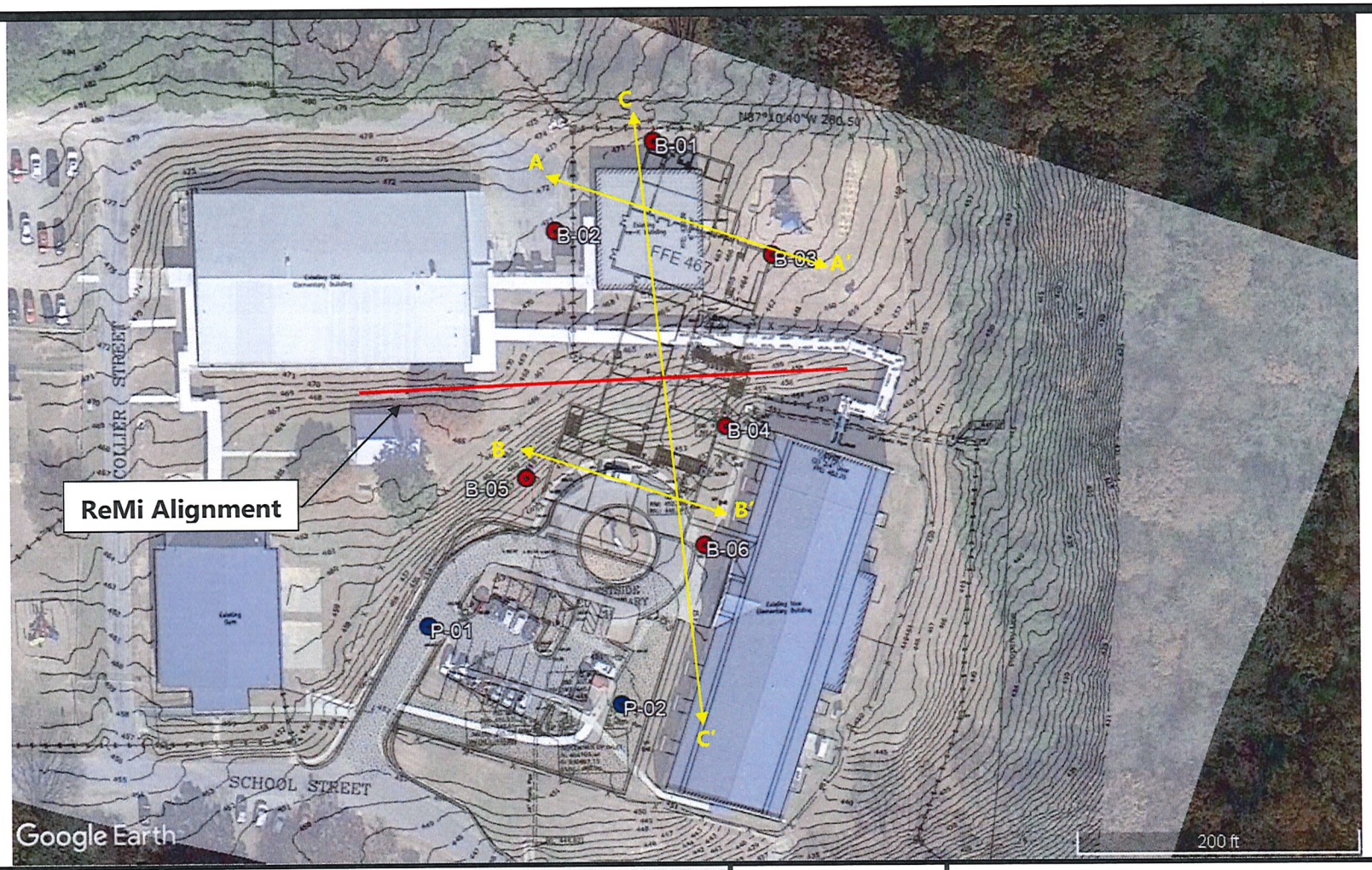
Hatch	Description	Hatch	Description	Hatch	Description
	**GW** - *Well-graded gravels, gravel – sand mixtures, little or no fines*		*Asphalt*		*Clay with Gravel*
	**GP** - *Poorly-graded gravels, gravel – sand mixtures, little or no fines*		*Aggregate Base*		*Sand with Gravel*
	**GM** - *Silty gravels, gravel – sand – silt mixtures*		*Topsoil*		*Silt with Gravel*
	**GC** - *Clayey gravels, gravel – sand – clay mixtures*		*Concrete*		*Gravel with Sand*
	**SW** - *Well-graded sands, gravelly sands, little or no fines*		*Coal*		*Gravel with Clay*
	**SP** - *Poorly-graded sands, gravelly sands, little or no fines*		**CL-ML** - *Silty Clay*		*Gravel with Silt*
	**SM** - *Silty sands, sand – silt mixtures*		*Sandy Clay*		*Limestone*
	**SC** - *Clayey sands, sand – clay mixtures*		*Clayey Chert*		*Chalk*
	**ML** - *Inorganic silts and very find sands, rock flour, silty or clayey fine sands or clayey silt with slight plasticity*		*Low and High Plasticity Clay*		*Siltstone*
	**CL** - *Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays*		*Low Plasticity Silt and Clay*		*Till*
	**OL** - *Organic silts and organic silty clays of low plasticity*		*High Plasticity Silt and Clay*		*Sandy Clay with Cobbles and Boulders*
	**MH** - *Inorganic silts, micaceous or diatomaceous fine sand, or silty soils*		*Fill*		*Sandstone with Shale*
	**CH** - *Inorganic clays of high plasticity*		*Weathered Rock*		*Coral*
	**OH** - *Organic clays of medium to high plasticity, organic silts*		*Sandstone*		*Boulders and Cobbles*
	**PT** - *Peat, humus, swamp soils with high organic contents*		*Shale*		*Soil and Weathered Rock*

Table 1: Key to Hatches Used for Boring Logs and Soil Profiles

BORING LOCATION PLAN



REFERENCE USED TO PRODUCE THIS DRAWING: Google Earth Satellite Imagery dated 11/14/19 with overlay of Site Plan, created by Architecture Plus, Inc., dated 9/21/23.	**BORING LOCATION PLAN**		**DATE: 11/29/2023**
	PROJECT NO. BV230163	**PROJECT NAME / LOCATION:** JC Westside Primary School Addition Hartman, Arkansas	**SCALE:** As Shown

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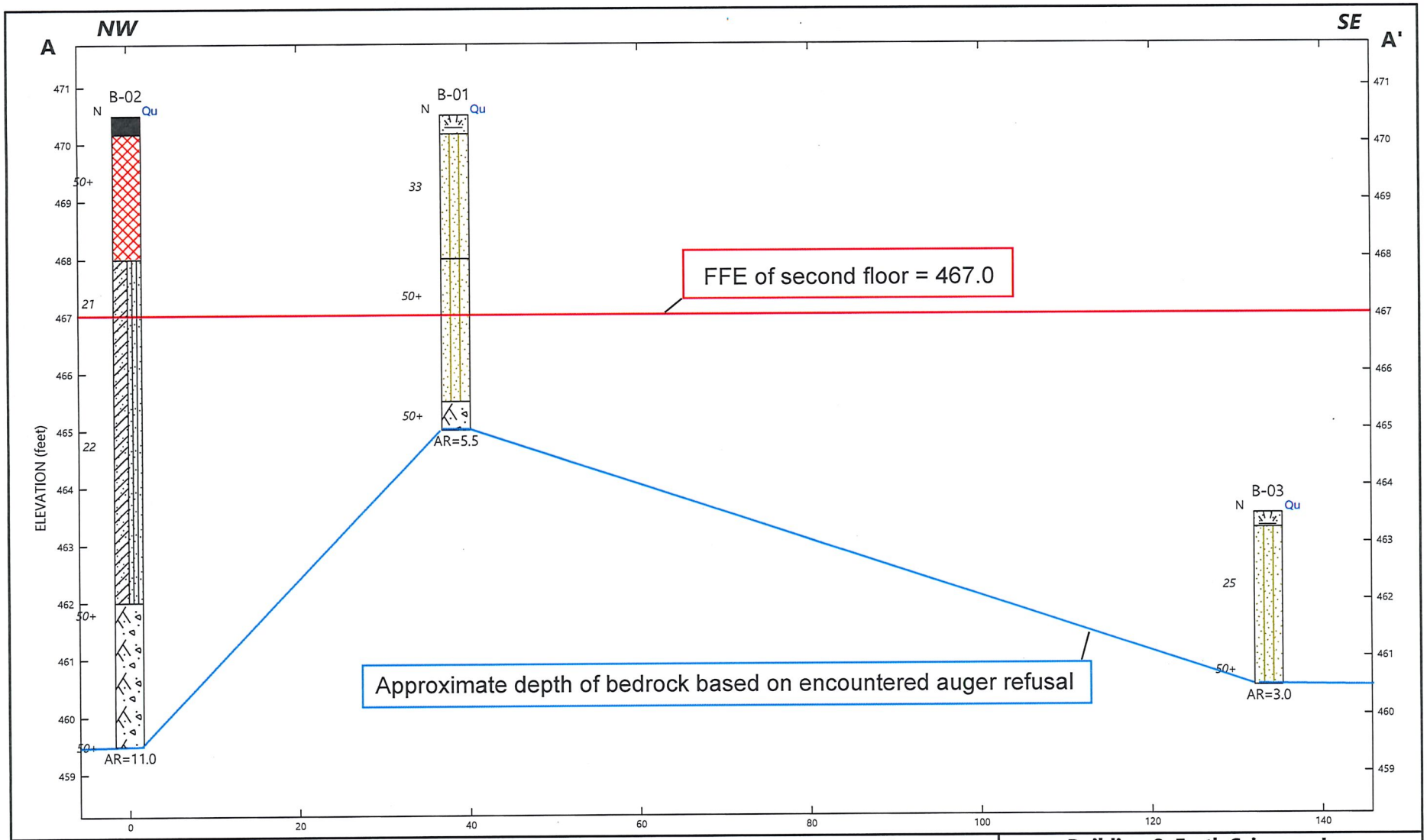
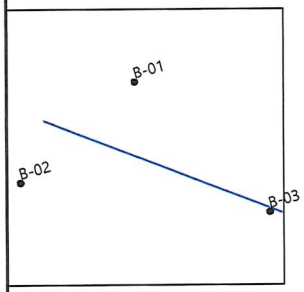
SUBSURFACE PROFILES





Site Map Scale 1 inch equals 100 feet

Key to Hatches

- Topsoil
- Asphalt
- USCS Silty Sand
- Fill
- Weathered Rock
- USCS Silty Clayey Sand

Legend

BT=Boring Termination, TPT=Test Pit Terminated
AR=Auger Refusal, ER=Excavation Refusal
N=Standard Penetration Test N-Value
Qu=Unconfined compressive strength estimate from pocket penetrometer test (tsf)
Water Level Reading at time of drilling.
Water Level Reading after drilling.

0 17

Horizontal Scale (feet)
Vertical Exaggeration: 7x

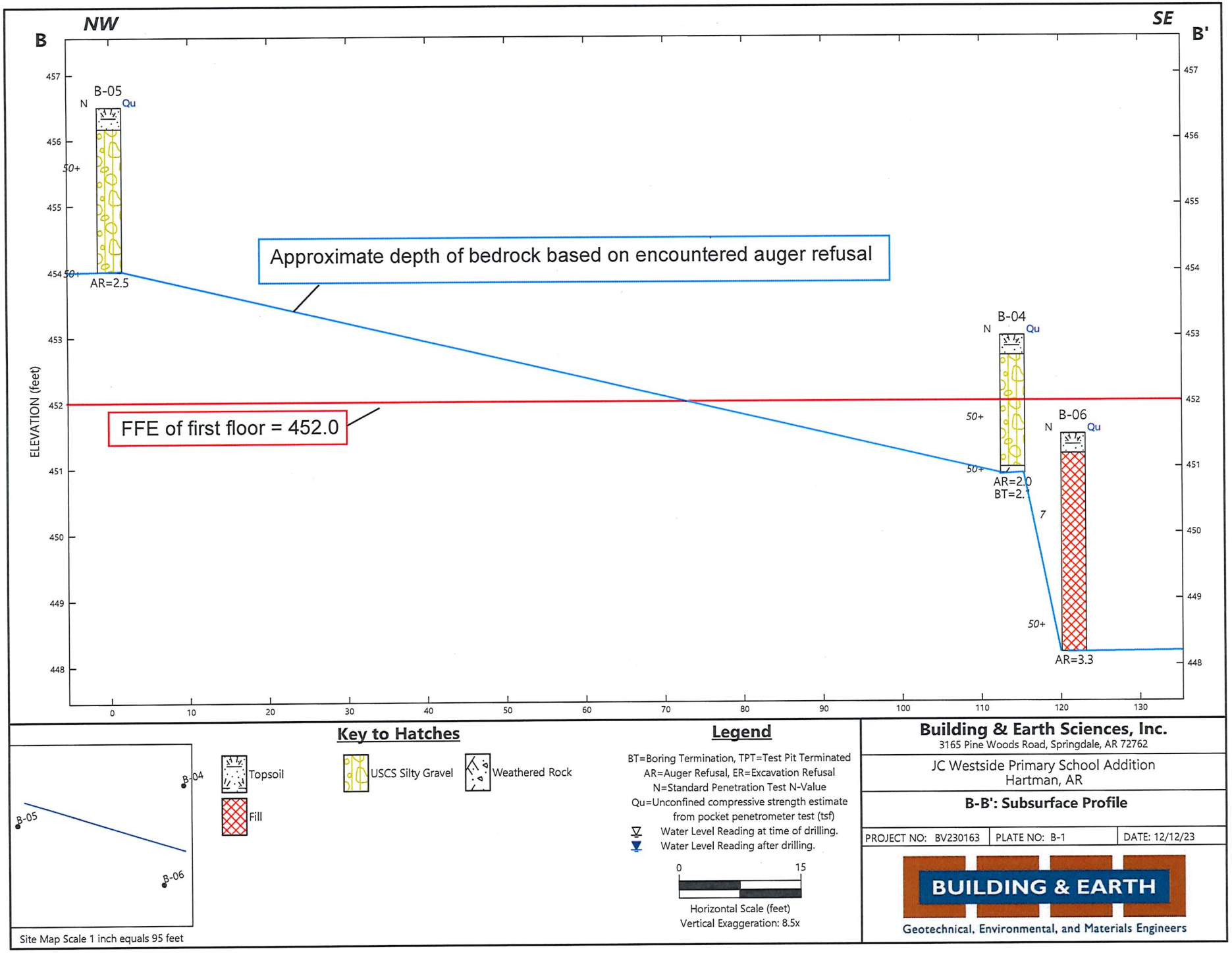
Building & Earth Sciences, Inc.
3165 Pine Woods Road, Springdale, AR 72762

JC Westside Primary School Addition
Hartman, AR

A-A': Subsurface Profile

PROJECT NO: BV230163	PLATE NO: A-1	DATE: 12/12/23

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers



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JC Westside Primary School Addition
Hartman, AR

B-B': Subsurface Profile

PROJECT NO: BV230163	PLATE NO: B-1	DATE: 12/12/23

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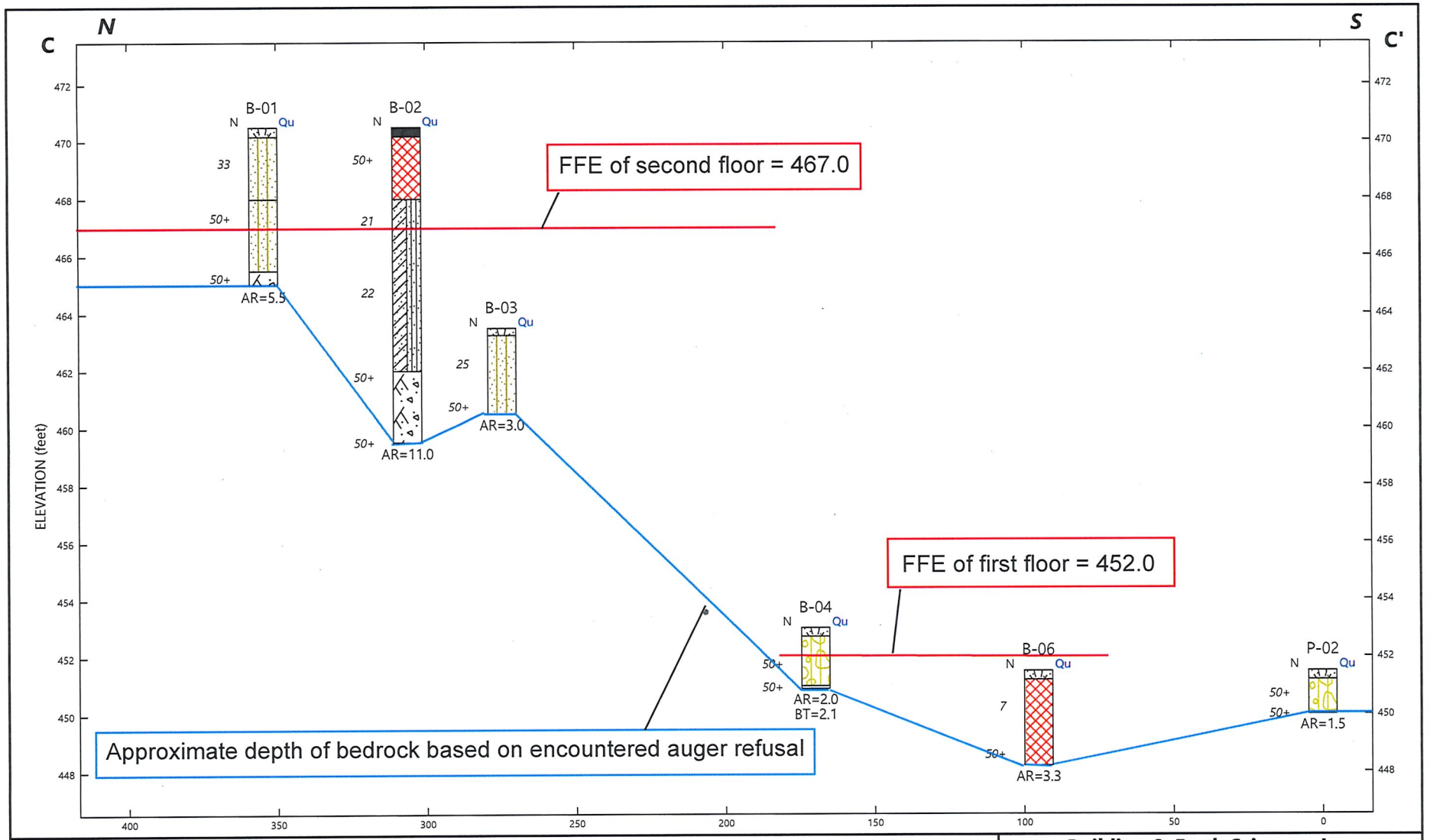

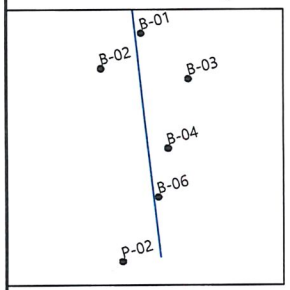

Site Map Scale 1 inch equals 290 feet

Key to Hatches

- Topsoil
- Asphalt
- USCS Silty Gravel
- USCS Silty Sand
- Fill
- Weathered Rock
- USCS Silty Clayey Sand

Legend

BT=Boring Termination, TPT=Test Pit Terminated
AR=Auger Refusal, ER=Excavation Refusal
N=Standard Penetration Test N-Value
Qu=Unconfined compressive strength estimate from pocket penetrometer test (tsf)
Water Level Reading at time of drilling.
Water Level Reading after drilling.

0 47
Horizontal Scale (feet)
Vertical Exaggeration: 9.5x

Building & Earth Sciences, Inc.
3165 Pine Woods Road, Springdale, AR 72762

JC Westside Primary School Addition
Hartman, AR

C-C': Subsurface Profile

PROJECT NO: BV230163	PLATE NO: C'	DATE: 12/12/23

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BORING LOGS

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: B-01

Sheet 1 of 1

3165 Pine Woods Road
Springdale, AR 72762
Office: (479) 756-1555

PROJECT NAME: JC Westside Primary School Addition
PROJECT NUMBER: BV230163
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT USED: Geoprobe 7822DT
HAMMER TYPE: Automatic
BORING LOCATION: North addition corner

LOCATION: Hartman, AR
DATE DRILLED: 11/29/23
WEATHER: Sunny, cold
ELEVATION: 470.5
DRILL CREW: Building & Earth
LOGGED BY: D. Price

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	N-Value / Qu (tsf) / Atterberg Limits / % Moisture	LAB DATA	SOIL DESCRIPTION	GRAPHIC	REMARKS
	470						0.3 TOPSOIL: ~ 4 in — 470.2		
			S-01	2 3 30		Sample S-01 M: 11.0%	SILTY SAND (SM): dense, reddish brown, gray, low plasticity, moist, ferrous staining, sandstone seams, trace roots, few clay pockets, (RESIDUAL)		Loose to about 1.5 feet
			S-02	20 38 50/3"	>>	Sample S-02 M: 7.9%	2.5 — 468.0 SILTY SAND WITH GRAVEL (SM): very dense, light reddish brown, light gray, low plasticity, moist, sandstone fragments, (RESIDUAL)		
5			S-03	50/6"	>>	Sample S-03 M: 6.4%	5.0 — 465.5 5.5 WEATHERED SANDSTONE: cemented, gray, grayish brown, (ATOKA) — 465.0 Auger Refusal at 5.5 feet.		
	465								
10									
	460								Groundwater not encountered at time of drilling. Borehole backfilled on date drilled unless otherwise noted. Consistency/Relative Density based on correction factor for Automatic hammer.

SAMPLE TYPE ☒ Split Spoon

LL: LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
PL: PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
PI: PLASTICITY INDEX
Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGT

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Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

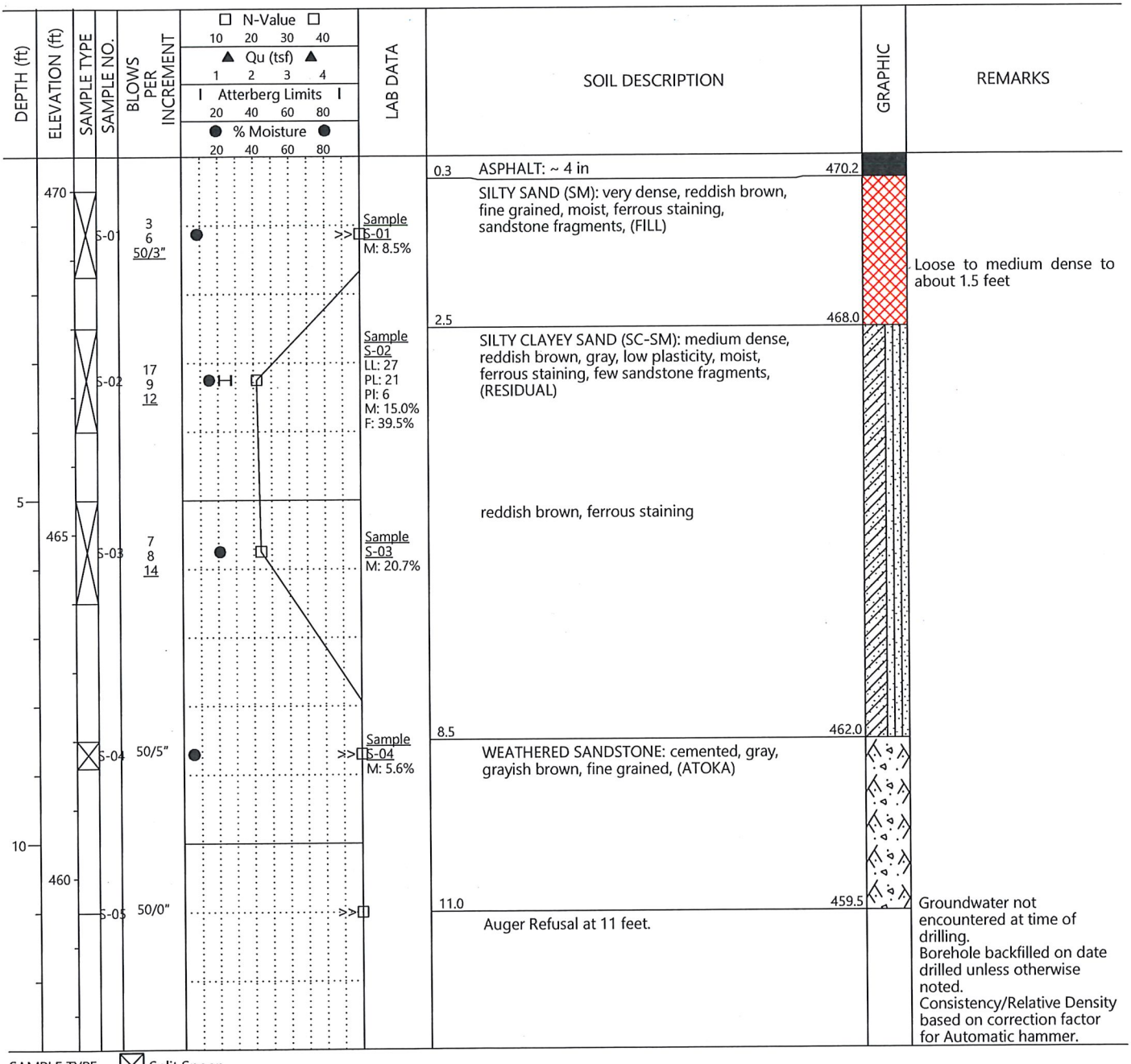
Designation: B-02

Sheet 1 of 1

3165 Pine Woods Road
Springdale, AR 72762
Office: (479) 756-1555

PROJECT NAME: JC Westside Primary School Addition
PROJECT NUMBER: BV230163
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT USED: Geoprobe 7822DT
HAMMER TYPE: Automatic
BORING LOCATION: Northwest addition corner

LOCATION: Hartman, AR
DATE DRILLED: 11/29/23
WEATHER: Sunny, cold
ELEVATION: 470.5
DRILL CREW: Building & Earth
LOGGED BY: D. Price



SAMPLE TYPE ☒ Split Spoon

LL: LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
PL: PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
PI: PLASTICITY INDEX
Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGT

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Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: B-03

Sheet 1 of 1

3165 Pine Woods Road
Springdale, AR 72762
Office: (479) 756-1555

PROJECT NAME: JC Westside Primary School Addition
PROJECT NUMBER: BV230163
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT USED: Geoprobe 7822DT
HAMMER TYPE: Automatic
BORING LOCATION: Northeast addition corner

LOCATION: Hartman, AR
DATE DRILLED: 11/29/23
WEATHER: Sunny, cold
ELEVATION: 463.5
DRILL CREW: Building & Earth
LOGGED BY: D. Price

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	N-Value / Qu (tsf) / Atterberg Limits / % Moisture	LAB DATA	SOIL DESCRIPTION	GRAPHIC	REMARKS
0	463.5						0.3 TOPSOIL: ~ 3 in (463.3)		
							SILTY SAND WITH GRAVEL (SM): dense, gray, reddish brown, fine to medium grained, moist, ferrous staining, sandstone fragments, (RESIDUAL)		
		☒	S-01	12 12 13		Sample S-01 LL: NP PL: NP PI: NP M: 8.6%			
		☒	S-02	50/6"	>>	Sample S-02 M: 7.7%	very dense, ferrous staining		
	460						3.0 (460.5) Auger Refusal at 3 feet.		
5									
	455								
10									Groundwater not encountered at time of drilling. Borehole backfilled on date drilled unless otherwise noted. Consistency/Relative Density based on correction factor for Automatic hammer.

SAMPLE TYPE ☒ Split Spoon

LL: LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
PL: PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
PI: PLASTICITY INDEX
Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGT

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

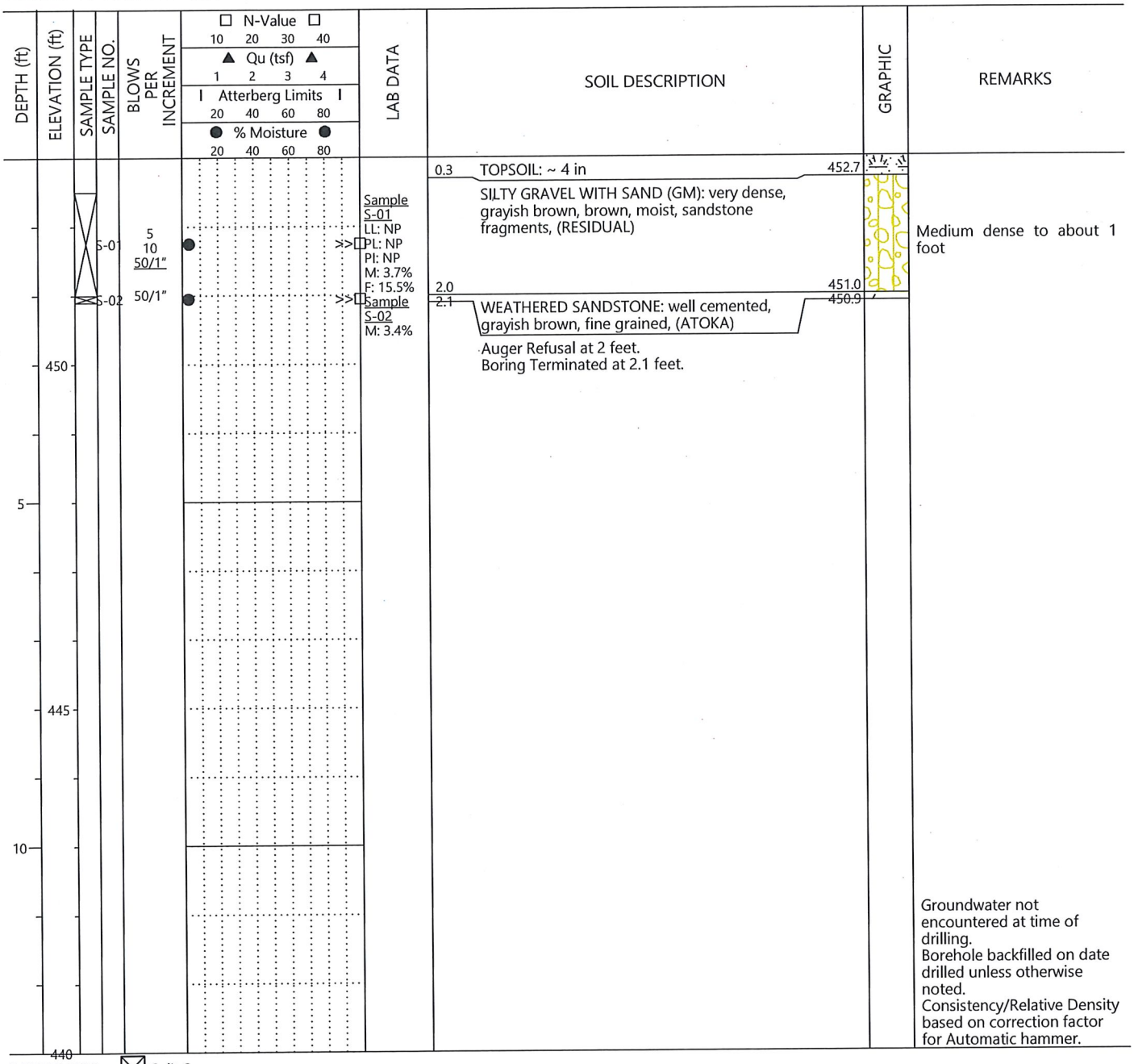
Designation: B-04

Sheet 1 of 1

3165 Pine Woods Road
Springdale, AR 72762
Office: (479) 756-1555

PROJECT NAME: JC Westside Primary School Addition
PROJECT NUMBER: BV230163
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT USED: Geoprobe 7822DT
HAMMER TYPE: Automatic
BORING LOCATION: East wall of addition

LOCATION: Hartman, AR
DATE DRILLED: 11/29/23
WEATHER: Sunny, cold
ELEVATION: 453.0
DRILL CREW: Building & Earth
LOGGED BY: D. Price



SAMPLE TYPE ☒ Split Spoon

LL: LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
PL: PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
PI: PLASTICITY INDEX
Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGT

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: B-05

Sheet 1 of 1

3165 Pine Woods Road
Springdale, AR 72762
Office: (479) 756-1555

PROJECT NAME: JC Westside Primary School Addition
PROJECT NUMBER: BV230163
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT USED: Geoprobe 7822DT
HAMMER TYPE: Automatic
BORING LOCATION: Southwest addtion corner

LOCATION: Hartman, AR
DATE DRILLED: 11/29/23
WEATHER: Sunny, cold
ELEVATION: 456.5
DRILL CREW: Building & Earth
LOGGED BY: D. Price

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	N-Value / Qu (tsf) / Atterberg Limits / % Moisture	LAB DATA	SOIL DESCRIPTION	GRAPHIC	REMARKS
0	456.5						0.3 TOPSOIL: ~ 4 in — 456.2		
		⊠	S-01	1 50/4"	●	Sample S-01 M: 8.0%	SANDY SILTY GRAVEL (GM): very dense, grayish brown, gray, moist, sandstone fragments, few clay pockets, (RESIDUAL)		Loose to about 1 foot
	455						2.5 — 454.0		
		⊠	S-02	50/0"			Auger Refusal at 2.5 feet.		
5	450								
10	445								Groundwater not encountered at time of drilling. Borehole backfilled on date drilled unless otherwise noted. Consistency/Relative Density based on correction factor for Automatic hammer.

SAMPLE TYPE ⊠ Split Spoon

LL: LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
PL: PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
PI: PLASTICITY INDEX
Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGT

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

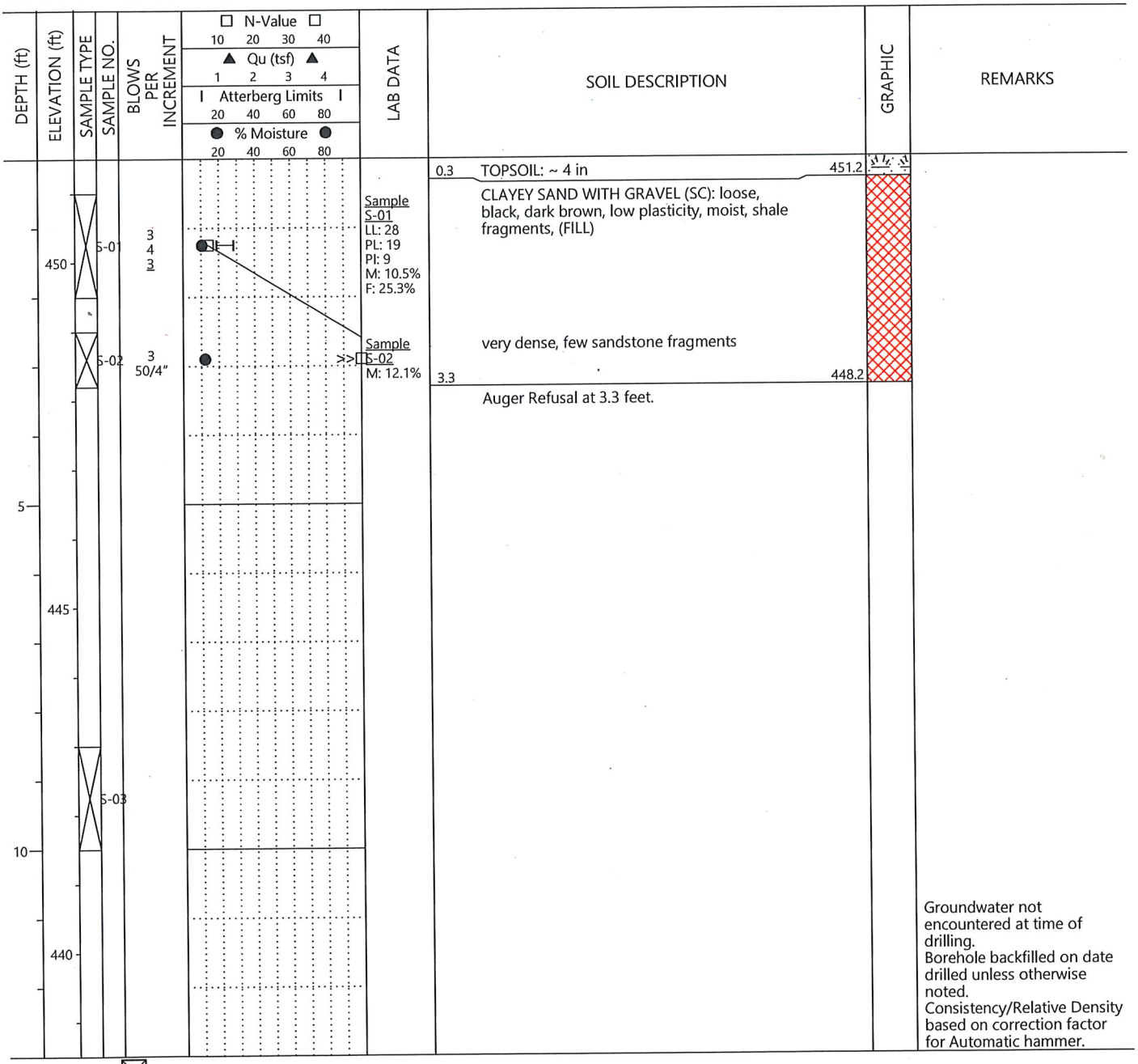
Designation: B-06

Sheet 1 of 1

3165 Pine Woods Road
Springdale, AR 72762
Office: (479) 756-1555

PROJECT NAME: JC Westside Primary School Addition
PROJECT NUMBER: BV230163
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT USED: Geoprobe 7822DT
HAMMER TYPE: Automatic
BORING LOCATION: Southeast addition corner

LOCATION: Hartman, AR
DATE DRILLED: 11/29/23
WEATHER: Sunny, cold
ELEVATION: 451.5
DRILL CREW: Building & Earth
LOGGED BY: D. Price



SAMPLE TYPE ☒ Split Spoon

LL: LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
PL: PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
PI: PLASTICITY INDEX
Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGT

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

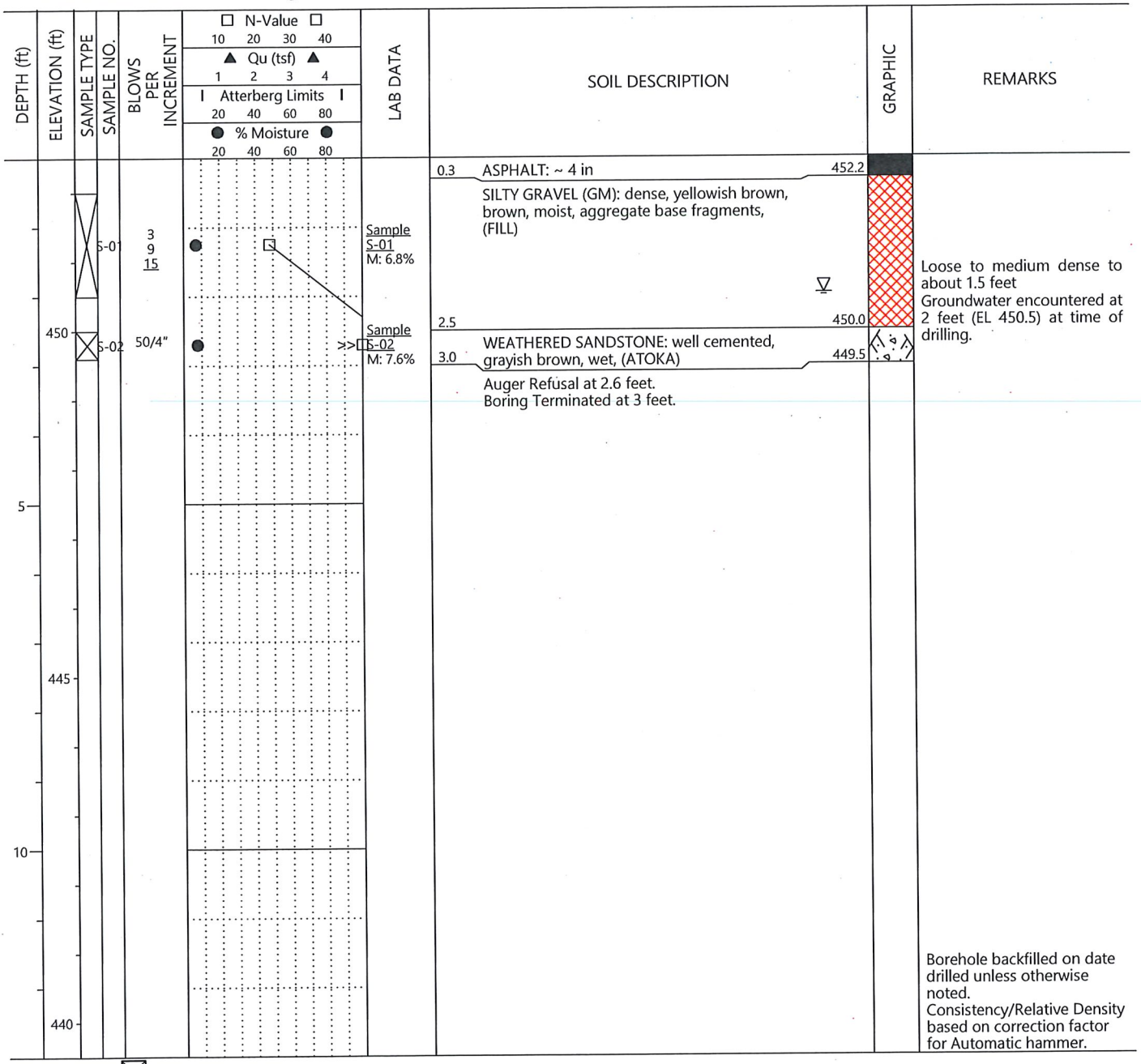
Designation: P-01

Sheet 1 of 1

3165 Pine Woods Road
Springdale, AR 72762
Office: (479) 756-1555

PROJECT NAME: JC Westside Primary School Addition
PROJECT NUMBER: BV230163
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT USED: Geoprobe 7822DT
HAMMER TYPE: Automatic
BORING LOCATION: West Parking Drive

LOCATION: Hartman, AR
DATE DRILLED: 11/29/23
WEATHER: Sunny, cold
ELEVATION: 452.5
DRILL CREW: Building & Earth
LOGGED BY: D. Price



SAMPLE TYPE ☒ Split Spoon

LL: LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
PL: PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
PI: PLASTICITY INDEX
Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGT

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: P-02

Sheet 1 of 1

3165 Pine Woods Road
Springdale, AR 72762
Office: (479) 756-1555

PROJECT NAME: JC Westside Primary School Addition
PROJECT NUMBER: BV230163
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT USED: Geoprobe 7822DT
HAMMER TYPE: Automatic
BORING LOCATION: East Parking Drive

LOCATION: Hartman, AR
DATE DRILLED: 11/29/23
WEATHER: Sunny, cold
ELEVATION: 451.5
DRILL CREW: Building & Earth
LOGGED BY: D. Price

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	N-Value / Qu (tsf) / Atterberg Limits / % Moisture	LAB DATA	SOIL DESCRIPTION	GRAPHIC	REMARKS
							0.3 TOPSOIL: ~ 4 in — 451.2		
		☒	S-01	13	●	Sample S-01 M: 5.2%	SILTY GRAVEL (GM): very dense, reddish brown, brown, moist, sandstone fragments, (RESIDUAL)		
	450	☒	S-02	50/1"	>>		1.5 — 450.0		
				50/0"	>>		Auger Refusal at 1.5 feet.		
5									
	445								
10									
	440								

Groundwater not encountered at time of drilling.
Borehole backfilled on date drilled unless otherwise noted.
Consistency/Relative Density based on correction factor for Automatic hammer.

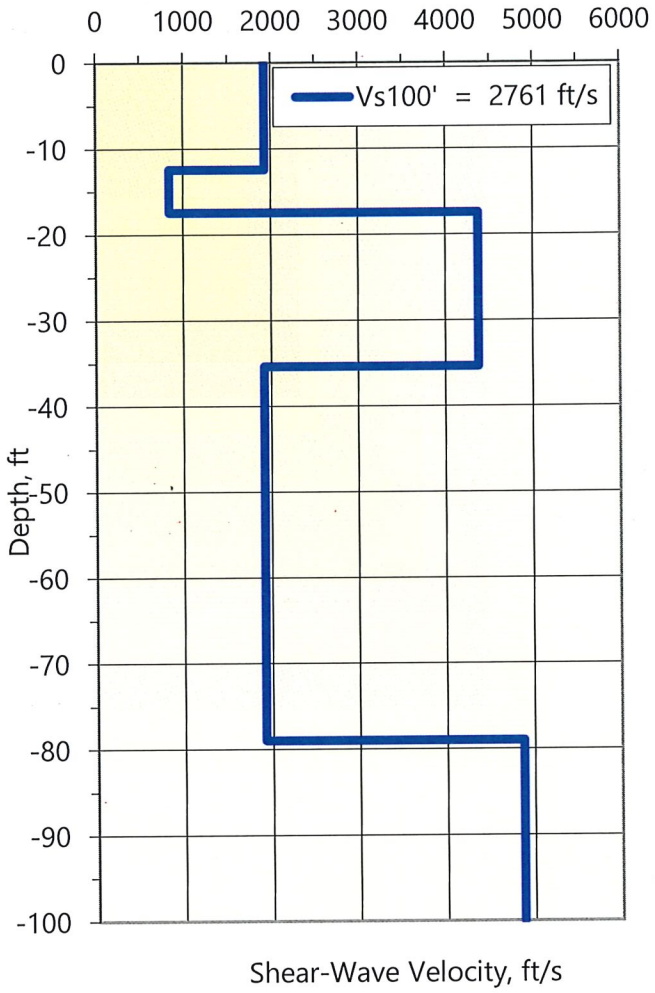
SAMPLE TYPE ☒ Split Spoon

LL: LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
PL: PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
PI: PLASTICITY INDEX
Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGT

ReMi TEST RESULTS AND ASCE REPORT

Geogiga Surface Plus 9.3 ReMi Survey Results

Depth (ft)	Shear Wave Velocity Vs (ft/sec)
0.00	1930.00
-12.47	1930.00
-12.47	838.10
-17.48	838.10
-17.48	4374.50
-35.38	4374.50
-35.38	1920.60
-78.96	1920.60
-78.96	4867.40
-100.00	4867.40

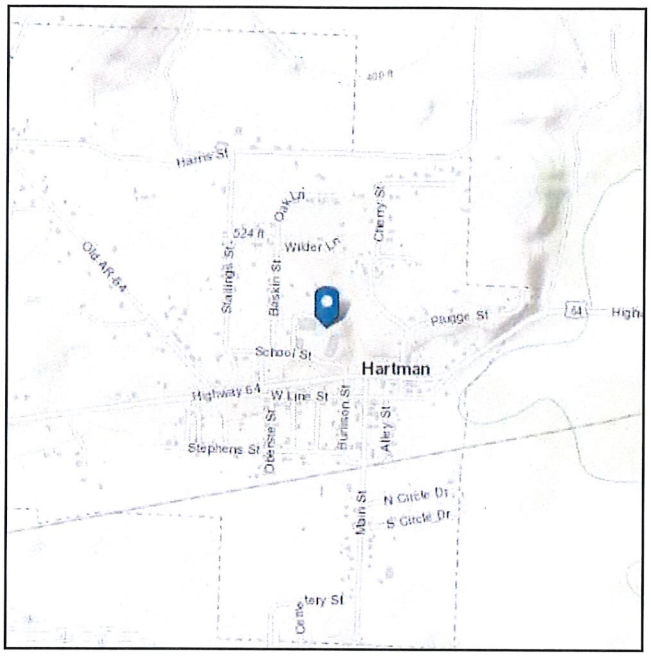


ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: III
Soil Class: B - Rock

Latitude: 35.434489
Longitude: -93.615919
Elevation: 463.71716759157357 ft (NAVD 88)



ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Seismic

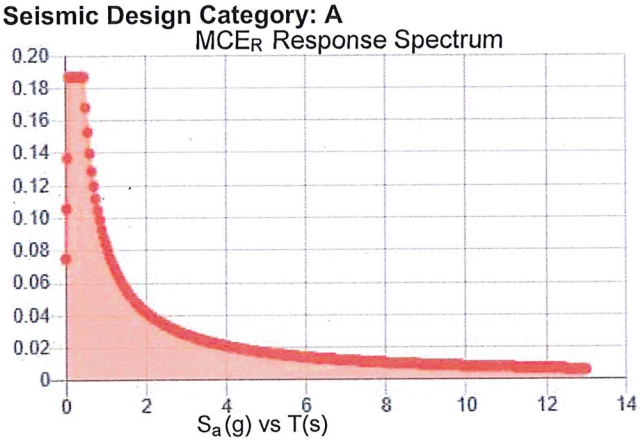
B - Rock

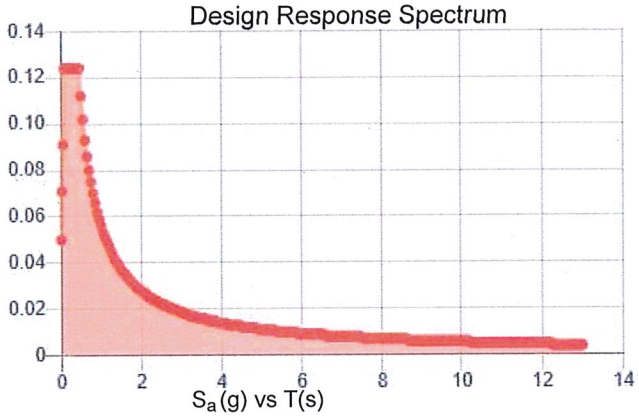
Site Soil Class:

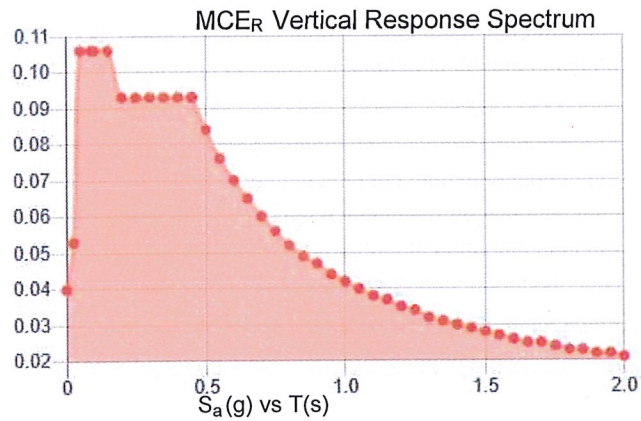
Results:

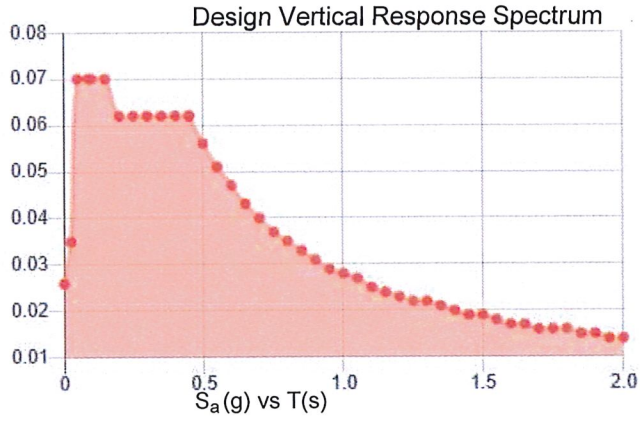
S_S :	0.207	S_{D1} :	0.056
S_1 :	0.105	T_L :	12
F_a :	0.9	PGA :	0.102
F_v :	0.8	PGA_M :	0.092
S_{MS} :	0.187	F_{PGA} :	0.9
S_{M1} :	0.084	I_e :	1.25
S_{DS} :	0.124	C_v :	0.707

Seismic Design Category: A









Data Accessed: **Mon Dec 04 2023**

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided "as is" and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.

LABORATORY TEST PROCEDURES

A brief description of the laboratory tests performed is provided in the following sections.

DESCRIPTION OF SOILS (VISUAL-MANUAL PROCEDURE) (ASTM D2488)

The soil samples were visually examined by our engineer and soil descriptions were provided. Representative samples were then selected and tested in accordance with the aforementioned laboratory-testing program to determine soil classifications and engineering properties. This data was used to correlate our visual descriptions with the Unified Soil Classification System (USCS).

NATURAL MOISTURE CONTENT (ASTM D2216)

Natural moisture contents (M%) were determined on selected samples. The natural moisture content is the ratio, expressed as a percentage, of the weight of water in a given amount of soil to the weight of solid particles.

ATTERBERG LIMITS (ASTM D4318)

The Atterberg Limits test was performed to evaluate the soil's plasticity characteristics. The soil Plasticity Index (PI) is representative of this characteristic and is bracketed by the Liquid Limit (LL) and the Plastic Limit (PL). The Liquid Limit is the moisture content at which the soil will flow as a heavy viscous fluid. The Plastic Limit is the moisture content at which the soil is between "plastic" and the semi-solid stage. The Plasticity Index (PI = LL - PL) is a frequently used indicator for a soil's potential for volume change. Typically, a soil's potential for volume change increases with higher plasticity indices.

MATERIAL FINER THAN NO. 200 SIEVE BY WASHING (ASTM D1140)

Grain-size tests were performed to determine the partial soil particle size distribution. The amount of material finer than the openings on the No. 200 sieve (0.075 mm) was determined by washing soil over the No. 200 sieve. The results of wash #200 tests are presented on the boring logs included in this report and in the table of laboratory test results.

LABORATORY TEST RESULTS

The results of the laboratory testing are presented in the following tables.

BORING NO.	DEPTH	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE	CLASSIFICATION
B-01	0.5 - 2.0	11.0					
B-01	2.5 - 3.8	7.9					
B-01	5.0 - 5.5	6.4					
B-02	0.5 - 1.8	8.5					
B-02	2.5 - 4.0	15.0	27	21	6	39	SC-SM
B-02	5.0 - 6.5	20.7					
B-02	8.5 - 8.9	5.6					
B-03	0.5 - 2.0	8.6	NP	NP	NP		
B-03	2.5 - 3.0	7.7					
B-04	0.5 - 2.0	3.7	NP	NP	NP	15	GM
B-04	2.0 - 2.1	3.4					
B-05	0.5 - 1.3	8.0					
B-06	0.5 - 2.0	10.5	28	19	9	25	SC
B-06	2.5 - 3.3	12.1					
P-01	0.5 - 2.0	6.8					
P-01	2.5 - 2.9	7.6					
P-02	0.5 - 1.1	5.2					

TABLE L-1: General Soil Classification Test Results

Soils with a Liquid Limit (LL) greater than 50 and Plasticity Index (PI) greater than 25 usually exhibit significant volume change with varying moisture content and are considered to be highly plastic

(1) Indicates visual classification. WR indicates weathered rock.

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by:* the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@geoprofessional.org www.geoprofessional.org

AIA® Document A201™ – 2017

General Conditions of the Contract for Construction

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

THE OWNER:
(Name, legal status and address)

THE ARCHITECT:
(Name, legal status and address)

TABLE OF ARTICLES

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

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

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

INDEX
(Topics and numbers in bold are Section headings.)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

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

§ 1.1.2 The Contract

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

§ 1.1.3 The Work

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

§ 1.1.4 The Project

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

§ 1.1.5 The Drawings

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

§ 1.1.6 The Specifications

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

§ 1.1.7 Instruments of Service

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

§ 1.1.8 Initial Decision Maker

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

§ 1.2 Correlation and Intent of the Contract Documents

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

consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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

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

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

§ 1.3 Capitalization

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

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

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

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

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

§ 1.6 Notice

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

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

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

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

§ 2.2 Evidence of the Owner's Financial Arrangements

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

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

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

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

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements,

assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

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

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

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

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

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

§ 2.4 Owner's Right to Stop the Work

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

§ 2.5 Owner's Right to Carry Out the Work

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

ARTICLE 3 CONTRACTOR

§ 3.1 General

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

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

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

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

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

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

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

§ 3.3 Supervision and Construction Procedures

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

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

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

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

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

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

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

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

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

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

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

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

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

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

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

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

§ 3.10 Contractor's Construction and Submittal Schedules

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

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

Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

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

§ 3.11 Documents and Samples at the Site

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

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

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

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

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

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

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

§ 3.13 Use of Site

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

§ 3.14 Cutting and Patching

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

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

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

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

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

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

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

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

ARTICLE 4 ARCHITECT

§ 4.1 General

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

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

§ 4.2 Administration of the Contract

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

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

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the

Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

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

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

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

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

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

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

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

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

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations

and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

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

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

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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

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

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

§ 5.3 Subcontractual Relations

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

prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

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

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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

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

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

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

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

§ 6.2 Mutual Responsibility

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

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

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

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

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

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

§ 6.3 Owner's Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

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

§ 7.2 Change Orders

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

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

§ 7.3 Construction Change Directives

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

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

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

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.4.

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

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

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

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

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

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

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

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

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will

affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

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

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

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

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

§ 8.2 Progress and Completion

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

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

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

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

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

§ 9.2 Schedule of Values

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

unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

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

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

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

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

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

§ 9.4 Certificates for Payment

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

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

§ 9.5 Decisions to Withhold Certification

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

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

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

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

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

§ 9.6 Progress Payments

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

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

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

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

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

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

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

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

§ 9.7 Failure of Payment

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

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

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

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

§ 9.9 Partial Occupancy or Use

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

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

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

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

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

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

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

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

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.2 Safety of Persons and Property

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

.1 employees on the Work and other persons who may be affected thereby;
.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

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

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

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

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

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

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

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials and Substances

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

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

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

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

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

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

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

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

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

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

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

§ 11.2 Owner's Insurance

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

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

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

§ 11.3 Waivers of Subrogation

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

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

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

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to

the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

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

§ 12.2.2 After Substantial Completion

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

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

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

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

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

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

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

§ 13.2 Successors and Assigns

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

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

§ 13.3 Rights and Remedies

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

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

§ 13.4 Tests and Inspections

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

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

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

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

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

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

§ 13.5 Interest

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

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

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

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

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

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

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

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

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance,

the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

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

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

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

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

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

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

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

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

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

§ 15.1.2 Time Limits on Claims

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

§ 15.1.3 Notice of Claims

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

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

§ 15.1.4 Continuing Contract Performance

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

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

§ 15.1.5 Claims for Additional Cost

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

§ 15.1.6 Claims for Additional Time

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

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

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

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

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

§ 15.2 Initial Decision

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

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

Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

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

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

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

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

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

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

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

§ 15.3 Mediation

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

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

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

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

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

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

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

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

§ 15.4.4 Consolidation or Joinder

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

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

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

SUPPLEMENTARY CONDITIONS

The following supplements modify the "General Conditions of the Contract for Construction," AIA Document A201, Fifteenth Edition, 2017. Where a portion of the General Conditions is modified or deleted by the Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

ARTICLE 1 - GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

1.1.1 THE CONTRACT DOCUMENTS

Delete the last sentence and substitute the following:

1.1.1 “Unless specifically excluded in Owner/Contractor Agreement, the Contract Documents also include Instructions to Bidders, Contractor’s Bid including unit prices and Addenda to these documents.”

Add the following definitions:

.8 Product: Materials, systems, and equipment incorporated or to be incorporated in the Work.

.9 Provide: Furnish and install and shall include, without limitation, labor, materials, equipment, transportation, services and other items required to complete the referenced tasks.

.10 Furnish: Pay for, deliver (or receive), unload, inspect, and store as specified or directed while retaining care, custody and control until received for installation by others based on a signed receipt.

.11 Install: Receive, unload, inspect, and store as specified or directed while retaining care, custody and control; set or place in position, make required connections; and adjust and test for satisfactory performance and operation.

.12 Not In Contract (N.I.C.): Products not in Contract, but which may require provisions in the Work for future installation.

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

Add the following:

1.2.4 Contract Documents are to be read and interpreted as a whole. The intent of the Contract Documents is to require Contractor to provide the highest quality of Work consistent with the design intent. Actual or alleged conflicts or inconsistencies between the Drawings and Specifications or other Contract Documents shall be brought to the Architect’s attention in writing, prior to performing the affected Work.

1.6 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER DOCUMENTS OF SERVICE

Revise as follows:

1.6.1 The Drawings, Specifications and other documents, including those in electronic form, prepared by the Architect and the Architect’s consultants are Instruments of Service through which the Work to be executed by the Contractor is described. The Contractor may retain one record set. Neither the Contractor nor any Subcontractor, Sub-subcontractor or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications and other documents prepared by the Architect or the Architect’s consultants, and unless otherwise indicated the Architect and the Architect’s consultants shall be deemed the authors of them and will retain all common law, statutory and other reserved rights, in addition to the copyrights, except as stated in the Agreement between the Owner and the Architect. All copies of Instruments of Service, except the Contractor’s record set, shall be returned or suitably accounted for to the Architect, on request, upon completion of the Work. The Drawings, Specifications and other documents prepared by the Architect and the Architect’s consultants, and copies thereof furnished to the Contractor, are for use solely with respect to this Project. They

are not to be used by the Contractor or any Subcontractor, Sub-subcontractor or material or equipment supplier on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants. The Contractor, Subcontractors, Sub-subcontractors and material or equipment supplier are authorized to use and reproduce applicable portions of the Drawings, Specification and other documents prepared by the Architect and the Architect's consultants appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this authorization shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by the Architect and the Architect's consultants. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' copyrights, or other reserved rights.

Add the following:

1.6.2 Owner/Architect Agreement describes ownership and use of the Drawings, Specifications, and other documents prepared by Architect and Owner. Contractor shall take no action that would result in derogation or the rights of the Architect and Owner as set forth in the Owner/Architect Agreement.

ARTICLE 2 - OWNER

2.1 GENERAL

Revise as follows:

2.1.1 Delete the following sentences: "The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owners approval or authorization. Except as otherwise provided in Subparagraph 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative."

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

Revise as follows:

2.2.5 Contractor will be furnished one (1) CD with Contract Documents as a PDF. There will not be any paper copies of the construction documents issued.

2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

Revise as follows:

2.4.1 Delete the following sentences: "Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect."

Add the following:

2.5 ARCHITECT'S COMPENSATION FOR SERVICES TO REMEDY DEFECTIVE WORK

2.5.1 When the Architect's services are required because of defective work, neglect, failure, deficiencies, default or failure to complete work within stated time by the Contractor, the Architect's compensation for such services shall be based on the Architect's invoice sent to the Owner. This Invoice along with other costs, damages and liabilities incurred by the Owner or Architect shall be the basis for adjusting the Contract Sum by a Change Order, or compensate the Owner for the Architect's Additional Services. This paragraph 2.5.1 shall be in addition to any other rights or remedies of the Architect set forth herein or provided by law.

ARTICLE 3: CONTRACTOR

Add the following:

3.2.4 If any Work deviates from the requirements of the Contract Documents, Contractor shall be solely responsible for all resulting costs, damages, and expenses. No claim by the Contractor that (a) Work indicated was not constructible, or (b) that performing the Work in accordance with Contract Documents would have caused or resulted in damages; shall be available to the Contractor as a defense or a claim to reduce the Contractor's liability, or to increase the Contractor's compensation or the Contract Time, unless the Contractor has informed the Owner and Architect in writing before performing Work in question and has received written direction concerning such Work from the Owner and Architect. This provision does not limit any other rights of the Owner or Architect or other obligations of Contractor.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

Revise as follows:

3.3.1 Deleting the following sentences: "If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of Changes proposed by the Contractor, the Owner shall be solely responsible for any resulting loss or damage."

Add the following:

3.3.4 Contractor shall review all specified construction installation procedures including procedures recommended by manufacturers or reference standards cited. If the specified procedure deviates from accepted construction practice, or if the procedure will affect any warranties including Contractor's general warranty, or is objected to by Contractor, Contractor shall advise Architect in writing prior to performing the affected Work, and propose alternative procedures which will not affect Contractor's warranty.

3.4 LABOR AND MATERIALS

Revise as follows:

3.4.2 The Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order. After the Award of the Contract, substitutions of products shall only be considered under the conditions, and in the manner, specified in Section 01630.

Add the following Subparagraphs 3.4.3 and 3.4.4 to 3.4:

3.4.3 After the Contract has been executed, the Owner and the Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specification).

3.4.4 By making requests for substitutions based on Subparagraph 3.4.3 above, the Contractor:

.1 represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;

.2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified.

.3 certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and

.4 will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

Add the following to subparagraph 3.16.2 to 3.16:

3.16.2 The Contractor awarded this project agrees to allow any City, Federal or State inspector, acting in their official capacity, to have access to the job site.

ARTICLE 4: ADMINISTRATION OF THE CONTRACT

4.5 MEDIATION

4.6 ARBITRATION

Delete all references to mediation and arbitration.

ARTICLE 5: SUBCONTRACTORS

Add the following Subparagraph 5.1.3 to 5.1

A. No person shall perform electrical work on the contract without possessing an Arkansas State Master or Journeyman License from the Arkansas State Electrical Examiners Board. All electrical work and apprentice electricians shall be supervised by a Master or Journeyman Electrician on a one-to-one ratio.

B. All electricians shall have a copy of their license with them and shall be required to show it to an appropriate inspector upon request.

ARTICLE 7: CHANGES IN THE WORK

7.3 CONSTRUCTION CHANGE DIRECTIVES

Delete clauses 7.3.3.1; .2; .3 and .4 and substitute the following clauses to 7.3.3:

7.3.3.1 All quotations for changes, be they additions or deductions, shall be submitted in a complete, itemized breakdown form acceptable to the Architect and/or Owner using Contract Unit prices when set forth therein. The value of any and all such additions or deductions shall be determined as set forth in ".3", as follows:

.2 The itemized breakdown shall show unit quantities and costs of all labor and materials. Submit all verifying data as necessary or required by the Architect and/or Owner to support claims, such as copies of original invoices, payrolls, etc. The burden of proof of cost rests upon the Contractor. Contractor agrees that the Owner or his Representative shall have the right, at reasonable times, to inspect and audit the books and records of Contractor to verify the propriety and allowability of such costs.

.3 Compute requests for changes be they additions or deductions as follows:

(1) For work performed by the Contractor:

Net Cost of Materials		a
State Sales Tax	b	
Net Placing Cost		c
W. C. Insurance Premium and FICA Tax	d	
		a+b+c+d
Overhead and Profit, 12% x (a+b+c+d)		e
Allowable Bond Premium		f
TOTAL COST		a+b+c+d+e+f

(2) Credit for work omitted (deleted) shall be computed as outlined in (1) "a through e" except the Contractor's share of overhead and profit percentage is 7%.

(3) For work performed by Subcontractors:
Subcontractors shall compute their work as outlined in (1), "a through e".
To the cost of that portion of the work (Change) that is performed by the Subcontractor, the General Contractor shall add an Overhead and Profit Charge of Five (5%) percent plus the Allowable Bond Premium.

ARTICLE 9: PAYMENTS AND COMPLETION

9.3 APPLICATIONS FOR PAYMENT

Add the following Clause 9.3.1.3 to 9.3.1:

9.3.1.3 The Owner shall pay ninety-five percent (95%) of the amount due the Contractor on account of progress payments. Five percent (5%) retainage will be withheld until the project is complete. **FINAL RETAINAGE WILL NOT BE RELEASED UNTIL ALL WORK ITEMS INCLUDING PUNCH LIST ITEMS AND PROJECT CLOSEOUT DOCUMENTS HAVE BEEN COMPLETED TO THE SATISFACTION OF THE OWNER.**

9.7 PAYMENT TO THE CONTRACTOR

Add the following Paragraph 9.7.2:

9.7.2 Payment to the contractor; The owner shall make final payment within 30 days of completion and final acceptance of the work. In the event the project extends beyond these 30 days, periodic payments may be made at the Owner's discretion.

9.11 LIQUIDATED DAMAGES

Add the following Paragraph 9.11 to Article 9:

9.11.1 The Contractor and the Contractor's surety, if any, shall be liable for and shall pay the Owner the sums hereinafter stipulated as liquidated damages for each calendar day of delay until the Work is substantially complete:
Five Hundred and no/100 Dollars ($500.00) (Refer to 1.2 of Special Conditions)

9.11.2 The Contractor and the Contractor's surety, if any, shall be liable for and shall pay the Owner the sum hereinafter stipulated as liquidated damages for each reinspection as stated in Section 01705 - Project Closeout:
Reinspection costs of $100.00 per hour for each Architect and/or Consultant, plus $0.405 per mile travel, plus expenses.

9.11.3 The Contractor and the Contractor's surety, if any, shall be liable and pay the Owner the sums hereinafter stipulated as liquidated damages for failure to submit no later than thirty (30) days after the Date of Substantial Completion, to the Owner and/or Architect, approved Final Project Record Documents:
One thousand and no/100 dollars ($1,000.00) (Refer to Section 01720).

9.11.4 The said amounts are fixed and agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such even sustain, and said amount is agreed to be the amount of damage which the Owner would sustain.

ARTICLE 11: INSURANCE AND BONDS

Add the following clauses to 11.1.1

11.1.1.9 Liability Insurance shall include all major divisions of coverage and be on a comprehensive basis including:
1. Premises Operations (including X and C)
2. Independent Contractors' Protective.
3. Products and Completed Operations.
4. Personal Injury Liability with Employment Exclusion deleted.
5. Contractual, including specified provision for Contractor's obligation under Paragraph 3.18.
6. Owned, non-owned and hired motor vehicles
7. Broad Form Property Damage including Completed Operations.
8. Underground.
9. Completed Value Builder's Risk (including theft)

11.1.1.10 If the General Liability coverages are provided by a Commercial General Liability Policy on a claims-made basis, the policy date or Retroactive Date shall predate the Contract; the termination day of the policy or applicable extended reporting period shall be no earlier than the termination date of coverages required to be maintained after final payment, certified in accordance with Subparagraph 9.10.2.

Add the following Clause 11.1.2.1 to 11.1.2:

11.1.2.1 The insurance required by Subparagraph 11.1.1 shall be written for not less than the limits shown on the sample certificates of insurance attached at the end of these Supplementary Conditions. Either format of certificate may be submitted. Only insurance companies admitted and licensed by the Arkansas State Insurance Commission (AR Code 22-9-402 et seq.) shall write policies. They must be executed by a resident local agent.

11.4 PROPERTY INSURANCE

11.4.1 Modify the first sentence of Subparagraph 11.4.1 as follows: Delete "unless otherwise provided, the Owner" and substitute "the Contractor."

Add the following sentences:

The form of policy for this coverage shall be Completed Value.

If the Owner is damaged by the failure of the Contractor to maintain such insurance, then the Contractor shall bear all reasonable costs properly attributable thereto.

11.4.1.2 Delete Clause 11.4.1.2.

11.4.1.3 Delete Clause 11.4.1.3.

11.4.4 Delete Subparagraph 11.4.4.

Delete Subparagraph 11.4.6 and substitute the following:

11.4.6 Certificates of Insurance shall be filed with the Owner prior to contact award. The Contractor shall file with the Owner two certified copies of the policy or policies providing this Property Insurance coverage, each containing those endorsements specifically related to the Project. Each policy shall contain a provision that the policy coverage will not be canceled or allowed to expire unless at least 15 days prior written notice has been given to the Contractor and the Owner.

11.4.7 Modify Subparagraph 11.4.7 by substituting "Contractor" for "Owner" at the end of the first sentence.

11.4.8 Modify Subparagraph 11.4.8 by substituting "Contractor" for "Owner" as fiduciary; except that at the first reference to "Owner" in the first sentence, the word "this" should be substituted for "Owner's."

11.4.9 Modify Subparagraph 11.4.9 by substituting "Contractor" for "Owner" each time the latter word appears.

11.4.10 Modify Subparagraph 11.4.10 by substituting "Contractor" for "Owner" each time the latter word appears.

11.5 PERFORMANCE BOND AND PAYMENT BOND

Delete Subparagraph 11.5.1 and substitute the following:

11.5.1 Within (10) days after receipt of the Owner's Intent to Award notice, the successful bidder shall furnish to the Owner an executed statutory Performance and Payment Bond. Failure to furnish the required bonds may cause forfeiture of bid guarantee to the Owner as liquidated damages (Act 757 of 1987).

11.5.1.1 The Performance and Payment Bond shall be in an amount equal to one hundred percent (100%) of the accepted Proposal (contract price) as security for the faithful performance of the contract, and as security for

the payment of all persons performing labor and furnishing materials in connection with the contract. The bond shall be written by a surety company which is qualified and authorized to do business in the State of Arkansas; the bonds must be executed by a Licensed Resident Local Agent of Arkansas who shall be entitled to full commission paid local agents and who is licensed by the Insurance Commissioner to represent the surety company executing said bond; and the bonds shall conform to the requirements of Arkansas Code Ann. 18-44-501 et seq.

11.5.1.2 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney. An original and (2) copies of the bond must be furnished, with power of attorney attached to each. The Contractor shall file (not record) the original bond with the Clerk in the Circuit Court of Sebastian County. The Contractor shall pay all expense incident to the filing of the bond. The remaining two copies shall be certified by the Clerk to evidence the filing of the original and submitted to the Owner.

END OF SECTION

SPECIAL CONDITIONS

1.1 OWNER'S USE OF THE PREMISES

A. The Owner or his representatives shall have access to the construction site for observation or installation of work items which are not a part of this work.

1.2 USE OF SITE BY OWNER

A. The Owner shall have the right to take possession of and use any complete or partially completed portions of the Work included under the Contract whether or not the time for completing the Work has expired, provided the Owner:
   1. Secures written consent of the Contractor, except in the event, in the opinion of the Architect, the Contractor is chargeable with unwarranted delay in the completion of the Work.
   2. Secures consent of the property insurance-carrier and consent of the Surety permitting occupancy of the building(s) or use of the project during the remaining period of construction without cancellation or lapse of insurance or bond on account of such occupancy.

B. Possession or use of any part of the Work, prior to final acceptance and payment, shall not constitute an acceptance of the Work taken or used.

C. If such use prior to the Contract time for completion increases the cost of the Work or delays its completion, the Contractor shall be entitled to extra compensation or extension of time, or both. The Contractor's claim for such extra compensation shall be in writing, with vouchers and other supporting data attached.

D. After the Contract time for completion has expired, the Contractor shall not be entitled to extra compensation or extension of time due to such use, neither shall the amount of the liquidated damages be reduced because of partial use or occupancy.

1.3 EXISTING FACILITIES

A. As the Work described in the Drawings and Specifications involves a public school complex that shall continue to be operational during the entire construction schedule, the following shall apply:
   1. A barrier (safety orange plastic construction fencing as minimum) shall be erected completely around the Project Site and Contractor's Staging/Storage Area for the duration of the work.
   2. Every effort shall be made by the Contractor to maintain accessible vehicle and pedestrian routes to all buildings by patrons for the duration of the Work. Coordination of accessible routes shall be discussed at the Pre-Construction Conference.

1.4 PHASING

A. Work at all areas shall be accomplished at the contractor’s schedule within the time allowed in the final accepted Work Progress Schedule as prepared by the Construction Manager: **All work must be closely coordinated with the Construction Manager, Owner and Architect.**

1.5 PRESENCE OF ASBESTOS-CONTAINING MATERIAL

A. The Contract for this Work does not include requirements for asbestos abatement. Any suspected asbestos-containing materials encountered by the Contractor during the Project Work shall be immediately brought to the attention of the Architect and Owner. Refer to Specification Section 01121 - Asbestos and Precautions and Procedures.

1.6 PERMITS/FEES

A. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL NECESSARY PERMANENT AND / OR TEMPORARY PERMITS, BONDS, TAPS, AND INSPECTIONS FOR ALL UTILITIES, HIGHWAYS, STREETS, BUILDING CONSTRUCTION, AND ANY OTHER SUCH ITEM NOT SPECIFICALLY LISTED. ANY AND ALL COSTS ASSOCIATED WITH THESE PERMANENT AND / OR TEMPORARY PERMITS / FEES SHALL BE A PART OF THE BASE BID.

END OF SPECIAL CONDITIONS

SECTION 01 01 00 - SUMMARY OF THE WORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:
1. The "Project," of which the "Work" of this Contract is a part, is titled:
Johnson County Westside School District Hartman, Arkansas Primary School Addition.
2. The "Work of this Contract includes, but is not necessarily limited to:
New construction of a 32,410± square feet two level Primary School Addition. Project scope includes classrooms, restrooms, dining with stage, kitchen, and PE space (Storm Shelter). Construction scope includes, poured-in-place concrete walls, cmu walls, conventional steel construction with cmu exterior walls and metal stud exterior walls with brick and split face masonry veneer, prefinished metal wall panels paint, wood and hollow metal doors and frames, acoustical lay-in ceiling and grid. Low slope single ply roof. See drawings for additional information.

.

B. Related Work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, Special Conditions, and Sections in Division 1 of these Specifications.

END OF SECTION

SECTION 01 14 20 - CONTRACTOR'S USE OF THE PREMISES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: This Section applies to work requiring the Contractor and/or his representatives including, but not necessarily limited to, suppliers, subcontractors, employees, and field engineers, to enter the Owner's existing facilities.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Promptly upon award of the Contract, notify all pertinent personnel regarding requirements of this Section.

B. Require that all personnel who will enter upon the Owner's existing facilities certify their awareness of and familiarity with the requirements of this Section.

1.3 TRUCK AND EQUIPMENT ACCESS

A. To avoid traffic conflict, to maintain safety on the site, and to avoid overloading of streets and driveways elsewhere on the Owner's property, limit the access of trucks and equipment to the route designated at the Preconstruction Conference as the Contractor's Access Route.

B. Provide adequate protection over existing paving and site improvements over or near which trucks and equipment pass to reach the job site.

1.4 CONTRACTOR'S VEHICLES AND PARKING

A. Require Contractor's vehicles, vehicles belonging to employees of the Contractor, and all other vehicles entering upon the Owner's property in performance of the Work of the Contract, to use only the Access Route so designated.

B. Do not permit such vehicles to park on any street or other area of the Owner's property except in the area so designated at the Pre-Construction Conference as "Contractor's Parking Area" on the Project Site, but shall be the Work area as a minimum.

1.5 CONTRACTOR'S STAGING AND STORAGE

A. The staging and storage area shall be limited to the areas so designated at the Pre-Construction Conference, but shall be the Work area as a minimum.

1.6 SECURITY

A. Restrict the access of all persons entering upon the Owner’s property in connection with the Work to the Access Route and to the actual site of the Work.

END OF SECTION

SECTION 01 20 10 - PRECONSTRUCTION CONFERENCE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: To help clarify construction contract administration procedures, the Architect will conduct a Preconstruction Conference prior to start of the Work. Provide attendance by the designated personnel.

B. Related Work:
1. Documents affecting Work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. For those persons designated by the Contractor, his subcontractors, and suppliers to attend the Preconstruction Conference, provide required authority to commit the entities they represent to solutions agreed upon in the Conference.

1.3 SUBMITTALS

A. To the maximum extent practical, advise the Architect at least 24 hours in advance of the Conference as to items to be added to the agenda.

B. The Architect will compile Minutes of the Conference and will furnish copies of the Minutes to the Construction Manager and the Owner. The Construction Manager may make and distribute such copies as is required.

1.4 PRECONSTRUCTION CONFERENCE

A. The Conference will be scheduled to be held within 15 working days after the Owner has issued the Notice to Proceed.

B. Attendance:
1. Provide attendance by authorized representatives of the Construction Manager, Contractors and major suppliers.
2. The Architect and / or Construction Manager will advise other interested parties, including the Owner, and request their attendance.

C. Minimum Agenda: Data will be distributed and discussed on:
1. Organizational arrangement of Construction Manager’s/Contractor's forces and personnel, and those of subcontractors, materials suppliers and the Architect;
2. Channels and procedures for communication;
3. Construction schedule, including sequence of critical work and phasing;
4. Contract Documents, including distribution of required copies of Drawings and revisions.
5. Processing of Shop Drawings and other data submitted to the Architect for review.
6. Processing of field decisions and Change Orders;
7. Rules and Regulations governing performance of the Work; and
8. Procedures for safety and first aid, security, quality control, housekeeping and related matters.
9. "As-Built" Drawings, Project Close-Out Documents.
10. Contractor Storage, Parking and Staging areas.
11. Bi-weekly meetings with the Owner, Architect, Construction Manager and Contractors.

END OF SECTION

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

B. See Division 01 Section "Allowances" for procedural requirements for handling and processing allowances.

1.2 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions.", or similar document with Architect's letterhead.

1.3 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
   1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
   2. Within 10 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
      a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      c. Include costs of labor and supervision directly attributable to the change.
      d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.
   1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
   2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
   3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
   4. Include costs of labor and supervision directly attributable to the change.
   5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
   6. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Proposal Request Form: Use AIA Document G709 for Proposal Requests, or other similar form approved by the Owner and Architect.

1.4 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.5 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
   1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
   1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012660 - CHANGE ORDER PROCEDURE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Make such changes in the Work, in the Contract Sum, in the Contract Time of Completion, or any combination thereof, as are described in written Change Orders signed by the Owner and the Architect and issued after execution of the Contract, in accordance with the provisions of this Section.

B. Related Work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
   2. Changes in the Work are described further in Article 7 of the General Conditions.
   3. Architect's Supplemental Instructions:
      a. From time to time during progress of the Work the Architect may issue a "Supplemental Instructions" which interprets the Contract Documents or orders minor changes in the Work without change in Contract Sum or Contract Time.
      b. Should the Contractor consider that a change in the Contract Sum or Contract Time is required, he shall submit an itemized proposal to the Architect immediately and before proceeding with the Work. If the proposal is found to be satisfactory and in proper order, the Supplemental Instructions will be superseded by a Change Order.
   4. Proposal Requests:
      a. From time to time during progress of the Work the Architect may issue a "Proposal Request" for an itemized quotation for changes in the Contract Sum and/or Contract Time incidental to proposed modifications to the Contract Documents.

1.2 QUALITY ASSURANCE

A. Include within the Contractor's quality assurance program such measures as are needed to assure familiarity of the Contractor's staff and employees with these procedures for processing Change Order data.

1.3 SUBMITTALS

A. Make submittals directly to the Architect at the address shown in the Project Manual.

1.4 PRODUCT HANDLING

A. Maintain a "Register of Proposal Requests, Supplemental Instructions and Change Orders" at the job site, accurately reflecting current status of all pertinent data.

1.5 PROCESSING CHANGES INITIATED BY THE OWNER

A. Should the Owner contemplate making a change in the Work or a change in the Contract Time of Completion, the Architect will issue a "Proposal Request" or "Supplemental Instructions" to the Contractor.

B. If the Contractor has been directed by the Architect to make the described change in the Work at no change in the Contract Sum and no change in the Contract Time of Completion, but the Contractor wishes to make a claim for one or both of such changes, the Contractor shall proceed with the change and shall notify the Architect as provided for under Article 7 of the General Conditions.

C. If the Contractor has been directed by the Architect to make the described change subject to later determination of cost or credit in accordance with Article 7 of the General Conditions, the Contractor shall:
   1. Take such measures as needed to make the change;
   2. Consult with the Architect and reach agreement on the most appropriate method for determining credit or cost for the change.

D. If the Contractor has been directed by the Architect to promptly advise him as to credit or cost proposed for the described change, the Contractor shall:
   1. Analyze the described change and its impact on costs and time;
   2. Secure the required information and forward it to the Architect for review;
   3. Meet with the Architect as required to explain costs and, when appropriate, determine other acceptable ways to achieve the desired objective;
   4. Alert pertinent personnel and subcontractors as to the impending change and, to the maximum extent possible, avoid such work as would increase the Owner's cost for making the change, advising the Architect in writing when such avoidance no longer is practicable.

1.6 PROCESSING CHANGES INITIATED BY THE CONTRACTOR

A. Should the Contractor discover a discrepancy among the Contract Documents, a concealed condition as described in Paragraph 4.7.6 of the General Conditions, or other cause for suggesting a change in the Work, a change in the Contract Sum, or a change in the Contract Time of Completion, he shall notify the Architect as required by pertinent Sections of the Contract Documents.

B. Upon agreement by the Architect that there is reasonable cause to consider the Contractor's proposed change, the Architect will issue a Proposal Request in accordance with the provisions described in subparagraph 1.1.B.4 above.

1.7 PROCESSING PROPOSAL REQUESTS

A. The Contractor shall make written reply to the Architect in response to each Proposal Request.
   1. State proposed change in the Contact Sum, if any. Any and all additional costs shall be itemized, by both the general contractor and subcontractors, to clearly and completely show all materials, both quantities and unit costs, and labor costs.
   2. State proposed change in the Contact Time of Completion, if any.
   3. Clearly describe other changes in the Work, if any, required by the proposed change or desirable therewith.
   4. Include full backup data such a subcontractor's letter of proposal or similar information.
   5. Submit this response in single copy.

B. When cost or credit for the change has been agreed upon by the Owner and the Contractor, or the Owner has directed that cost or credit be determined in accordance with provisions of Article 7 of the General Conditions, the Architect will issue a "Change Order" to the Contractor.

1.8 PROCESSING CHANGE ORDERS

A. Change Orders will be dated and will be numbered in sequence.

B. The Change Order will describe the change or changes, will refer to the Proposal Requests or Supplemental Instructions involved, and will be signed by the Owner and the Architect.

C. The Architect will issue three copies of each Change Order to the Contractor.
   1. The Contractor promptly shall sign all three copies and return two copies to the Architect.
   2. The Architect will retain one signed copy in his file and will forward one signed copy to the Owner.

D. Should the Contractor disagree with the stipulated change in Contract Sum or change in Contract Time of Completion, or both:
   1. The Contractor promptly shall return two copies of the Change Order, unsigned by him, to the Architect with a letter signed by the Contractor and stating the reason or reasons for the Contractor's disagreement.
   2. The Contractor's disagreement with the Change Order shall not in any way relieve the Contractor of his responsibility to proceed with the change as ordered and to seek settlement of the dispute under pertinent provisions of the Contract Documents.

END OF SECTION

SECTION 01 29 73 - SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Construction Manager (with detailed cost break-down information from each contractor,) shall provide a detailed, summarized breakdown of the agreed and accepted Bid Proposals showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   2. Schedule of Values is required under Paragraph 9.2 of the General Conditions.

21. QUALITY ASSURANCE

A. Use required means to assure arithmetical accuracy of the sums described.

B. When so requested by the Architect, provide copies of the contracts/subcontracts or other data acceptable to the Architect and / or Owner, substantiating the sums described.

31. SUBMITTALS

A. Ten days prior to first application for payment, the Construction Manager shall submit a proposed Schedule of Values to the Architect and Owner.
   1. Meet with the Architect and determine additional data, if any, required to be submitted.
   2. Secure the Architect's approval of the Schedule of Values prior to submitting first application for payment.

B. The Schedule of Values shall be in the format as per the forms following this Section, deleting or adding line items as may be required to accurately describe the Work.

END OF SECTION

Schedule of Values

Project: Johnson County Westside School District
Location: Hartman, Arkansas
Contractor:

Architect's
Project No.: 19-68
Date:

Item	Description of Work	Scheduled Value	Work Completed					Work Remaining	
			Previous Application	This Application		Total Completed and Stored	%	Balance to Finish	Retainage
				Work In Place	Stored Materials				
Division 1	**General Conditions**								
1.0	Overhead								
1.1	Bonds & Insurance								
1.2	Permits & Fees								
Division 2	**Existing Conditions**								
2.0	Utility Demo Relocation								
2.1	Selective Demolition								
Division 3	**Concrete**								
3.0	Site Concrete-Walks								
3.1	Building Concrete-								
	Piers & Grade Beams								
3.2	Building Concrete - Slabs								
Division 4	**Masonry**								
4.0	Masonry								
Division 5	**Metals**								
5.0	Structural Steel								
5.1	Steel Joists								
5.2	Steel Deck								
5.3	Metal Studs								
5.4	Handrails & Railings								
Division 6	**Wood & Plastics**								
6.0	Rough Carpentry								
6.1	Finish Carpentry								
6.2	Casework/Millwork								
Division 7	**Thermal & Moisture**								
7.0	Roofing System -								
	Membrane								
7.1	Bldg Insulation & V.B.								
7.2	Roofing Sys-Shingles								
7.3	Roofing Accessories								
7.4	Sealants & Caulking								
7.5	Membrane Waterproofing								
7.6	E.I.F.S.								

Item	Description of Work	Scheduled Value	Work Completed					Work Remaining	
			Previous Application	This Application		Total Completed and Stored	%	Balance to Finish	Retainage
				Work In Place	Stored Materials				
Division 8	**Doors & Windows**								
8.0	Doors & Frames								
8.1	Overhead Doors & Grilles								
8.2	Specialty Doors								
8.3	Storefronts								
8.4	Hardware								
8.5	Other Glazing								
Division 9	**Finishes**								
9.0	Gypsum Board								
9.1	Ceramic Tile								
9.2	Acoustical Ceiling								
9.4	Resilient Flooring & Base								
9.5	Painting								
9.6	Carpet								
9.7	Vinyl Wallcovering								
Division 10	**Specialties**								
10.0	Toilet Accessories								
10.1	Entry Mats								
10.2	Interior Signage								
10.3	Lockers								
10.4	Misc. Specialties								
Division 11	**Equipment**								
11.0	Stage Equipment								
11.1	Wall Surface System								
11.2	Food Service Equipment								
Division 12	**Furnishings**								
12.0	Window Treatment								
Division 13	**Special Construction**								
Division 14	**Conveying Systems**								
14.0	Elevator								
Division 21	Fire Suppression								
Division 22	**Plumbing**								
15.0	Plumbing - Rough-in								
15.1	Plumbing - Top-out								
Division 23	**Mechanical**								
23.1	HVAC System - Units								
23.2	HVAC Test & Balance								
23.3	HAVC System - Ductwork								
Division 26	**Electrical**								
26.0	Electrical Power -								
	Switch Gear								
26.1	Electrical Power -								
	Conduit, Fittings & Wire								
26.2	Electrical Lighting-Fixtures								
Division 28	**Elect Safety & Security**								
28.1	Fire Alarm System								

Item	Description of Work	Scheduled Value	Work Completed					Work Remaining	
			Previous Application	This Application		Total Completed and Stored	%	Balance to Finish	Retainage
				Work In Place	Stored Materials				
Division 31	**Earthwork**								
31.0	Earthwork								
31.2	Clearing								
31.3	Exc. Trench., Backfill								
31.4	Comp Cont & Test								
31.5	Termite Control								
31.6	Erosion and Sed Cont								
Division 32	**Exterior Improve**								
32.1	Asphalt Conc								
32.2	Port Cement Conc								
32.3	Landscape (topsil, sod)								
Division 33	**Utilities**								
33.1	Storm Drainage								
	Change Orders								
Subtotal	**Site Development**	$ -							
	Site Improvement	#REF!							
	Building	$ -	Construction costs not including Sitework cost						
	Total	#REF!	$ -	$ -	$ -	$ -		$ -	$ -

SECTION 01 31 10 - ALTERATIONS PROJECT PROCEDURES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Contractor's responsibilities concerning isolation of dust-producing work from adjacent and occupied spaces of the building where work is to occur.

B. Contractor's responsibilities concerning temporary dust-containment for materials, products, and equipment used in the construction project.

PART 2 - PRODUCTS

A. As required and selected by the Contractor for the work described in PART 3 - EXECUTION.

PART 3 - EXECUTION

A. Temporary Dust Partitions: Maintain temporary dust partitions to seal openings to occupied areas to isolate the areas of construction and ensure that no dust, smoke and/or fumes are released into the building. Temporary Partitions may also be required for some locations to provide building security. Such partitions shall be installed as required and directed by the Owner's Construction Coordinator and the Architect. They will be identified at the Preconstruction Conference and are NOT indicated on the Drawings.
   1. Dust Drapes: To be maintained in place and require approval of the Owner and/or Architect.
      a. Covering material: 6 mil. Clear polyethylene sheeting, with a minimum of 1 foot overlapped and continuously-taped joints. Attach sheeting from ceiling to finished floor to create dust-proof separation. If conditions make attachment to the ceiling impossible, light framing with sheeting attached all around shall be installed to prohibit dust penetration from the work areas.
   2. Mats
      a. Provide "walk-off" type mats at doors or entrances into construction area to reduce tracking of dust and debris. Replace or clean daily or as required to ensure dust containment.
   3. Ventilation Exposure Controls
      a. Provide supply air to and exhaust air from the work area to maintain a negative pressure of 0.01 inch of water. The ventilation system shall operate on a 24-hour basis throughout the construction process.
      b. **ALL NEW HVAC SYSTEM FILTERS THROUGHOUT THE BUILDING ADDITIONS AND EXISTING ROOMS WHICH ARE REMODELED, SHALL BE CHANGED TO NEW ONES UPON RECEIPT OF CERTIFICATE OF OCCUPANCY FROM CITY.**
   4. **Temporary Walls: To be maintained in place and require approval of the Owner's Construction Coordinator.**
      a. 2 x 4 stud walls with ½" plywood, as a minimum. Walls to be full height of structure, constructed from FFL to underside of roof decking.
      b. Walls shall provide security, dust, control and public protection at all areas where existing interior and/or exterior walls are to be removed.
      c. All temporary exterior walls and/or doors shall be weathertight/weatherproof.

END OF SECTION

SECTION 01 31 13 - COORDINATION

PART 1 - GENERAL

1.1 EXAMINATION

A. Each contractor, subcontractor, or supplier shall thoroughly examine the drawings and specifications pertaining to separate contracts and include in his base bid those items for which he will be responsible and for the proper coordination of the work to be performed.

1.2 TRANSITIONS

A. The architect accepts no responsibility for the naming of every item that may be needed to make transitions from the work of one contractor to another. All such transitions shall be the entire responsibility of the contractor, subcontractor, and materials and equipment suppliers involved.

1.3 SCHEDULES

A. General contractor shall coordinate the scheduling of all work.

1.4 LOCATION OF WORK

A. The contractor shall check and verify all measurements and dimensions shown on contract drawings and shop drawings of all the work as it progresses.

B. The proper location of work of all subcontractors, including supports for equipment shall be the final conclusive responsibility of the general contractor regardless of who is responsible for the layout of the work in the first instance.

1.5 UNLOADING AND HOISTING MATERIALS

A. The contractor, each subcontractor, and each supplier of materials and equipment shall be responsible for the hoisting of their materials and equipment to the proper location for installation on the project.

B. They shall also be responsible for unloading of all materials and equipment at the job site.

1.6 STORAGE OF MATERIALS

A. General contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and equipment and coordinate the storage and execution of their work with his.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013120 - GENERAL CONSTRUCTION REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Special Provisions.
2. Commencement activity.
3. Quality control.
4. Project closeout.

B. Related Documents:
1. The Contract Documents, as defined in Section 01 01 00 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 SPECIAL PROVISIONS

A. Project: The Project is the total construction for which the Contractor is responsible, including all labor, materials and equipment used or incorporated in such construction.

B. Work: The Work comprises the completed construction designed under the Project and includes labor necessary to produce such construction, and materials and equipment incorporated or to be incorporated in such construction.

C. Contract Documents: Five (5) paper sets of Contract Documents will be furnished to the Contractor. One (1) electronic PDF set of Contract Documents will be furnished to the Contractor.

D. Demolition: Contractor, if there are any, shall remove all existing Improvements on the site. Demolish existing construction completely and remove from the site. Use such methods as required to complete the work in compliance with city and utility company requirements. All existing utility connections shall be disconnected, properly capped and removed by the Contractor. Demolish foundation walls to a depth of not less than 24 inches below the finish grade surface. Complete removal is required under the new building or other new foundations. Remove all below-grade wood and metal. Any existing basements, cisterns and/or other below grade voids shall be filled with compatible fill material suitable for proposed constructions and compacted per specific requirements. All debris, rubbish, salvage and other materials shall be removed from the site. Protect all adjacent properties and/or structure from damage.

E. Utilities: It is the Contractor's responsibility to coordinate with the appropriate utility companies actual location of mains serving the site and route the building utility lines in the most direct route.
1. The location of utilities existing in the building as indicated on the Drawings may be modified by the Contractor to accommodate a more direct route to the utility connection location with written approval from the Owner and Architect.

F. Permits and Fees: The Contractor shall obtain and pay for the Building Permit and other permits and governmental fees, licenses, and inspections required. The Contractor is to include in the offer the cost of the following charges (permanent and temporary) if applicable to the project, payable to State, local or special community development agencies and any additional fees as required:
1. Water service connection and meter fee.
2. Electrical company connection and meter fee.
3. Telephone company connection and meter fee.
4. Sanitary sewer connection fee.
5. Culvert installation.
6. Sign installation.

7. Historical and Archeological Finds: All items having any apparent historical or archeological interest discovered in the course of construction must be carefully preserved. The Contractor must leave the archeological find undisturbed and immediately report it to the Owner and Architect.
8. Any and all other fees not listed but required by state local or other agencies.

ALL OF THE ABOVE LISTED PERMITS AND FEES REQUIRE THE CONTRACTOR TO CONTACT EACH AGENCY DURING THE BIDDING PROCESS, IN ORDER TO OBTAIN THESE FEES.

1.3 COMMENCEMENT ACTIVITY

A. Evidence that the Contractor has started procurement of materials, preparation and submission of shop drawings, preparation of subcontracts and other preparatory work must satisfy the requirement that work begin upon receipt of Notice to Proceed.

1.4 PRECONSTRUCTION CONFERENCE AND OTHER MEETINGS

A. Specified in Section 01 20 10 – Preconstruction Conference.

1.5 QUALITY CONTROL

A. Testing:
1. Employ the services of an independent testing laboratory to take samples, perform tests and make inspections. The costs for such laboratory and tests shall be borne by the Contractor.
2. Submit testing reports as required.

1.6 PRE-FINAL AND FINAL/OCCUPANCY INSPECTIONS

A. The Contractor is to notify in writing, the Architect, that the work is complete for a Pre-Final Inspection with the Owner and the Architect. The Contractor must provide the Owner at least 10 calendar days advance notice.

B. The Contractor is to diligently complete all punch list items before a Final/Occupancy Inspection is scheduled.

1.7 PROJECT CLOSEOUT

A. Specified in Section 01 78 00 - Closeout Submittals and Training.

B. Closeout Submittals:

1. Specified in Section 01 78 00 - Closeout Submittals and Training.
2. **BEFORE THE PROJECT CAN BE CLOSED OUT, AND BEFORE FINAL PAYMENT CAN BE MADE, THE CONTRACTOR SHALL HAVE PROVIDED ALL SUBMITTALS REQUIRED BY THE CONTRACT DOCUMENTS. ALL SUBMITTALS REQUIRED BY THE CONTRACT DRAWINGS OR SPECIFICATIONS SHALL BE SENT TO THE ARCHITECT FOR REVIEW AND COORDINATION, IN ACCORDANCE WITH THE REQUIREMENTS OF THE RESPECTIVE DRAWING OR SPECIFICATION SECTION. ANY ITEMS THAT THE ARCHITECT DETERMINES ARE INCOMPLETE OR INCORRECT SHALL BE CORRECTED AND RESUBMITTED. ALL CLOSEOUT SUBMITTALS MUST BE RECEIVED NO LATER THAN THE DATE OF SUBSTANTIAL COMPLETION.**
3. Required submittals include, but are not necessarily limited to, the following:
   a. Warranties/Guarantees. As indicated in the Contract Documents.
   b. Operation and Maintenance Manuals.
      1) Furnish three complete manuals, or sets of manuals, containing the manufacturers' instructions for maintenance and operation of each item of equipment and apparatus furnished under the Contract, and any additional data specifically required under the various sections of the Specifications.

2) ARRANGE THE MANUALS IN PROPER ORDER, INDEXED, AND BOUND INTO 3-RING BINDERS. ALL INFORMATION SHALL ALSO BE SUBMITTED AS AN ELECTRONIC COPY, PDF, ON A CD.

3) In the front of each binder, include a list containing the name, address, phone number, and area or item of responsibility, for every party to be contacted, should any problems or defects with the building or its equipment occur during the warranty period(s). The first party listed shall be the Contractor.

c. Project Record Documents. Furnish "As-Builts" required by the Specifications.
d. Certificate of Occupancy. Where the local authority at the site of the building requires either a temporary or permanent Certificate of Occupancy, obtain and pay for the Certificate(s) and furnish a copy to the COR.
e. Inspection/Testing Reports. Furnish two copies of all reports required by the Architect or as otherwise indicated in the various other Specification sections.
f. Shop Drawings, Product Data. As indicated in the various Specification sections.
g. Hardware and Keying Schedules. As indicated in the appropriate Specification section.
h. Spare Parts. Replacement Stock, Samples, Special Tools. As indicated in the various Specification Sections.
i. Contractor must sign and submit a “Certificate of Asbestos and Lead-Based Paint”.

C. Retention:
1. The Architect will assign a monetary value to all punch list items not completed, and to all required submittals not received, as of the date of "Final Acceptance" and the total value of those items shall be retained and/or deducted from the Contractor's final payment until the Contractor demonstrates to the Owner's satisfaction that such items have been completed or corrected.

END OF SECTION

SECTION 01 32 16 – CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 SCHEDULE

A. Prepare and submit for architect's approval a projected construction schedule for the entire work.

B. The schedule shall indicate the dates for the starting and completion of various stages and sequencing of construction and shall be revised monthly. Submit with contractor's Application for Payment each month.

1.2 FORM

A. Prepare schedule in the form of a horizontal bar chart providing:
   1. Separate horizontal bar column for each major specification section.
   2. Place in chronological order of beginning of each item of work.
   3. Identify each horizontal bar:
      a. By major specification section
      b. By distinct graphic delineation
   4. Horizontal time scale (weeks)
   5. Allow space for denoting of actual progress of the work.
   6. Minimum sheet size: 8-1/2" x 14". Maximum sheet size: 11' x 17".

1.3 SCHEDULE UPDATE

A. Update schedules accurately indicating the progress to first day of each month and submit monthly with Application and Certificate for Payment. Updated schedules are to be distributed at monthly progress meetings to all attendees.

B. **The original schedule shall always be shown on the monthly updated schedules. The bar char and data shall always show (state), the original schedule and the revised schedule. Thus, showing how the schedule has, or has not, changed over time (each month).**

END OF SECTION

SECTION 01 33 23 - SUBMITTALS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Project Data

B. Shop Drawings

C. Samples

D. Design Data

E. Test Reports

F. Certificates

G. Manufacturer's Instructions

H. Manufacturer's Field Reports

I. Erection Drawings

1.2 PROJECT DATA: Submit "electronically" to the Architect

A. Manufacturer's standard schematic drawings:
1. Modify drawings to delete information which is not applicable to project.
2. Supplement standard information to provide additional information applicable to project.

B. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data.
1. Clearly mark each copy to identify pertinent materials products, or models
2. Show dimensions and clearances required
3. Show performance characteristics and capacities
4. Show wiring diagrams and controls.

1.3 SHOP DRAWINGS: Submit "electronically" to the Architect

A. Original drawings, prepared by contractor, subcontractor, supplier, or distributor, which illustrate some portion of the work; showing fabrication, layout, setting, or erection drawings.
1. Prepared by a qualified detailer
2. Identify details by reference to sheet and detail numbers shown on contract document drawings
3. Minimum sheet size: 8-1/2" x 11"
4. Reproductions for submittal: Blackline copies

1.4 SAMPLES

A. Physical examples to illustrate materials, equipment, or workmanship, and to establish standards by which completed work is judged.
1. Office Samples: of sufficient size and quantity to clearly illustrate:
a. Functional characteristics of product or material with integrally related parts and attachment devices
b. Finishes

1.5 DESIGN DATA: Submit “electronically” to the Architect

A. Submit for the Architect/Engineer’s knowledge as contract administrator or for the Owner.

B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

1.6 TEST REPORTS: Submit “electronically” to the Architect

A. Submit for the Architect/Engineer’s knowledge as contract administrator or for the Owner.

B. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

1.7 CERTIFICATES: Submit “electronically” to the Architect

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

B. Indicate if material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certification as appropriate.

C. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect/Engineer.

1.8 MANUFACTURER’S INSTRUCTIONS: Submit “electronically” to the Architect

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing to Architect/Engineer for delivery to Owner in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.9 MANUFACTURER’S FIELD REPORTS: Submit “electronically” to the Architect

A. Submit reports for the Architect/Engineer’s benefit as contract administrator or for the Owner.

B. Submit report in duplicate within 30 days of observation to architect/engineer for information.

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

1.10 ERECTION DRAWINGS: Submit “electronically” to the Architect

A. Submit drawings for the Architect/Engineer’s benefit as contract administrator or for the Owner.

B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

C. Data indicating inappropriate or unacceptable Work may be subject to action by the Architect/Engineer or Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONTRACTOR RESPONSIBILITIES

A. Review shop drawings, project data, and samples prior to submission and make corrections as necessary to meet the specifications and/or the construction conditions. **Do not submit to architect unless it is clearly shown on the information that the contractor has reviewed the information and it meets the requirements of the construction documents.**

B. Verify:
1. Field measurements
2. Field construction criteria
3. Catalog numbers and similar data

C. Coordinate each submittal with requirements of work and of contract documents.

D. Contractor's responsibility for errors and omissions in submittals is not relieved by Architect/Engineer's review of submittals.

E. Contractor's responsibility for deviations in submittals from requirements of contract documents is not relieved by Architect/Engineer's review of submittals, unless Architect/Engineer gives written acceptance and deviations are clearly marked on submittals.

F. Notify Architect/Engineer in writing at time of submission of deviations in submittals from requirements of contract documents.

G. Begin no work which requires submittals until return of submittals with Architect/Engineer's stamp and initials or signature indicating review.

3.2 SUBMISSION REQUIREMENTS

A. Schedule submissions at least 14 days before dates reviewed submittals/materials will need to be ordered for proper execution within contractor's schedule for construction.

B. Submit all shop drawings and material/product/project data electronically (via emails) to the Architect.

1. **Should the contractor use a contract management system to send/ receive submissions (including pay requests, change orders and etc.) such as ProCore and desires the architect to use such, then the contractor shall train the architect and his staff to become competent with the system. This training shall take place at the architect's office and will require at least eight (8) hours of training.**

C. Submit actual samples specified materials/products which require a color/finish/texture selection.

D. Accompany submittals with transmittal letter (via email) containing:
1. Date
2. Project title and number
3. Contractor's name and address
4. The number of each shop drawing, project data, and sample submitted.
5. Notification of deviations from contract documents
6. Other pertinent data

E. Submittals shall include:
1. Date and revision dates
2. Project title and number

3. The names of:
   a. Architect/Engineer
   b. Contractor
   c. Subcontractor
   d. Supplier
   e. Manufacturer
   f. Separate detailer when pertinent
4. Identification of product or material
5. Relation to adjacent structure or materials
6. Field dimensions, clearly identified as such
7. Specification selection number.

3.3 RESUBMISSION REQUIREMENTS

A. Shop Drawings:
   1. Revise initial drawings as required and resubmit as specified for initial submittal
   2. Indicate on drawings any changes which have been made other than those requested by the Architect/Engineer.

B. Project Data and Samples: Submit new data and samples as required for initial submission.

3.4 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

A. Distribute copies of shop drawings, material/product information, and project data which carry Architect/Engineer's stamp, or initialed approval to:
   1. Contractor's file
   2. Job site file
   3. Record documents file
   4. Other prime contractors
   5. Subcontractors
   6. Supplier
   7. Fabricator

B. Distribute samples as directed.

3.5 ARCHITECT/ENGINEER'S DUTIES

A. Review submittals with reasonable promptness, but each submittal shall be reviewed within fourteen (14) days of receipt.

B. Review for:
   1. Design concept of project
   2. Information given in contract documents

C. Review of separate item does not constitute review of an assembly in which item functions.

D. Affix stamp, initials, or signature certifying to review of submittal.

E. Return submittals to contractor for distribution via email.

END OF SECTION

SECTION 01 41 00 - TESTING LABORATORY SERVICES (CONTRACTOR PAYS)

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:
1. Cooperate with the selected testing agency and all others responsible for testing and inspecting the Work.
2. Provide such other testing and inspecting as are specified to be furnished by the Contractor in this Section and/or elsewhere in the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Requirements for testing may be described in various Sections of these Specifications.
3. Where no testing requirements are described, but the Owner decides that testing is required, the Owner may require such testing to be performed under current pertinent standards for testing. Payment for such testing will be by the Owner.

1.2 QUALITY ASSURANCE

A. The testing laboratory will be qualified to the Architect and/or Owner's approval.

B. Testing, when required, will be in accordance with all pertinent codes and regulations, and with selected standards of the American Society for Testing and Materials.

C. Inspections, tests, and related actions specified in this Section and elsewhere in the Contract Documents are not intended to limit each and every Contractor's own quality control procedures which facilitate overall compliance with requirements of the Work.

PART 2 - PRODUCTS

(Not applicable)

PART 3 - EXECUTION

(Not applicable)

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide temporary facilities and controls needed for the Work including, but not necessarily limited to:
1. Temporary utilities such as telephone; (construction manager to provide)
2. Field office for the Construction Manager's personnel; (construction manager to provide)
3. Sanitary facilities; (construction manager to provide)
4. Enclosures such as tarpaulins, barricades, and canopies; (construction manager to provide)
5. Project Sign (construction manager to provide)

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Except that equipment furnished by subcontractors shall comply with requirements of pertinent safety regulations, such equipment normally furnished by the individual trades in execution of their own portions of the Work are not part of this Section.
3. Permanent installation and hookup of the various utility lines are described in other Sections.

1.2 PRODUCT HANDLING

A. Maintain temporary facilities and controls in proper and safe condition throughout progress of the Work.

PART 2 - PRODUCTS

2.1 UTILITIES

A. Telephone:
1. Make necessary arrangements and pay costs for installation and operation of telephone service to the Construction Manager's office at the site.
2. Make the telephone available to the Architect for use in connection with the Work.
3. The telephone shall be hard-wired (cell phone is not acceptable) and capable of both local and long distance phone calling (receiving and sending).
4. There shall also be a fax machine, installed and paid for by the Contractor, which will be at the contractor's office at the site and capable of receiving and sending faxes 24 hours a day, seven days a week.

B. Water:
1. The Construction Manager shall install as necessary and/or provide temporary water distribution for needed work. Remove such temporary facilities upon completion of the Work.
2. The Owner will pay for water used in the construction.

C. Electricity:
1. The Electrical Contractor shall provide necessary temporary wiring and, upon completion of the Work, remove such temporary facility.
2. Provide area distribution boxes so located that the individual trades may furnish and use 100 foot maximum length extension cords to obtain power and lighting at points where needed for work, inspection, and safety.
3. The Owner will pay for electricity used in the construction.

D. Heating:
1. Provide, maintain and pay for all temporary heat necessary for proper conduct of operations needed in the Work.

2.2 FIELD OFFICES AND SHEDS

A. Construction Manager's facilities:
1. Provide a field office building and sheds / storage trailer adequate in size and accommodation for offices, supply, and storage.

B. Contractor facilities:
1. Contractors can have a field office building and / or storage trailer at the site, if acceptable to the Construction Manager and Owner.

C. Sanitary facilities:
1. Provide temporary sanitary facilities in the quantity required for use by all personnel.
2. Maintain in a safe and sanitary condition at all times.

2.3 ENCLOSURES

A. Provide and maintain for the duration of construction all scaffolds, tarpaulins, canopies, warning signs, steps, platforms, bridges, and other temporary construction necessary for proper completion of the Work in compliance with pertinent safety and other regulations.

B. Provide a positive barricade (orange, plastic safety fencing as a minimum) that is obvious to the public at the extents of the construction area.

2.4 PROJECT SIGNS

A. Provide and erect a job sign describing the project. Design of sign will be as provided by Architect and will not exceed 4' x 8' (plywood), with 4 colors. The information on the sign will include as a minimum: Project Name, Architect's Name, Engineers' Names, Construction Manager's Name, Owner's Name and Project / School logo.

B. Upon completion of the Work, remove the job sign.

C. No other signs will be permitted.

2.5 EROSION CONTROL DEVICES

A. Erect erosion control devices as described in the Drawings. If not described then as required by local and state (ADEQ) authority to control water and soil run-off from the Work area into existing or to be constructed storm drainage systems (open or closed systems).

B. Such devices shall remain in place for the duration of the Work and shall only be removed when approved by the local and state (ADEQ) authority and/or the Owner and Architect.

PART 3 - EXECUTION

3.1 MAINTENANCE AND REMOVAL

A. Maintain temporary facilities and controls as long as needed for safe and proper completion of the Work.

B. Remove such temporary facilities and controls as rapidly as progress of the Work will permit, or as directed by the Architect.

END OF SECTION

SECTION 01 60 00 - PRODUCT REQUIREMENTS

1.1 PRODUCT OPTIONS AND SUBSTITUTIONS

A. Provide Products that comply with Contract Documents, are undamaged and new at time of installation.

B. Provide Products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and intended use and effect.

C. Substitutions may be considered when Contractor becomes aware of a product or procedure that is more environmentally sensitive.

1.2 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle Products in accordance with manufacturer's instructions, using means and methods that will prevent damage, deterioration and loss, including theft.

B. Schedule Product delivery to minimize long-term storage at Project site and prevent overcrowding of construction spaces.

C. Coordinate Product delivery with installation schedule to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

D. Deliver Products to Project site in undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

E. Promptly inspect shipments to ensure that Products comply with project requirements, quantities are correct, Products are undamaged, and properly protected.

F. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.3 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect Products in accordance with manufacturers' published instructions, with seals and labels intact and legible.

B. Store Products subject to damage by elements above ground, under cover in weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's published instructions.

C. For exterior storage of fabricated Products, place on sloped supports, above ground.

D. Provide off-site storage and protection when Project site does not permit on-site storage or protection.

E. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of Product.

F. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

G. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

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

END OF SECTION

SECTION 01 64 00 - PRODUCT HANDLING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Protect products scheduled for use in the Work by means including, but not necessarily limited to, those described in this Section.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Additional procedures also may be prescribed in other Sections of these Specifications.

1.2 QUALITY ASSURANCE

A. Include within the Construction Manager’s and Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.

1.3 MANUFACTURERS' RECOMMENDATIONS

A. Except as otherwise approved by the Architect, determine and comply with manufacturers' recommendations on product handling, storage, and protection.

1.4 PACKAGING

A. Deliver products to the job site in their manufacturer's original container, with labels intact and legible.
1. Maintain packaged materials with seals unbroken and labels intact until time of use.
2. Promptly remove damaged material and unsuitable items from the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the Owner.

B. The Architect may reject as non-complying such material and products that do not bear identification satisfactory to the Architect as to manufacturer, grade, quality, and other pertinent information.

1.5 PROTECTION

A. Protect finished surfaces, including jambs and soffits of openings used as passageways, through which equipment and materials are handled.

B. Provide protection for finished floor surfaces in traffic areas prior to allowing equipment or materials to be moved over such surfaces.

C. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by the Owner.

1.6 REPAIRS AND REPLACEMENTS

A. In event of damage, promptly make replacements and repairs to the approval of the Architect and at no additional cost to the Owner.

B. Additional time required to secure replacements and to make repairs will not be considered by the Architect to justify an extension in the Contract Time of Completion.

END OF SECTION

SECTION 01 70 50 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SCOPE

A. Prior to final acceptance of project by Owner the following procedure shall be followed and the following work shall be accomplished.

1.3 SUBSTANTIAL COMPLETION

A. Construction Manager and Contractor(s) shall submit in writing notice that Project, or designated portion of Project, is substantially complete, accompanied by a list of major items to be completed or corrected as determined by the final inspection. Architect shall issue Certificate of Substantial Completion, AIA Form G704.

1.4 FINAL INSPECTION

A. Construction Manager and Contractor(s) shall submit written certification that:
1. Contract Documents have been reviewed;
2. Project has been inspected for compliance with Contract Documents;
3. Work has been completed in accordance with Contract Documents;
4. Equipment and systems have been tested in the presence of Owner's Representative and are operational;
5. Project is completed and ready for final inspection.

B. Architect will make final inspection within 7 days after receipt of certification.

C. Should Architect consider that work is finally complete in accordance with requirements of Contract Documents, he shall request Construction Manager and Contractor(s) to make Project Closeout submittals.

D. Should Architect consider that work is not finally complete, he shall so notify Construction Manager stating reasons. Construction Manager and Contractor shall take immediate steps to remedy the stated deficiencies and send second written notice to Architect certifying that work is complete. Architect will reinspect work.

1.5 REINSPECTION COSTS

A. SHOULD ARCHITECT BE REQUIRED TO PERFORM SECOND INSPECTION (OR SUBSEQUENT INSPECTION) BECAUSE OF FAILURE OF WORK TO COMPLY WITH ORIGINAL CERTIFICATIONS OF CONSTRUCTION MANAGER AND/OR CONTRACTOR, OWNER WILL COMPENSATE ARCHITECT AND HIS CONSULTING ENGINEER(S) FOR ADDITIONAL SERVICES AND DEDUCT THE AMOUNT PAID FROM THE FINAL PAYMENT TO THE CONSTRUCTION MANAGER AND/OR CONTRACTOR. SUCH COMPENSATION SHALL BE AT THE RATE OF $100.00 PER HOUR FOR EACH ARCHITECT AND/OR CONSULTANT, PLUS $0.57 PER MILE TRAVEL, PLUS EXPENSES.

1.6 CLOSEOUT SUBMITTALS

A. Prior to approval of Final Payment, the following documents shall be submitted to Architect.
1. PROJECT RECORD DOCUMENTS (As-Builts)
   a. One copy of the following, accompanied by a cover letter stating that they represent a complete and accurate record:
      Drawings
      Project Manual
      Addenda
      Shop Drawings
      Change Orders
   b. During the course of the work a copy of the Drawings shall be kept at the site and shall NOT be used for construction purposes. Changes shall be neatly marked on the documents with a RED marking pen. Each document shall be labeled "PROJECT RECORD" in 1" high printed letters.
   c. Drawings shall reflect the following information:
      Horizontal & vertical location of all underground and/or concealed utilities.
      Deviations of dimension(s) and/or detail(s).
      Changes made by Change Order.
2. OPERATION & MAINTENANCE MANUALS
   a. Three (3) copies of Manuals on the following items providing performance data, parts list, accessories, operating and maintenance instructions, warranties:
      HVAC Equipment and Controls
      Elevator Equipment
      Electrical Equipment
      Fire Alarm Equipment
      Fire Sprinkler Equipment
   b. Manuals shall be durable plastic loose-leaf binders for 8-1/2" material with Title on cover and Index of all materials as the first page.
3. SERVICE & MAINTENANCE AGREEMENT
   a. Two (2) copies of the following items:
      HVAC and Elevator Equipment - One (1) Year Service and Maintenance Agreement (at no charge) beginning on the date of Substantial Completion.
4. WARRANTIES OR BONDS
   a. Two (2) copies of Warranties for all items listed within specification sections requiring such.
   b. Letter from each and every Contractor stating that asbestos **FREE** materials, products and equipment were used in the completion of the work.
5. TRAINING
   a. Thoroughly instruct the Owner's personnel in the operations of the following as applicable:
      HVAC Equipment - Each system shall be operated for the Owner's personnel during the cooling season and during the heating season, including necessary adjustments. Furnish, where directed, a printed sheet (with transparent protective cover) containing brief operating instructions.
      Elevator Equipment
      Electrical Equipment
      Fire Alarm Equipment
      Fire Sprinkler Equipment
      Systems/Equipment not specifically listed but requested by the Owner.
6. FINAL PAYMENT
   a. Each Contractor shall submit Final Application in accordance with the Contract Documents.
   b. Should any portion of the listed Closeout Submittals not be submitted, the Contractor will have an amount equal to 0.001% of the Contractor’s Bid Proposal withheld from the Final Payment. This amount will be withheld until each item is submitted.

1.7 POST-CONSTRUCTION INSPECTION

A. Prior to expiration of one (1) year from Date of Substantial Completion, Architect in company with Owner and Construction Manager will make visual inspection of Project to determine whether correction of work is required (of each Contractor), in accordance with provisions of the Contract Documents.

END OF SECTION

SECTION 01 73 00 – EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Closeout procedures.

B. Starting of systems.

C. Demonstration and Instructions

D. Testing, Adjusting and Balancing

E. Protecting installed construction.

1.2 RELATED SECTIONS

A. Section 01 74 00 – Cleaning

B. Section 01 78 00 – Closeout Submittals

C. Section 01 78 39 – Project Record Documents

1.3 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect's review.

B. Provide submittals to Architect that are required by governing or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.4 STARTING OF SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect/Engineer seven (7) days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable Contractors' personnel in accordance with manufacturers' instructions

G. Submit a written report in accordance with Section 01 30 00 That equipment or system has been properly installed and is functioning correctly.

1.5 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to Owner's personnel two (2) weeks prior to date of Substantial Completion.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season.

C. Utilize Operation and Maintenance Manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

D. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time at the site.

1.6 TESTING, ADJUSTING AND BALANCING

A. Contractor will appoint and employ services of an independent firm to perform testing, adjusting, and balancing. Contractor shall pay for services.

B. See mechanical specifications for specific requirements.

C. Reports will be submitted by the independent firm to the Architect/Engineer indicating observations and results of tests and indicating compliance or non-compliance with the requirements of the Contract Documents.

1.7 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

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

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

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing materials manufacturer.

F. Prohibit traffic from landscaped areas.

1.8 USE OF BUILDING

A. Contractor shall allow the Owner use of the substantially completed building for placement and installation of equipment. Such use of the structure shall not signify that the Owner accepts the building.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 74 00 - CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Throughout the construction period, each Contractor and/or the Construction Manager shall maintain the buildings and site in a standard of cleanliness as described in this Section.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. In addition to standards described in this Section, comply with requirements for cleaning as described in pertinent other Sections of these Specifications.

1.2 QUALITY ASSURANCE

A. Conduct daily inspection, and more often if necessary, to verify that requirements for cleanliness are being met.

B. In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS AND EQUIPMENT

A. Provide required personnel, equipment and materials needed to maintain specified standard of cleanliness.

2.2 COMPATIBILITY

A. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

B. Contractors shall NOT use oil-based floor sweep prior to floorcovering installation.

PART 3 - EXECUTION

3.1 PROGRESS CLEANING

A. General
1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing required protection of materials.
2. Do not allow accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
3. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from the job site.
4. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.

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

2. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site. Restack, tidy, or otherwise service arrangements to meet the requirements of subparagraph 3.1-A-1 above.
3. Maintain the site in a neat and orderly condition at all times.

C. Structures:
1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
2. Weekly, and more often if necessary, sweep interior spaces clean.
   a. "Clean," for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and a hand-held broom.
3. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.
4. Following the installation of finish floor materials, clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which finish materials are installed.
   a. "Clean," for the purpose of this subparagraph, shall be interpreted as meaning free from foreign material which, in the opinion of the Architect, may be injurious to the finish floor material.

3.2 FINAL CLEANING

A. "Clean," for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.

B. Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.1 above.

C. Site:
1. Unless otherwise specifically directed by the Architect, broom clean paved areas on the site and public paved areas adjacent to the site.
2. Completely remove resultant debris.

D. Structures:
1. Exterior:
   a. Visually inspect exterior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
   b. Remove all traces of splashed materials from adjacent surfaces.
   c. Remove paint droppings, spots, stains, and dirt from finished surfaces.
2. Interior:
   a. Visually inspect interior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
   b. Remove all traces of splashed materials from adjacent surfaces.
   c. Remove paint droppings, spots, stains, and dirt from finished surfaces.
3. Glass: Clean inside and outside.
4. Polished surfaces: To surfaces requiring routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished.

E. Schedule final cleaning as approved by the Architect to enable the Owner to accept a completely clean Work.

3.3 CLEANING DURING OWNER'S OCCUPANCY

A. Should the Owner occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning shall be determined by the Construction Manager in accordance with the General Conditions of the Contract.

END OF SECTION

SECTION 01 78 00 - CLOSEOUT SUBMITTALS AND TRAINING

1.1 MANUALS

A. Purpose: Operation and maintenance manuals are the training of, and use by, facility employees in the operation and maintenance of the systems and related equipment as specified below. The manuals must consist of instruction on systems and equipment. A separate manual or chapter must be prepared for each of the following classes of equipment or system:
   1. Heating plants.
   2. Cooling plants.
   3. Air-conditioning systems.
   4. Heating systems (if separate from air-conditioning).
   5. Ventilating systems.
   6. Exhaust systems.
   7. Control systems.
   8. Plumbing systems.
   9. Fire protection and alarm systems.
   10. Electrical systems.
   11. Emergency systems.
   12. Miscellaneous building equipment and systems (such as compressed air systems, loading dock equipment, and vehicle maintenance equipment).

B. Content: Unless otherwise indicated, each chapter must contain the following, as applicable:
   1. Introduction.
   2. Table of contents.
   3. Description of system (including design intent and considerations).

C. Preparation: The outline below is intended as a general guide for preparing the manuals. The manuals must be prepared to provide for the optimum operation and maintenance of the various systems. The description of systems and general operating instructions for plumbing and electrical manuals may cover only complicated or unusual parts of these systems, such as sewage ejectors, transformers, high tension switchgear, and signal and alarm systems. Manufacturer's literature and data must be those of the actual equipment installed under contract for the particular facility. Further guidance is available in the ASHRAE Handbook, 1984, Systems Volume, Chapter 39, Mechanical Maintenance.

D. Suggested Outline for Operation and Maintenance (O&M) Manuals: This is a suggested outline, with general requirements of O&M manuals. The outline is presented to indicate the extent of material to be covered and the individual items required in manuals for major facilities. The outline may be modified to suit specific installations; however, the purpose of the manual must be fulfilled. The manual is not intended to duplicate manufacturers' data, but proper references must be made in the text of the O&M manual to indicate that that information is applicable and where it is located.
   1. Part I. Description and Design Intent
      a. Introduction
         1) Provide a brief description of project and purpose of the maintenance manual. The following statements must be included: "Operation and maintenance of this equipment must be performed in accordance with this manual and posted instructions, subject to compliance with applicable technical guides and standards. It is recognized that minor changes in control points and settings will be required, based on actual operating experience, to correct varying conditions and improve operation. When such changes appear necessary, they must be submitted to the chief operating engineer for consideration. Upon approval of any changes, the applicable portions of all copies of the manual and proposed instructions must be revised and reissued, and any change in operating procedure brought to the attention of all operating personnel."
         2) This manual is specifically developed to assist the District officials in charge at the facility to operate and maintain the building systems and equipment. Manufacturers' recommendations set forth for certain components must be followed during the complete warranty period for that equipment.

3) Contents of Manual. This portion of the introduction must explain that the manual is to contain complete operating, maintenance, and safety instructions for all equipment listed. It must also contain any other appropriate references as required to outline an explanation of the manuals and major categories of reference material required with the manuals.

b. Table of Contents
   1) The table of contents must list numbers and titles of chapters, sections, and main paragraphs, with their page numbers. Each volume in a set of manuals must contain its own table of contents. Publications containing 10 or more illustrations or tables must include a list of illustrations or tables, as applicable. These lists must show number, title, and page number of each illustration and table. Following is a typical table of contents:

c. Maintenance of Systems
   1) Space conditioning
   2) Heating
   3) Central chilled water and distribution
   4) Air distribution and ventilating
   5) Temperature control

d. Plumbing Systems
   1) Potable water
   2) Domestic hot water
   3) Roof and sanitary drains

e. Fire Protection System
   1) Water supply and distribution
   2) Exterior fire hydrants
   3) Sprinklers
   4) Fire Department connections
   5) Fire extinguishers
   6) Exit signs
   7) See "Electrical Systems" for Fire Alarm and Emergency Lighting Units

f. Electrical Systems
   1) Incoming service
   2) Electrical power distribution
   3) Lighting
   4) Intercom and paging
   5) Fire alarm
   6) Emergency lighting units

g. Miscellaneous Building Equipment
   1) Elevators
   2) Dock levelers, door operators
   3) Scales
   4) Vehicle maintenance equipment

2. Part II. Operating Sequence and Procedures
   a. Contents: Each chapter must describe the procedures necessary for facility personnel to operate the system and equipment covered in that chapter.
   b. Operating Procedures: The operating procedures must be divided into four subsections: Startup, Operation, Emergency Operation, and Shutdown.
      1) Startup: Give complete instructions for energizing the equipment and making initial settings and adjustments whenever applicable. If equipment is fully automatic, a statement to that effect is all that is required. If a specific sequence of steps must be performed, give step-by-step instructions in the proper sequence. If timing- (such as warm-up between power-on and adjustment) is important, clearly state the

         specific minimum time required at the proper point in the procedure. Refer to controls and indicators by panel; make references consistent with the nomenclature used in illustrations and tables of controls and indicators. If preliminary settings differ for different modes of operations, give procedures for each mode.

2) Operation: Give detailed instructions in proper sequence for each mode of operation. When, for a given action on the part of the operator, alternate equipment responses are possible, give the appropriate operation reaction to each.
3) Emergency Operation: If some functions of the equipment can be operated while other functions are disabled, give instructions for operations under these conditions. Include here only those alternate methods of operation (from normal) that the operator can follow when there is a partial failure or malfunctioning of components, or other unusual condition.
4) Shutdown: Include instructions for stopping and securing the equipment after operation. If a particular sequence is required, give step-by-step instructions in that order.

3. Part III. Maintenance Instructions and Requirements
   a. Contents: Each chapter must describe the procedures necessary for District personnel to perform the maintenance on the systems and equipment covered in that chapter. Emphasis must be placed on the method of mechanical control of systems and equipment from a maintenance standpoint. References must be made, as appropriate, to drawings, schematics, and sequences of operation included as part of the construction contract drawings and specifications that show piping and equipment arrangements and items of control. Prints of these drawings must be reduced to 11 inches x 17 inches for insertion in the manuals. Drawings must represent the "as-built" condition.
   b. Maintenance Procedures: The maintenance procedures must be divided into two categories: Preventive Maintenance and Corrective Maintenance.
      1) Preventive Maintenance
         i. Provide a schedule for preventive maintenance. State, preferably in tabular form, the recommended frequency of performance for each preventive maintenance task (cleaning, inspection, and scheduled overhauls).
         ii. Provide instruction and schedules for all routine maintenance cleaning and inspection, with recommended lubricants.
         iii. If periodic inspection of equipment is required for operation, cleaning, or other reasons, indicate the items to be inspected and give the inspection criteria for, but not limited to, the following:
            (a) Motors
            (b) Controls
            (c) Filters
            (d) Heat exchangers
         iv. Provide instruction for minor repairs or adjustments required for preventive maintenance routines. Minor repair and adjustment must be limited to repairs and adjustments that may be performed without special tools or test equipment and that require no special training or skills. Identify test points and give values for each.
      2) Corrective Maintenance
         i. Corrective Maintenance: Corrective maintenance instructions must be predicated upon a logical effect-to-cause troubleshooting philosophy and a rapid replacement procedure to minimize equipment downtime. Instructions and data must appear in the normal sequence of corrective maintenance, for example, troubleshooting first, repair and replacement of parts second, and then the parts list.
         ii. Troubleshooting: This information must describe the general procedure for locating malfunctions and must give, in detail, any specific remedial procedures or techniques. The data shown are intended to isolate only the most common equipment deficiencies. Troubleshooting tables, charts, or diagrams may be used to present specific procedures. A guide to this type must be a three-column chart. The columns must be entitled Malfunction, Probable Cause, and Recommended Action. The information must be alphabetically arranged by component, and each component must, in turn, list deficiencies that may be expected. Each deficiency must contain one or more problems with a recommended correction.
         iii. Repair and Replacement: Indicate the repair and replacement procedures most likely to be required in the maintenance of the equipment. Information included here must consist of step-by-step instructions for repair and replacement of defective items. Include all information required to accomplish repair or replacement, including information such as torque values. Identify all tools, special equipment, and materials that may be required. Identify uses for maintenance equipment. The paragraphs must contain headings to identify the topics covered.

iv. Safety Precautions: This subsection must comprise a listing of safety precautions and instructions to be followed before, during, and after repairs or adjustments are made or routine maintenance is performed.

c. Manufacturers' Brochures: Include manufacturers' descriptive literature covering devices used in the system, together with illustrations, exploded views, and renewal parts lists. This section must also include special devices manufactured by the electrical Contractor.

d. Special Maintenance: Provide information of a maintenance nature covering warranty items that have not been discussed elsewhere.

e. Shop Drawings: Provide a copy of all approved shop drawings covering approval of equipment for the project with the manufacturers' brochures.

f. Spare Parts Lists: Include a recommended spare parts list for all equipment furnished for the project. The parts list must include a tabulation of descriptive data for all the electrical-electronic spare parts and all the mechanical spare parts proposed for each type of equipment or system. Each part must be properly identified by part number and manufacturer.

E. Submittal

1. Preliminary Submittal: Two draft copies of the completed manuscript for items in this outline must be submitted to the Architect for review within 30 days after approval of equipment to be provided. One copy will be returned to the Contractor within 30 days after submittal and, if required, must be revised and resubmitted within 15 days.
2. Final Submittal: four complete sets of manuals must be furnished to the Architect not later than 30 days before completion of the project.

1.2 POSTED OPERATING INSTRUCTIONS

A. General. Operating instructions and diagrams must be prepared for posting near the equipment. Posted operating instructions must be photographic or equal non-fading reproductions framed under glass or encased in non-discoloring plastic and must be mounted in locations as directed. Copies of the posted operating instructions must also be used with the operating and maintenance manuals as a basis for training facility personnel in the operation and maintenance of systems and related equipment installed under contract at the facility.

B. Posted operating instructions must consist of simplified, consolidated equipment, control, and power diagrams graphically representing the entire system and actual equipment installed, including concise written instructions on how to start and stop systems, what settings and conditions are to be observed, and what control adjustments are to be made or maintained by the operation. Posted operating instructions must include, but are not limited to the following:

1. Boiler and burner controls.
2. Refrigeration controls.
3. Heating, ventilating, and air-conditioning controls for each system.
4. Controls for dust collection systems.
5. One-line schematic diagrams of water supply (plumbing).
6. One-line diagrams of steam distribution and hot water and chilled water systems, including risers, main shutoff valves, balancing cocks, and the like.
7. One-line isometric diagrams of sanitary drainage.

1.3 TRAINING

A. The Contractor must train facility personnel in the operation and maintenance of mechanical and electrical equipment. Coordination must be maintained with systems designers for developing the hours of instruction and scope of material to be covered. Training of facility personnel must not begin until the Architect has approved the final submittal copy of the operation and maintenance manual.

B. Schedule Submittal: The proposed scope of training and materials and instruction schedule must be submitted for review and approval approximately 30 days before the scheduled completion of the buildings. Mutually agreeable dates for training must be arranged with the Owner, but the training must be completed before final acceptance of the facility.

C. Time Period of Training: The minimum specific hours of training time required for each category of major equipment and systems is indicated below. Past experience indicates a workable ratio in the vicinity of approximately 25 percent classroom to 75 percent application, except that the ratio may be reversed for control systems. The Owner must have the option of redistributing the training times, subject to the total time specified. Training must be presented on an 8-hour per day, 5-day per week schedule, with all reading assignments and review to be within this period.

1.4 TRAINING PERIOD

Item	Time (Hours)
1. Heating Plant Covers heat-generating equipment, such as heat exchangers, boilers, and burners; electric resistance heating; and related equipment, where applicable (including combustion testing), together with associated operation and safety controls.	8
2. Cooling Plant Covers the refrigeration plant, cooling tower (including water treatment), and related equipment, together with associated operating and safety controls.	8
3. Ventilation Covers air-handling units with heating and cooling coils, fans, and all other air-handling equipment, together with associated operating and limit controls.	8
4. Overall Control System Covers central control center, coordinating respective controls of heating, cooling, and ventilation systems, and shows how these controls work together to provide an integrated overall control of the complete air-conditioning system, both heating and cooling, as well as all other utility control systems.	8
5. Electrical System Covers all building services, lighting, and intercommunications, and security system.	N.A.
6. Elevators Covers operation of the different types installed, demonstrations in the machine room on the various operating and control equipment installed, and explanation of the use of the electric circuit diagrams (of sufficient size) to ensure proper operation and assistance in troubleshooting.	N.A.
7. Piping and Plumbing Includes, but is not limited to, domestic water supply, storm and sanitary drainage systems, cold-water supply systems, sprinkler systems, and the like.	N.A.
8. Miscellaneous Includes, but is not limited to, vehicle maintenance equipment, fire protection and alarm equipment, dust collection systems, compressed air systems, automatic door operators, dock levelers, truck scales, data collection center, and all other equipment not specifically covered above.	8

1.5 TRAINING PARTICIPATION SHEETS

A. Submit to the Owner sign-in sheets with the dates and names of all training participants. Training sheets must be reviewed and certified by an authorized facility manager.

1.6 OTHER CLOSEOUT SUBMITTALS

A. Additional requirements for Systems Manuals, Operating Instructions, Training and other deliverables are contained in individual Specification Sections. All closeout requirements must be provided to and accepted by the Owner prior to requesting final payment. Examples of additional closeout requirements include, but are not limited to, the following
   1. Final Punch-List with all items certified as complete.
   2. *Record "As Built" Drawings*, the Contractor shall submit certified As-Built Record Drawings and Specifications in the quantities and media specified.
   3. *Warranty*, the Contractor shall submit all transferable guarantees and warranties for equipment, materials and installations furnished by any manufacturer, supplier, or installer.

4. Signed Asbestos and Lead-Based Paint Certificate.
5. Material Safety Data Sheets
6. Signed and sealed Contractor Release of Claims.
7. Meter Test & Hydrostatic water pressure test report.
8. Sanitary Sewerage test report.
9. Gas Distribution test report.
10. Test reports for Earthwork, Concrete, HVAC TAB, Structural Steel.

END OF SECTION

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:
1. Throughout progress of the Work, the Construction Manager and each Contractor shall maintain an accurate record of changes in the Contract Documents, as described in Article 3.2 below.
2. Upon completion of the Work, transfer the recorded changes to a set of Record Documents, as described in Article 3.2 below.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Other requirements affecting Project Record documents may appear in pertinent other Sections of these Specifications.

1.2 QUALITY ASSURANCE

A. Delegate the responsibility for maintenance of Record Documents to one person on the Construction Manager’s staff as approved by the Architect.

B. Accuracy of records:
1. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of Specifications and each sheet of Drawings and other Documents where such entry is required to show the change properly.

C. Make entries within 24 hours after receipt of information that the change has occurred.

1.3 PROJECT RECORD DOCUMENTS HANDLING

A. Maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the Work and transfer of all recorded data to the final Project Record Documents.

B. In the event of loss of recorded data, use means necessary to again secure the data to the Architect's approval.
1. Such means shall include, if necessary in the opinion of the Architect, removal and replacement of concealing materials.
2. In such case, provide replacements to the standards originally required by the Contract Documents.

PART 2 - PRODUCTS

2.1 RECORD DOCUMENTS

A. Job set: Promptly following receipt of the Owner's Notice to Proceed, secure from the Architect at no charge to the Construction Manager one complete set of all Documents comprising the Contract.

B. Final Record Documents ("As-Builts"): At a time nearing the completion of the Work, secure from the Architect at no charge to the Construction Manager one complete set of reproducibles of all Drawings in the Contract.

PART 3 - EXECUTION

3.1 MAINTENANCE OF JOB SET

A. Immediately upon receipt of the job set described in Paragraph 2.1-A above, identity each of the Documents with the title, "RECORD DOCUMENTS - JOB SET."

B. Preservation:
1. Considering the Contract completion time, the probable number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Architect.
2. Do not use the job set for any purpose except entry of new data and for review by the Architect, until start of transfer of data to final Project Record Documents.
3. Maintain the job set at the site of Work as that site is designated by the Architect.

C. Making entries on Drawings:
1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by graphic line and note as required.
2. Date all entries.
3. Call attention to the entry by a "cloud" drawn around the area or areas affected.
4. In the event of overlapping changes, use different colors for the overlapping changes.

D. Make entries in the pertinent other Documents as approved by the Architect.

E. Conversion of schematic layouts:
1. In some cases on the Drawings, arrangements of conduits, circuits, piping, ducts, and similar items, is shown schematically and is not intended to portray precise physical layout.
   a. Final physical arrangement is determined by the Contractor, subject to the Architect's approval.
   b. However, design of future modifications of the facility may require accurate information as to the final physical layout of items which are shown only schematically on the Drawings.
2. Show on the job set of Record Drawings, by dimension accurate to within one inch, the centerline of each run of items such as are described in subparagraph 3.1-E-1 above.
   a. Clearly identify the item by accurate note such as "cast iron drain," "galv. water," and the like.
   b. Show, by symbol or note, the vertical location of the item ("under slab," "in ceiling plenum," "exposed," and the like).
   c. Make all identification sufficiently descriptive that it may be related reliably to the Specifications.
3. The Architect may waive the requirements for conversion of schematic layouts where, in the Architect's judgment, conversion serves no useful purpose. However, do not rely upon waivers being issued except as specifically issued in writing by the Architect.

F. If it is determined at any time during the construction that the Construction Manager and/or Contractor has failed or is neglecting to record as-built conditions, a reduction of the pay request may be made by the Owner and /or Architect until the condition is corrected.

3.2 FINAL PROJECT RECORD DOCUMENTS (“As-Builts”)

A. The purpose of the final Project Record Documents is to provide factual information regarding all aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive site measurement, investigation, and examination.

B. Approval of recorded data prior to transfer:
1. Following receipt of the reproducibles described in Paragraph 2.1-B above, and prior to start of transfer of recorded data thereto, secure the Architect's approval of all recorded data.
2. Make required revisions.

C. Transfer of data to Drawings:
   1. Carefully transfer change data shown on the job set of Record Drawings to the corresponding reproducibles, coordinating the changes as required.
   2. Clearly indicate at each affected detail and other Drawing a full description of the changes made during construction, and the actual location of items described in subparagraph 3.1-E-1 above.
   3. Call attention to each entry by drawing a "cloud" around the area or areas affected.
   4. Make changes neatly, consistently, and with the proper media to assure longevity and clear reproduction.

D. Transfer of data to other Documents:
   1. If the Documents other than Drawings have been kept clean during progress of the Work, and if entries thereon have been orderly to the approval of the Architect, the job set of those Documents other than Drawings will be accepted final Record Documents.
   2. If any such Document is not so approved by the Architect, secure a new copy of that Document from the Architect at the Architect's usual charge for reproduction and handling, and carefully transfer the change data to the new copy to the approval of the Architect.

E. Review and submittal:
   1. Submit the completed set of Project Record Documents to the Architect as described in Paragraph 1.3-D above.
   2. Participate in review meetings as required.
   3. Make required changes and promptly deliver the final Project Record Documents to the Architect.

3.3 CHANGES SUBSEQUENT TO ACCEPTANCE

A. The Construction Manager and/or Contractor has no responsibility for recording changes in the Work subsequent to Final Completion, except for changes resulting from work performed under Warranty.

END OF SECTION

SECTION 02 41 10 - UTILITY DEMOLITION/RELOCATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section covers work required for the demolition and/or relocation of underground and above ground utilities and associated structures. All work is to be coordinated with the appropriate local utility company, and includes but is not limited to:

STORM DRAINAGE & SANITARY SEWER
WATER
GAS
ELECTRIC
ARKANSAS "ONE CALL" FOR UNDERGROUND UTILITY LOCATIONS 1-800-482-8998
TELEVISION - CABLE
TELEPHONE

B. **ANY AND ALL FEES OR CHARGES ASSOCIATED WITH ANY UTILITY DEMOLITION OR RELOCATION SHALL BE PAID FOR BY THE CONTRACTOR. THE CONTRACTOR IS TO INCLUDE ANY AND ALL FEES (TEMPORARY AND PERMANENT) IN HIS BASE BID AND IS TO THOROUGHLY DISCUSS ALL UTILITY DEMOLITION AND/OR RELOCATIONS WITH THE APPROPRIATE PUBLIC AND/OR PRIVATE UTILITY COMPANY PRIOR TO BIDDING.**

1.2 PROTECTION

A. Protection of Existing Improvements
   1. Protection shall be provided to prevent damage to existing improvements indicated to remain in place on the Owner's property and adjoining properties.
   2. Damaged existing improvements shall be restored to their original condition, as acceptable to parties having jurisdiction.
   3. Land areas outside the limits of demolition performed under this contract shall be preserved in their present condition. The Contractor shall confine his demolition activities to areas defined for work on the drawings.

B. Protection of Existing Utilities
   1. The Contractor shall verify all existing utility locations either shown or not shown on the drawings.
   2. The Contractor shall immediately notify the Owner and applicable utility company of any damages to existing utilities.
   3. Repairs to damaged utilities shall be made in accordance with the requirements of the Owner and applicable utility company at no extra cost to the Owner.
   4. The Contractor shall coordinate with the Owner and the applicable utility company for shutoff of or connection to active utilities. Existing utility services shall not be interrupted except as authorized in writing by the Owner.

C. Protection of Open Excavations: Barricades or other type protectors shall be provided in accordance with current OSHA regulations.

1.3 JOB CONDITIONS

A. Traffic
   1. Demolition operations and the removal of debris shall be conducted in a manner that will ensure minimum interference with roads, driveways, walks and other adjacent occupied or used facilities.
   2. Roads, driveways, walks and other adjacent occupied or used facilities shall not be closed or obstructed without written permission from the Owner of the adjacent facilities.

B. Use of explosives shall not be permitted.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 UNDERGROUND UTILITY DEMOLITION/RELOCATION

A. Underground utility demolition/relocation shall include removal/relocation of electric, telephone, television, gas, water, sanitary sewer, storm sewer lines and appurtenances as shown on the Drawings.

B. Underground utilities to be demolished and/or relocated are shown on the drawings.

C. Excavations for removal of underground utilities shall be backfilled in accordance with the following:
1. Section 31 05 13-Earthwork
2. Section 31 23 33-Excavation, Trenching and Backfilling

3.3 ABOVE GROUND UTILITY DEMOLITION/RELOCATION

A. Above ground utility demolition/relocation shall include the removal/relocation of electric, telephone, television lines and appurtenances as shown on the Drawings.

B. Above ground utilities to be demolished and/or relocated are shown on the Drawings.

3.4 DISPOSAL OF DEMOLISHED MATERIALS

A. The following shall become the property of the Contractor and shall be disposed of by the Contractor off the site:
1. Items which are not reused.

3.5 CLEANUP

A. On completion of demolition and after removal of all debris, site shall be left in a clean condition satisfactory to the Owner.

B. Cleanup shall include off-site disposal of all items and materials not required to be salvaged as well as all debris and rubbish resulting from demolition operations.

END OF SECTION

SECTION 02 41 13 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Carefully demolish and remove from the site those items shown on the Drawings or otherwise scheduled to be demolished and removed. Any items to be turned over to the Owner are noted on the Drawings.

B. Related work:
1. Documents affecting Work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 64 00.

PART 2 - PRODUCTS

(No products are required in this Section)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

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

3.3 DEMOLITION

A. By careful study of the Contract Documents, determine the location and extent of selective demolition to be performed.

B. Prior to start of Work, in company with the Architect, visit the site and verify the extent and location of selective demolition required.
   1. Carefully identify limits of selective demolition.
   2. Mark interface surfaces as required to enable workmen also to identify items to be removed and items to be left in place intact.

C. Prepare and follow an organized plan for demolition and removal of items.
   1. Shut off, cap, and otherwise protect existing utility lines in accordance with the requirements of the agency or utility having jurisdiction.
   2. Completely remove items scheduled to be so demolished and removed, leaving surfaces clean, solid, and ready to receive new materials specified elsewhere.
   3. In all activities, comply with pertinent regulations of agencies having jurisdiction.

D. Demolished material shall be considered to be property of the Contractor (unless noted otherwise) and shall be completely removed from the job site.

E. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

F. **DEMOLISHED AREAS OF THE BUILDING THAT ARE EXPOSED TO THE WEATHER/NATURAL ELEMENTS SHALL BE MADE WEATHERPROOF AT ALL TIMES, PRIOR TO THE INSTALLATION OF NEW MATERIALS. ANY DAMAGE TO THE EXISTING CONDITIONS DUE TO THE WEATHER (ANY FORM OF THE WEATHER) SHALL BE REPAIRED/REPLACED AT CONTRACTOR'S EXPENSE, THIS INCLUDES FURNITURE, PERSONAL ITEMS, AND BUILDING MATERIALS.**

3.4 REPLACEMENTS

A. In the event of demolition of items not so scheduled to be demolished, promptly replace such items to the approval of the Architect and at the complete expense of the Contractor.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide cast-in-place concrete where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections, in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Comply with the provisions of the following codes, specifications and standards, except as otherwise shown or specified:
1. ACI 301 “Specifications for Concrete”
2. ACI 302 “Construction of Concrete Floors”
3. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete."
4. ACI 315 "Details and Detailing of Concrete Reinforcement."
5. ACI 318 "Building Code Requirements for Reinforced Concrete."
6. CRSI "Manual of Standard Practice."
7. AWS D1.4 "Standard Welding Code - Reinforcing Steel."

C. Employ at contractor's expense, testing laboratory to perform material evaluation tests.

1.3 SUBMITTALS: Within 35 days of receipt of Owner’s Notice to Proceed, submit:

A. Submit two copies of reinforcing steel shop drawings. Shop drawings shall show all fabrication dimensions and locations for placing of reinforcement and accessories. One copy of drawings will be returned to the Contractor after review by the Architect. After the drawings have been corrected in accordance with the review comments, resubmit six copies, two of which will be retained by the Architect. Do not fabricate reinforcement until drawings have been reviewed and corrected. Bar marks used on the first submission must be used on subsequent submissions except that the marks of revised bars may be changed.

B. Submit six copies of product data for all items indicated by the letter (S) in the following articles. Two copies of data will be retained by the Architect. Do not install work in which these products are used until data has been reviewed and found to be acceptable.

C. If more than four copies of reinforcing steel shop drawings and submittal data are required by the Contractor, sub-contractors and material suppliers, a correspondingly greater number of copies shall be submitted.

D. Submit two copies of concrete mix design information as specified hereinafter. Do not place concrete until this data has been submitted and reviewed by the Architect.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Forms for surfaces which will not be exposed to view shall be metal, lumber, or plywood of sufficient strength and stiffness to produce the required concrete configurations.

B. Form ties - factory fabricated rod type designed to snap off at least 3/4" inside of the wall surface.

C. Form coating - commercial formulation that will prevent absorption of moisture, will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent curing or treatment of concrete surfaces.

D. Fiberboard forms - Savway Carton Forms, Inc., Savway Carton Forms.

2.2 REINFORCEMENT MATERIALS

A. Reinforcing bars - ASTM A 615, Grade 60 including Supplementary Requirements S1.

B. Fibrous Reinforcement (S) - Fibermesh with 1/2" fiber length as manufactured by Fibermesh Company, Chattanooga, Tennessee, or equal.

C. Wire - ASTM A82

D. Bar supports - wire bar type conforming to CRSI Manual of Standard Practice recommendations. Use bar supports with sand plates for reinforcement in slabs on grade or drainage fill. Legs of other bar supports shall be stainless steel or plastic protected.

2.3 CONCRETE MATERIALS

A. Portland cement - ASTM C150, Type I.

B. Fine aggregate - ASTM C33.

C. Course aggregate - ASTM C33 with #467 or #57 gradation for 1-1/2" maximum size aggregate.

D. Water - fresh, clean and drinkable.

E. Air-entraining admixture (S) - ASTM C260.

F. Water-reducing admixture (S) - ASTM C494, Type A.

G. Water-reducing, retarding admixture (S) - ASTM C494, Type D.

H. High-range water-reducing admixture (S) - ASTM C494, Type F.

I. High-range water reducing and retarding admixture (S) - ASTM C494, Type G.

J. Fly ash - ASTM C618, Class C. Class F fly ash is NOT PERMITTED.

K. Storage and handling of concrete materials shall conform to the recommendations of ACI 304.

2.4 ACCESSORY MATERIALS

A. Bonding agent (S) - Larsen Products Company Weld-Crete.

B. Bonding admixture (S) - Larsen Products Company Acrylic Admix - 101.

C. Liquid curing compound (S) - ASTM C309, Type I, [Class A of type that will not inhibit bonding of floor covering, paint or other applied finishes.] **CURING COMPOUNDS MAY NOT CONTAIN SOAP, WAX, OIL OR SILICONE. A LETTER OF COMPATIBILITY SHALL BE PROVIDED FROM THE MANUFACTURER OF THE COMPOUND (ACI PUB. 302.1 R-96, "GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION."**

D. Moisture-retaining cover (S) - waterproof paper conforming to ASTM C171.

E. Vapor barrier (S) - Stego Wrap, 15 mil. thick vapor barrier by Stego Industries, 877-464-7834, with vapor proofing seam tape, mastic and pipe boots, conforming to ASTM E 1745-97, ASTM E 154-98, ASTM E 96-95, and ASTM E 1643-98, no exceptions.

F. Metal joint form (S) - Heckmann Building Product, Inc., No. 95, 20 gauge tongue and groove joints.

G. Expansion joint filler (S) - W. R. Meadows, Inc. Sealtight Cork Expansion Joint Filler.

H. Expansion joint cap (S) - Greenstreak Plastic Products No. 842 Removable Top Expansion Joint Cap.

I. Joint sealant (S) - Lion Oil Company Lion D200 Elastomeric Sealant.

J. Expansion anchor (S) - Hilti Fastening Systems Kwik-Bolt.

K. Drainage Fill(s) - ASTM C33, No. 67 Gradation.

L. Concrete Sealer(s) - Refer to 3.11, F for additional information.

PART 3 - EXECUTION

3.1 FORMWORK

A. Use earth cuts to form vertical surfaces of foundation piers. Elsewhere use forms, wherever necessary, to confine the concrete and shape it to the required dimensions. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall have sufficient rigidity to maintain specified tolerances.

B. The design and engineering of formwork shall be the responsibility of the Contractor.

C. Forms shall be accurately built to provide smooth surfaces and the required dimensions, and they shall be sufficiently tight to prevent leakage. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

D. Install 3/4" chamfer strips in external formed corners which will be exposed to view upon completion of construction.

E. Camber the formwork, as necessary, to compensate for deflections in the formwork prior to hardening of the concrete. Provide positive means of adjustment, such as wedges or jacks, for shores and struts so that settlement can be taken up during placing operations. Brace forms against lateral deflections.

F. Provide temporary openings at bases of wall forms and other points where necessary to facilitate cleaning and observation immediately before concrete is placed.

G. At construction joints overlap form material and hold securely against the hardened concrete to prevent offsets or leakage and to maintain a true surface.

H. Build into forms the required inserts, pipe sleeves, bolts and other equipment whether specified under this Section or other Sections of the Specifications.

I. Before placing concrete, clean all surfaces of forms and embedded materials of any mortar from previous concreting and of all other foreign material.

J. Before placing reinforcing steel or concrete, apply form coating to form surfaces in order to prevent absorption of moisture and to prevent bond with the concrete.

K. Construct formwork so that concrete surfaces will conform to the following tolerances:
   1. Variations from plumb in lines and surfaces of pedestals, walls, and arrises, 1/4" in any 10' length, but not more than 1".
   2. Variations from level or grade in slab soffits, and in arrises, 1/4" in any 10' of length; 3/8" in any 20' of length; and 3/4" maximum for entire length.
   3. Variations of distance between walls and beams, 1/4" per 10' of distance, but not more than 1" total variation.
   4. Variation from position of linear building lines from established position in plans, not more than 1".
   5. Variation in sizes and locations of sleeves, floor openings, and wall openings, minus 1/4" and plus 1/2".
   6. Variation in cross-sectional dimensions of pedestals and beams and thickness of slabs and walls, minus 1/4" and plus 1/2".
   7. Variation in footing plan dimensions, minus 1/2" and plus 2"; misplacement or eccentricity, 2% of the footing width in direction of misplacement but not more than 2"; thickness reduction, minus 5% of indicated thickness.
   8. Variation in steps; in a flight of stairs, 1/8" for rise and 1/4" for treads; in consecutive steps, 1/16" for rise and 1/8" for treads.

3.2 REMOVAL OF FORMS

A. Formwork for walls, and similar vertical surfaces may be removed as soon as the concrete has hardened enough that damage will not result from removal operations.

B. Formwork for slabs, and other surfaces which support the weight of the concrete shall be left in place until the concrete strength has reached its specified 28 day compressive strength.

C. To determine concrete strength for form removal purposes test cylinders in addition to those required for determining concrete acceptability may be made, cured under the same conditions as concrete in the structure, and tested at the appropriate time. Otherwise, concrete in the structure may be considered to have attained the same 28 day compressive strength as laboratory cured cylinders tested for concrete acceptability when it has been cured as specified for a period of 28 days, not necessarily consecutive, during which the temperature of air in contact with concrete surfaces is above 50 degrees F.

3.3 REINFORCEMENT

A. Detail, fabricate and place reinforcement in accordance with ACI 315, ACI 318 and requirements of the Drawings. Shop drawings used in fabricating and placing reinforcement shall have been reviewed by the Architect and corrected in accordance with review comments.

B. Reinforcement shall be accurately placed in the positions shown and secured against displacement by construction loads and the placing of concrete. Reinforcement for foundation beams shall be supported by

concrete bricks. Other reinforcements shall be supported by metal bar supports and spacers located and installed as recommended by the CRSI Manual of Standard Practice.

C. At the time concrete is placed reinforcement shall be free from mud, oil, or other coatings that reduce or destroy bond. Reinforcement with rust, mill scale or a combination of both will be acceptable without cleaning or brushing, provided that the cross sectional area and height of deformations have not been reduced.

D. Welding of reinforcing bars will not be permitted.

E. Heating of reinforcing bars will not be permitted.

F. Do not bend reinforcement partially embedded in concrete.

G. Fabricating tolerances for reinforcement shall be accordance with ACI 315.

H. Reinforcing bars shall be placed to the following tolerances:
Clear distance to formed surfaces: +- 1/4".
Spacing: -1/4" and +1/2" between beam or pedestal, bars +-1" between ties, stirrups, wall bars and slab bars.
Height of top bars in slabs and beams: +-1/4" for members 8" and less and +-1/2" for members more than 8".
Longitudinal location of ends of bars: +-2" except at discontinuous ends of members where tolerance shall be +-1/2".

3.4 JOINTS AND EMBEDDED ITEMS

A. Construction joints not shown on the Drawings shall be made and located to least impair the strength of the structure. Locations shall be approved by the Architect; however, in general vertical joints shall be located near the middle of the spans of slabs and beams. Horizontal joints in walls shall be at the underside of slabs, and at the tops of foundation beams or floor slabs. Joints shall be perpendicular to the main reinforcement.

B. Unless shown otherwise continue reinforcement across joints and provide keyways as shown on the Drawings.

C. The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed prior to placing adjoining concrete.

D. Joints in grade slabs, walks and concrete pavement shall be located and made as shown on the Drawings. If saw-cut joints are required or permitted cutting shall be started as soon as the concrete has hardened sufficiently to prevent aggregate from being dislodged by the saw, and shall be completed before shrinkage stresses become sufficient to produce cracking. If saw-cut joints abut vertical surfaces already in place when the slab is installed, the length of the joint which is inaccessible to the saw shall be grooved while the concrete is still plastic. The groove shall be made with a removable hardboard strip of same width and depth as saw-cut.

E. Locate and install expansion joints as shown on the Drawings. Install expansion joint cap above joint filler. After concrete has hardened remove top of cap and install joint sealant in accordance with the manufacturer's recommendations.

F. Install all sleeves, inserts, anchors, and other embedded items prior to placing concrete, position them accurately and support them against displacement.

3.5 PROPORTIONING AND DESIGN OF CONCRETE MIXES

A. Select proportions of concrete ingredients in accordance with the requirements of ACI 318 to provide the specified properties and to produce workability and consistency that will permit concrete to be worked readily into the forms and around reinforcement under conditions of placement to be employed, without excessive segregation or bleeding.

B. Submit written reports of mix designs, determined in accordance with Section 03 30 00, Subparagraph 3.5.A for each class of concrete. However, in any case do not begin production of concrete until mix design has been reviewed by the Architect.

C. 28 day concrete compressive strength shall be as shown on the Drawings. If not shown on the Drawings, then it shall be 3,500 PSI concrete.

D. Proportion and produce concrete to have a slump of 4" with a tolerance of -1" and +1/2". Concrete must produce the required compressive strength when the slump is at the upper limit of the permitted tolerance.

E. Add fibrous reinforcement to building interior grade slab concrete at the concrete batch plant at the minimum rate of 1-1/2 pounds per cubic yard. Mix the concrete in accordance with the fibrous reinforcement manufacturer's recommendations for uniform and complete distribution.

F. Fly ash may be used as a partial replacement for portland cement in the mixes. The weight of fly ash in a mix shall not exceed 20% of the weight of portland cement in the mix.

G. Concrete which will be exposed to the weather upon completion, shall be air-entrained. Other concrete may be air-entrained. Air content, by volume, shall be between 4 and 7 percent.

H. When the mean daily temperature is below 40 degrees F or when freezing temperatures are forecast within 24 hours after placement all concrete shall be air-entrained.

I. When the air temperature during placing operations is greater than 90 degrees F, all concrete shall contain a water-reducing, retarding admixture.

J. When the air temperature during placing operations is less than 90 degrees F, concrete may contain a water-reducing admixture.

K. High-range water-reducing admixture shall be used in concrete for all slabs. This admixture shall be added at the job site to concrete with a 4" slump, as required to produce concrete with a slump between 7" and 8-1/2". When the air temperature during placing operations is greater than 90 degrees F, high-range water-reducing and retarding admixture shall be used for this work.

L. The use of admixtures or materials not specified will not be permitted. Admixtures which are required or permitted shall be used in accordance with the manufacturer's directions.

3.6 PRODUCTION OF CONCRETE

A. All concrete shall be ready-mixed and shall be batched, mixed and transported in accordance with ASTM C94, except as specified otherwise herein.

B. In cold weather the minimum temperature of the concrete when delivered shall be 50 degrees F for sections with least dimension 12" or greater and 55 degrees F for sections with least dimension less than 12". However, cement shall not be mixed with water or with mixtures of water and aggregate having a temperature greater than 100 degrees F. When materials must be heated to produce the required minimum concrete temperatures, heating provided must be such that concrete temperatures are not greater than 10 degrees above the required minimum temperatures.

C. In hot weather if low slump, flash set or cold joints are encountered concrete ingredients shall be cooled before mixing, or flake ice or well-crushed ice of a size that will melt completely during mixing shall be substituted for all or part of the mixing water. When air temperature is above 90 degrees F mixing and delivery time shall not exceed 60 minutes.

D. Do not add water to the mix at the job except under conditions specifically permitted by the Architect.

3.7 CONCRETE PLACEMENT

A. THE ARCHITECT SHALL BE NOTIFIED AT LEAST 24 HOURS IN ADVANCE OF ALL PLACING OPERATIONS.

B. INSTALL ONE PLY OF VAPOR BARRIER, AS PER ASTM E 1643-98 AND MANUFACTURER'S INSTRUCTIONS, OVER ALL DRAINAGE FILL WHICH WILL RECEIVE GRADE SLABS, LAPPING JOINTS 6", TAPE ALL JOINTS AND PENETRATIONS. INSTALL SCREEDS IN SUCH A MANNER THAT VAPOR BARRIER WILL NOT BE PUNCTURED.

C. When concrete is placed, formwork shall have been completed; snow, ice, water, debris and other foreign materials shall have been removed; reinforcement shall have been secured in place; embedded items shall have been positioned; and the entire preparation shall have been inspected by the Architect. Sprinkle subgrade as required to eliminate suction. Do not place concrete on frozen or muddy ground.

D. Chutes, if used, shall be metal or metal lined and shall have a slope between 1 vertical to 2 horizontal and 1 vertical to 3 horizontal.

E. Pumping equipment, if used, shall have adequate pumping capacity. The loss of slump in pumping equipment shall not exceed 2". Concrete shall not be conveyed through pipe made of aluminum or aluminum alloy.

F. Deposit concrete continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. In any case the thickness of placement layers shall not exceed 2 feet. Placement shall be at such a rate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited.

G. Do not begin placement of supported elements until concrete previously placed in walls is no longer plastic and has been in place at least 2 hours.

H. Deposit concrete as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Do not subject concrete to any procedure which will cause segregation. Deposit concrete in foundation piers through a hopper or other means that will permit concrete to drop naturally without striking forms, or sides of pier excavations.

I. Consolidate all concrete by mechanical vibration, supplemented by spading, tamping and rodding to secure a dense, homogeneous mass, thoroughly worked around reinforcement and embedded fixtures, and into corners of forms.

J. Vibrators shall have a minimum frequency of 8000 vibrations per minute and sufficient amplitude to consolidate the concrete effectively. They shall be operated by workmen experienced in their proper use.

K. Insert and withdraw vibrators at points approximately 18" apart. At each insertion, the duration shall be sufficient to consolidate the concrete but not sufficient to cause segregation, generally from 5 to 15 seconds. Where concrete is placed in layers, vibrators shall be inserted through the layer being placed and into the layer below.

L. A spare vibrator shall be kept on the job during all placing operation.

3.8 BONDING

A. Before depositing fresh concrete against hardened concrete, remove laitance and inferior surface concrete, clean surface of the hardened concrete, and clean forms and adjoining reinforcement of mortar and loose material.

B. Immediately prior to placing of fresh concrete dampen, but do not saturate, the hardened concrete of all joints between fresh and hardened concrete, except where joints are required to be coated with bond-breaker. Remove any standing water from horizontal joint surfaces.

3.9 REPAIR OF SURFACE DEFECTS

A. Defects which, in the opinion of the Architect, cannot be satisfactorily repaired by the provisions of this paragraph shall be repaired by the provisions of this paragraph shall be repaired as directed by the Architect or, if the Architect determines that repairs cannot be satisfactorily made by any method, the work shall be removed and replaced as specified by Section 03300, Subparagraph 3.14.H.

B. Repair other surface defects, including tie holes, immediately after form removal.

C. Remove all honeycombed and other defective material down to sound concrete. Make edges of cuts perpendicular to the concrete surfaces. Thoroughly clean and coat in the area to be patched with bonding agent applied in accordance with the manufacturer's recommendations. Install patching mortar after bonding agent has dried.

D. Patching mortar shall be 1 part cement to 2-1/2 parts sand by damp loose volume with the minimum quantity of mixing water required for handling and placing. Add bonding admixture in accordance with the manufacturer's directions. If surface will be exposed to view blend white portland cement with gray portland cement to produce a color matching the color of the surrounding concrete, as determined by a trial patch installed in an inconspicuous location. Thoroughly consolidate mortar into place and strike off slightly higher than the surrounding surface. Leave undisturbed for approximately one hour, then finish to match the surrounding surface. Keep the patched surface damp for seven days.

E. Cut form ties back at least 3/4". Clean and thoroughly dampen tie holes, then fill solid with patching mortar.

F. Repair defects in unformed surfaces as directed by the Architect.

3.10 FINISHING OF FORMED SURFACES

A. Repair defects of surfaces which will not be exposed to view in accordance with 3.09, then remove fins and other projections. No further finish is required for these surfaces.

B. Repair defects of surfaces which will be exposed to view in accordance with 3.09, remove fins and other projections, then provide grout cleaned finish as follows:
   1. Combine one part cement to 1-1/2" parts fine and by volume and mix with water and bonding admixture to consistency of thick paint. Add bonding admixture to water in accordance with the manufacturer's directions. Blend white and gray portland cements to produce a color matching the color of the surrounding concrete. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout, then apply grout. Immediately after applying the grout, scrub the surface with a cork float or stone to coat the surface and fill small holes. While grout is still plastic, remove excess grout by scraping and rubbing with clean burlap, a rubber float or other means to produce a uniformly textured surface. Keep surface damp for at least 36 hours after rubbing. Complete any area in the same day it is started, with units of area being natural breaks in the finished surfaces. A trial patch of the finish shall be made to show color match and texture of finish. Trial patch shall be approved by the Architect before proceeding.

3.11 FINISHING OF UNFORMED SURFACES

A. After concrete has been placed, consolidated, struck off and leveled do not work further until ready for floating. When the water sheen has disappeared and the concrete has stiffened sufficiently to permit floating operations, float surface as required to compact it, remove surface imperfections and level the surface to a tolerance of 1/4" in 10' when tested with a 10' long straight edge. After leveling refloat the surface to a uniform sandy texture.

B. Trowel finish interior floor slabs after float-finishing. Trowel as required to produce a smooth uniform surface, free of trowel marks and other defects and plane to a tolerance of 1/4" in 10' when tested with a 10' straightedge. Grind surface imperfections which would telegraph through applied floor coverings.

C. Finish interior slabs which will receive terrazzo by drawing a broom across the surface immediately after float-finishing to produce a textured surface.

D. Finish all exterior slabs, including walks and pavement by drawing a broom across the surface immediately after trowel-finishing, to produce a uniformly textured surface. Broom line shall be parallel to direction of slope.

E. Tool exposed top edges of slabs with a round edging tool.

F. Finish interior slabs with concrete sealer Kure-n-Harden as manufactured by Sonneborn, or equal where exposed concrete is the final finish.

3.12 CURING AND PROTECTION

A. Beginning immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury as specified herein.

B. Immediately after placement operations are complete, provide protection of unformed surfaces from premature drying by one of the following:
   1. Cover concrete surfaces with moisture retaining cover lapped 3" at joints and sealed with waterproof tape. Leave cover in place for at least 7 days. Immediately repair any holes or tears using cover material and waterproof tape.
   2. Apply curing compound in accordance with the manufacturer's recommendations. Immediately repair any damage to curing membrane which occurs within 7 days by the application of additional curing compound. Curing compound must be of a type that will not inhibit the bond of applied floor materials.

C. Keep wood forms continuously wet for 7 days unless they are removed earlier. If forms are removed earlier than 7 days apply curing compound as specified for unformed surfaces to provide a 7-day curing period. Curing compound must be of a type that will not inhibit the bond of applied finishes.

D. When the mean daily outdoor temperature is greater than 40 degrees F, concrete surfaces shall be protected from freezing for at least 24 hours after placement. When the mean daily outdoor temperature is less than 40 degrees F, maintain the temperature of the concrete between 50 degrees F and 70 degrees F for 7 days after placement. Make arrangements for protecting concrete in advance of placement operations. Use methods of protection that will maintain the required temperature without injury due to concentration of heat. Do not use combustion heaters during the first 24 hours after placement. After the required protection period, discontinue protective measures in such a way that the change in air temperature does not exceed 5 degrees F in any one hour period.

E. When weather conditions are such that plastic shrinkage cracking tends to appear and cold joints tend to form during placement use windbreaks, shading or fog spraying to prevent rapid drying of the concrete. Make arrangements for such measures in advance of placement operations.

F. Protect the concrete from heavy shock and vibration for not less than 28 days after placement.

3.13 TESTING

A. Make tests of concrete for each 100 cubic yards or fraction thereof of each mix design of concrete placed in any one day.

B. Sampling of concrete, slump tests, determination of air content and making of compressive test cylinders shall be performed in accordance with ASTM C172, C143, C231, and C31, respectively. The Contractor will be responsible for all costs in connection with concrete testing.

C. Make three compressive cylinders for each test, along with determination of slump. Field cure cylinders for 20-24 hours in accordance with ASTM C31; then ship to the laboratory. One cylinder will be tested at 7 days and two cylinders will be tested at 28 days. The average compressive strength of the two cylinders tested at 28 days constitute the test result. Cylinders will be tested in accordance with ASTM C39.

3.14 EVALUATION AND ACCEPTANCE OF CONCRETE WORK

A. Cylinder test results will be evaluated separately for each specified concrete mix design.

B. The strength level of the concrete will be considered satisfactory if the averages of all sets of three consecutive test results equal or exceed the specified strength and no individual test result falls below the specified strength by more than 500 pounds per square inch.

C. If the Contractor wishes to remove soffit forms earlier than 28 days, he may, at his own expense, have additional compressive strength tests made in the same manner as those made for concrete acceptability, except that they shall be field cured for the full curing period as required by ASTM C31.

D. When it appears the tests will fail to meet specified strength requirements the Contractor shall make such changes in the proportions of concrete for the remainder of the work as are necessary in order to meet the strength requirements. In addition, the Architect may also require additional curing of portions of the concrete already placed.

E. The Architect may also require tests from the hardened concrete in accordance with ASTM C42 when the concrete compressive cylinder tests fail to meet strength requirements. Such tests will be at the Contractor's expense.

F. In the event concrete cylinder tests and tests from the hardened concrete fail to meet strength requirements and structural analysis does not confirm the safety of the structure, the Architect may require load testing of the affected portions of the structure in accordance with Chapter 20 of ACI 318. Such testing will be at the Contractor's expense.

G. If concrete work is judged to be inadequate by the results of tests it shall be reinforced with additional construction if the Architect determines that this can be accomplished without impairing the usefulness of the structure. If structural analysis or the results of tests do not confirm the safety of the structure, and the Architect determines that reinforcing the structure cannot be done without impairing its usefulness, the affected concrete work shall be removed and replaced.

H. Concrete work which fails to meet drawing and specification requirements because of considerations other than concrete quality shall be repaired as directed by the Architect unless he determines that repairs cannot be accomplished satisfactorily, in which case the affected concrete work shall be removed and replaced.

I. Repairs or removal and replacement required because of failure to meet drawing and specification requirements shall be at the Contractor's expense.

END OF SECTION

SECTION 03 45 00 - ARCHITECTURAL PRECAST CONCRETE

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.

B. Refer to all available drawings and specifications.

1.2 SUMMARY

A. Section includes:
1. Architectural precast concrete caps.
2. Field sealing and sealant of all precast concrete caps between precast caps.

B. Related Sections:
1. Section 03 30 00 “Cast-in-Place Concrete” for installing connection anchors in concrete.
2. Section 04 20 00 “Masonry”

1.3 DEFINITIONS

A. Design Reference Sample: Sample of approved architectural precast concrete color, finish, and texture, preapproved by architect.

1.4 SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: for each precast concrete mixture. Include compressive strength and water-absorption tests.

C. Shop Drawings:

1. Detail fabrication and installation of architectural precast concrete units.
2. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit.
3. Indicate joints, reveals, drips, chamfers, and extent and location of each surface finish.
4. Indicate location of each architectural precast concrete unit by same identification mark placed on panel.
5. Indicate relationship of architectural precast concrete units to adjacent materials.

D. Samples: Design reference samples for initial verification of design intent, for each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of three, representative of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches.

1. When other faces of precast concrete unit are exposed, include samples illustrating workmanship, color, and texture of backup concrete as well as facing concrete.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A precast concrete erector who has retained a “PCI-Certified Field Auditor” to conduct a field audit of a project in same category as this Project and who can produce an Erectors’ Post-audit Declaration.

B. Fabricator Qualifications: A firm that assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

C. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1077 and ASTM E329 for testing indicated.

D. Quality Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, “Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products”.

E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, “Structural Welding Code – Steel”; and AWSD1.4/D1.4M, “Structural Welding Code – Reinforcing Steel.”

F. Range Samples: After sample panel approval and before fabricating architectural precast concrete units, produce a minimum of three sets of samples, approximately in area, representing anticipated range of each color and texture on Project’s units. Maintain one set of range samples at Project site and remaining range sample sets at manufacturer’s plant as color and texture approval reference.

1.6 COORDINATION

A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

1.7 WARRANTY

A. Provide standard warranty in accordance with General Conditions. Warranty shall be in writing and shall warrant work under this Section to be free from defects for the period stipulated.

1.8 DELIVERY, STORAGE AND HANDLING

A. Accept full responsibility for delivery, handling and storage of units.

B. Deliver architectural precast concrete units in such quantities and at such times to limit unloading units temporarily on the ground or other rehandling.

C. Support units during shipment on nonstaining shock-absorbing material.

D. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.

E. Place stored units so identification marks are clearly visible, and units can be inspected.

F. Handle and transport units in a manner that avoids excessive stresses that cause cracking or damage.

G. Lift and support units only at designated points indicated on Shop Drawings.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. White cement, aggregates, water and admixture conforming to ASTM C150 Type I or Type III.

B. Exposed aggregate to match selected finish sample.

C. Use same brand and source of cement and aggregate for entire project to ensure uniformity of coloration and other mix characteristics.

D. Coloring Admixture: ASTM C979/C979M, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.

E. Air entrainment admixture: to ASTM C260, certified by manufacturer to be compatible with other required admixtures.

F. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.

2.2 STEEL CONNECTION MATERIALS

A. Carbon-Steel Shapes and Plates: ASTM A36/A36M.

B. Carbon-Steel-Headed Studs: ASTM A108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1M, Type A or Type B, with arc shields and with minimum mechanical properties of PCI MNL 117, Table 3.2.3.

C. Carbon-Steel Plate: ASTM A283/A283M, Grade C.

2.3 ACCESSORIES

A. Precast Accessories: Provide clips, hangers, high-density plastic or steel shims, and other accessories required to install architectural precast concrete units.

2.4 GROUT MATERIALS

A. Sand-Cement Grout: Portland cement, ASTM C150/C150M, Type I, and clean, natural sand, ASTM C144 or ASTM C404. Mix at ratio of 1-part cement to 2-1/2 to 3 parts sand, by volume, with minimum water required for placement and hydration. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C1218/C1218M.

2.5 CONCRETE MIXTURES

A. Prepare design mixtures for each type of precast concrete required.

1. Use a single design mixture for units with more than one major face or edge exposed.
2. Where only one face of unit is exposed use either a single design mixture or separate mixtures for face and backup.

B. Limit use of fly ash and ground granulated blast-furnace slag to 20 percent of Portland cement by weigh; limit metakaolin and silica fume to 10 percent of portland cement by weight.

C. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at architectural precast concrete fabricator’s option.

D. Normal-weight Concrete Mixtures:

1. Compressive Strength (28 days): 5000 psi minimum
2. Maximum Water-Cementitious Materials Ratio: 0.45

E. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to ASTM C642, except for boiling requirement.

F. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

2.6 MOLD FABRICATION

A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.

1. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during concrete placement. Coat form liner with form-release agent.

B. Maintain molds to provide completed architectural precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

1. Form joints are not permitted on faces exposed to view in the finished work.

2.7 FABRICATION

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.

C. Place face mixture to a minimum thickness after consolidation of the greater of I inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.

D. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.

E. Comply with PCI MNL 117 for hot- and cold-weather concrete placement.

F. Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that does not show in finished structure.

G. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not influence performance or appearance of final product.

H. Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and

Architect's approval.

2.8 FABRICATION TOLERANCES

A. Fabricate architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.

B. Fabricate architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with the following product tolerances:

2.9 FINISHES

A. Exposed faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units to match approved design reference sample.

2.10 SOURCE QUALITY CONTROL

A. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 117 requirements. If using self-consolidating concrete, also test and inspect according to PCI TR-6, ASTM C1610/C1610M, ASTM C1611/C1611M, ASTM C1621/C1621M, and ASTM C1712.

B. Strength of precast concrete units is considered deficient if units fail to comply with AC! 318 requirements for concrete strength.

C. Defective Units: Discard and replace recast architectural concrete units that do not comply with acceptability requirements in PCI **MNL** 117, including concrete strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval. Architect reserves the right to reject precast units that do not match approved samples, sample panels, and mockups. Replace unacceptable units with precast concrete units that comply with requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, bearing surface tolerances, and other conditions affecting performance of the Work.

B. Do not install precast concrete units until supporting cast-in-place concrete has attained minimum allowable design compressive strength and supporting steel or other structure is structurally ready to receive loads from precast concrete units.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install clips, hangers, bearing pads, and other accessories required for connecting architectural precast concrete units to supporting members and backup materials.

B. Install architectural precast concrete level, plumb, and square within specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.

1. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
2. Unless otherwise indicated, maintain uniform joint widths of 3/4 inch.

C. Connect architectural precast concrete units **in** position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.

3.3 ERECTION TOLERANCES

A. Erect architectural precast concrete units level, plumb, square, and in alignment, without exceeding the following noncumulative erection tolerances:

1. Top Elevation from Nominal Top Elevation: As follows:

a. Exposed Individual Unit: Plus or minus 1/4 inch.

2. Joint Width (Governs over Joint Taper): Plus or minus 1/4 inch.

3.4 FIELD QUALITY CONTROL

A. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.

B. Additional testing and inspecting, at Contractor's expense, shall be performed to determine compliance of replaced or additional work with specified requirements.

3.5 REPAIRS

A. Repair architectural precast concrete units if permitted by Architect. Architect reserves the right to reject repaired units that do not comply with requirements.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from 20 feet.

C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A780/A780M.

D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.

E. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

3.6 CLEANING

A. Clean surfaces of precast concrete units exposed to view.

B. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Protect other work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION

SECTION 04 10 00 - MASONRY MORTAR AND GROUT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Pre-blended Mortar for unit masonry.
2. Pre-blended Grout for unit masonry.

1.2 SUBMITTALS

A. Section 01 33 23 - Submittal Procedures: Procedures for submittals.
1. Test Reports: Submit the following reports directly to Contracting Officer from Testing Laboratory, with copy to Contractor. Prepare reports in conformance with Section 01 41 00 – Testing Laboratory Services.
a. Conformance to Proportion specification of ASTM C 270.
b. Test and evaluation reports to ASTM C 780.
2. Submit all Products listed in this Section.

1.3 PROJECT CONDITIONS OR SITE CONDITIONS

A. Environmental Requirements:
1. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.
2. Specific Cold Weather Requirements: When the ambient air temperature is below 40 degrees F, heat mixing water to maintain mortar temperature between 40 degrees F and 120 degrees F until placed. When the ambient air temperature is below 32 degrees F, heat the sand and water to maintain this mortar temperature.

PART 2 - PRODUCTS

2.1 PREBLENDED MORTAR MIXES, NON-COLORED MORTAR MIXES AND INTEGRAL WATER REPELLENT MORTAR MIXES.

A. Manufacturer:
1. SPEC MIX, Inc., www.specmix.com, 1-888-773-2649
2. Ash Grove Packaging Group, 10809 Executive Center Drive, Ste.321, Little Rock, AR, 72211
3. Or approved equal.

B. Proprietary Products/Systems: Dry, preblended mortar mixes, including the following:
1. SPEC MIX Pre-Blended Colored Mortar Mix:
a. Material: Preblended factory mix of Portland cement and hydrated lime, masonry cement or mortar cement and sand aggregate.
b. Mortar Type:Property Mixture Type N (for brick); Type S (for concrete block precast and cut stone)
c. Aggregate Type: Fine.
d. Material Standard for Aggregate: Comply with ASTM C144.
e. Material Standard for Portland Cement: Comply with ASTM C150.
f. Material Standard for Hydrate Lime: Comply with ASTM C207.
g. Material Standard for Masonry Cement: Comply with ASTM C91.
h. Material Standard for Mortar: Comply with ASTM C270.
i. Material Standard for Masonry Grout: Comply with ASTM C476.
j. Material Standard for Pigments: Comply with ASTM C979.
k. Material Standard for Mortar Cement: Comply with ASTM C1329.

2. SPECMIX, or Ashgrove/ IWR Mortar:
   a. Material Description: Dry preblended mortar mixes incorporating dry SPEC MIX Integral Water-Repellent Mortar Admixture.
   b. Water Penetration of Masonry (ASTM E154): No dampness reported
   c. Mortar Type: Property Mixture Type N
   d. Compressive Strength of Masonry Mortar (ASTM C1384): Greater than 95% of control mortar (containing no admixtures).
3. SPECMIX, or Ashgrove Promix Core Fill Grout, ASTM C476

2.2 PRODUCT SUBSTITUTIONS

A. Substitutions: Substitutions permitted, but all products/materials must be pre-blended within manufacturer's controlled environment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 MANUFACTURER'S INSTRUCTIONS

A. Comply with the instructions and recommendations of the mortar manufacturer

B. Integral Water-Repellent Mortar:
   1. Installer shall use only concrete masonry units containing compatible integral water repellent CMU admixture for exterior wall construction.
   2. Installer shall use only mortar containing integral water repellent mortar admixture at the manufacturer's recommended addition rate and mixed according to the manufacturer's recommended instructions.

C. Pre-blended color Mortar Mix:
   1. Fill head and bed joints for full thickness of the face shells to provide the greatest resistance to water penetration.
   2. Tooling:
      a. Tool the mortar joints concave or to a V-profile to provide the greatest resistance to water penetration. Do not use raked, flush, extruded, struck, beaded, weathered or other joint profiles due to their reduced water resistance.
      b. Tool the mortar joints when they are thumbprint hard to provide the greatest resistance to water penetration and to help minimize hairline cracks between the mortar and the CMU.
   3. Cover the top of unfinished masonry work to protect it from the weather and to prevent accumulation of water in the cores of the CMU.
   4. Cleaning:
      a. Remove primary efflorescence from masonry walls exposed in the finished work in accordance with manufacturer's recommendations and NCMA TEK Bulletin #8-3A.
      b. Remove dirt or stains from masonry walls exposed in the finished work in accordance with the manufacturer's recommendations and NCMA TEK Bulletin #8-2A.
      c. Promptly remove excess wet mortar containing integral water repellent mortar admixture from the face of the masonry as the work progresses. Do not use strong acids, over-aggressive sandblasting or high pressure cleaning methods.
      d. Comply with applicable environmental laws and restrictions.

3.3 INSTALLATION

A. After reinforcing of masonry is securely tied in place, plug cleanout holes with masonry units. Brace against wet grout pressure.

B. Install mortar and grout under provisions of Section 04 20 00.

3.4 FIELD QUALITY CONTROL

A. Section 01 4100 – Testing Laboratory Services: Procedures for testing.

B. Testing - Masonry Grout: Conduct strength tests in accordance with ASTM C 1019.

C. Testing - Masonry Mortar: Conduct strength tests in accordance with the following:
   1. Spread mortar on the masonry units 1/2 inch to 5/8 inch thick, and allow to stand for one minute.
   2. Remove mortar and place in a 2-inch by 4-inch cylinder in two layers, compressing the mortar into the cylinder using a flat-end stick or fingers. Lightly tap mold on opposite sides, level off and immediately cover molds and keep them damp until taken to the laboratory.
   3. After 48 hours' set, have the laboratory remove molds and place them in the fog room until tested in damp condition.

3.5 CONSTRUCTION

A. Mix mortar using a mechanical mortar mixer to ensure homogeneity and workability. Hand mixing of the mortar is permitted only with written approval of the Architect/Specifier who will outline hand-mixing procedures.
   1. Observe mixing times of 4-5 minutes, consistent from batch to batch.

B. Use clean, potable water; add the maximum amount consistent with optimum workability.
   1. Maintain a uniform water/cement ratio.
   2. At the end of the day, thoroughly rinse the mixer to avoid contamination of future mortar batches.

C. Retemper mortar by adding additional mixing water only to replace water lost due to evaporation.

D. Core Fill Grout
   1. Preparatory Work
      a. Core Fill Grout may be used in both low and high-lift applications. Special consideration should be given when selecting the type of grout for a particular application.
      b. Handle and store product according to manufacturer’s recommendations. Products shall be custom packaged to the specification and must be stored dry, covered and protected from weather and other damage.
   2. Methods
      a. Core Fill Grout may be placed by hand or by mechanical delivery. It should be consolidated upon placement and reconsolidated before initial set.
      b. Course grout may be used in grout spaces in brick masonry, 2” (51 mm) or more in horizontal dimensions where no horizontal steel is in the grout space, and in the cells in block.
         1. Do not retemper colored mortars.
      c. Discard mortar 2.5 hours after initial mixing.
      d. Tool mortar joints when surface in thumbprint hard.
         1. Keep tooling time consistent
         2. Do not strike joint too early or too late in order to maintain color consistency.
      e. Cure mortar in a minimum of 28 days.
      f. For masonry core fill grout applications, comply with the requirements of ASTM C476.

3.6 REPAIR/RESTORATION

A. Specify requirements for cleaning, repair or restoration of existing mortar or masonry work.

3.7 CLEANING

A. Cleaning Method:
   1. Clean masonry with the least aggressive cleaning solution and technique possible.
   2. Comply with cleaning procedure and recommendations of the manufacturers of both the cleaning solution and the unit masonry.
   3. Utilize the same cleaning procedure on the sample panel at selection and during construction.

3.8 PROTECTION

A. Protect installed work from damage due to subsequent construction activity on the site.

END OF SECTION

SECTION 04 20 00 - MASONRY (BRICK AND BLOCK)

PART 1 - GENERAL

1.1 DESCRIPTION

A Work included: Provide masonry and architectural precast concrete units where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 03 45 00 – Architectural Precast Concrete
3. Section 04 10 00 – Masonry Mortar and Grout
2. Section 05 50 00 – Metal Fabrications – steel lintels
4. Section 09 26 00 - Gypsum Wallboard and Metal Stud System

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

B. Mock-ups:
1. Erect a sample wall panel of brick masonry which will be exposed to view in the finished project for approval by the Architect and Owner. Mock-ups shall be as follows:
   a. Approximately 8 ft. long by 4 ft. high, showing the proposed color range, texture, bond, mortar and workmanship. All brick shipped for the sample shall be included in the panel. **All brick shapes, brick patterns and all other masonry items which comprise a typical exterior wall shall be a part of the mock-up.**
   b. When required, provide a separate panel for each type of brick or mortar.
   c. Do not start work until Architect has accepted sample panel.
   d. Use panel as standard of comparison for all masonry work built of same material.
   e. Do not destroy or move panel until work is completed and accepted by the Owner.
   f. **Several mock-ups may be required to review different combinations of brick and/or CMU color selections. Such mock-ups are considered a part of the work.**

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 64 00 - Product Handling: Transport, handle, store, and protect Products.

B. Materials shall be delivered and stored so as to avoid damage from breakage, moisture, staining or damage of any kind.

C. Storage of Materials: Store materials under cover in a dry place and in a manner to prevent damage or intrusion of foreign matter. During freezing weather protect all masonry units with tarpaulins or other suitable material. Store cement, lime and air-setting mortars in watertight sheds with elevated floors. Protect reinforcement from the elements; immediately before placing, reinforcement shall be free from loose rust, ice or other foreign coatings that will destroy or reduce the bond.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

A. Environmental Requirements:
1. No masonry work shall be installed in an atmosphere with temperature less than 40 degrees F. unless work is protected in a manner previously approved by the Architect.
2. Hot Weather construction - Protect masonry construction from direct exposure to wind and sun when erected in an ambient air temperature of 99 degrees F. in shade with relative humidity less than 50 percent.
3. Cover work at end of each day's work with non-staining waterproof material so as to prevent entrance of excess water at top of wall.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Brick: Provide Acme, or equal, modular size units where indicated on drawings, wire cut (velour) texture complying with ASTM C216, grade SW, Type FPS.
1. Colors:
A. Match existing building brick (special mingle brick from the Perla Plant).

C. Concrete Masonry Units:
1. Provide hollow load-bearing concrete masonry units made from lightweight aggregates and meeting the requirements of ASTM C90 for Grade N-1 units. Use standard modular sizes as shown on the Drawings (8 x 8 x 16, 4 x 8 x 8, and 4 x 8 x 16, smooth face, are most typical sizes), cutting where required. Compressive strength on the average gross area will be a minimum of 800 psi for an individual unit and 1000 psi for an average of 3 units. Concrete masonry units shall have a shrinkage potential as defined in ASTM C90 of 0.04% or less. If requested submit certification as to shrinkage potential. Provide for lintels, bond beams, half high block, corners and other special conditions as shown on the Drawings.
2. Provide accessory shapes as indicated or otherwise required.
3. **PROVIDE UNITS WHICH MEET THE REQUIREMENTS FOR ONE or TWO HOUR FIRE RATED WALLS WHERE NOTED ON THE DRAWINGS.**
4. Split Face CMU – ABC Block. or equal. Color shall be integral with the block. Color shall match existing building split face block (Espresso – custom color is anticipated).

D. Masonry Veneer Anchors: Dur-O-Wall D/A213 Veneer Anchors, Standard Weight, 12 gauge Pintel with 14 gauge Plate. Install to exterior metal studs with hot dipped galvanized or stainless steel screws.

E. Concrete Masonry Unit Reinforcement: At concrete block and brick veneer walls use Dur-O-Wall Ladder Type Dur-O-Eye assembly, hot dipped galvanized, ASTM 641, Class 1, extra heavy weight classification, or

approved substitution. Cross rods to be a 16" on center, with a minimum of four (4) longitudinal rods. Use Dur-O-Wall, Ladder-Type Assembly at concrete block walls without brick veneer. All CMU reinforcement to be one inch less than wall width in which it is placed.

F. Veneer Expansion Joint Material: 3/8" thick x one brick or stone wythe closed cell neoprene conforming to ASTM D1056 Class RE41 or 2A1 compressibility exceeds 50%.

G. Block and brick cavity wall expansion material: Factory extruded rubber conforming to ASTM D-2000 2AA-805 with a Durometer hardness of 80 when tested in accordance with ASTM D2240. Use 11-1/8" wide material for 12" concrete masonry units.

H. Mesh Wall Ties: ½" square, hot dipped galvanized wire, 16 ga., 24" long x 1-1/2" less nominal width of wall. Place at four feet (4') on center vertically at all vertical expansion joints in stone veneer and/or stone and block cavity walls.

J. Membrane Flashing:
   1. Flashing embedded in masonry walls (base of wall at weeps, all door heads, all window heads and sills and all other locations noted on the Drawings) shall be Nervastral Seal-Pruf H-D, 20 mils thick, as manufactured by Rubber & Plastics Compound Company, Inc. or approved substitution.
   2. Furnish in long lengths of proper widths with bonded 4-inch lapped joints. Extend flashing to within one inch of exterior wall face.

K. Weep-holes: Mortar Net Weep Vents, color selected by Architect. 2.5" x 3.5" x .5", 100% recycled polyester with 90% open mesh, with Mortar Net Drainage System, 1" x 10" x 5', or equal.

L. Masonry Cleaner: All masonry work shall be thoroughly cleaned with Vana Trol Sure Klean as manufactured by the Process Solvent Company, Inc. (Prosoco) or approved substitution. (Other products as manufactured by Prosoco may be required to be used as cleaner and their selection and use are the Contractor's responsibility at no cost to the Owner.)

M. Mortar Dropping Net: Mortar Net Drainage System, 1" wide x 10" high, high density polyethylene strands woven into a 90% open mesh.

N. Exterior Masonry Sealer/Water Repellant - Siloxane: Clear penetrating water repellent. Alkylalkoxysiloxanes that are oligomerous with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier.
   1. Products:
      a. Prime-a-Pell 200, by Chemprobe Corporation.
      b. Euco Weather-Guard, by Euclid Company
      c. Weather Seal Siloxane, by ProSoCo, Incorporated
      d. Or approved substitution.

O. VAPOR AND AIR BARRIER: AT EXTERIOR CMU WALLS WITH BRICK VENEER, USE GRACE CONSTRUCTION PRODUCTS, PROCOR FLUID APPLIED MEMBRANE OR EQUAL.

P. Concrete Masonry Unit Insulation (Exterior Walls): PolyMaster Plastic Foam Insulation, as manufactured by PolyMaster, Inc., 1-800-580-3626, or equal.

Q. Flashing at single wythe CMU walls: BlockFlash by Mortar Net Solutions. Drainage Mat, BlockFlash Flashing Pans with integrated weep spout and insect guard and connector bridge. Install as directed per manufacturer's recommendations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution Requirements: verification of existing conditions before starting work.
B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 INSTALLATION OF REINFORCED CONCRETE UNIT MASONRY

A. General: the installation provisions of paragraphs 1.1 through 3.3 apply to the installation of reinforced concrete unit masonry except where in conflict with the following requirements. Stack bond shall be used for both reinforced CMU walls and unreinforced CMU walls.

B. Position reinforcement accurately at the spacing indicated. Support and secure vertical bars against displacement. Horizontal reinforcement may be placed as the masonry work progresses. Where vertical bars are shown in close proximity, provide a clear distance between bars of not less than the nominal bar diameter or 1" (whichever is greater). Locate horizontal bars on the same side of vertical bar.

C. Splice reinforcement bars where shown; do not splice at other points unless acceptable to the Architect. Provide lapped splices, unless otherwise indicated. In splicing vertical bars or attaching to dowels, lap ends, place in contact and wire tie.

D. Maintain vertical continuity of core or cell cavities, which are to be reinforced and grouted, to provide minimum clear dimension indicated and to provide minimum clearance and grout coverage for vertical reinforcement bars. Keep cavities free of mortar. Solidly bed webs in mortar where adjacent to reinforced cores or cells.

E. Where horizontal reinforced beams (bond beams) are shown, use special units or modify regular units to allow for placement of continuous horizontal reinforced bars. Place small mesh expanded metal lath or wire screening in mortar joints under bond beam courses over cores or cells or non-reinforced vertical cells, or provide units with solid bottoms.

F. Use fine or course grout as specified as required to completely fill all space intended to be grouted.

G. Grouting Technique: Low-lift grouting technique subject to requirements which follow.
1. Provide minimum clear dimension of 2" and clear area of 8 sq. In. In vertical cores to be grouted.
2. Place vertical reinforcement prior to layout of CMU. Extend above elevation of maximum pour height as required for splicing. Support in position at vertical intervals not exceeding 192 bar diameters nor 10 ft.
3. Lay CMU to maximum pour height. Do not exceed 5' height, or if bond beam occurs below 5' height, stop pour at course below bond beam.
4. Pour grout using chute or container with spout. Rod or vibrate grout during placing. Place grout continuously; do not interrupt pouring of grout for more than one hour. Terminate grout pour 1-1/2" below top course of pour.
5. Bond Beams: Stop grout in vertical cells 1-1/2" below bond beam course. Place horizontal reinforcement in bond beams; lab at corners and intersections as shown. Place grout in bond beam course before filing vertical cores above bond beam.

H. PRIOR TO INSTALLATION OF BRICK VENEER AT EXTERIOR CMU WALLS, INSTALL FLUID APPLIED VAPOR AND AIR BARRIER TO ALL CMU'S AS PER MANUFACTURER'S INSTRUCTIONS.

3.3 LAYING BRICK / CMU

A. Lay brick and all accessories in accordance with the Drawings, using running bond pattern except where a flat rowlock, soldier or otherwise is noted with veneer securely anchored to back-up masonry and metal studs as described under anchors.
B. Lay all brick masonry straight, plumb and true to line with square angles and corners. Use masonry table saw to cut and fit brick units. Handsaws shall not be used to cut brick.

C. Lay each brick in full joint of mortar on its bed and ends. Slush and fill each joint with mortar each course of brick as work progresses.

D. Take precautions to prevent mortar droppings in cavity or air space between face brick and concrete block and/or wall sheathing. Install weep-hole ventilators at all waterproofed edges. Install Mortar Dropping Net at all exterior brick cavities.
E. Anchor brick veneer thru exterior wall sheathing and into exterior wall studs with veneer anchors at a minimum of 16" horizontally and 16" vertically, for the entire face/surface of the wall.

F. Protect all freshly constructed masonry from injury of any kind. Replace injured work in a manner satisfactory to the Contracting Officer. Completely point and thoroughly wash all finished exposed masonry surfaces down with masonry cleaner in accordance with manufacturer's printed instructions.

G. All window and door heads shall have membrane flashing, mortar net and mortar net weeps installed as part of brick veneer system. Membrane flashing to extend at least four inches (4") to each side of opening (4" beyond each jamb).

H. All brick veneer at floor line shall have membrane flashing, mortar net and mortar net weeps installed as part of brick veneer system. Install Mortar Net and Mortar Net Weeps in strict accordance with manufacturer’s requirements.

G. Performance requirements: Conduct inspections, perform testing, and make repairs or replace unsatisfactory precast units as required.

3.5 JOINTS

A. Nominal thickness shall be 3/8" and uniform at brick.
B. Shove vertical joints tight.

C. Strike joints flush in exposed brick vertical surfaces and all precast concrete joints.

D. Tool joints slightly concave in exposed brick or concrete block surfaces.

E. Tool joints slightly flush in exposed brick or concrete block to be painted.

3.6 BUILT-UP WORK

A. Cooperate with other trades in building in items in masonry work.

B. Grout solid around built-in items and in door frames.

3.7 LINTELS

A. Install rebars and grout solid as indicated. Provide temporary shoring for openings wider than 36".

B. Lintels shall extend into side walls at jambs, minimum of 4".

C. Coordinate steel lintels with Section 05 50 00.

3.8 FLASHING, WEEPHOLES, VENTS

A. General: Install embedded flashing and weepholes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.

B. At masonry-veneer walls placed over exterior wall sheathing, extend flashing from exterior face of veneer, through the veneer, up face of sheathing at least 8 inches, and then behind air-infiltration/building paper and behind exterior wall sheathing.

1. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end. At head and sills, extend flashing 4 inches at ends and turn up not less than 2 inches to form a pan.
2. Cut off flashing flush with face of wall after masonry wall construction is completed.

C. At Masonry veneer walls over CMU walls, install flashing and weeps at described in paragraph 3.8.B, except surfaces receiving flashing shall be sufficiently spotted with mastic to hold in place until masonry is set. Secure within CMU wall at mortar joint.

D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashing at all lintels and shelf angles, and as follows:
1. Space weep holes 24 inches o.c. maximum.
2. At all cavities with flashing place Mortar Dropping Net continuous within cavity and placed on top of thru-wall flashing and exterior sheathing.

3.9 REPAIR, POINTING AND CLEANING

A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.
B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings and adjacent work to provide a neat uniform appearance, prepared for application of sealants.

C. Final Cleaning: After mortar is thoroughly set and cured, clean masonry as follows: (Follow manufacturer's recommendations, but as a minimum perform the following.)
1. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave ½ panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film or waterproof masking tape.
4. Saturate wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Use bucket and brush hand cleaning method described in BIA "Technical Note No. 20 Revised" to clean brick masonry made from clay or shale, except use masonry cleaner indicated under Part 2 - Products.
6. **APPLY MASONRY CLEANER AND CLEAN WALLS AS MANY TIMES AS REQUIRED TO REMOVE ALL EXCESS MORTAR, EFFLORESCENCE, LAITTANCE, OR ANY OTHER ITEM ON THE SURFACE OF THE MASONRY TO THE SATISFACTION OF THE OWNER AND/OR ARCHITECT. (I.E. MULTIPLE CLEANINGS OF THE WALLS MAY BE REQUIRED AND ARE CONSIDERED A PART OF THE WORK AT NO ADDITIONAL COST.)**

D. Protection: Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures unit masonry work being without damage and deterioration at time of substantial completion.

3.10 APPLICATION OF EXTERIOR MASONRY SEALER

A. Apply sealer to all exterior brick or stone and precast concrete and any other exposed masonry (clay or concrete) units as follows and as required by manufacturer.

B. Complete all caulking and pointing work before application. All surfaces will be structurally sound, clean and free of all dust, dirt efflorescence, oil and all other foreign materials. New masonry construction will be fully cured and dry.

C. Apply directly from container using brush, roller, airless or conventional air type sprayer.

D. Protect adjacent surfaces, landscaping, property and vehicles from overspray and drift.

E. Apply in a uniform manner that fully wets the surface without flooding or rundowns, and as directed by manufacturer's instructions.

F. Apply two coats. Allow minimum 4 hours between coats.

3.11 INSTALLATION OF CMU INSULATION

A. The foamed-in place insulation is to be placed in the walls per manufacturer's specifications. The material shall be applied in such a manner as to assure complete cavity fill. The product shall be applied with the liquid ratios at the mixing gun being within the manufacturer's specified range. A cubic foot of fresh foam shall weigh between 2 lbs. 8 oz. and 3 lbs. 6 oz. After installation of the material, allow 2 weeks for curing before painting the walls.

B. The installation shall be contracted only by a firm which is certified and/or approved by the manufacturer for installation.

C. After the foam is installed and cured, walls shall be protected from excessive moisture (rain) for at least 72 hours.

END OF SECTION

SECTION 05 40 00 - COLD FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Exterior wall metal stud framing with anchorage and bracing.
2. Load-bearing metal stud wall and partition framing, with anchorage and bracing.

B. Related Documents: The Contract Documents, as defined in Section 010100 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

A. American Iron and Steel Institute (AISI)
1. Specification for the Design of Cold-Formed Steel Structural Members.
2. Cold-Formed Steel Design Manual (Latest).

B. American National Standards Institute (ANSI)
1. ANSI A58.1 - Roof, Wind and Snow Loads.

C. American Society for Testing and Materials (ASTM):
1. ASTM A653 - Standard Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM A570 Hot-Rolled Carbon Steel Sheet & Strip, Carbon Hot-Rolled Structural Quality.
3. ASTM A611 - Standard Specification for Structural Steel Sheet, Carbon, Cold-Rolled.
4. ASTM C955 - Standard Specification for Load Bearing Steel Studs, Runners (Track), Bracing, and Bridging for Screw Application of Gypsum Panel Products.

D. American Welding Society (AWS):
1. AWS D1.1 - Structural Welding Code and D1.3 - Specifications for Welding Sheet Steel in Structures.
2. AWS - Standard Qualification Procedure.

E. Federal Specification.
1. FS TT-P-636C - Rust-Inhibitive Paint.

F. Metal Lath/Steel Framing Association (ML/SFA) - Lightweight Steel Framing Systems Manual, Latest Edition.

1.3 SYSTEM DESCRIPTION

A. Design Requirements: The supplier shall design and/or verify the size and strength of all light gauge cold-formed Metal Framing members and connections in accordance with the ML/SFA Lightweight Steel Framing Systems Manual.
1. Design shall use the superimposed design loads as per the Notes on the Structural Sheets of the Contract Drawings.
2. Design shall be based upon information shown on the drawings and specified herein.
3. Additional Design Criteria - ANSI A58.1 or:
    a. Load-bearing live loads:
        1) Load-bearing partitions:
            i. Lateral pressures: 5 psf
        2) Non-load-bearing partitions:
            i. Lateral pressures: 5 psf
        3) Exterior curtain walls:
            i. Wind loads based on wind speeds of 75 MPH.

4) Maximum allowable deflection with brick veneer:
   i. Calculated on 18 ga. stud capacity alone: 1/600.

4. Design shall conform to: AISI Specification for the Design of Cold-Formed Steel Structural Members. Wall bridging shall be designed to provide resistance to minor axis bending and rotation of wall studs. Designated selected exterior and/or interior walls shall be designed to provide frame stability and lateral load resistance. All connections (member to member, and member to structure) shall be designed and detailed.
5. Qualification of Field Welding: Qualify welding process and welding operators in accordance with AWS Standard Qualification Procedure.
6. Design non-axial load-bearing framing to accommodate 1/2 inch (13 mm) vertical deflection.

1.4 SUBMITTALS

A. Section 01 33 23 - Submittal Procedures: Procedures for submittals.
   1. Product Data:
      a. Manufacturers' literature containing product and installation specifications and details.
   2. Shop Drawings:
      a. Documents illustrating materials, shop coatings, steel thickness, details of fabrication and erection, details of attachment, spacing of fasteners, required accessories and critical installation procedures.
   3. Assurance/Control Submittals:
      a. Test Reports: Submit the following reports directly to the Architect from, Independent Testing Laboratory, with copy to Owner. Prepare reports in conformance with Section 014100 – Testing Laboratory Services:
         1) Testing/Inspection reports conducted on shop and field-bolted and welded connections. Include data on type(s) of tests conducted and test results. Note inspection findings.
      b. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
      c. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
   2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

B. Pre-Installation Meetings:
   1. Convene a pre-installation meeting one week prior to commencing Work of this Section. Notify the Architect and Contracting Officer of the meeting date and time at least 7 days prior.
   2. Require attendance of parties directly affecting Work of this Section.
   3. Review conditions of operations, procedures and coordination with related Work.
   4. Agenda:
      a. Tour, inspect, and discuss conditions of installation of other work including door and window frames and mechanical and electrical work.
      b. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.
      c. Review required submittals, both completed and yet to be completed.
      d. Review Drawings.
      e. Review and finalize construction schedule related to cold formed metal framing installation and verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
      f. Review required inspections, testing, certifying, and material usage accounting procedures.
      g. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.
      h. Review safety precautions relating to operations.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Transport, handle, store, and protect Products.

B. Protect metal framing units from rusting and damage. Deliver to project site in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade. Store off ground in a dry ventilated space or protect with suitable waterproof coverings and protect against mechanical damage to units. Store materials on a flat plane. Any damaged materials shall be removed from the site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All studs and/or joists and accessories shall be of the type, size, gauge and spacing shown on the plans / drawings or as required by manufacturer design engineer, if called for. Studs, runners (track), bracing, and bridging shall be manufactured per ASTM Specification C-955.

B. All painted studs, joists and accessories shall be formed from steel that conforms to the requirements of ASTM A570 or A611, as set forth in Section 1.2 of the AISI Specification for the Design of Cold-Formed Steel Structural Members (latest edition).

C. All galvanized studs, joists and accessories shall be formed from steel that conforms to the requirements of ASTM A653, as set forth in Section 1.2 of the AISI Specification for Design of Cold-Formed Steel Structural Members (latest edition).

D. All painted studs, joists and accessories shall be prime-painted with a rust-inhibitive paint, FS TT-P-636C.

E. All galvanized studs, joists and accessories shall have a minimum G-40 coating. All exterior structural galvanized studs, joists, and accessories shall have a minimum G-60 coating.

F. All section properties shall be calculated in accordance with the AISI Specification for the Design of Cold-Formed Steel Structural Members (latest edition).

G. Framing Accessories:
   1. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
      a. B&D Industries, LLC, Albany, NY (800) 924-4807.
      b. Deitrich, Pittsburgh, PA (800) 873-2443.
      c. The Steel Network, Incorporated., Raleigh, NC (888) 474-4876.
      d. Unimast, Schiller Park, IL (800) 654-7883.
   2. Interior or Exterior non-axial-load-bearing Wall Head Condition Deflection Accessories:
      a. Deitrich: Double-Deep-Leg Track.
      b. The Steel Network: VertiClip® SLD (interior), SL (exterior).
      c. Unimast: Double-Deep-Leg Track.
   3. Exterior non-axial-load-bearing Wall Slab Bypass Deflection Accessories:
      a. B&D: Quick Clip®.
      b. The Steel Network: VertiClip® SLB or SLS Series.
      c. Unimast: Lovely Clip®.

H. Section 01 60 00 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 FABRICATION

A. General: Framing components may be prefabricated prior to erection. Fabricate components plumb, square, true to line and braced against racking with joints welded. Perform lifting of prefabricated components in a manner to prevent damage or distortion.

B. Fastenings: Attach similar components by welding. Attach dissimilar components by bolting, or screw fasteners, as standard with manufacturer.

C. Cutting of steel framing members may be accomplished with a saw or shear. Torch cutting of load carrying members is not permitted.

D. Wire tying of framing components is not permitted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 INSTALLATION AND STUDWALLS

A. Manufacturer's Instructions: Install metal framing systems in accordance with manufacturer's printed or written instructions and recommendations, unless otherwise indicated.

B. Stud Walls:
1. Runner Tracks: Install continuous tracks sized to match studs. Align tracks accurately to layout at base and tops of studs. Secure tracks as recommended by stud manufacturer for type of construction involved, except do not exceed 24 inches on center spacing for nail or power- driven fasteners, or 16 inches on center for other types of attachment. Provide fasteners at corners and ends of tracks.
2. Position studs plumb in runners and space no greater than 16 inches and not more than 2 inches from abutting walls and at each side of openings. Connect studs to upper and lower tracks using self-drilling, screws or welding in accordance with Manufacturer's recommendations such that the connection meets or exceeds the design loads required at that connection.
3. Brace all studs at mid-height for added strength, stiffness, and fire-stopping.
4. Construct corners using minimum of three studs. Double studs at door, window, and sidelight jambs. Install intermediate studs above and below openings to match wall stud spacing.
5. **Provide deflection allowance below supported horizontal building framing in ceiling or head track for non-load-bearing framing in a method recommended by stud manufacturer.**
   a. **Where walls and partitions must close out against the deck for smoke and fire separation provide a top track rigidly attached to vertical studs but free to move vertically in a 14 gauge break-formed deep leg track rigidly attached to deck with slack to accommodate structural live load deflections noted on drawings; or head condition vertical slide clips in coordination with alignment track (20 gage at exterior walls, 25 gage at interior walls).**
   b. **Where wall or partition studs pass by the structural deck provide vertical slide clips welded or screw attached to the structural support but do not attach rigidly to studs.**

3.3 INSTALLATION: PRE-FABRICATED AND PANELIZED CONSTRUCTION

A. Panels shall be designed to resist construction and handling loads as well as service loads.

3.4 INSTALLATION: NON-PANELIZED (STICK-BUILT) MEMBERS

A. Align track accurately at supporting structure and fasten to structure as shown on shop drawings.

B. Track intersections shall butt evenly.

C. Studs shall be plumbed, aligned, and securely attached to flanges or webs of upper and lower tracks. Axially loaded studs shall be seated squarely in both top and bottom tracks.

3.5 INSTALLATION: JOISTS

A. Joist shall be located directly over bearing studs or a load distribution member shall be provided to transfer loads.

B. Provide web stiffeners where necessary at reaction points, and at points of concentrated loads, as shown on the shop drawings.

C. Bridging, either strap or solid, shall be provided as shown on the shop drawings.

D. Provide additional joists under parallel partitions where the partition length exceeds 1/2 of the joist span.

E. Provide additional joists around all floor/roof openings which are larger than the joist spacing and as noted on the shop drawings.

F. End blocking shall be provided where joist ends are not otherwise restrained from rotation.

3.6 FASTENINGS AND ATTACHMENTS

A. Anchorage of the tracks to the structure shall be with methods designed for the specific application of sheet to that surface. Size, penetration, type and spacing shall be determined by design.

B. Welds shall conform to the requirements of AWS D1.1, AWS D1.3, and AISI Manual Section 4.2. Welds may be butt, fillet, spot, or groove type, the appropriateness of which shall be determined by, and within the design calculations. All welds shall be touched-up using zinc rich paint to galvanized members, and paint similar to that used by the manufacturer for painted members.

C. Steel drill screws shall be of the minimum diameter indicated by the design of that particular attachment detail. Penetration through joined materials shall not be less than 3 exposed threads.

D. Wire tying in structural applications is not permitted.

3.7 CONSTRUCTION

A. Site Tolerances:
   1. Vertical alignment (plumbness) of studs shall be within 1/960th (1/8 inch in 10.0 inches) of the span.
   2. Horizontal alignment (levelness) of walls shall be within 1/960th (1/8 inch in 10.0 inches) of their respective lengths.
   3. Spacing of studs shall not be more than $\pm$1/8 inch from the designed spacing providing that the cumulative error does not exceed the requirements of the finishing materials.
   4. Squareness - Prefabricated panels shall not be more than 1/8 inch out of square within the length of that panel.

3.8 FIELD QUALITY CONTROL

A. Section 01 41 00 – Testing Laboratory Services
   1. Inspect all work in order to assure strict conformance to the shop drawings at all phases of construction.
   2. All members shall be checked for proper alignment, bearing, completeness of attachments, proper placement, reinforcement, etc.
   3. All attachments shall be checked for conformance with the shop drawings. All welds shall be touched-up as specified herein.
   4. General Inspection of structure shall be completed prior to applying loads to those members.
   5. Inspections where and as required by local codes shall be controlled inspections.

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide miscellaneous metal work shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Perform shop and/or field welding required in connection with the work of this Section in strict accordance with pertinent requirements of the American Welding Society.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product Data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Shop Drawings in sufficient detail to show fabrication, installation, anchorage and interface of the Work of this Section with the work of adjacent trades.
4. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used in the Work.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 64 00.

PART 2 - PRODUCTS

2.1 MATERIALS

A. In fabricating items which will be exposed to view, limit materials to those which are free from surface blemishes, pitting, rolled trade names and roughness.

B. Comply with the following standards, as pertinent:
1. Steel plates, shapes and bars: ASTM A36;
2. Steel plates to be bent or cold-formed: ASTM A283, grade C;
3. Steel tubing (hot-formed, welded or seamless): ASTM A501.
4. Steel bars and bar-size shapes: ASTM A306, grade 65 or ASTM A36;
5. Cold-finished steel bars: ASTM A108;
6. Cold-rolled carbon steel sheets: ASTM A336;

7. Galvanized carbon steel sheets: ASTM A526, with G90 zinc coating in accordance with ASTM A525.
8. Stainless steel sheets: AISI type 302 or 304, 24 gage with number 4 finish.
9. Gray iron castings: ASTM A48, class 10;
10. Malleable iron castings: ASTM A47;
11. Steel pipe: ASTM A53, grade A, schedule 40, black finish unless otherwise noted;
12. Concrete inserts:
    a. Threaded or wedge type galvanized ferrous castings of malleable iron complying with ASTM A27;
    b. Provide required bolts, shims, and washers, hot-dip galvanized in accordance with ASTM A153.

2.2 FASTENERS

A. General:
1. For exterior use and where built into exterior walls, provide zinc-coated fasteners.
2. Provide fasteners of type, grade and class required for the particular use.

B. Comply with the following standards as pertinent:
1. Bolts and nuts: Provide hexagon-head regular type complying with ASTM A307, grade A;
2. Lag bolts: Provide square-head type complying with Federal Spec FF-B-561;
3. Machine screws: Provide cadmium plated steel type complying with Federal Spec FF-S-111;
4. Washers:
    a. Plain washers: Comply with Federal Spec FF-W-92, round, carbon steel;
    b. Lock washers: Comply with Federal Spec FF-W-84, helical spring type carbon steel;
5. Toggle bolts: Provide type, class and style needed but complying with Federal Spec FF-B-588;
6. Anchorage devices: Provide expansion shield complying with Federal Spec FF-S-325.

2.3 FIXED ELEVATOR PIT LADDER

A. At location as shown on Drawings, as “Elevator Pit Ladder”, or other similar note, provide Series F Fixed Ladder. 6’-0” ± Height (with 3’-0” extension at each side rail at pit). Field verify height before ordering. Manufactured by Cotterman, 1-800-522-3337, or equal. Powder/Polyester Coat finish. Color to be selected by architect from eleven (11) standard colors.

2.4 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

2.5 SHOP PAINT

A. Primer: Apply one (1) shop coat of manufacturer’s standard red or gray primer paint. Primer paint shall be rust inhibitive.

B. For repair of galvanizing, use a high zinc-dust content paint complying with MIL-P-21035.

2.6 FABRICATION

A. Except as otherwise shown on the Drawings, use materials of size, thickness and type required to produce reasonable strength and durability in the Work of this Section.

B. Fabricate with accurate angles and surfaces which are true to the required lines and levels, grinding exposed weld smooth and flush, forming exposed connections with hairline joints, and using concealed fasteners wherever possible.

C. Prior to shop painting or priming, properly clean metal surfaces as required for the applied finish and for the proposed use of the item.

D. On surfaces inaccessible after assembly or erection, apply two coats of the specified primer. Change color of second coat to distinguish it from the first.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

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.

3.3 COORDINATION

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.

3.4 INSTALLATION

A. General:
   1. Set work accurately into position, plumb, level, true and free from rack, and as per any manufacturer instructions.
   2. Anchor firmly into position.
   3. When field welding is required, comply with AWS recommended procedures of manual-shielded metal-arc welding for appearance and quality of weld and for methods to be used in correcting weld work.
   4. Grind exposed welds smooth and touch up shop prime coats.
   5. Do not cut, weld, or abrade surfaces which have been hot-dip galvanized after fabrication and which are intended for bolted or screwed connections.

B. Immediately after erection, clean the field welds, bolted connections and abraded areas of shop priming. Paint the exposed areas with the same material used for shop priming.

C. Paint all exposed interior and exterior metal as per Section 09 90 00 - Paint.

END OF SECTION

SECTION 05 51 50 – LADDERS

PART 1 GENERAL

1.1 DESCRIPTION

A. Aluminum access ladder

1.2 RELATED WORK

A. Section 05 50 00 – Metal Fabrications: Fasteners and installation requirements used to attach ladders to structure. **(Section 05 50 00 includes fixed elevator pit ladder).**

B. Section 07 70 00 – Roof Accessories

C. Division 26 – Basic Electrical Materials and Methods: For electrical grounding of ladders.

1.3 REFERENCES

A. AA – Aluminum Association.

B. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

C. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

D. OSHA 1910.27 – Fixed Ladders.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 23.

B. Product Data: Manufacturer's data sheets on each product.

C. Shop Drawings:
1. Detail fabrication and erection of each ladder indicated. Include plans, elevations, sections, and details of metal fabrications and their connections.
2. Provide templates for anchors and bolts specified for installation under other Sections.
3. Provide reaction loads for each hanger and bracket.

D. Qualification Data:
1. Refer to Quality Assurance provisions for submittal requirements evidencing experience, certifications and resources.

E. Selection Samples: For each finish specified, two complete sets of color chips representing manufacturer's full range of available colors. Architect to choose from manufacturer’s standard colors.

F. Verification Samples: For each finish specified, two samples, minimum size 6 inches (150 mm) square, represent actual product color.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in producing aluminum metal ladders similar to those indicated for this Project.
1. Record of successful in-service performance.

2. Sufficient production capacity to produce required units.
3. Professional engineering competent in design and structural analysis to fabricate ladders in compliance with industry standards and local codes.

B. Installer Qualifications: Competent and experienced firm capable of selecting fasteners and installing ladders to attain designed operational and structural performance.

C. Product Qualification: Product design shall comply with OSHA 1910.27 minimum standards for ladders.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurement before fabrication.
1. Established Dimensions: Where field measurements cannot be made without delaying the Work, indicate established dimensions on shop drawing submittal and proceed with fabrication.

1.8 WARRANTY

A. A. Manufacturer has responsibility for an extended Corrective Period for work of this Section for a period of 5 years commencing on the shipment date of the product against all the conditions indicated below, and when notified in writing from Owner, manufacturer shall promptly and without inconvenience and cost to Owner correct said deficiencies.
1. Defects in materials and workmanship.
2. Deterioration of material and surface performance below minimum OSHA standards as certified by independent third party testing laboratory. Ordinary wear and tear, unusual abuse or neglect excepted.
3. Within the warranty period, the manufacturer shall, at its option, repair, replace, or refund the purchase price of defective ladder.

B. Manufacturer shall be notified immediately of defective products, and be given a reasonable opportunity to inspect the goods prior to return. Manufacturer will not assume responsibility, or compensation, for unauthorized repairs or labor. Manufacturer makes no other warranty, expressed or implied, to the merchantability, fitness for a particular purpose, design, sale, installation, or use, of the ladder; and shall not be liable for incidental or consequential damages, losses of or expenses, resulting from the use of ladder products.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers as shown, but not limited to: O'Keeffe's, Inc.; 325 Newhall St. San Francisco, CA 94124. ASD. Toll Free Tel: (888) 653-3333. Tel: (415) 824-4900. Fax: (415) 824-5900. Email: info@okeeffes.com. Web: http://www.okeeffes.com.

2.2 APPLICATIONS/SCOPE

A. Access Ladder
a. Model 501 Heavy Duty Tubular Rail access ladder as manufactured by O'Keeffe's, Inc. See Drawings for location. Height to be determined by Contractor.
b. Model 503 – Tubular Rail High Parapet Access Ladder with Platform and Return. See Drawings for Location. Height to be determined in field by Contractor.

2.3 FINISHES

A. Clear Anodic Finish: AA-M10C22A41 Mechanical finish as fabricated. Architectural Class I, clear coating 0.018 mm or thicker.

2.4 MATERIALS

A. Aluminum Sheet: Alloy 5005-H34 to comply with ASTM B209.

B. Aluminum Extrusions: Alloy 6063-T6 to comply with ASTM B221.

2.5 FABRICATION

A. Rungs: Not less than 1-1/4 inches (32 mm) in section and 18–3/8 inches (467mm) long, formed from tubular aluminum extrusions. Squared and deeply serrated on all sides.
1. Rungs shall withstand a 1,500 pound (454 kg) load without deformation or failure.

B. Channel Side Rails: Not less than 1/8 inch (3 mm) wall thickness by 3 inches (76 mm) wide.

C. Heavy Duty Tubular Side Rails: Assembled from two interlocking aluminum extrusions no less than 1/8 inch (3 mm) wall thickness by 3 inches (76 mm) wide. Construction shall be self-locking stainless steel fasteners, full penetration TIG welds and clean, smooth and burr-free surfaces.

D. Walk-Through Rail and Roof Rail Extension: Not less than 3 feet 6 inches (1067 mm) above the landing and shall be fitted with deeply serrated, square, tubular grab rails.

E. Landing Platform: 1-1/2 inches (38 mm) or greater diameter, tubular aluminum guardrails and decks of serrated aluminum treads.

F. Ladder Safety Post: Retractable hand hold and tie off.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Coordinate anchorages. Furnish setting drawings, templates, and anchorage structural loads for fastener resistance.

B. Do not begin installation until supporting structure is complete and ladder installation will not interfere with supporting structure work.

C. If supporting structure is the responsibility of another installer, notify Architect of unsatisfactory supporting work before proceeding.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.
END OF SECTION

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide wood, nails, bolts, screws, framing anchors and other rough hardware, and other items needed, and perform rough carpentry for the construction shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
1. Miscellaneous wood framing and sheathing.
2. Miscellaneous furring for wall finishes.
3. Miscellaneous blocking, cants and curbs for roofing systems, related metal flashings and roof mounted equipment/accessories.
4. Behind wall wood blocking for support of toilet accessories, wall cabinets, wainscots and miscellaneous other wall-hung/attached accessories.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in division 1 of these Specifications.
2. Division 5 - Metals

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Codes and standards:
1. In addition to complying the pertinent codes and regulations of governmental agencies having jurisdiction, unless otherwise specifically directed or permitted by the Architect comply with:
a. "Product Use Manual" of the Western Wood Products Association for selection and use of products included in that manual;
b. "Plywood Specification and Grade Guide" of the American Plywood Association;
c. "Standard Specifications for Grades of California Redwood Lumber" of the Redwood Inspection Bureau for Redwood, when used.

1.3 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 64 00.

B. Protection:
1. Deliver the materials to the job site and store, in a safe area, out of the way of traffic, and shored up off the ground surface.
2. Identify framing lumber as to grades, and store each grade separately from other grades.
3. Protect metals with adequate waterproof outer wrapping.
4. Use extreme care in off-loading of lumber to prevent damage, splitting, and breaking of materials.

PART 2 - PRODUCTS

2.1 GRADE STAMPS

A. Identify framing lumber by the grade stamp of the Southern Pine Inspection Bureau, or such other grade stamp as is approved in advance by the Architect.
B. Identify plywood as to species, grade, and glue type by the stamp of the American Plywood Association.

C. Identify other materials of this Section by the appropriate stamp of the agency approved in advance by the Architect.

2.2 MATERIALS

A. Provide materials in the quantities needed for the Work shown on the Drawings, and meeting or exceeding the following standards of quality: All materials to be new, not previously used for any other purpose.
   1. Miscellaneous framing and blocking: Southern pine or fir, #3 minimum. (Pressure treated where noted on Drawings.)
   2. Roofing nailers, sill plates and any wood in contact with masonry or concrete: Southern pine #3 minimum, pressure treated in accordance with the Standard Specifications of the American Wood Preservers Association.
   3. Plywood:
      (1) Roof Sheathing and wall sheathing: APA rated sheathing, exposure 1, 5/8" fire retardant.
   4. Roofing Underlayment: 30 lb. asphalt impregnated roofing felt ASTM D4869, TYPE II (Noted “30# underlayment” on Drawings), or Self-Adhering Sheet Underlayment, (Noted “Self-Adhering Sheet Underlayment” on Drawings.) Granular Surfaced: ASTM D 1970, minimum of 55-mil-(1.4-mm-) thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release paper backing; cold applied. **Provide primer for adjoining concrete or masonry surfaces to receive underlayment.**
   5. Air/Vapor Barrier (at exterior walls with metal wall panels noted “air/vapor barrier” on Drawings) W.R. Meadows, Air Shield, 40 mils thick. Cross-laminated polyethylene bonded to specially modified asphalt, self-adhering. Provide all Air Shield components for all wall penetrations, heads, jambs and sills, a complete system.

2.3 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

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.

3.3 DELIVERIES

A. Stockpile materials sufficiently in advance of need to assure their availability in a timely manner for this Work.

B. Make as many trips to the job site as are needed to deliver materials of this Section in a timely manner to ensure orderly progress of the Work.

3.4 COMPLIANCE

A. Do not permit materials not complying with the provisions of this Section to be brought onto or to be stored at the job site.

B. Promptly remove non-complying materials from the job site and replace with materials meeting the requirements of this Section.

3.5 WORKMANSHIP

A. Produce joints which are tight, true, and well nailed, with members assembled in accordance with the Drawings and with pertinent codes and regulations.

B. Selection of lumber pieces:
1. Carefully select the members.
2. Select individual pieces so that knots and obvious defects will not interfere with placing bolts or proper nailing, and will allow making of proper connections.
3. Cut out and discard defects which render a piece unable to serve its intended function.
4. Lumber may be rejected by the Architect, whether or not it has been installed, for excessive warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting.

C. Do not shim any framing component.

3.6 GENERAL FRAMING

A. General:
1. In addition to framing operations normal to the fabrication and erection indicated on the Drawings, install wood blocking and backing required for the work of other trades.
2. Set horizontal and sloped members with crown up.
3. Do not notch, cut, or bore members for piped, ducts, or conduits, or for other reasons except as shown on the Drawings or as specifically approved in advance by the Architect.

B. Bearings:
1. Make bearings full unless otherwise indicated on the Drawings.
2. Finish bearing surfaces on which structural members are to rest so as to give sure and even support.
3. Where framing members slope, cut or notch the ends as required to give uniform bearing surface.

3.7 BLOCKING AND BRIDGING

A. Install blocking as required to support items of finish (millwork, cabinets, accessories, etc.) and to cut off concealed draft openings, both vertical and horizontal, between ceiling and floor areas.

B. Bridging:
   1. Install wood cross bridging (not less than 2" x 3" nominal), metal cross bridging of equal strength, or solid blocking between joists where the span exceeds 8'-0".
   2. Provide maximum distance of 8'-0" between a line of bridging and a bearing.
   3. Cross bridging may be omitted for roof and ceiling joists where the omission is permitted by code, except where otherwise indicated on the Drawings.
   4. Install solid blocking between joists at points of support and wherever sheathing is discontinuous. Blocking may be omitted where joists are supported on metal hangers.

3.8 ALIGNMENT

A. On framing members to receive a finished surface align the finish subsurface to vary not more than 1/8" from the plane of surfaces of adjacent furring and framing members.

3.9 INSTALLATION OF PLYWOOD SHEATHING

A. Placement:
   1. Place plywood with face grain perpendicular to supports and continuously over at least two supports, except where otherwise shown on the Drawings.
   2. Center joints accurately over supports, unless otherwise shown on the Drawings at roof sheathing, all joints not centered over supports shall be attached with metal panel clips at 2'-0" o.c. maximum.

B. Protect plywood from moisture by use of waterproof coverings until the plywood in turn has been covered with the next succeeding component or finish.

3.10 FASTENING

A. Nailing:
   1. Provide common wire nails or spikes with penetration into the piece receiving the point of not less than 1/2 the length of the nail or spike, provided, however, that 16d nails may be used to connect two pieces of 2" (nominal) thickness.
   2. Nail without splitting wood.
   3. Prebore as required.
   4. Remove split members and replace with members complying with the specified requirements.
   5. Nailing Schedule

CONNECTION	NAILING
1. Joist to sill or girder, toenail	3 - 8d
2. Bridging to joist, toenail each end	2 - 8d
3. Bottom Plate to joist or blocking, face nail	16d at 16 inches o.c.
4. Top plate to stud, end nail	2-16d
5. Stud to bottom plate	4-8d, toenail or 2-16d, end nail
6. Double studs, face nail	16d at 24 inches o.c.
7. Double top plates, face nail	16d at 16 inches o.c.
8. Top plates, laps and intersections, face nail	2 - 16d
9. Continuous header, two pieces	16d at 16 inches o.c.along each edge
10. Ceiling joists to plate, toenail	3 - 8d
11. Continuous header to stud, toenail	4 - 8d
12. Ceiling joists, laps over partitions, face nail	3 - 16d
13. Ceiling joists to parallel rafters, face nail	3 - 16d
14. Rafter to plate, toenail	3 - 16d
15. Built-up corner studs	16d at 24 inches o.c.
16 Built-up beams	20d at 32 inches o.c. at top and bottom staggered 2 - 20d at ends and at each splice

B. Bolting:
   1. Drill holes 1/16" larger in diameter than the bolts being used.
   2. Drill straight and true from one side only.
   3. Do not bear bolt threads on wood, but use washers under head and nut where both bear on wood, and use washers under all nuts.

C. Screws:
   1. For lag screws and wood screws, prebore holes same diameter as root of threads, enlarging holes to shank diameter for length of shank.

3.11 MISCELLANEOUS ITEMS

A. Install all items of this Section at the locations shown on the Drawings and in accordance with the approved Shop Drawings.

B. Install all items in strict accordance with manufacturers written installation and cleaning instructions.

END OF SECTION

SECTION 06 40 00 – ARCHITECTURAL WOODWORK (CABINETS)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Fabricated custom cabinets and fixtures.
2. Countertops: Plastic Laminate and Chemical Resistant Decorative Laminate.
3. Cabinet and fixture hardware.

B. Related Documents: The Contract Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

C. Related Sections:
1. Section 06 10 00 – Rough Carpentry
2. Section 09 26 00 – Gypsum Wallboard and Metal Stud System
3. Section 09 90 00 – Paint

1.2 REFERENCES

A. American National Standards Institute (ANSI):
1. ANSI A135.4 - Basic Hardboard.
2. ANSI A208.1 - Mat Formed Wood Particleboard.

B. Architectural Woodwork Institute (AWI):
1. AWI AWQS - Architectural Woodwork Quality Standards, 6th Edition Version 1.0.

C. National Electric Manufacturer's Association (NEMA):
1. NEMA LD3 - High Pressure Decorative Laminates.

D. United States Department of Commerce Product Standard (PS):
1. PS 1 - Construction and Industrial Plywood.
2. PS 20 - American Softwood Lumber Standard.

1.3 DEFINITIONS

A. Exposed Surfaces
1. Surfaces visible with doors and drawers closed
2. Wall unit bottoms 42 or more inches above finished floor
3. Interiors of all open cabinets (cabinets without doors and/or drawers)

B. Semi-Exposed Surfaces
1. Interior surfaces not visible with doors and drawers in closed position

C. Concealed Surfaces
1. Surfaces not visible after installation, or during use of the product.

1.4 SUBMITTALS

A. Section 01 33 23 - Submittals: Procedures for submittals.
1. Product Data: Data for hardware and accessories indicating material, type, function, attachment and finish.
2. Shop Drawings:

a. Indicate each material used, wood species, component profiles, sections, and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location, and schedule of finishes in conformance with requirements of AWI AWQS.
b. Indicate composition of each material and compliance with referenced standards.
c. Keying Schedule: Indicate keying system for cabinet and fixture locks.
d. Present drawings in related and dimensional positions; section details drawn at minimum 1-1/2 inch scale.

3. Samples: 2 inch x 3 inch samples of each plastic laminate, solid surfacing and wood finish and color.
4. Assurance/Control Submittals:
   a. Certificate: Manufacturer certificate indicating that Products meet or exceed specified requirements.
   b. Qualification Documentation: Custom cabinetwork and fixture manufacturer and installer documentation of experience indicating compliance with specified qualification requirements.
5. Mock-Up: A 4' wide sample of base and wall cabinets along with countertop and shelving shall be prepared for Architect's review as part of the Submittal process. Mock-up may be used in final construction.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with AWI AWQS Custom quality.
   1. Affix the AWI Quality Grade Stamp to each unit of custom cabinet and fixture work. The AWI Quality Grade Stamp shall display Custom Grade as specified for each section of Work.

B. Qualifications:
   1. Manufacturer: Company specializing in manufacturing store fixtures specified in this section with minimum five years documented experience. Member in good standing of the Architectural Woodwork Institute.
   2. Installer: Company specializing in performing work of this Section with minimum 5 years documented experience.

C. Pre-installation Meeting:
   1. Convene a pre-installation meeting at Project Site, one week prior to commencing work of this Section.
   2. Require attendance of parties directly affecting work of this Section.
   3. Review preparation and installation procedures and coordinating and scheduling required with related work.
   4. Agenda:
      a. Tour, inspect, and discuss condition of areas where custom cabinets and fixtures will be installed and other preparatory work performed by other trades.
      b. Review custom cabinet and fixture requirements (drawings, specifications and other contract documents). Identify requirements for Contractor furnished Products.
      c. Review required submittals, both completed and yet to be completed.
      d. Review and finalize construction schedule related to custom cabinet and fixture work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
      e. Review requirements for inspections, installation certification, and material usage accounting procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements

B. Package fixtures in watertight container for transportation to project site to prevent damage and for storage outside building, if required.

C. Protect fixtures from damage and excessive or inadequate relative humidity.

D. Maintain relative humidity between 25 percent and 55 percent.

E. Average temperature to be between 60 degrees and 70 degrees Fahrenheit.

F. Cabinets are not to be installed until all overhead utilities and ceiling work are completed in the areas where casework is to be installed.

1.6 WARRANTY

A. Manufacturer shall warrant the casework for a period of one year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
1. Local millwork manufacturers.
2. Submit documentation indicating local millwork manufacturer has produced millwork of a quality acceptable to the Architect for projects similar to this type of Work for this Contract.
3. Obtain approval from Architect.

2.2 WOOD MATERIALS

A. Softwood Lumber: PS 20; graded in accordance with AWI Custom; average moisture content of 6 percent.

B. Hardwood Lumber: NHLA; graded in accordance with AWI Custom; average moisture content of 6 percent.

2.3 CORE MATERIALS

A. Particleboard
1. High performance industrial grade particleboard, 45 pound density, ANSI A 208.1-1993 M-3. Thickness as described herein. Provide at all components unless otherwise specified herein.
a. 3/4 inch particle board core door and drawer face, base, wall, and tall cabinet tops and bottoms, cabinet sides, drawer spreaders, cabinetback rear hang strips, structural dividers, and exposed cabinet backs.
b. 1/2 inch particle board core drawer body, drawer bottoms and semi-exposed cabinet backs.

B. Plywood.
1. Exterior grade. 3/4 inch thick - use at toe base

2.4 PLASTIC LAMINATE MATERIALS - (Typically at all millwork)

A. Manufacturers: Subject to compliance with project requirements provide plastic laminates for exposed surfaces shall meet of one of the following:
1. Formica Corporation.
2. Nevamar Corporation.
3. Wilsonart International.
4. Pionite.

B. High-Pressure Decorative Laminate for all exposed surfaces: NEMA LD3-2000.

C. Chemical Resistant Decorative Laminate: NEMA LD3, Type 390, .030 inch.

D. Patterns and Finishes: Indicated on Millwork Drawings and Color and Material Schedule. Grain direction for exposed surfaces shall be vertical on doors, drawer faces, end panels, fascia panels, and exposed backs; horizontal at aprons.

E. Thermally fused melamine, for semi-exposed surfaces (inside drawer boxes, interior of base and upper cabinets), compliant with NEMA performance standards. Color: White, unless otherwise indicated.

2.5 ACCESSORIES

A. Adhesive: Type recommended by AWI to suit application.

B. Edge Banding: As provided by Wilsonart to provide an exact laminate match.

C. Fasteners: Size and type to suit application.

D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application.

E. Concealed Joint Fasteners: Threaded steel.

F. Grommets: Plastic material for cut-outs. Basis of Design: Mockett – color to be selected from manufacturer's standard colors.

G. Silicone Sealant: Sealant recommended by manufacturer in color to match laminate.

H. Tackable Wall Treatment: Walltalkers, tac wall - color: See Sheet F1.0 Color and Material Schedule. Install where shown on millwork elevations.

2.6 HARDWARE

A. All cabinet hardware shall be furnished and installed by the architectural woodwork fabricator. If any item of hardware listed below is not available, consult Architect for direction.
   1. Drawer slides:
      a. Standard Drawers – 100# undermount slides, color matched to cabinet interior color
      b. File and Paper Storage Drawers – 150# full extension, side mount
   2. Hinges:
      a. Concealed hinges – 120 degree swing. Provide base plates to maintain 1/8 inch nominal reveals between doors/drawers within the same cabinet, and between doors of adjoining cabinets. Doors shall be self-closing and fitted with silencer bumpers. Provide door catches as required to comply with Americans with Disabilities Act for opening resistance
   3. Pulls: Wire design, 4 inch. Brushed Chrome.
   4. Adjustable Shelf Supports – Twin pin design with anti tip-up shelf restraints shelves with slot to mechanically attach shelf to clip. Load rating shall be minimum 300 lbs each support.
   5. Locks: Cabinet locks: Disk tumbler deadbolt action. All locks within a room keyed alike, each room keyed differently. Minimum of two master keys required.
   6. Drawer locks: Corbin No. 0666 X US 26D (or equal)
   7. Wardrobe rod – 14 gauge, 1-1/16 inch diameter chrome-plated hand rod with captive supports at each end, securely fastened to cabinet sides and/or fixed vertical divider.

B. Miscellaneous Hardware: Provide miscellaneous hardware items not specifically noted or specified but required for a complete and proper installation of all architectural woodwork including trim and casework.

C. All exposed cabinet hardware shall be brushed chrome finish.

2.7 FABRICATION

A. Fabricate cabinets and fixtures to AWI AWQS, Section 40013 - Architectural Cabinets, Custom Grade Standards, flush overlay construction without face frames, plastic laminate clad finish.

B. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.

C. Fit shelves, doors, and exposed edges with matching plastic edging. Use one piece for full length only.

D. Cap exposed plastic laminate finish edges with material of same finish and pattern - all edge banding must match laminate sheets. Use Wilsonart edge banding at all Wilsonart materials- no substitutions.

E. Door, Drawer Fronts and Finished End Panels: plastic laminate clad finish; flat/flush panel doors and finished end panels; flush drawers.

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

G. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.

H. Mechanically fasten back splash to countertops with steel brackets at 16 inches on center.

I. Provide cutouts for inserts, appliances, outlet boxes, fixtures and fittings. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

J. Tops noted to be plastic laminate
   1. AWI Quality Grade: Custom
   2. High Pressure Laminate Tops, and backsplash: Wilsonart or approved equal, general purpose laminate for horizontal and vertical surfaces.

K. Surfaces
   1. Exposed Surfaces
      a. Horizontal Grade Postform (.039) - Decorative laminate, - to be used for countertops and work surfaces
      b. Vertical Grade Surface (.028) – Decorative laminate – to be used for all other exposed surfaces
   2. Semi-exposed Surfaces
      a. Closed interior: Thermofused melamine, color white
      b. Reverse faces of exposed surfaces: CLS Cabinet Liner, color white
      c. Drawer Boxes: Thermofused melamine, color white
   3. Edges
      a. Cabinet body edge: nominal 1mm PVC at all exposed and semi-exposed
      b. Door and drawer front edge: 3 mm PVC four sides
      c. Shelves: Nominal 1 mm PVC, front edge. Color to match shelf color
      d. Drawer Boxes: nominal 1 mm PVC. Color to match drawer box color

2.8 SOLID SURFACE MATERIALS (TYPICALLY AT COUNTERTOPS)

A. Acceptable Manufacturers:
   1. Dupont – Corian
   2. Cambria
   3. Wilsonart Gibralter

B. Material shall be 3 cm thick x longest practical lengths

C. See Color and Material Schedule for color selections. Seams shall be invisible to the un-aided eye at a distance 2’-0” from the product.

D. Silicone Sealant; Mildew resistant, FDA compliant sealant recommended by manufacturer, in color to match solid surface.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
   1. Verify custom cabinet and fixture dimensions by field dimensions.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 INSTALLATION

A. Install custom fabricated cabinets and fixtures in conformance with AWI AWQS, Section 1700 - Installation of Woodwork. Install solid surface materials in strict accordance with manufacturer's instructions.

B. Set and secure fixtures in place; rigid, plumb, and level at locations indicated on Drawings.
   1. Secure to floor or walls using appropriate angles and anchorages to comply with seismic design requirements.

C. Use fixture attachments in concealed locations for wall mounted components.

D. Carefully scribe fixtures abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

E. Secure fixtures to floor and walls using appropriate angles and anchorages.

F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.3 CONSTRUCTION

A. Interface with Other Work:
   1. Coordinate installation sequence of fixtures with trades providing data and communication connections to fixtures.

B. Site Tolerances:
   1. Maximum Variation from True Position: 1/16 inch.
   2. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

3.4 FIELD QUALITY CONTROL

A. Architect will inspect custom cabinet and fixture installation, alignment, attachment to structure, and connection to data and communication lines.

3.5 ADJUSTING

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

3.6 CLEANING AND PROTECTION

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

B. Replace any damaged casework, counters, shelves, hardware, fittings and fixtures

.END OF SECTION

SECTION 07 01 60 - FLASHING AND SHEET METAL

PART 1- GENERAL

1.1 DESCRIPTION

A. Work included: Provide flashing and sheet metal not specifically described in other Sections of these Specifications but required to prevent penetration of water through the exterior shell of the building.

B. Related work:
1. Documents affecting Work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Section in Division 1 of these Specifications.
2. Section 061000 – Rough Carpentry
3. Section 062000 – Finish Carpentry
4. Section 074113 – Metal Roof, Wall and Soffit Panels
5. Section 077200 – Roof Accessories

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

B. In addition to complying with pertinent codes and regulations, comply with pertinent recommendations contained in current edition of "Architectural Sheet Metal Manual" published by the Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

C. Standard items may be used for flashing, trim, reglets, and similar purposed provided such item meet or exceed the quality standards specified.

1.3 SUBMITTALS: Comply with Section 013323

A. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades;
4. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 016000.

PART 2 - PRODUCTS

2.1 MATERIALS AND GAGES

A. Where sheet metal is required and no material or gage is indicated on the Drawings, provide the highest quality and gage commensurate with the referenced standards.

B. Where shown on the Drawings at locations noted "metal flashing", or “counter flashing” including all parapet wall flashing, provide a non-rusting metal equal to .040" mill finish aluminum.

C. Where shown on the Drawings at locations noted “flashing”, “metal valley flashing”, or similar “flashing” note provide 24 gauge steel, pre-finished (Kynar 500 coating) metal equal to Colorklad.

D. Where shown on the Drawings at locations noted “copper flashing” provide 16 oz. (0.0216" thick) ASTM 8370 cold rolled copper except where soft temper is required for forming.

E. Gutters and Downspouts: Factory Prefinished .027 aluminum, 6" seamless gutters 5" x 4" downspouts. Color to be selected from manufacturers standard color line.

F. Metal Drip Edge: Factory prefinished .024" thick aluminum, color to be selected from manufacturer’s standard color line.

G. Nails, Rivets and Fasteners:
   1. Fasteners: Hard copper, brass or bronze.
   2. Nails for wood and nailing concrete: flathead, barbed, wire slating nails not less than No. 12 gage, 1" long.
   3. Screws and bolts: Round heads.

H. Solder: ASTM B32; 50% tin, 50% lead.

I. Flux: Rosin, muriatic acid neutralized with zinc or approved equal.

J. Roofing Underlayment: Tamko TW Metal and tile underlayment, 75 mil, self-adhering, fiberglass reinforced, rubberized asphalt, or equal.

K. Flashing Fabric: As specified in Section 042000 (materials and installation).

L. Air Infiltration Barrier (A.I.B. on drawing): See section 061000 for materials and installation.

2.2 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

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. Install flashing at all locations as shown on Drawings. Install all materials as per Manufacturer's Recommendations.

C. Where an exposed face dimension of the metal exceeds 6”, it shall have a “crimp along the length of the entire face to avoid “oil-canning. Two (2) crimps shall be installed when the exposed face dimension exceeds 11”.

3.2 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Comply with

temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement so that completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
5. Install sealant tape where indicated.
6. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
1. Coat back side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of **10 feet (3 m**) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing and/or substrate not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws, and for metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints as shown and as required for watertight construction.

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm), except reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder metallic-coated steel and aluminum sheet.
2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
3. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
4. Copper Soldering: Tin edges of uncoated copper sheets using solder for copper.

G. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

3.4 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter brackets and/or straps spaced not more than 36 inches (900 mm) apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
   1. Install gutter with expansion joints at locations indicated, but not exceeding, **50 feet (15.24 m**) apart. Install expansion-joint caps.
   2. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.

C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c. in between.

D. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in adhesive material compatible with the roofing.

E. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

F. Conductor Heads: Anchor securely to wall with elevation of conductor head rim 1 inch (25 mm) below scupper discharge.

G. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of 4 inches (100 mm) in direction of water flow.

3.5 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements of sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated.
   1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch (600-mm) centers.
   2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch (600-mm) centers.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with sealant.

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.6 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 04 Section 04 20 00 – Masonry.

C. Reglets: Installation of reglets is specified in Division 03 Section 03 30 00 - Cast-in-Place Concrete, and/or Division 04 Section 04 20 00 - Masonry.

D. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches, minimum beyond wall openings.

3.7 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

3.8 TESTS

A. Upon request of the Architect, demonstrate by hose or standing water that the flashing and sheet metal are completely watertight.

END OF SECTION

SECTION 07 13 20 - SELF-ADHERING SHEET WATERPROOFING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following: (For use at poured-in-place concrete walls and concrete walls at elevator pit)
   1. Modified bituminous sheet waterproofing.
   2. Geocomposite Drain/Protection Board
   3. Waterstop
   4. HDPE Sheet Waterproofing

1.2 SUBMITTALS

A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.

B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for waterproofing.

D. Special warranties.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A firm that is approved or licensed by waterproofing manufacturer for installation of waterproofing required for this Project.

B. Preinstallation Conference: Conduct conference at Project site.
   1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

1.5 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace waterproofing material that does not comply with requirements or that fails to remain watertight within specified warranty period.
   1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MODIFIED BITUMINOUS SHEET WATERPROOFING

A. Modified Bituminous Sheet: Not less than 60-mil- (1.5-mm-) thick, self-adhering sheet consisting of 56 mils (1.4 mm) of rubberized asphalt laminated to a 4-mil- (0.10-mm-) thick, polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   2. Products:
      a. Grace, W. R. & Co.; Bituthene 3000**.**
      b. Or equal product/manufacturer, which meets or exceeds W.R. Grace stated product.
   3. Physical Properties
      a. Tensile Strength: 250 psi (1.7 MPa) minimum; ASTM D 412, Die C, modified.
      b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
      c. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D 1970.
      d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3-mm) movement; ASTM C 836.
      e. Puncture Resistance: 40 lbf (180 N) minimum; ASTM E 154.
      f. Hydrostatic-Head Resistance: 150 feet (45 m) minimum; ASTM D 5385.
      g. Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70 deg F (21 deg C); ASTM D 570.
      h. Vapor Permeance: 0.05 perms (2.9 ng/Pa x s x sq. m); ASTM E 96, Water Method.

2.2 AUXILIARY MATERIALS

A General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
   1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid waterborne primer recommended for substrate by manufacturer of sheet waterproofing material.

C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.

D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.

E. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.

F. Sheet Strips: Self-adhering, rubberized-asphalt sheet strips of same material and thickness as sheet waterproofing.

G. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

H. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick, predrilled at 9-inch (229-mm) centers.

I. Underslab Waterproof Sheets: W.R. Grace PREPRUFE 300R, or equal. Furnish with all manufacturer's required ancillary materials which are required for a complete installation.

J. Geocomposite Drain W.R. Grace Hydrocut 220, Pre-Fabricated Drain and protection layer, or equal, with Hydroduct Coil 600. Furnish with all manufacturer's required ancillary materials which are required for a complete installation, including but not limited to end outlet, 4" dia. CPP and tape.

K. Waterstop: W.R. Grace Adcor ES, engineered swell hydrophilic waterstop strip, or equal.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.

F. Bridge and expansion joints and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips.
1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.

G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.

H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.2 APPLICATION

A. Install all products as shown on the drawings and as shown at each manufacturer's website for installation of the specified products. Such shall be considered a part of this specification Section.

B. Install modified bituminous sheets and associated products according to waterproofing manufacturer's written instructions and according to recommendations in ASTM D 6135.

C. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

D. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.

E. Horizontal Application: Apply sheets from low point to high point of decks to ensure that side laps shed water.

F. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.

G. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic.

H. Install sheet waterproofing, drain mat, protection board, primers, flashing materials, and non-waterproofing materials (and auxiliary materials to tie into adjacent waterproofing, and into storm drainage system as may be required.)

I. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches (150 mm) beyond repaired areas in all directions.

J. Install protection course with butted joints over waterproofing membrane immediately.

K. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

L. Install Waterstop at all concrete cold-joint abutments which are below grade at the elevator pit, or other similar locations.

3.3 PROTECTION AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Protect installed materials from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 07 21 00 - BUILDING INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide building insulation where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related work:
1. Documents affecting Work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Upon completion of this portion of the Work, complete and post a certificate of insulation compliance in accordance with pertinent requirements of governmental agencies having jurisdiction.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.

1.4 PRODUCT HANDLING

A. Comply with pertinent provision of Section 01 64 00.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide the following building insulation where shown on the Drawings or otherwise needed to achieve the degree of insulation required under pertinent regulations of governmental agencies having jurisdiction. Provide products by listed manufacturer or approved substitution.

1. Batt Insulation:
a. Exterior Metal Stud Walls: Foil-faced fiberglass, 6½" thick, R-19 minimum, Flame Spread 25 maximum, locations as noted on Drawings.
b. Interior Rooms: locations as noted on Drawings. Owens Corning Sonobatts (or equal)6 ½" thick R-19, Flame Spread 25 maximum, installed 4’-0” along the perimeter above ceiling tile over all ceilings where partitions and wall sound batts extend to deck as shown on drawings. At other locations showing sound batts over the ceilings where walls do not extend to deck, sound batts above ceiling shall be over entire ceiling.
c. Classroom and etc. Interior Metal Stud Walls: Unfaced fiberglass, sound batt, 3½“ thick.

2. Sill Sealer: Sill Sealer, Styrofoam, by Dow, 1/4" x 6-1/2" x required length(s). (Place under all exterior wall metal stud sill plates/tracks.)

3. Concrete Masonry Unit Insulation (Exterior Walls): PolyMaster Plastic Foam Insulation, as manufactured by PolyMaster, Inc., 1-800-580-3626 or equal.
4. Vapor and Air Barrier at Exterior Concrete Masonry Unit Walls, Receiving Brick or Block Veneer: ProCor Fluid Applied Membrane as manufactured by Grace Construction Products, or equal.
5. Rigid Insulation at exterior CMU walls with brick or CMU veneer: Owens Corning 1” Foamular CW15 Extruded Polystyrene Insulation
6. Roof Insulation – See Section 07 54 00 PVC Thermoplastic Membrane Roofing Section
7. 2” Rigid insulation at foundation walls and perimeter insulation shall be Owens Corning Foamular 250 extruded polystyrene.
8. Mechanical and Plumbing Insulation: See “M” and “P” sheets.

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2.2 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

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. Remove, or protect against, projections in construction framing which may damage or prevent proper insulation.

3.2 INSTALLATION

A. Install the work of this Section in strict accordance with the Drawings, requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position.

END OF SECTION

SECTION 07 42 00 – PREFORMED METAL ROOF, WALL AND SOFFIT PANELS

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

1. Factory-formed: exposed fastener, metal wall panels with related metal trim and accessories.
2. Prefinished metal soffit panels
3. Finish must conform to the "Metal Construction Association Certified Premium Painted™" designation

1.3 RELATED SECTIONS

A. Division 5 Section “Cold Formed Metal Framing”
B. Division 6 Section “Rough Carpentry”
C. Division 7 Section “Flashing and Sheet Metal and Trim”

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide metal wall panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.

B. System shall meet performance criteria as installed. Either test data or signed and sealed engineering calculations shall document the performance of the panel system to meet design loads required.

C. Wind Loading: Design and size components to withstand dead and live loads caused by wind pressures as noted on structural drawings.

D. Maximum Deflection under Design Loads:

1. 1/240 of span.

E. Air Infiltration: Air leakage through assembly of not more than 0.000 cfm/sq. ft. of wall area when tested according to ASTM E 283 at a static-air-pressure difference of 6.24lbf/sq. ft.

F. Water Penetration: No water penetration when tested according to ASTM E 331 at a static pressure of 13.24 lbf/sq. ft.

1.5 SUBMITTALS

A. Product Data: Manufacturer's current product specifications and installation instructions.

B. Shop Drawings: Include small-scale elevations, as required. Show details of trim and flashing conditions, fastening and anchorage methods, weatherproofing techniques, terminations, and penetrations.

C. Samples:

1. Selection Samples: Submit actual metal chips with full range of colors available for Architect's selection.

2. Verification Samples: Submit two samples of each type of metal panel required, not less than 12 inches (305mm), and illustrating finished panel profile.

D. Product Test Reports: Submit copies of test reports or load tables verifying performance capability of panel system:

1. Metal Wall Panels: Include reports for UL 790/ASTM E 108, ASTM E 283, ASTM E 331, Field Tested, ASTM E 84 Flame Spread Rating, Paint Performance Tests.

2. Fastener test and pull-out calculations

3. Load tables

4. Maintenance Data

1.6 QUALITY ASSURANCE

A. Installer: Company specializing in the type of work required for this project, with not less than five (5) years of documented experience with successfully completed projects of similar nature and scope..

B. Pre-Installation meeting: Convene meeting not less than one week prior to beginning installation between general contractor, installing contractor, owner's representative and manufacturer.

1.7 DELIVERY, STORAGE & HANDLING

A. Do not deliver materials of this section to project site until suitable facilities for storage and protection are available.

B. Protect materials from damage during transit and at project site. Store under cover, but sloped to provide positive drainage. Do not expose materials with strippable protective film to direct sunlight or extreme heat.

C. Do not allow storage of other materials or allow staging of other work on installed metal panel system.

D. Upon receipt of delivery of metal panel system, and prior to signing the delivery ticket, the installer is to examine each shipment for damage and for completion of the consignment.

1.8 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish Warranty Period: 20 years from date of Substantial Completion.

B. Special Installer's Warranty: Specified form in which Wall Installer agrees to repair or replace components of custom-fabricated sheet metal wall that fail in materials or workmanship within 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering preformed roofing and siding products which may be incorporated in the work include, but are not limited to, the following:
   1. MBCI - Metal Roofing and Wall Systems.
   2. McElroy Metal
   3. Varco Pruden - Metal Roofing and Wall Systems.

2.2 STEEL FOR PAINTING/COATING

A. Hot-dip zinc coated steel sheet, ASTM A 446, Grade A except where higher strength required for performance, G90 zinc coating, surface treated for maximum coating performance.

2.3 METAL FINISHES

A. General: Apply coatings either before or after forming and fabricating panels, as required by coating process and as required for maximum coating performance capability. Protect coating promptly after application and cure, by application of strippable film or removable adhesive cover, and retain until installation has been completed. Provide colors or color matches as indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.

B. Fluoropolymer Coating: Full-strength 70% "Kynar 500" coating baked-on for 15 minutes at 450° F (232° C), in a dry film thickness of 1/0 mil, 30% reflective gloss (ASTM D 523), over minimum 0.2 mil baked-on modified epoxy primer.
   1. Durability: Provide coating which has been field tested under normal range of weathering conditions for minimum of 20 years without significant peel, blister, flake, chip, crack or check in finish, and without chalking in excess of 8 (ASTM D 659), and without fading in excess of 5 NBS units.

2.4 THERMAL INSULATION

A. Glass Fiber Blanket Insulation: Flexible, resilient, noncombustible blankets of glass fiber and resinous binders, k-value of 0.27 at 75° F (24° C), density not less than 1.5 lbs. per cubic foot; comply with FS HH-I-521, Type I.

2.5 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer's standard non-corrosive types. With exterior heads gasketed, if exposed fastening system.

B. Underlayment: 30 lb. asphalt impregnated roofing felt, ASTM D4869, Type II. (Provide underlayment under all metal roofing).

C. Ice and Water Shield: Install 40 mil ice and water shield at all metal roofing area.

D. Accessories: Except as indicated as work of another specification section, provide components required for a complete roofing/siding system, including trim, copings, fascias, gravel stops, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, louvers, sealants, gaskets, fillers, closure strips and similar items. Match materials / finishes of preformed panels.

E. Bituminous Coating: Cold applied asphalt mastic, SSPC paint 12, compounded for 15 mil dry film thickness per coat.

2.6 PANEL FABRICATION; PERFORMANCES

A. General: Fabricate and finish panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, and as required to fulfill indicated performance requirements which have been demonstrated by factory testing. Comply with indicated profiles and dimensional requirements, and with structural requirements.

B. **Metal roof panels** noted as "Prefinished Metal Roof" on the drawings, shall be MBCI Lokseam® 24 gauge concealed fastening Standing Seam Metal Roof panel system, 16" Coverage Width, Striated Finish, 1-3/4" rib height, Fluoropolymer (Kynar 500) paint system. Color to be selected from manufacturer standard colors. Anticipated to be "Slate" to be "Harbor Blue"

C. **Metal Wall Panels** noted as "Prefinished Metal Wall Panels" on the drawings, shall be MBCI FW-120-1 with bead concealed fastener wall panel. 12" Coverage width, 24 gauge, 1-1/2" panel height, smooth finish See Exterior Material and Color Schedule on the drawings for locations of each metal wall panel:

1. **WP-1 Color "Almond"**
2. **WP-2 Color "Harbor Blue"**
3. **WP-3 Color "Pacific"**

D. **Prefinished Metal Soffit Panels** – MBCI FW-120-1 Soffit Panels

a. Material: .24 gauge
b. Texture: Smooth
c. Finish: KYNAR 5000® PDVF or HYLAR 5000® Finish
d. Colors: Almond
e. Panel coverage: 12"
f. Panel Height: 1-1/2"

E. Prefinished metal gutter, downspouts, and rake trim

1. Standard Box style gutter 4 3/4" deep x 6" high at back, 24 gauge with Kynar 500 finish system.
   -Color of gutter and rake trim – Match "Almond" metal panel color.
   -Downspouts – match "Almond" metal panel color.

F. Required Performances: Fabricate panels and other components of roof/wall system for the following installed-as-indicated performances:

1. Wall Loading: 20 lbs. per square foot inward; 15 lbs. per square foot.
2. Roofing Loading: 40 lbs. per square foot inward; 15 lbs. per square foot outward.
3. Water Penetration: No significant, uncontrolled leakage at 4 lbs. per square foot pressure with spray test.
4. Air Infiltration: 0.02 CFM per square foot for gross roof/wall areas, with 4 lbs. per square foot differential pressure.
5. Sound Transmission: STC rating of 28.
6. Sound Absorption, Interior Surfaces: Coefficient of 0.75. Where sound absorption requirement is indicated, fabricate interior liner panels with approximately 1000 uniformly spaced 1.8" diameter holes per square foot. Cover insulation with polyethylene film and provide inserts of wire mesh to form acoustical spacer grid.

G. Apply bituminous coating or other permanent separation materials on concealed panel surfaces where panels would otherwise be in direct contact with substrate materials which are non-compatible or could result in corrosion or deterioration of either material or finishes.

H. Fabricate panel joints with captive gaskets or separator strips, which provide a tight seal and prevent metal-to-metal contact in a manner which will minimize noise from movements within panel system.

I. Condensation: Fabricate panels for control of condensation, including vapor inclusion of seals and provisions for breathing, venting, weeping and draining.

2.7 SNOW GUARDS

A. Prefabricated, non-corrosive units designed for compatibility with metal roof panels. Install snow guards where indicated on roof plan. Snow guards shall be “ColorGard®” and mounted to roof panels with S-5!@SPE clamp applicable to roof panel type. Aluminum snow guards shall be as approved by Metal Roof Panel manufacturer with color to match roof panel color(s). See Product Data at the end of this section.

2.8 FABRICATION

A. Panels:

1. Panels to be Factory fabricated in a controlled environment.

2. Panels to be tension leveled during roll forming process.

3. Panels to be produced in longest lengths possible, except when modular units are utilized.

B. Form all components true to shape, accurate in size, square and free from distortion or defects. Cut panels to precise lengths indicated on approved shop drawings or as required by field conditions.

C. Accessories: Factory fabricates trim and flashing components in standard 12-foot lengths.

1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.

2. Fabricate wall panels as required to maintain fabrication tolerances and to withstand design loads.

D. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

E. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

F. Panels, fabrication and installation shall meet the requirements of the Metal Construction Association Preformed Metal Wall Guidelines.

PART 3 - EXECUTION

3.1 PREPARATION

A. Field Measurements

1. Field measurements should be taken by the installer for verification of dimensional correctness in relationship to original plans, prior to providing manufacturer with a bill of material.

B. Delivery, Storage and Handling

1. Do not deliver materials of this section to project site until suitable facilities for storage and protection are available.

2. Protect materials from damage during transit and at project site. Store under cover, but sloped to provide positive drainage. Do not expose materials with strippable protective film to direct sunlight or extreme heat.

3. Do not allow storage of other materials or allow staging of other work on installed metal panel system.

4. Upon receipt of delivery of metal panel system, and prior to signing the delivery ticket, the installer is to examine each shipment or damage and for completion of the consignment.

C. Sequencing and Scheduling

1. Installer shall coordinate with general contractor as to scheduled delivery time after receipt of field verified bill of material by manufacturer as it relates to actual project scheduling.

3.2 METAL WALL PANEL INSTALLATION, GENERAL

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts, or install on substrate as shown on the drawings. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cutting of metal wall panels by torch is not permitted.

2. Rigidly fasten metal wall panels and allow for thermal expansion and contraction as required by the panel manufacturer. Pre-drill panels as required.

3. Install screw fasteners.

4. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.

5. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing and material compatibility.

6. Provide weatherproof seals for pipe and conduit penetrating exterior walls.

B. Fasteners: Use fasteners of size and length as required for compatibility with substrate.

1. Steel Wall Panels: Use stainless-steel fasteners or metallic coated fasteners for surfaces exposed to the exterior and galvanized steel fasteners for surfaces exposed to the interior.

2. Concealed fasteners shall have a high performance coating

3. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal wall panel manufacturer.

C. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies.

D. Provide water and air infiltration retarder / barriers as noted within project documents.

3.3 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete sheet metal roofing assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

2. Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual" and NRCA Waterproofing Manual. Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3. Panels, fabrication and installation shall meet the requirements of the Metal Construction Association Preformed Metal Wall Guidelines.

B. Coordinate with installation of:

1. Cold Formed Metal Framing, as noted in Section 05 40 00

2. Rough Carpentry, as noted in Section 06 10 00

3. Flashing and Sheet Metal and Trim (includes gutters, downspouts, and metal copings), as noted in Section 07 01 60

3.4 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed. Maintain in a clean condition during construction.

B. Protection:

1. Provide as required completed work of this section will be without damager or deterioration at date of substantial completion.

C. Touch up minor abrasions with matching paint provided by panel manufacturer. Remove and replace panels that cannot be satisfactorily touched up. See Metal Construction Association Technical Bulletin #95-1051.

D. Sweep and remove chips, shavings and dust from roof on a daily basis during installation period. Leave installed work clean, free from grease, finger marks and stains. Remove all protective masking from material immediately after installation of product.

E. Upon completion of installation, remove scraps and debris from project site.

F. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt and sealant.

END OF SECTION

SECTION 07 54 00 – PVC THERMOPLASTIC MEMBRANE ROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.02 SUMMARY

A. This Section includes the following:
1. Mechanically Attached PVC sheet roofing
2. Rigid Roof Insulation
3. DensDeck Hardboard
4. Walkway pads

B. Scope of Work: The scope of work includes providing interior protection, to minimize the intrusion of dust and debris, created by the installation of the new PVC Roofing System if required. The phased installation of the new roof system will be installed in such a manner as to maintain a watertight integrity on a daily basis. Over the cleaned and prepared existing substrate, the specified hardboard and the 60 mil PVC single ply SikaPlan membrane shall be installed in order to meet the project's ASCE-7 requirements. All flashing membranes, pre-fabricated metal, and PVC coated clad metal will be install in accordance with PVC manufacturer's specifications or recommendations. The completed PVC roof system and PVC manufacturer's supplied accessories shall be install in such a manner so that the PVC Manufacturer's Twenty- (20) year Full Systems (NDL) Warranty can be issue upon successful completion of the roofing project.

C. Related Sections include the following:
1. Division 7, Section 07 01 60 – Flashing and Sheet Metal
2. Division 7, Section 07 92 00 – Sealants and Caulking

1.03 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

B. Design Uplift Pressure: The uplift pressure, calculated according to procedures in SPRI's "Wind Load Design Guide for Fully Adhered and Mechanically Fastened Roofing Systems," before multiplication by a safety factor.

C. Factored Design Uplift Pressure: The uplift pressure, calculated according to procedures in SPRI's "Wind Load Design Guide for Fully Adhered and Mechanically Fastened Roofing Systems," after multiplication by a safety factor.

1.04 REFERENCES

A. American Society of Civil Engineers (ASCE): ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

B. Single-Ply Roofing Institute (SPRI): Application Guidelines and Wind Design Guidelines for Various Single Ply Membranes.

C. National Roofing Contractors Association (NRCA): Current Roofing and Waterproofing Manual.

D. Factory Mutual Global (FMG): Factory Mutual Research Approval Guide: Current Property Loss Protection Data Sheets:
1. Data Sheet 1-7, "Wind Forces on Buildings and Other Structures."
2. Data Sheet 1-28, "Design Wind Loads."

3. Data Sheet 1-29, “Roof Deck Securement and Above-Deck Roof Components.”
4. Data Sheet 1-52, “Field Uplift Test.”

E. Underwriters Laboratories (UL):
1. Roof Materials and Systems Directory. 2009
2. UL 790: Tests for Fire Resistance of Roof Covering Materials: 1983

F. American Society for Testing and Materials (ASTM)
1. ASTM D 570 – 1981 (R 1988) Water Absorption of Plastics
2. ASTM D 638 – 1991 Tensile Properties of Plastics
3. ASTM D 751 – 1989 Coated Fabrics
4. ASTM D 882 – 1991 Tensile Properties of Thin Plastic Sheeting
5. ASTM D 1004 – 1990 Initial Tear Resistance of Plastic Film and Sheeting
6. ASTM D 1204 – 1984 Linear Dimensional Changes of Non-rigid Thermoplastic Sheeting or Film at Elevated Temperature
7. ASTM D 2136 – 1984 (R 1989) Coated Fabrics – Low-Temperature Bend Test
8. ASTM D 2565 – 1982 Operating Xenon Arc-Type Light Exposure Apparatus With and Without Water for Exposure of Plastics
9. ASTM D 3045 – 1974 (1984) Heat Aging of Plastics Without Load
10. ASTM D 4434 – 1987 Poly (Vinyl Chloride) Sheet Roofing
11. ASTM E 108 – 1991 (Rev. A) Fire Tests of Roof Coatings
12. ASTM G 21 – 1990 Determining Resistance of Synthetic Polymeric Materials to Fungi
13. ASTM G 53 – 1991 Operating Light – and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials

1.05 PERFORMANCE REQUIREMENTS

A. General Requirements: Provide an installed thermoplastic single ply roofing system, flashings and related work that are watertight and will not permit the passage of liquid water, that will withstand wind loads, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.

C. Roofing System Design: Comply with SPRI “Wind Design Guide for Adhered Roofing Systems” for the following ground roughness exposure, classification of building and system design:
1. System 1 Design Mechanically Attach Single Ply Membrane Roofing
2. Surface Roughness Category: Exposure B
3. Classification of Building: Category III
4. Wind Design: 90 mph @ 3 sec gust

D. Underwriters Laboratories Inc. (UL):
1. UL RMSD – 2009 Roofing Materials and Systems Directory
2. UL 790 – 2009 Fire Resistance of Roofing Coverings Materials
3. Exterior Fire Exposure Classification: Class A, ASTM E 108, for application and slopes shown
4. Roofing System shall be Class A rated in accordance with ASTM E 108, FM 4470, or UL 790.
5. Be listed as part of Fire-Classified roof deck construction in the UL RMSD or Class I roof deck construction in the FM RoofNav (www. roofnav.com)
6. FM or UL approved components of the roof covering assembly shall bear the appropriate FM or UL label.
7. UL approved PVC membrane products contain an average of 10 percent recycled vinyl content from pre and post consumer sources.

E. Wind Uplift Resistance: Complete roof covering assembly, including insulation, shall be listed and be in accordance with FM RoofNav (www.roofnav.com) Non-rated systems shall not be installed. Provide wind load calculations and submit engineering calculations and substantiating data to validate wind resistance of any non-rated roof system. Base wind uplift calculations on a design wind speed of 90 mph @ 3 second gust in accordance with ASCE 7.

F. American National Standards Institute (ANSI)

G. American Architectural Manufacturer's Association (AAMA)

H. Occupational Safety and Health ACT (OSHA)

1.06 SUBMITTALS

A. Product Data: Submit latest edition of manufacturer's roofing and base flashing specifications including list of materials proposed for use, installation procedures, and manufacturer's Product Safety Data Sheets.

B. Shop Drawings: Include plans, sections, and details of the following:
1. Base flashings and membrane terminations
2. Tapered insulation, including slopes
3. Furnish for approval any proposed details that differ from those included with this proposal package. Roofing manufacturer shall first approve all proposed details in writing prior to submitting to Architect and/or Owner for approval.
4. Furnish detail project sequencing, staging, material loading, man power plans, and project construction schedule for approval.

C. Samples for Verifications: Of the following products:
1. Six samples of sheet roofing.
2. Six samples of the membrane fasteners and securement bars or plates.
3. Six samples of the specified polyisocyanurate insulation.
4. Six samples of the specified hardboard insulation.
5. Six samples of the insulation metal plates and screws.
6. Six samples of the PVC walkway.

D. Certificates:
1. Installer shall submit written certification that there are no undocumented workers being employed by them or by any subcontractor on this project.
2. Manufacturer's written certifications of approval / acceptance of these specifications and details.
3. Be listed as part of Fire-Classified roof deck construction in the Class I roof deck construction in the FM RoofNav (www. roofnav.com)

E. Single Ply Roofing Institute (SPRI): Standard Pullout Test Procedure
1. Provide fastener pullout testing and documentation for each roof area and for each type of roof deck in accordance with SPRI – Standard Pullout Test Procedure.

G. Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency to indicate compliance of components of the roofing system.

H. Provide wind load calculations and submit engineering calculations and substantiating data to validate wind resistance of any non-rated roof system. Base wind uplift calculations on a design wind speed of 90 mph @3 second gust in accordance with ASCE 7.

I. UL Certification: UL approved PVC membrane product contains an average of 10 percent recycled vinyl content from pre and post consumer sources.

J. Warranty: Sample copy of 20-year (NDL) Full System manufacturer's warranty stating obligations, remedies, limitations, and exclusions of warranty

K. Inspection Report: Copy of roofing system manufacturer's final inspection report of completed roofing installation.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing roofing similar to that required for this Project and who is approved, authorized or licensed by the roofing system manufacturer for a minimum of three (3) years to install manufacturer's products.

B. Installer's Roofing Mechanics Qualifications: The roofing mechanics engage with the operational of the thermoplastic hot air welding equipment must be train and authorize by the thermoplastic manufacturer. The roofing mechanic must have at least three years experience of operating hand and/or robotic hot air welding equipment for hot air welding thermoplastic membranes. Only those roofing mechanics with three years experience will be allow to "hot air weld" the thermoplastic materials/membranes for this project. Roofing contractor must provide requested documentation for each roofing mechanic is permit to use the hot air welding equipment for the referenced roofing project(s).

C. Manufacturer Qualifications: Provide primary products, including each component of the single ply membrane system and related flashings produced by a single manufacturer, which has produced that type system successfully for not less than 20 years. Provide secondary products, including insulation, coated metal flashings, fasteners, vapor/air barrier sheets, and other accessories, which are acceptable to the single ply membrane manufacturer for use with roofing system indicated.

D. Manufacturer PVC membrane shall meet the following characteristics:
   1. Protective membrane surface coating to resist accumulation of air borne contaminants such as dust and dirt

E. There shall be no deviation made from the contract specification or the approved shop/detail drawings without prior written approval by both the PVC manufacturer and by the Owner's Representative.

F. Conformance and Compatibility: The entire roofing and flashing system (including edge metal) shall be in accordance with specified and indicated requirements, including fire and wind resistance requirements. Work not specifically addressed and any deviation from specified requirements shall be in general accordance with recommendations of the NRCA 0405, membrane manufacturer published commendations and details and shall be compatible with surrounding components and construction. Any deviation from specified or indicated requirements shall be submitted to the Owner's Representative and PVC roof membrane manufacturer for approval prior to installation.

G. Fire-Tested-Response Characteristics: Provide roofing materials with the fire-tested-response characteristics indicated as determined by testing identical products per test method indicated by UL, FM, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
   1. Exterior Fire-Test Exposure: Class A, ASTM E 108, for application and slopes indicated.
   2. Fire-Resistance Ratings are to be test per ASTM E 119 for fire-resistance-rated roof assemblies of which roofing materials are a part of the specified roofing assembly.
   3. Roofing System shall be Class A rated in accordance with ASTM E 108 or UL 790 and to be listed as part of Fire-Classified roof deck construction in the UL RMSD or Class I roof deck construction in the FM RoofNav (www. roofnav.com).

H. UL Certification: UL approved PVC membrane product contains an average of 10 percent recycled vinyl content from pre and post consumer sources.

I. Preliminary Roofing Conference: Before starting roof replacement, conduct conference at Project site. Meet with the all participants and review the same items for the pre-installation conference. In addition, review status of submittals and coordination of work related to roof construction. Notify participants at least 7 working days before conference.

J. Pre-installation Conference: Before installing roofing system, conduct conference at Project site to comply with requirements of this re-roofing project. Notify participants at least 7 working days before conference.
   1. Meet with Owner Representative, if applicable; testing and inspecting agency representative; roofing Installer; roofing system manufacturer's representative; deck Installer; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.

2. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
3. Review loading limitations of deck during and after roofing.
4. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and conditions of other construction that will affect roofing.
5. Review governing regulations and requirements for insurance, certificates, and inspection and testing, if applicable.
6. Review temporary protection requirements for roofing system during and after installation.
7. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

K. The Manufacturer's Technical Representative shall perform in-progress site inspections in accordance with the following project requirements:
1. A minimum of one (1) in-progress inspection shall be performed for the duration of the project.

L. Contractor's Responsibility: Any failure by the Owner's Representative or Manufacturer's Representative to detect, pinpoint, or object to any defect or noncompliance of these specifications of work in progress or completed work shall not relieve the contractor, or reduce, or in any way limit, his responsibility of full performance of work required of the contractor under these specifications.

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components. Deliver materials in sufficient quantity to allow work to proceed without interruption.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within temperature range required by roofing system manufacturer.
1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Store and protect materials, including roofing insulation from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store all materials in a dry location. Use pallets to support all materials from roof deck. Distribute the load to stay within live load limits of the roof construction. Remove unused materials from the roof at the end of each day's work. Comply with roofing manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.09 PROJECT CONDITIONS

A. Weather Limitations: Proceed with roofing work only when existing and forecasted weather conditions permit roofing to be installed according to manufacturer's written instructions and warranty requirements.

B. The Applicator shall conduct fastener pullout tests in accordance with the latest revision of the SPRI/ANSI Fastener Pullout Standard to help verify condition of deck/substrate and to confirm expected pullout values.

C. The PVC adhered membrane shall not be installed under the following conditions without consulting PVC manufacturer for precautionary steps:
1. The roof assembly permits interior air to pressurize the membrane underside.
2. Any exterior wall has 10% or more of the surface area comprised of opening doors or windows.
3. The wall/deck intersection permits air entry into the wall flashing area.

D. Protective wear shall be worn when using solvents or adhesives or as required by job conditions.

E. Environmental Requirements:
1. Apply roofing in dry weather.
2. Do not expose roof components and flashing in inclement weather or when it is predicted 30% or more possibility for inclement weather.

3. When ambient temperature is below 40 degrees Fahrenheit, expose only enough sensitive cements, sealants, and adhesives as required for use within a four-hour period.
4. Do not expose membrane and accessories to a constant temperature of 180 degrees Fahrenheit.

F. Protection:
1. Provide special protection and avoid traffic on completed areas of membrane installation.
2. Restore to original condition or replace work or materials damaged during handling of roof materials.
3. Take precautions as required to protect adjacent work and structures.

G. Emergency Equipment: Maintain on site equipment necessary to apply emergency temporary edge seal in event of sudden storms or inclement weather.

H. Restrictions:
1. Comply with General Requirements on use of site.
2. Smoking is prohibited on all roof areas and on the campus grounds.
3. Maintain facility and all utility services in a functional condition.
4. Provide sanitary facilities for employees.

1.10 WARRANTY

A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights of the Owner may have under other provisions of the Contractor Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Manufacturer’s Warranty: Furnish roof membrane manufacturer's 20-year, full roof system for materials and installation workmanship warranty, including all flashing, insulation, and accessory materials necessary to construct a complete, watertight roof system. The warranty shall run directly from the roof system manufacturer to the owner and commence at time of owner's acceptance of the roof work.

C. Contractor's Warranty: Submit roofing Installer's workmanship warranty, on a notarized written warranty form, signed by Installer, covering Work of this Section, including membrane roofing, sheet flashing, roof insulation, fasteners, and air or vapor retarders, if any, for the following warranty period:
1. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The components of the roof system are to be products of a single manufacturer or approved by the PVC manufacturer, whose products meet or exceed the project specifications, have manufactured and installed the roofing materials and systems of the type specified for a minimum of twenty (20) years, and who maintains a single source responsibility for the total roofing system.

B. Manufacturers: The components of the roofing system are to products of a single manufacturer as required to provide the specified system warranty. Subject to compliance with requirements, provide roofing products from the following:
1. Basis of Design - Sika Sarnafil, Canton, MA.

2.02 PVC SHEET

A. Reinforced polyvinyl chloride (PVC) membrane shall contain fibers or scrim, shall comply with ASTM D 4434, Type III, polyester-reinforced.
1. SikaPlan as manufactured by Sika Sarnafil.

B. The PVC membrane shall have the following properties:
1. Principal polymer: PVC

2. Classification Type III, polyester-reinforced PVC
3. PVC Thickness: 60 mils **minimal**
4. UL Fire Classification: Class A
5. Exposed Face Color: White

Exposed Face Color: White Parameters	**ASTM Test Method**	**Minimum ASTM Requirement**	**Sarnafil Typical Physical Properties**
Reinforcing Material	-		Polyester
Overall Thickness, nominal., inches (mm)	D751	0.045 (1.14)	**0.060 MINIMAL**
Thickness Over Scrim, inches (mm)	D751	-	0.024 avg.
Breaking Strength, min., lbf/in. (KN/m)	D751	200 (35.0)	303 (53.1)
Elongation at Break, min.	D751		
Machine Direction		15%	42%
Cross Machine Direction		15%	47%
Seam strength*, min. (% of breaking strength)	D751	75	85
Retention of Properties After Heat Aging	D3045	-	-
Tensile Strength, min., (% of original)	D751	90	95
Elongation, min., (% of original)	D751	90	90
Tearing Strength, min., lbf (N)	D1004	45.0 (200)	50 (220)
Low Temperature Bend, -40°F (-40°C)	D2136	Pass	Pass
Accelerated Weathering Test (Florescent Light, UV exposure)	G154	5,000 Hours	10,000 Hours
Cracking (7x magnification)	-	None	None
Discoloration (by observation)	-	Negligible	Negligible
Crazing (7 x magnification)	-	None	None
Linear Dimensional Change	D1204	0.5% max.	0.24%
Weight Change After Immersion in Water	D570	± 3.0% max.	2.5%
Static Puncture Resistance, 33 lbf (15 kg)	D5602	Pass	Pass
Dynamic Puncture Resistance, 14.7 ft-lbf (20 J)	D5635	Pass	Pass
Initial Solar Reflectance	E903	-	0.85
Emissivity	D371		0.89
Solar Reflective Index (SRI)	E1980	-	107
Recycled Content (5 & 10 ft. sheets only)	Up to 12% Pre-Consumer / Up to 1% Post Consumer.		

Failure occurs through membrane rupture not seam failure. Physical Properties shown are prior to applying felt backing, if specified.

2.03 RIGID INSULATION

Rigid Roof Insulation: Roof insulation shall be UL and FM approved. Insulation shall be approved in writing by the insulation manufacturer for intended use and for use with the specified roof assembly.

1. Polyisocyanurate: A closed cell, rigid polyisocyanurate foam core material, integrally laminated between glass fiber reinforced organic facers, in full compliance with ASTM C 1289, Type II, Class 1, Grade 2 (20 psi). Panels shall have a nominal thickness of 2.5 inches and 2.5 inches. Minimum Total Aged R Value of R-25. Acceptable types are as follows:
   > Paratherm by Siplast; Irving, TX
2. Install per manufacturer's recommendations

2.04 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing materials.
   1. Furnish liquid-type auxiliary materials that meet VOC limits of authorities having jurisdictions.

B. Flashing and Flashing Accessories: As recommended by the Thermoplastic sheet manufacturer's printed instructions for reinforced sheet flashing of same material type without the felt backing, mil thickness and color as sheet membrane.

C. Fasteners: Manufacturer approved corrosion resistant steel screws of the appropriate size for fasteners for roof membrane and insulation attachment and for sheet metal flashing. Fasteners for the membrane shall be supplied by the thermoplastic manufacturer and are to be installed as recommended by PVC sheet manufacturer's printed instructions.

D. Securement Plates: FM approved corrosion resistant steel plates of the appropriate size for the securement of the membrane, insulation and cover boards to approved substrates. Securement plates for the membrane, insulation and cover boards shall be supplied by the thermoplastic manufacturer and are to be installed as recommended by the PVC manufacturer's printed instructions.

E. Membrane Bonding Adhesive: Provide PVC membrane manufacturer's low volatile organic compound (VOC) membrane adhesive, as supplied by roof membrane manufacturer, and recommended by the manufacturer's printed data for bonding of PVC membrane materials to acceptable insulation, wood, metal, concrete or other acceptable substrate materials.

F. Metal Termination Bars: Manufacturer's standard aluminum bars, approximately 1-inch (25-mm) wide, roll formed and pre-punched every 6 inches on center.

G. Metal Reglet: Manufacturer's 6063T5 extruded aluminum counterflashing, approximately 2.25 inches wide and 0.10 inch thick, pre-punched at 8 inches on center for attachment to the wall or curb. Use prefabricated mitered inside and outside corners where walls interest.

H. Sealants: Membrane manufacturer's approved sealant shall be used to seal penetrations through the membrane system and at miscellaneous sealant applications that are exposed to roof systems components.

I. Membrane Securement Bar: An approved, heavy-duty 14 gauge, galvanized or stainless, roll-formed steel bar used to attach membrane to the roof deck. The formed steel is pre-punched with holes every 1 inch on center to allow various fastener spacing options.

J. Sealing Tape: A high performance sealant tape with superior surface tack that remains elastic and is designed to bond the PVC membrane and a variety of metals. Sealing tape strip is used to seal the metal roof edge of buildings reducing air infiltration into the roof assembly, behind the PVC membrane flashing at termination details, and to seal the overlaps of the air/vapor retarder membrane.

K. Safety Warning Tape: A reflective, highly visible product to draw attention to unprotected roof perimeters and potential hazardous areas; and designed for use on a PVC roof. The warning tape shall be a yellow reflective tape that is 5 mil's thick, 2 inch wide and 30 feet in length. The tape is made of vinyl and comes with a liner on the back for easy installation. Tape exceeds reflectivity 3 requirements, Federal Spec L-S-300, Class 1 and FP-79 type II.

L. Miscellaneous Accessories: Provide pourable sealants, performed cone and vent sheet flashings, performed inside and outside corner sheet flashings, T-joint covers, termination reglets, and other accessories as recommended by roofing system manufacturer for intended use.

M. Other miscellaneous materials shall be of the "best grade" available and to be approved in writing by the roofing manufacturer, prior to use, for the specific application.

2.05 COVERBOARD

A. Furnish auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing materials.
   1. Type and Thickness: Gypsum board with a fiberglass facer, 1/2-inch.
   2. R-value: 0.67.
   3. Product: Subject to compliance with requirements, provide "Dens-Deck®" as manufactured by Georgia-Pacific Corp. and supplied by PVC manufacturer.

2.05 COVERBOARD ACCESSORIES

A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatible with sheet material.

B. Fasteners: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions of FM 4470, designed for fastening roof insulation and cover board to substrate, and acceptable to roofing system manufacturer.

2.06 RELATED MATERILAS

A. Timber, General: Hand select material at factory from lumber of species and grade indicated below for compliance with "Appearance" grade requirements of ALSC National Grading Rule; provide certificate of inspection from an accredited Agency for selected material.

1. Provide seasoned lumber with 19 percent moisture content at time of dressing and shipment, for sizes 2-inches or less in thickness.
2. Provide lumber with 15 percent moisture content at time of dressing and shipment for, sizes 2-inches or more in thickness.

B. Dimensioned Lumber: Graded in accordance with established grading rules; grade and species as follows:
1. Concealed Boards: WWPA standard grade, any species or SPIB No. 3 grade Southern Pine
2. Lumber for Miscellaneous Uses: Standard grade unless otherwise indicated.
3. Plywood: PS 1; select sheathing grade or APA rated 5/8-inch minimum thickness, CD-X or better in sheathing.

2.07 MISCELLANEOUS FASTNERS AND ANCHORS

A. General: All fasteners, anchors, nails, straps, bars, etc. shall be post-galvanized steel, aluminum or stainless steel. Mixing metal types and methods of contact shall be assembled in such a manner as to avoid galvanic corrosion. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins. All concrete fasteners and anchors shall have a minimum embedment of 1¼ inch (32 mm) and shall be approve for such use by the fastener manufacturer. All miscellaneous wood fasteners and anchors used for flashings shall have a minimum embedment of 1 inch (25 mm), stainless steel, and to be approved for such use by the fastener manufacturer.

2.08 ROOF WALKWAYS (Optional)

A. Walkway: A factory-formed, nonporous, heavy-duty, slip resisting, surface-textured protection pads, approximately 9/16 inch (14 mm) in thickness, as supplied by PVC manufacturer. Color of protection pads shall Light Grey.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine and verify that receiving substrate surfaces of the structure have no defects or errors, which would result in poor or potentially defective application or cause latent defects in workmanship.
1. Installer shall examine substrate to which roofing material is to be applied to ensure that its condition is satisfactory for roofing application. Do not permit voids greater than 1/4 inch wide in the substrate. Substrates for roofing materials shall be dry and free of oil, dirt, grease, sharp edges, and debris. Inspect substrates, and correct defects before application of thermoplastic sheets.

B. Verify that roofing openings and penetrations are in place, set, and braced and that roof drains are properly clamped into position.

C. Do not proceed with installation until unsatisfactory conditions have been corrected. Starting installation shall imply contractor's acceptance of surfaces and conditions.

3.02 PREPARATION

A. Clean substrate of dust, debris, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove all sharp projections.

B. Fill all gaps and voids between substrate components that are wider than 1/4 inch. Fill all gaps with same materials as the substrate.

C. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

D. Protect adjacent areas or surfaces from damage as a result of the Work of this Section.

E. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of the roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.03 WOOD NAILER INSTALLATION

A. Install new continuous wood nailers at the perimeter of the entire roof and around roof projections and penetrations as shown on the Detail Drawings or as required by PVC manufacturer.

B. All Wood Nailers shall be anchored to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons/lineal meter) in any direction. Individual nailer lengths shall not be less than 3 feet (0.9 meter) long. Nailer fastener spacing shall be at 12 inches (0.3 m) on center or 16 inches (0.4 m) on center if necessary to match the structural framing. Fasteners shall be staggered 1/3 the nailer width and installed within 6 inches (0.15 m) of each end. Two fasteners shall be installed at ends of nailer lengths. Wood nailer attachment shall meet the current Factory Mutual Loss Prevention Data Sheet 1-49. Refer to Division 6100 for acceptable fasteners for wood product attachments.

C. Thickness shall be as required to match substrate or insulation height to allow a smooth transition.

D. Stainless steel, corrosion resistant, fasteners are required when mechanically attaching any PVC product to wood nailers and wood products treated with ACQ (Alkaline copper Quaternary). When ACQ treated wood is used on steel roof decks or with metal edge detailing, a separation layer must be placed between the metal and ACQ treated wood.

E. New wood nailers and/or plywood sheeting shall meet the performance criteria in Division 6100.

3.04 COVERBOARD INSTALLATION

A. Fasten Dens-Deck® Prime according to requirements of FM's "Approval Guide" for specified Windstorm Resistance Classification and to the insulation and roofing systems manufacturer's written instructions.

B. Comply with roofing system manufacturer's written instructions for installing roof insulation.

C. Warped or bent cover boards are not acceptable.

D. Single Layer of Dens-Deck® Prime: The Dens-Deck® Prime shall be laid in parallel courses with end joints staggered. The layer of Dens-Deck® shall be laid transverse to the top layer of the insulation board, with joints staggered at least 1/3 of overall length from those of the insulation layer. Fill gaps exceeding 1/4 inch (6 mm) with insulation.

E. Dens-Deck® Prime shall be neatly cut to fit within 1/4 inch (6 mm) of nailers, penetrations and projections.

F. Trim surface of Dens-Deck® Prime where necessary at roof drains so completed surface is flush and does not restrict flow of water.

G. Dens-Deck® Prime shall be a maximum of 4' x 8' in size.

H. Attachment of Dens-Deck over the specified polyisocyanurate insulation shall be of the following application:
   1. Steel Decking:
      a. The Dens-Deck shall be mechanically fastened to the steel decking with PVC manufacturer's approved metal fasteners and plates per the projects ASCE-7 requirements.
      b. Approved perimeter fastening of roof insulation or the Dens-Deck Prime shall be defined as the strip of roof area around the entire outside perimeter of the building having a width defined by the least of the following parameters: 1) 10% of the building length; 2) 10% of the building width; 3) 40% of the building eave height. The perimeter and corner widths shall not be less than eight (8') feet.
      c. Fasteners are to be installed in accordance with fastener manufacturer's recommendations. Fasteners are to have a minimum 1-inch penetration through the structural steel decking or as recommended by fastener manufacturer and PVC manufacturer.
      d. Use fastener tools with a depth locator to ensure proper installation.
      e. Pullout tests are to be done to verify deck condition and actual pullout values. Test results are to be forward to the Owner's representative and to the PVC manufacturer prior to start of the project.

3.05 RIGID INSULATION INSTALLATION

A. Mechanical attachment of insulation to steel deck shall be per manufacturer's recommendations.

3.06. PVC SHEET INSTALLATION

A. General: Install in strict accordance with manufacturer's latest published requirements, instructions, specifications, details and approved shop drawings.

B. Install sheet according to ASTM D 5082 and per ASCE-7 wind uplift requirements for the referenced project.

C. Install PVC membrane sheet per manufacturer's requirements in order to obtain manufacturer Twenty (20)-year Standard (NDL) warranty.

D. Manufacturer's technical representative should be on the jobsite during the first initial day of installation of the roofing system.

E. The surface of the substrate shall be inspected prior to installation of the PVC roof membrane. The substrate shall be clean, dry and smooth with no excessive surface roughness, contaminated surfaces or unsound surfaces such as broken, delaminated, or damaged boards. Any wet, broken, delaminated, or damaged boards shall be replaced with new cover boards.

F. The PVC membrane is to be attached with approved metal fasteners and an approved metal securement plates. Placement and fastener pattern will be according to the PVC Manufacturer requirements for project specific ASCE-7 wind up-lift attachment. Membrane overlaps shall be shingled with the flow of water where possible. Tack welding of the PVC membrane side laps for purposes of temporary restraint during installation is not permitted.

G. Attachment of PVC membrane - Perimeter and Corner Areas: The perimeter and corner area will be determined by building height and width and other conditions according to ASCE 7 guidelines, PVC Manufacturer's Technical Department or FM LPDS 1-29 if insured by Factory Mutual.
   Notes:
   1. Perimeter area is defined as the outer boundary of the roof. If the roof is broken into different levels, each roof area shall be treated as an individual roof with its outer boundary being treated as a perimeter. Typically, internal expansion joints and firewalls are not considered to be full perimeters. Refer to Factory Mutual's Data Sheet 1-28 for more information.

2. The ridge area is defined as the high point in the roof area formed by two intersecting planes. When the sum of the slopes is a minimum of 4 inches in 12 inches (30 degree), each side of the ridge shall be treated as a perimeter area.

H. Mechanically fasten sheet securely at all vertical to horizontal transitions, at points of terminations, at the corners, and at the perimeter of roof to meet the according to ASCE 7 guidelines, PVC Manufacturer's Technical Department or per FM LPDS 1-29 if insured by Factory Mutual.

I. Spread sealant bed over deck drain flange at deck drains and securely seal roofing sheet in place with drain clamping ring.

J. Field-seam according to "Seam Installation" Article.

K. Securement Around Perimeter and Rooftop Penetrations
1. Around all perimeters, at the base of walls, drains, curbs, vent pipes, or any other roof penetrations, manufacturer's fasteners and metal bar or plates shall be installed. Fasteners and securement bar or plates shall be installed accord to the manufacturer's instructions. Fasteners shall be installed using the fastener manufacturer's recommended fastening tools with depth locators.
2. PVC membrane flashings shall extend a minimum of 3 inches past the securement bar or plates and is hot air welded to the PVC deck sheet.

3.07 SEAM INSTALLATION

A. General:
1. All seams shall be hot air welded. Seam overlaps should be 3 inches (75 mm) wide minimum when automatic machine-welding and 4 inches (100 mm) wide when hand-welding, except for certain details.
2. Welding equipment shall be provided by or approved by the roofing manufacturer. All mechanics intending to use the equipment shall have successfully completed a training course provided by a Manufacturer's Technical Representative prior to welding.
3. All membrane to be welded shall be clean and dry.

B. Hand-Welding:
1. Hand-welded seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.
2. The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.
3. The nozzle shall be inserted into the seam at a 45-degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow," the hand roller is positioned perpendicular to the nozzle and pressed lightly. For straight seams, the 1½-inch (40-mm) wide nozzle is recommended for use. For corners and compound connections, the ¾ inch (20 mm) wide nozzle shall be used.

C. Machine Welding:
1. Machine welded seams are achieved by the use of automatic welding equipment. When using this equipment, PVC Manufacturer's instructions shall be followed and local codes for electric supply, grounding and over current protection observed. Dedicated circuit house power or a dedicated portable generator is recommended. No other equipment shall be operated off the generator.
2. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

D. Quality Control of Welded Seams:
1. The Applicator shall check all welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark grey material from the underside of the top membrane.
2. On-site evaluation of welded seams shall be made daily by the Applicator at locations as directed by the Owner's Representative or PVC Manufacturer's representative.

3. One inch (25-mm) wide cross-section samples of welded seams shall be taken at least three times a day by the Contractor.
4. Contractor shall label each seam test cut with the time, date, and location of the test cut. Contractor shall also document the test cut on a project roof plan.
5. Retain test cuts for the PVC manufacturer's technical representative's inspection and evaluation.
6. Correct welds display failure from shearing of the membrane prior to separation of the weld.
7. Repair tears, voids, and lapped seams in roofing that does not meet requirements.
8. Each test cut shall be patched by the Applicator at no extra cost to the Owner.
9. All membrane seams, both field and flashings, shall be hot air welded and probed on a daily basis. NO EXCEPTIONS.

3.08 FLASHING INSTALLATION

A. General: All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and the manufacturer. Approval shall only be for specific locations on specific dates. Flashing shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces. Use caution to ensure adhesive fumes are not drawn into the building.

B. Sarnacol contact adhesive shall be used to adhere the PVC membrane flashing to acceptable wall and equipment curb substrates. No bitumen shall be in contact with the PVC membrane. If bitumen exists, then the manufacturer's asphalt resistant membrane shall be use for the membrane flashing.

C. Contact Adhesive for Membrane Flashings:
1. Over the properly installed and prepared flashing substrate, the contact adhesive shall be applied according to instructions found on the Product Data Sheet. The contact adhesive shall be applied in smooth, even coats with no gaps, globs or similar inconsistencies. Only an area that can be completely covered in the same day's operations shall be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.
2. No adhesive shall be applied in seam areas that are to be welded. All panels of membrane shall be applied in the same manner, overlapping the edges of the panels as required by welding techniques.
3. All flashing membranes shall be consistently adhered to substrates. All interior and exterior corners and miters shall be cut and hot-air welded into place. Where applicable, manufacturer's pre-fabricated corners shall be used.

D. All flashings shall extend a minimum of 8 inches (0.2 m) above roofing level unless otherwise accepted in writing by the Owner's Representative and Manufacturer's Technical Department.

E. All flashings that exceed 30 inches (0.75 m) in height shall receive additional securement. Consult PVC manufacturer for securement methods.

F. All PVC membrane flashings shall be mechanically fastened along the counter-flashed top edge with securement bar; fastened 6-8 inches on center. Seal the top edge and backside of the membrane flashing with Multi-Purpose Sealing Tape and approved sealant. Complete termination per manufacturer's requirements. Provide a metal counterflashing to protect the sealant and multi-purpose sealant tape.

G. Only an area, which can be completely covered in the same day's operations, shall be flashed.

H. Daily test lap edges with probe to verify seam weld continuity of all membrane flashings.

I. Complete all membrane flashing and metal details on a daily basis. No temporary flashings shall be allowed with the prior written approval of the Owner's Representative and PVC Manufacturer. If any water is allowed to enter under the completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Applicator's expense.

3.09 PVC COATED CLAD PERIMETER AND METAL BASE FLASHINGS

A. General: All flashings shall be installed concurrently with the roofing membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and the manufacturer. Acceptance shall only be for specific locations on specific dates. If any water is allowed to enter

under the newly completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Applicator's expense.

B. PVC coated metal flashings, shall be formed to match existing conditions and installed per the Detail Drawings.

C. PVC coated metal shall be installed to provide adequate resistance to bending and allow for normal thermal expansion and contraction.

D. Install Multi-purpose sealant tape and termination bar as indicated on project details. The Multi-purpose sealant tape must be applied to clean and dry surfaces.

E. Secure the PVC coated metal over the PVC field membrane and the multi-purpose sealant tape. Fastened the PVC coated metal with approved stainless steel nails or other acceptable fastener. Fasteners shall be fastened 4 inches on center and staggered 4 inches on center.

F. Adjacent sheets of PVC coated metal shall be spaced ¼ inch (6 mm) apart. The joint shall be covered with 2-inch (50-mm) wide aluminum tape. A 4-inch minimum wide strip of PVC membrane flashing membrane shall be hot air welded over the joint. Check all coverstrip welds with a rounded screwdriver prior to installation of eight-inch coverstrip. Re-weld any inconsistencies before eight-inch coverstrip installation.

G. An 8 inch minimum wide strip of the 60 mil PVC membrane flashing shall be hot air welded to the 4 inch wide flange of the PVC coated metal and to the field membrane. Check all coverstrip welds with a rounded screwdriver. Re-weld any inconsistencies.

3.10 METAL FLASHINGS, COPINGS, EDGE TRIM AND ACCESSORIES INSTALLATION

A. General: Secure metal flashings accessories at roof edges and perimeters according to FM Loss Prevention Data Sheet 1-49 for specified wind zone.

B. All metal flashings, gutters, downspouts, and perimeter metal edging shall be fabricated and install per current SMCA requirements.

C. Complete all metal work in conjunction with roofing and flashings so that a watertight condition exists daily.

D. Metal shall be installed to provide adequate resistance to bending to allow for normal thermal expansion and contraction.

E. Metal flashings shall be securely fastened into solid wood blocking. Approved fasteners shall penetrate the wood nailer a minimum of 1 inch (25mm).

F. Airtight and continuous metal hook strips are required behind all metal fascias. Hook strips are to be fastened 12 inches (0.3 m) on center into the wood nailer or masonry wall.

G. Metal hook strips for metal copings and metal perimeter edging shall extend past wood nailers over wall or perimeter surfaces by 1.5 inches (38 mm) minimum. The metal hook strip shall be securely sealed with multi-purpose sealing tape to prevent <u>any</u> air entry between the building and the metal hook strip, between the PVC membrane, and between the metal coping and / or the PVC coated metal.

H. All metal counter-flashings shall overlap base membrane flashings at least 4 inches (100 mm).

I. All metal joints shall be watertight. Use SMCA approved metal joint application and approved sealant.

3.11 WALKWAY INSTALLATION (Optional)

A. Walkways: Install walkway on two sides of each rooftop serviceable type equipment, i.e. air-conditioning units, at the point of entrance on to the roof, i.e. the base of any ladder, roof hatch, at a roof landing, and/or as indicated on the project's roof plan. The minimum length of the walkway, installed at any one location, shall be four (4') feet.

B. Install the walkway per the PVC manufacturer's written instructions.
   1. Clean all dirt and debris from the deck membrane in areas where the walkway will be installed.
   2. Important: Check all deck membrane welds with a rounded screwdriver prior to installation of walkway. Re-weld any inconsistencies before walkway installation.
   3. Install walkway in the indicated roof areas.

3.12 SAFETY WARNING TAPE INSTALLATION

A. General Requirements: When there is a fall distance of six (6') feet or more along the roof's perimeter or along the parapet wall having a height less than 39 inches, OSHA requires the walking/working surface must be protected from falling by the use of a guardrail system, a safety net system, or a personal fall arrest system.

B. As part of a safety awareness on the roof, the complete roofing system shall have a permanent safety warning tape shall be installed in the fall distance boundary of six (6') feet from the perimeter edge or a parapet wall with a height less than 39 inches in order to alert the workers of the requirement of having a personal fall arrest systems while working pass the six (6') feet boundary line. After the installation of the specified roofing system, the roofing contractor shall:
   1. Verify the roof area(s) where fall protection is required. In the established roof areas requiring personal fall arrest system, Contractor is to install a permanent perimeter warming tape.
   2. Follow OSHA fall protection guidelines for his employees to clean all dirt and debris from the deck membrane for the installation of the permanent perimeter warning tape.
   3. Thoroughly clean the roof of all dirt and debris from the installed PVC roof membrane. Failure to properly clean the membrane for the installation of the permanent warning tape will result in less than satisfactory adhesion.
   4. Make sure to check all deck membrane welds with a rounded screwdriver prior to installation of perimeter warning tape. Re-weld any inconsistencies found in the PVC membrane before perimeter warning tape installation.
   5. Make sure PVC membrane is clean and dry before applying the perimeter tape. The perimeter tape is apply to membrane; taking care to avoid trapping air and creating blisters as tape is smoothed over with hand pressure. If a chalk line is used, be sure to keep chalk dust clear of application area.
   6. Install sufficient perimeter warming tape to make the permanent perimeter warming line four (4") inches wide.
   7. Make sure not to apply the perimeter warning tape to the PVC membranes when the temperature is below 40 degrees Fahrenheit.

3.13 FIELD QUALITY CONTROL

A. Roofing Applicator: The contractor shall make On-site evaluation of welded seams to locations as directed by the owner's representative or PVC manufacturer's technical representative. Two-inch wide cross-sections samples shall be taken three times a day minimum through completed seams. Correct welds shall display failure from shearing the membrane prior to separation of weld. The contractor at no extra charge to owner shall patch each test cut. Test seam samples shall be label with locations of seam cut, date of seam cut, and retain for owner' representative or PVC manufacturer's technical representative for test cut inspections. At the close of project, all seam test cuts are to be submitted to the owner's representative for review.

B. Manufacturer's Quality Control Inspection: The Manufacturer's Technical Representative shall review the on-going work a minimum of one (1) in-progress inspection every 10 working days. The Technical Representative shall note:
   1. All defects noted non-compliance with the specifications or the recommendations of the thermoplastic manufacturer should be itemized in a punch list. These items must be corrected immediately by the contractor to the satisfaction of the owner's representative and PVC manufacturer.

C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion of the roofing project.
   1 All defects noted non-compliance with the specifications or the recommendations of the thermoplastic manufacturer should be itemized in a punch list. These items must be corrected immediately by the contractor to the satisfaction of the owner's representative and PVC manufacturer.

2. A copy of Final Inspection Report shall be sent to the Owner's Representative within two days after date inspection(s) is performed.

3.14 PROTECTING AND CLEANING

A. Protect sheet membrane roofing from damage and wear during the construction period. Installer is to inspect the completed roofing system for any damage and repair damages found in the roofing system.

B. Correct deficiencies in or remove roofing that does not comply with requirements, repair substrates, reinstall roofing, and repair sheet flashings to a condition free of damage and deterioration at the time of Substantial Completion and according to warranty requirements.

C. Upon completion of the Work of this Section, dispose of, away from the Site, all debris, trash, containers, residue, roofing remnants and scraps. The completed Roof shall be washed with water and approved cleaner to remove all dirt and residue from roof membrane.

3.15 ACCEPTANCE

A. Prior to demobilization from the site, the owner's representative, manufacturer technical representative and installer shall review the completed work. All defects noted noncompliance with the specifications or the recommendations of the PVC manufacturer should be itemized in a punch list. These items must be corrected immediately by the contractor prior to demobilization to the satisfaction of the owner representative, and to PVC manufacturer.

B. All warranties as required for the project of this specification shall be submitted for approval prior to final payment.

END OF SECTION

SECTION 07 70 00 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Prefabricated roof curbs, equipment supports, pipe flashing at metal roofing, roof hatch, complete with insulated integral support curb, counter flashings, fixed ladders, and aluminum canopies.

B. Coordinate with installation of roofing and related metal flashings.

C. Coordination between roof hatch manufacturer and ladder construction.

D. All horizontal sheet metal surfaces shall receive a cross break to sheet rain water.

1.2 RELATED WORK

A. Section 05 51 50 – Ladders

B. Section 06 10 00 - Rough Carpentry.

C. Section 07 54 00 – PVC Thermoplastic Membrane Roofing

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data need to prove compliance with the specified requirements;
3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Hatches:
1. Bilco Co., Type E.
2. Or equal.

B. Curbs and Equipment Supports:
1. Custom Curbs, Inc.
2. ThyCurb.

2.2 ROOF HATCH

A. Size/Construction: 3'-0" x 3'-0" size; single leaf type; galvanized steel paint grip construction with full welded corner joints; insulated hatch lid and insulated integral support curb; complete with integral counter flashings to roof flashing system and flanges on support curb for anchorage to roof deck. Roof hatch shall be pre-assembled from the manufacturer. Provide with Bilco, or equal, Ladderrup Safety Post, LU-4-Aluminum, Mill finish.

B. Opening Hardware: Manufacturer's standard manually operating type capable of ensuring effortless control and smooth operation without causing damage to hatch and roofing system; capable of being opened from inside and outside; complete with hold-open mechanism and inside padlock hasp. Operation of cover shall not be affected by temperature. Coordinate installation of handrail to underside of lid to be used in conjunction with Access Ladder.

C. Provide manufacturer’s standard warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

2.3 CURBS AND EQUIPMENT SUPPORTS

A. Size to fit openings and equipment.

B. Shall be of box section design, heavy gauge galvanized steel construction. Thycurb, Model TC-3, insulated, at “flat” roofs, or equal.

C. Pipe penetration at metal roofs shall be Deck Mate Pipe Flashing, Model D.M.1 thru 9 (sized to pipe size) as manufactured by Roof Products and Systems Corp. (1-800-624-8642), or equal. Deck Mate is EPDM or Neoprene compression molded rubber with 1" wide corrosion resistant flexible aluminum base, incorporated to a pleated expansion joint.

2.6 FABRICATION

A. Fabricate accessories weathertight, and free of visual distortions and defects.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories in strict accordance with manufacturer's recommendations and details. Coordinate with installation of roofing systems and related flashings.

END OF SECTION

SECTION 07 84 00 - FIRESTOPPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide thorough-penetration firestopping in fire rated construction, construction-gap firestopping at connections of the same or different materials in fire rated construction, construction-gap firestopping occurring within fire rated wall, floor or floor-ceiling assemblies, construction-gap firestopping occurring at the top of fire rated walls, through-penetration smoke-stopping in smoke partitions where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related work:
1. Section 09 26 00 - Gypsum Wallboard and Metal Stud System
2. Division 23 - Mechanical
3. Division 26 - Electrical

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
1. Acceptable to or licensed by manufacturer, State or local authority where applicable.
2. At least 2 years experience with systems.
3. Successfully completed at least 5 comparable scale projects using this system.

B. Local and state regulatory requirements: Submit forms or acceptance for proposed assemblies not conforming to specific UL Firestop System numbers, or UL classified devices.

C. Materials shall have been tested to provide fire rating at least equal to that of the construction.

D. References
1. Underwriters Laboratories - U.L. Fire Resistant Directory
   a. Through-penetration firestop devices (XHCR)
   b. Fire resistance ratings (BXUV)
   c. Through-penetration firestop systems (XHEZ)
   d. Fill, void, or cavity material (XHHW)
2. American Society for Testing and Materials standards:
   a. ASTM E814 - 88: Standard Test Method for Fire Tests of Through-Penetration Firestops.

E. Definitions
1. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.
2. Barriers: Time rated fire walls, smoke barrier walls, time rated ceiling/floor assemblies and structural floors.
3. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit spread of heat, fire, gasses and smoke.
4. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated materials is not obtained.
5. Construction Gaps: Gaps between adjacent sections of walls, exterior walls, at wall tops between top of wall and ceiling, and structural floors or roof decks; and gaps between adjacent sections of structural floors
6. System: specific products and applications, classified and numbered by Underwriters Laboratories, Inc. to close specific barrier penetrations.

7. Sleeve: Metal fabrication or pipe section extending through thickness of barrier and used to permanently guard penetration. Sleeves are described as part of penetrating system in other sections and may or may not be required.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 64 00.

B. Packing and shipping:
1. Deliver products in original unopened packaging with legible manufacturer's identification.
2. Coordinate delivery with scheduled installation date, allow minimum storage at site.

C. Storage and protection: Store materials in a clean, dry, ventilated location. Protect from soiling, abuse, moisture and freezing when required. Follow manufacturer's instructions.

1.5 PROJECT CONDITIONS

A. Existing Conditions:
1. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
2. Proceed with installation only after penetrations of the substrate and supporting brackets have been installed.

B. Environmental requirements:
1. Furnish adequate ventilation if using solvent.
2. Furnish forced air ventilation during installation if required by manufacturer.
3. Keep flammable materials away from sparks or flame.
4. Provide masking and drop cloths to prevent contamination of adjacent surfaces by firestopping materials.
5. Comply with manufacturing recommendations for temperature and humidity conditions before, during and after installation of firestopping.

1.6 GUARANTEE

A. Submit copies of written guarantee agreeing to repair or replace joint sealers which fall in joint adhesion, co-adhesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated. The guarantee period shall be one year from date of substantial completion.

PART 2 - PRODUCTS

2.1 THROUGH-PENETRATION FIRESTOPPING OF FIRE-RATED CONSTRUCTION

A. Systems or devices listed in the U.L. Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetrant type, annular space requirements and fire rating

involved in each separate instance, and that the system be symmetrical for wall applications. Systems or devices must be asbestos-free.

1. Additional requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product, included as a part of the U.L. system or device, and designed to perform this function.
2. Acceptable manufacturers and products;
   a. Those listed in the U.L. Fire Resistance directory for the U.L. System involved.
3. All firestopping products must be from a single manufacturer. All trades shall use products form the same manufacturer.

2.2 CONSTRUCTION-GAP FIRESTOPPING OF FIRE-RATED CONSTRUCTION

A. Firestopping at construction gaps between edges of floor slabs and exterior wall construction.

B. Firestopping at construction gaps between tops of partitions and underside of structural systems.

C. Firestopping at construction gaps between tops of partitions and underside of ceiling or ceiling assembly.

D. Firestopping of control joints in fire-rated masonry partitions.

E. Firestopping expansion joints.

F. Acceptable manufacturers and products - those listed in the U.L. Fire Resistance Directory for the U.L. System involved.

2.3 SMOKE-STOPPING AT SMOKE PARTITIONS

A. Through-penetration smoke-stopping: Any system complying with the requirements for Applications Schedule in Part 3.06 of this Section, is acceptable, provided that the system includes the specified smoke seal or will provide a smoke seal. The length of time of the fire resistance may be disregarded.

B. Construction-gap smoke-stopping: Any system complying with the requirements for construction-gap firestopping in fire-rated construction is acceptable, provided that the systems includes the specified smoke seal or will provide a smoke seal. The length of time of the fire resistance may be disregarded.

2.4 ACCESSORIES

A. Fill, void or cavity materials: As classified under category XHHW in the U.L. Fire Resistance Directory.

B. Forming materials: As classified under category XHKU in the U.L. Fire Resistance Directory.

2.5 OTHER MATERIALS

A. Provide other materials, not specifically described by required for a complete and proper installation, as selected by the Contractor, subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

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.
   1. Verify barrier penetrations are properly sized and in suitable conditions for application of materials.

3.2 PREPARATION

A. Clean surfaces to be in contact with penetration seal materials, of dirt, grease, oil, loose materials, rust or other substances that may affect proper fitting, adhesion, or the required fire resistance.

3.3 INSTALLATION

A. Install penetration seal materials in accordance with printed instructions of the U.L. Fire Resistance Directory and in accordance with manufacturer's instruction.

B. Seal holes or voids made by penetrations to ensure an effective smoke barrier.

C. Where floor openings without penetrating items are more than four inches in width and subject to traffic or loading, install firestopping materials capable of supporting same loading as floor.

D. Protect materials from damage on surfaces subject to traffic.

E. Place firestopping in annular space around fire dampers before installation of damper's anchoring flanges which are installed in accordance with fire damper manufacturers recommendations.

F. Where large openings are created in walls or floors to permit installation of pipes, ducts, cable tray, bus duct or other items, close unused portions of opening with firestopping material tested for the application. See U.L. Fire Resistance Directory.

G. Install smoke stopping as specified for firestopping.

H. Where rated walls are constructed with horizontally continuous air space, double width masonry or double stud frame construction, provide vertical, 12 inch wide fiber dams for full thickness and height of air cavity at maximum 15 foot intervals.

3.4 FIELD QUALITY CONTROL

A. Examine penetration sealed areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities.

C. Perform under this section patching and repairing of firestopping caused by cutting or penetration by other trades.

3.5 ADJUSTING AND CLEANING

A. Clean up spills of liquid components.

B. Neatly cut and trim materials as required

C. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

END OF SECTION

SECTION 07 92 00 - SEALANTS AND CAULKING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Throughout the Work, seal and caulk joints where shown on the Drawings and elsewhere as required to provide a positive barrier against passage of moisture and passage of air.

B. Related Requirements:
1. Applicable portions of the Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, 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 01 of the Specifications.
2. Section 03 30 00 - Cast in Place Concrete
3. Section 04 20 00 – Masonry (CMU and Brick)

1.2 QUALITY ASSURANCE

A. Applicator Qualifications: Employ personnel qualified by the sealant manufacturer by training, field experience, or both.

B.Manufacturer’s Field Representative Qualifications: Employee or agent of sealant manufacturer who is authorized to provide specified field services.

1.3 PRECONSTRUCTION TESTING

A. Before installing sealants, arrange for sealant manufacturer to test each combination of sealant, substrate, and joint backing for adhesion, and substrate staining (silicone sealants only).
1. Allow sufficient time for testing and analyzing test results without delaying the Work.
2. Deliver to manufacturer recommended number and sizes of substrate samples representative of those being installed.
3. Report manufacturer’s recommendations for satisfactory sealant adhesion including use of primers, substrate preparation techniques, or both.
4. Testing is not required if manufacturer provides data showing previous testing, not older than 24 months, that indicates satisfactory adhesion and absence of staining.

B. Adhesion Testing: Utilize ASTM C 794 (laboratory), ASTM C 1521 (field), or both to determine whether primer is required for cured sealants to achieve an optimum bond to substrates.

C. Stain Testing: Utilize ASTM C 1248 to determine the potential of staining where silicone sealants contact stone and masonry substrates.

1.4 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit the following:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements; Manufacturer's recommended installation procedures

C. Samples: Accompanying the submittal described above, submit three Samples in manufacturer’s standard size of each sealant, each backing material, and each bond breaker proposed to be used.

D. Preconstruction Test Reports: Indicate which joint sealant and primer combinations resulted in satisfactory sealant adhesion to joint substrates. Indicate whether silicone sealants stained representative substrates.

E. Qualifications Statements: For applicator and manufacturer's field representative.

F. Warranties: Submit samples of manufacturer's warranties.

1.5 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 64 00.

B. Do not retain at the job site material which has exceeded the shelf life recommended by its manufacturer.

1.6 WARRANTY

A. Manufacturer Warranty: Provide manufacturer's standard warranty against defective materials of the following terms:
1. Silicone Sealants: 20 years; include coverage against staining porous stone.
2. Polyurethane Sealants: 5 years.
3. Acrylic Latex Sealants: 2 years.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS

A. Except as specifically otherwise approved by the Architect, use only the types of joint sealants described in this Article.

B. Type JS-1 - Non-staining Silicone Sealant: Single component, non-staining, non-sag, gun grade product meeting ASTM C 920, Type S, Grade NS, Class 100/50, and current SWRI Validation.
1. Pecora Corporation: 890NST, 890FTS, or both.
2. Approved equal.

C. Type JS-2 - Nonstaining, Mildew-Resistant Silicone Sealant: Single component, non-sag, gun grade product meeting ASTM C 920, Type S, Grade NS, Class 25 or better
1. Pecora Corporation: 898NST.
2. Approved equal.

D. Type JS-3 - Acrylic Latex Sealant: General purpose, gun grade, non-sag, paintable, non-staining latex sealant complying with ASTM C 834.
1. Pecora Corporation: AC-20 + Silicone.
2. Tremco: Acrylic Latex.
3. Approved equal.

E. Type JS-4 - Polyurethane Sealant: Single-component, non-sag, paintable, polyurethane joint sealant meeting ASTM C 920, Type M, Grade NS, Class 25, Use NT, M, G, A, O.
1. BASF: MasterSeal NP 1.
2. Pecora Corporation: Dynatrol I-XL
2. Approved equal.

F. Type JS-5 - Traffic-grade, Polyurethane Sealant: Single component, pourable polyurethane joint sealant meeting ASTM C 920, Type S, Grade P, Class 25; Use T.
1. BASF: MasterSeal SL 1
2. Pecora Corporation: NR-201.
3. Approved equal.

2.2 ACOUSTICAL SEALANT

A. Type JS-6 - Acoustical Sealant: General purpose, gun grade, nonsag, paintable, nonstaining latex sealant complying with ASTM C834 and capable of reducing airborne sound transmission through perimeter joints and openings in building construction as determined per ASTM E 90 based on installation per ASTM C 919.
   1. Pecora Corporation: AC-20 FTR or AIS-919.
   2. Tremco: Tremco Acoustical Sealant.
   3. US Gypsum: Sheetrock Acoustical Sealant.

2.3 SEALANT PRIMERS

A. As recommended by sealant manufacturer based on results of preconstruction testing, field experience, or both.

2.4 BACKUP MATERIALS

A. Backer Rod: Nonstaining, flexible, compressible, cylindrical, open-cell, closed-cell, or bi-cellular material approved by sealant manufacturer for applications indicated and meeting ASTM C 1330.

B. Concrete Expansion Joint Filler: W.R. Meadows, Inc. Sealtight Fibre Expansion Joint Filler, or equal. (Thickness and heights as shown on the Drawings.)

2.5 MISCELLANEOUS MATERIALS

A. Joint Cleaner: Noncorrosive, non-staining type recommended by sealant manufacturer for joint surfaces to be cleaned.

B. Masking Materials: Noncorrosive, non-staining to materials to which they contact.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

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.

3.2 PREPARATION

A. Prepare surfaces to receive sealants in accordance with joint sealant manufacturer’s written instructions.

B. Clean joint surfaces by one or a combination of the following methods:
   1. Porous Substrates: Clean concrete, masonry, unglazed tile or glass-reinforced concrete by brushing, grinding or mechanical abrading.
   2. Non-porous Substrates: Clean metal, glass and other non-porous surfaces using razor knife, followed by solvent wipe.
   3. Exterior Insulation and Finish System (EIFS) Substrates: Remove contaminants using method recommended by EIFS manufacturer. Use of abrasive cleaning methods is not permitted.

C. Remove frost, dust, loose particles and other foreign materials from joint substrates by vacuuming or blowing out with oil-free compressed air; make as many passes as required to result in clean joints.

D. Remove frost, dust, loose particles and other foreign materials from joint substrates by vacuuming or blowing out

with oil-free compressed air; make as many passes as required to result in clean joints.

E. Joint Priming: Apply joint sealant primer to sides of joints in accordance with manufacturer's instructions.

F. Apply masking tape where required to prevent contact of sealant primer or joint sealants with adjoining surfaces. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF BACKUP MATERIAL

A. Compress the backup material 25% to 30% to achieve a positive and secure fit.

B. Install sealant backing in continuous unbroken lengths; do not stretch, twist, or braid rod stock.

3.4 PRIMING

A. Use primer recommended by the sealant manufacturer, based on results of preconstruction adhesion testing.

3.5 BOND-BREAKER INSTALLATION

A. Provide bond-breaker tape where recommended by the manufacturer of the sealant, in shallow joints or to prevent three-sided adhesion.

3.6 INSTALLATION OF SEALANTS

A. Apply joint-sealants per ASTM C 1193 and joint sealant manufacturer's instructions.

B. **GENERAL: PLACE SEALANTS AT ALL INTERIOR AND EXTERIOR LOCATIONS WHERE DISSIMILAR MATERIALS, AND/OR SIMILAR MATERIALS, MEET AND AT JOINTS AND/OR ABUTMENTS THAT DO NOT CLOSE TIGHT. USE AT EXTERIOR AND INTERIOR DOOR AND WINDOW OPENINGS. USE AT EXISTING TO NEW CONSTRUCTION JOINTS.**

C. Prior to start of installation in each joint, verify the joint type according to details on the Drawings, or as otherwise directed by the Architect, and verify that the required proportion of width of joint to depth of joint has been secured.

D. Equipment:
1. Apply sealant under pressure with power-actuated or hand gun, or by other appropriate means.
2. Use guns with nozzle of proper size, and providing sufficient pressure to completely fill the joints as designed.

E. Thoroughly and completely mask joints where the appearance of sealant on adjacent surfaces would be objectionable.

F. Install the sealant in strict accordance with the manufacturer's recommendations as approved by the Architect, thoroughly filling joints to the recommended depth.

G. Tool joints to concave profile, unless indicated otherwise.

H. Cleaning up:
1. Remove masking tape immediately after sealant has been tooled.
2. Clean adjacent surfaces free from sealant as the installation progresses, using solvent or cleaning agent recommended by the manufacturer of the sealant used.

3.7 JOINT SEALANT SCHEDULE

A. Exterior Traffic-bearing Joints in Concrete, Brick, and Stone Paving: JS-5.

B. Exterior Weather Seal Joints in Vertical and Non-traffic-bearing Horizontal Surfaces: Type JS-1.
   1. Control and expansion joints.
   2. Window and door perimeters.
   3. Other exterior joints

C. Vertical Joints between Exterior Wall and Interior Construction: JS-4.

D. Interior Mildew-resistant Joints: JS-2.
   1. Plumbing fixture perimeters.
   2. Joints in countertops.
   3. Control and expansion joints in tile.
   4. Floor and wall joints in wet areas.
   5. Other joints indicated.

E. Interior Acoustical Joints: JS-6.
   1. Perimeters of acoustically-rated partitions and ceilings.
   2. Between wall surface and acoustical ceiling L-shaped perimeter trim.
   3. Perimeters of grilles, registers, and diffusers in acoustically-rated walls and ceilings.
   4. Other locations indicated.

F. Interior Joints Where Little to No Movement is Expected: JS-3.
   1. Interior joints for which another type of sealant is not indicated.

END OF SECTION

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Louvers installed in hollow metal doors.
4. Light frames and glazing installed in hollow metal doors.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
3. Division 08 Section "Door Hardware".
4. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
9. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
12. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
14. FEMA P-361 2015 – Design and Construction Guidance for Community Safe Rooms.
15. ICC 500 - 2014 ICC/NSSA Standard for the Design and Construction of Storm Shelters.
16. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.

17. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
18. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.

B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.

C. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of anchorages, joints, field splices, and connections.
6. Details of accessories.
7. Details of moldings, removable stops, and glazing.
8. Details of conduit and preparations for power, signal, and control systems.

D. Samples for Verification:

1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.

B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".

C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40” above sill) or UL 10C.

1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
3. Smoke Control Door Assemblies: Comply with NFPA 105.

    a. Smoke "S" Label: Doors to bear “S” label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.

D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.

E. Severe Storm Shelter Openings: Provide complete door systems for hurricane or tornado storm shelters, and other areas of refuge, complying and tested according to FEMA P-361, Third Edition (2015), Design and Construction Guidance for Community Safe Rooms; and ICC 500 (2014), ICC/NSSA Standard for the Design and Construction of Storm Shelters.

1. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

F. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:

1. CECO Door Products (C).
2. Curries Company (CU).

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.3 HOLLOW METAL DOORS

A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.

B. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Design: Flush panel.
2. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
3. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
4. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
5. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Design: Flush panel.

    a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.

2. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
3. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
4. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
5. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

D. Manufacturers Basis of Design:

1. Curries Company (CU) - Polystyrene Core - 707 Series.

2.4 HOLLOW METAL DOORS FOR SEVERE STORM SHELTERS

A. General: Provide complete tornado or hurricane resistant door and frame shelter assemblies constructed to resist the design wind pressures for components and cladding and missile impact loads as described in ICC 500 - 2014, ICC/NSSA Standard for the Design and Construction of Storm Shelters. Only single opening and paired opening doors and their frames constructed to resist calculated design wind pressures and laboratory tested missile impacts are acceptable.

1. Door systems, both single doors and paired openings, tested and complying with ICC 500 - 2014 and FEMA P-361 (2015), Design and Construction Guidance for Community Safe Rooms and supported by third party test results.
2. Sheets fabricated on exterior openings from commercial quality hot dipped zinc coated steel complying with ASTM A924 A60. Gauges to be in accordance with manufacturers tested assemblies.
3. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
4. Top Edge: Reinforce top of doors with a continuous steel channel extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached and welded in place with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9".

B. Manufacturers Basis of Design:

1. CECO Door Products (C) - StormPro Series.
2. Curries Company (CU) - StormPro Series.

2.5 HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.

1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
2. Frames: Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.
3. Manufacturers Basis of Design:

    a. Curries Company (CU) – M Series.

C. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.

1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
3. Manufacturers Basis of Design:

    a. Curries Company (CU) - C Series.
    b. Curries Company (CU) - M Series.

D. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

E. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.6 FRAMES FOR SEVERE STORM SHELTERS

A. General: Subject to the same compliance standards and requirements as standard hollow metal frames, provide complete tornado or hurricane resistant door and frame assemblies, for both single doors and paired openings, tested and labeled as complying with ICC 500 - 2014 and FEMA P-361 (2015) and supported by third party test results.

1. Fabricate exterior frames from 14 gauge hot dipped zinc coated steel that complying with ASTM designations A924 A60.
2. Manufacturers Basis of Design:

    a. CECO Door Products (C) - StormPro Series.
    b. Curries Company (CU) - StormPro Series.

2.7 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
3. FEMA 361 Storm Shelter Anchors: Masonry T-shaped, wire masonry type, or existing opening type anchors.

B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.

C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.8 LOUVERS

A. Metal Louvers: Unless otherwise indicated provide louvers to meet the following requirements.

1. Blade Type: Vision proof inverted V or inverted Y.
2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

B. Louvers for Fire Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire protection rating of 1-1/2 hours and less.

1. Manufacturers: Subject to compliance with requirements, provide louvers to meet rating indicated.
2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

2.9 LIGHT OPENINGS AND GLAZING

A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.

B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.

C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.

D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

E. See Door Sheet A4.0 for glass type IV to be factory installed in Storm Shelter doors. Coordinate with Glazing specifications section as required.

2.10 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.11 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.

C. Hollow Metal Doors:

1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
3. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
4. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".

D. Hollow Metal Frames:

1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
7. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
8. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
9. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

    b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Three anchors per jamb up to 60 inches high.
        2) Four anchors per jamb from 60 to 90 inches high.
        3) Five anchors per jamb from 90 to 96 inches high.
        4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
        5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.

    c. Severe Storm Shelter Openings: Provide jamb, head, and sill anchors in accordance with manufacturer’s tested and approved assemblies.

10. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
11. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.

E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.

3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.12 STEEL FINISHES

A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.

C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."

D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.

1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.

3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

END OF SECTION 08 11 13

SECTION 08 12 16 - ALUMINUM ENTRANCE, FIXED FRAMES, & WINDOWS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide aluminum entrances and fixed frames where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, Labor Standards, Contract for Construction and Sections in Division 1 of these Specifications.
2. Section 08 71 00: Finish Hardware
3. Section 08 80 00: Glazing

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Shop Drawings in sufficient detail to show fabrication, installation, anchorage and interface of the Work of this Section with the work of adjacent trades.
4. Color and Finish sample(s).
5. Hardware schedule with door references as per the Architectural Drawings.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 64 00.

1.5 SYSTEM REQUIREMENTS

A. Design Requirements:
1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
2. Requirements shown by details are intended to establish basic dimensions of units, sight lines, and profiles of members
3. Provide concealed fastening.
4. Provide entrance and storefront systems including necessary modifications, to meet specified requirements and maintaining visual design concepts.
5. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
6. Provide for expansion and contraction due to structural movement without detriment to appearance or performance. A caulk joint around the perimeter of the openings shall be sized according to recommendations provided by the caulk manufacturer.
7. Framing systems shall accommodate expansion and contraction movement due to surface temperature differentials 180 degrees F without causing buckling, stress on glass, failure of joint seals, excessive stress on

structural elements, reduction of performance, or other detrimental effects. Expansion mullions and expansion joints on the subsill are to be included for any elevations wider than 24'-0" and should be clearly indicated on the shop drawings.

PART 2 - PRODUCTS

2.1 EXTERIOR ALUMINUM ENTRANCES AND FIXED FRAMES

A. Provide aluminum door and frame in the dimensions and arrangements shown on the Drawings. Reference numbers and manufacturer are to establish product design and do not preclude equal products of another manufacturer.

Basis of Design – Tubelite. Kawneer, EFCO, and OBE equal products are acceptable.

1. Fixed Frames (exterior storefront):
   a. Tubelite T14000 Series Storefront Framing flush glaze thermally broken with a two part chemically curing, unfilled polyurethane casting resin poured in place tube framing. See aluminum frame elevations on drawings.

2. Entrance door:
   a. Tubelite medium stile entrances with 10" high one piece tubular bottom rail and 8" mid-rail and 4" stiles at doors, sizes as shown on Drawings, color and finish to match frames.

B. FINISHES

1. Finish: Two-step electrolytic anodized color
   a. Typical frames – Class I Clear Anodized.

2.2 FINISH HARDWARE

A. **Install the following selected manufacturer's door hardware at all aluminum doors**. All exposed items shall match aluminum frame where noted.
1. Weatherstrip: Tubelite P1275, 1276, and 1277 with E2058 threshold, set x size required at exterior doors.
2. Door Sweep: Tubelite P1275, 1276 and 1277. at exterior doors.

See Hardware Sets Section 08 71 00 for remainder of hardware.

B. Procedures
1. Perform all fitting of finish hardware to doors and frames at the factory; except do not drill or tap for surface mounted items until time of installation at the site.
2. Comply with finish hardware manufacturer's instructions and template requirements.
3. use concealed fasteners to the maximum extent practicable.

2.3 EXTERIOR ALUMINUM WINDOWS

A. Provide aluminum window in dimensions and arrangements shown on Drawings. Reference numbers and Manufacturer are to establish product design and do not preclude equal products of another manufacturer.
1. Fixed Frames: Tubelite T1400 series flush glaze thermally broken with a two part chemically curing, unfilled polyurethane casting resin placed tube framing. Finish – two-step electrolytic anodized color – Class I clear Anodized.

2.4 FABRICATION

A. Fabricate in strict accordance with the manufacturers' specifications and Shop Drawings as approved by the Architect, prefabricating in the shop to the maximum extent practicable.

B. Provide hairline fit at joints, with smooth continuity of line and accurate relation of planes and angles. Securely fasten.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

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.

3.2 COORDINATION

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. Make measurements as required in the field to assure proper fit.

3.3 INSTALLATION

A. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position for long life.

B. Remove protective coating completely from exposed surfaces as soon as progress of the Work will permit with safety.

C. Provide the types of glass required and glaze in accordance with pertinent provisions of Section 08 80 00 of these Specifications.

3.4 ADJUST AND CLEAN

A. Adjust doors and operators for proper operation. Proper operation shall meet ADA / ANSI A117. 1-2003 Requirements.

B. Wash down exposed surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Remove excess sealant by method acceptable to sealant manufacturer.

D. Protect finishes until Substantial Completion.

END OF SECTION

SECTION 08 14 16 - FLUSH WOOD DOORS

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. Section Includes:

1. Solid core doors with wood veneer faces.
2. Factory finishing wood doors.
3. Factory fitting wood doors to frames and factory machining for hardware.
4. Light frames and glazing installed in wood doors.

B. Related Sections:
1. Division 01 Section "General Conditions".
2. Division 08 Section “Door Schedule”.
3. Division 08 Section "Hollow Metal Doors and Frames".
4. Division 08 Section "Glazing".
5. Division 08 Section "Door Hardware".

C. Standards and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ANSI A208.1 – Wood Particleboard.
3. Intertek Testing Service (ITS Warnock Hersey) - Certification Listings for Fire Doors.
4. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
5. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
6. UL 10C - Positive Pressure Fire Tests of Door Assemblies; UL 1784 - Standard for Air Leakage Tests of Door Assemblies.
7. Window and Door Manufacturers Association - WDMA I.S.1-A Architectural Wood Flush Doors.

1.3 SUBMITTALS

A. Product Data: For each type of door indicated. Include details of core and edge construction, louvers, trim for openings, and WDMA I.S.1-A classifications. Include factory finishing specifications.

B. Shop Drawings shall include:

1. Indicate location, size, and hand of each door.
2. Indicate dimensions and locations of mortises and holes for hardware.
3. Indicate dimensions and locations of cutouts.
4. Indicate requirements for veneer matching.
5. Indicate location and extent of hardware blocking.
6. Indicate construction details not covered in Product Data.
7. Indicate doors to be factory finished and finish requirements.

8. Indicate fire protection ratings for fire rated doors.

C. Samples for Initial Selection: For factory finished doors.

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.

2. Corner sections of doors, 8 by 10 inches, with door faces and edges representing actual materials to be used.

   a. Provide samples for each species of veneer and core material.
   b. Finish veneer faced door samples with same materials proposed for factory finished doors.

3. Frames for light openings, 6 inches long, for each material, type, and finish required.

D. Warranty: Provide sample of manufacturer’s warranty.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer wherever possible.

B. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, latest edition, "Industry Standard for Architectural Wood Flush Doors’.

C. Fire Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing at positive pressure according to NFPA 252 (neutral pressure at 40” above sill) or UL10C.

1. Oversize Fire Rated Door Assemblies: For units exceeding sizes of tested assemblies provide manufacturer’s construction label, indicating compliance to independent 3rd party certification agency’s procedure, except for size.

2. Temperature Rise Limit: Where required and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire test exposure.

3. Smoke Control Door Assemblies: Comply with NFPA 105.

   1) Smoke "S" Label: Doors to bear “S” label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.

D. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for receiving, handling, and installing flush wood doors.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package pre-finished doors individually in plastic bags and wrap bundles of doors in plastic sheeting.

C. Mark each door on top rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
b. Telegraphing of core construction in wood face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

3. Warranty Period for Solid Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 DOOR CONSTRUCTION – GENERAL

A. WDMA I.S.1-A Performance Grade: Extra Heavy Duty; Aesthetic Grade: Premium.

B. Fire Rated Doors: Provide construction and core as needed to provide fire ratings indicated.

1. Category A Edge Construction: Provide fire rated door edge construction with intumescent seals concealed by outer stile (Category A) at 45, 60, and 90 minute rated doors. Comply with specified requirements for exposed edges.

2. Pairs: Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

a. Provide fire retardant stiles that are listed and labeled for applications indicated without formed steel edges and astragals.

b. Where required for concealed hardware, provide formed steel edges and astragals with intumescent seals. Finish steel edges and astragals with baked enamel.

2.2 CORE CONSTRUCTION

A. Particleboard Core Doors:

1. Particleboard: Wood fiber based materials complying with ANSI A208.1 Particleboard standard. Grade LD-2.

2. Adhesive: Fully bonded construction using Polyurethane (PUR) glue.

3. Blocking: As indicated under article “Blocking”.

B. Fire Resistant Composite Core Doors:

1. Core: Non-combustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire protection rating indicated.

2. Blocking: As indicated under article “Blocking”.

3. Edge Construction: At hinge stiles, provide laminated edge construction with improved screw holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 BLOCKING

A. Non-Fire-Rated Doors:

1. Provide blocking as indicated below:

a. HB2: 5 inch bottom rail blocking, in doors indicated to have kick plates.
b. HB6: 5 inch mid-rail blocking in doors indicated to have exit devices.

B. Fire Rated Doors:

1. Provide blocking as indicated below:

a. HB1: 5 inch in doors indicated to have closers and overhead stops.
b. HB6: 5 inch mid-rail blocking in doors indicated to have exit devices.

2.4 VENEERED DOORS FOR TRANSPARENT FINISH

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Graham
2. Mohawk
3. VT Industries
4. Eggers

B. Interior Solid Core Doors:

1. Grade: Premium.

2. Faces: Veneer grades as noted below; veneer minimum 1/50-inch (0.5mm) thickness at moisture content of 12% or less.

a. Plain sliced select white birch.

3. Match between Veneer Leaves: Book match.

4. Assembly of Veneer Leaves on Door Faces:

    a. Running Match.

5. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.

6. Transom Match: Continuous match.

7. Vertical Edges: Matching same species as faces. Wood or composite material, one piece, laminated, or veneered. Minimum requirements per WDMA section P-1, Performance Standards for Architectural Wood Flush Doors.

8. Horizontal Edges: Solid wood or structural composite material meeting the minimum requirements per WDMA section P-1, Performance Standards for Architectural Wood Flush Doors

9. Construction: Five plies. Stiles and rails are bonded to core, then entire unit sanded before applying face veneers.

10. At doors over 40% of the face cut-out for lights and or louvers, furnish engineered composite lumber core.

2.5 LOUVERS

A. Metal Louvers: Door manufacturer's standard metal louvers unless otherwise indicated.

1. Blade Type: Vision proof inverted V or inverted Y.
2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish.

2.6 LIGHT FRAMES AND GLAZING

A. Wood Beads for Light Openings in non-rated Wood Doors:

1. Wood Species: Same species as door faces.
2. Profile: Lipped.

B. Metal Light Kits for fire rated Wood Doors:
1. Veneer Wrapped metal frames with matching wood species: Same species as door faces.
2. Profile: Similar to manufacturers Lipped bead on non-rated doors.

C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with the flush wood door manufacturer's written instructions.

2.7 FABRICATION

A. Factory fit doors to suit frame opening sizes indicated.
1. Comply with requirements in NFPA 80 for fire rated doors.
2. Undercut: As required per manufacturer’s templates and sill condition.

B. Factory machine doors for hardware that is not surface applied. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
2. Metal Astragals: Factory machine astragals and formed steel edges for hardware for pairs of fire rated doors.

C. Openings: Cut and trim openings through doors in factory.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Comply with applicable requirements in Division 08 Section "Glazing."
3. Louvers: Factory install louvers in prepared openings.

D. Electrical Raceways: Provide flush wood doors receiving electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through wire transfer hardware or wiring harness specified in hardware sets in Division 08 "Door Hardware". Wire nut connections are not acceptable.

2.8 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Transparent Finish: Provide a clear protective coating over the wood veneer allowing the natural color and grain of the selected wood species to provide the appearance specified. Stain is applied to the wood surface underneath the transparent finish to add color and design flexibility.

1. Finish: Meet or exceed WDMA I.S. 1A TR8 UV Cured Acrylated Polyester finish performance requirements.
2. Staining:

a. **Basis of Design: VT Industries AL-18 “Alpine”**

3. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware."

B. Installation Instructions: Install doors and frames to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

1. Install fire rated doors in corresponding fire rated frames according to NFPA 80.

C. Factory Fitted Doors: Align in frames for uniform clearance at each edge.

D. Factory Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

E. Field modifications to doors shall not be permitted, except those specifically allowed by manufacturer or fire rating requirements.

3.3 ADJUSTING

A. Operation: Re-hang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

SECTION 08 31 00 - ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Fire-resistive rated access door and frame units.
2. Non fire-resistive rated access door and frame units.
3. Wall and ceiling locations.

B. Related Documents: The Contract Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 SUBMITTALS

A. Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed submit:
1. Product Data: Sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
2. Shop Drawings: Indicate exact position of all access door units.
3. Assurance/Control Submittals:
a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

B. Section 01 70 50 – Project Closeouts Submittals: Procedures for closeout submittals.
1. Project Record Documents: Accurately record the following:
a. Actual locations of all access units.

1.5 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 64 00 – Project Handling: Transport, handle, store, and protect Products.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following: (or equal)
1. J.L. Industries, Bloomington, MN (612) 835-6850.
2. Karp, Maspeth, NY (800) 888-4212.
3. Larsen's Manufacturing Company, Minneapolis, MN (800) 527-7367.
4. Milcor, Lima, OH (800) 528-1411.

2.2 ACCESS DOORS

A. Non Fire-Rated: 24" x 24" 20 gage recessed steel panel doors for installation in masonry, tile or drywall walls.

B. Fire-Rated Models: 24" x 24" 14 gage recessed steel panel doors for installation in masonry, tile or drywall walls.

2.3 FABRICATION

A. Fabricate frames and flanges of 0.058 inch steel. Coordinate frame configuration and anchoring with wall or ceiling construction where access door is to be installed.

B. Fabricate door panels of 0.070 inch single thickness steel sheet.

C. Weld, fill, and grind joints to ensure flush and square unit.

D. Hardware:
1. Hinge: 175 degree stainless steel piano hinge concealed constant force closure spring type.
2. Lock: Screw driver slot for quarter turn cam lock unit.

2.4 FINISHES

A. Base Metal Protection: Prime coat units with alkyd primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify of existing conditions before starting work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
1. Verify that rough openings for door and frame are correctly sized and located.

C. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 INSTALLATION

A. Install units in accordance with manufacturer's published instructions where indicated on Drawings and required for access. Not all locations are shown on the Drawings as they must be field determined during the construction. However, the Contractor is still responsible for these units and all costs are to be a part of the Base Bid.

FOR BIDDING PURPOSES, ASSUME AT LEAST THREE (3) NON-FIRE RATED ACCESS DOORS AND ONE (1) FIRE RATED ACCESS DOORS WILL BE INSTALLED).

B. Install frames plumb and level in opening. Secure rigidly in place.

C. Position unit to provide convenient access to concealed work requiring access.

3.3 CONSTRUCTION

A. Interface with Other Work: Coordinate with mechanical, electrical, and other Work requiring access units.

END OF SECTION

SECTION 08 33 00 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
1. Overhead coiling counter door (manually operated)
2. Hardware.

B. Related work:
1. Documents affecting Work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Section in Division 1 of these Specifications.

1.2 DEFINITIONS

A. Operation cycle: One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.

1.3 PERFORMANCE REQUIREMENTS

A. Structural performance to include providing overhead coiling door capable of withstanding the effects of gravity.

B. Operating cycle requirements: Design overhead coiling door components and operator to operate for not less than 50,000 cycles.

1.4 SUBMITTALS

A. Reference Section 01 33 23 - Submittal Procedures: Procedures for submittals
1. Submit all manufacturers product data.
2. Shop drawings: Include special conditions not detailed in manufacturers product data and interface with adjacent conditions.
3. Assurance/Control Submittals
a. Certificates: Manufacturer’s certificate that Products meet or exceed specified requirements.
b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
c. Manufacturer’s Installation Instructions.

B. Section 01 78 00 - Closeout Submittals: Procedures for closeout submittals
1. Project Record Documents including Operating and Maintenance Manual.
2. Special Warranty: Submit written special warranty with forms completed in Mineral Springs School District name and registered with manufacturer as specified in this Section.
3. Certificate stating properly installed materials that comply with this specification.

1.5 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience and approved by manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING
A. Section 01 60 00 - Product Requirements: Transport, handle, store and protect Products.

1.7 WARRANTY

A. Section 01 78 00 - Closeout Submittals: Procedures for closeout submittals.

B. One year standard warranty against defects in material and workmanship.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. AlumaTek, Inc., Greenville, RI (800) 949-9950
2. Cornell Cookson, Mountaintop, PA (800) 233-8366
3. Dynaflair Corporation, Tampa, FL (813) 248-8100 (800) 624-3667
4. Dynamic Closures Corporation, Massena, NY (800) 663-4599
5. Metro Door, Hauppauge, NY (800) 669-3667
6. Overhead Door Corporation, Farmer's Branch, TX (800) 972-1730

B. Product options and substitutions. Substitutions: Permitted.

2.2 DESCRIPTION

A. Provide and install the following Overhead Coiling doors:

229 Warewashing **4'-8" W x 4'-6" H (Wall Opening Dimensions)**

B. Field verify all openings.

2.3 OVERHEAD COILING COUNTER DOORS

A. Model: 650 Series Counter Doors by Overhead Door Corporation, or equal.
1. Door Numbers**: 229**

B. Curtain: Interlocking slats, Type F-128 fabricated of galvanized steel. Endlocks shall be attached to alternate slats to maintain curtain alignment and prevent lateral slat movement.

C. Finish: Slats and hood shall be galvanized steel in accordance with ASTM A 653 and receive rust-inhibitive, roll coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick powder coated top coat. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer.

D. Color: Powder coating (Powderguard) finish in color as selected by Architect from manufacturer's standard (approximately 200 color options) colors.

E. Bottom Bar: Steel tubular locking bottom bar.

F. Guides: Steel shapes

G. Brackets: Steel plate to support counterbalance, curtain and hood.

H. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel.

I. Hood: Galvanized primed steel hood. Provide intermediate support brackets as required.
J. Manual Operation: Manual push up.

K. Locking: Cylinder lock.

L. Wall Mounting Condition: **Face-of-wall mounting**

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required and ready to receive Work.
   1. Verify that opening sizes, tolerances, and conditions are as indicated on Drawings.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

D.By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 INSTALLATION

A. Install door unit assembly in accordance with published manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Sensing edge bottom is to be above the ceiling edge.

3.3 CONSTRUCTION

A. Site Tolerances:
   1. Maintain dimensional tolerances and alignment with adjacent work.
   2. Maximum Variation From Plumb: 1/16 inch.
   3. Maximum Variation From Level: 1/16 inch.

3.4 ADJUSTING

A. Following completion of installation, including related work by others; lubricate, test and adjust doors for ease of operation, free of warp, distortion or twist.

3.5 CLEANING

A. Section 01 74 00 - Cleaning: Cleaning installed work.

B. Clean surfaces soiled by work as recommended by manufacturer.

C. Remove labels and visible markings.

3.6 DEMONSTRATION

A. Demonstrate proper operation, at least 5 Operation Cycles to Owner's Representative.

B. Instruct Owner's Representative in proper maintenance procedures.

END OF SECTION

SECTION 08 71 00 – FINISH HARDWARE

PART 1 – GENERAL:

1.01 SUMMARY:

A. Section includes the supply and installation of the Finish Hardware.
1. Include the termination of all Electrified Hardware.
2. Include field verification of any existing doors, frames or hardware.

B. Related Sections
1. Division 1
2. Sealants – Division 7
3. Openings – Division 8
4. Finishes – Division 9
5. Fire Alarm – Division 28
6. Electrical – Division 26
7. Security – Division 28

1.02 REFERENCES:

A. Documents and Institutes that shall be used in estimating, detailing and installing the items specified.

1. International Building Code – Current/Adopted Edition
2. ICC/ANSI A117.1 – Accessible and Usable Building and Facilities -Current/Adopted Edition
3. NFPA 70 – Current/Adopted Edition
4. NFPA80 –Standards For Fire Doors and Fire Windows – Current/Adopted Edition
5. NFPA101 – Life Safety Code – Current/Adopted Edition
6. NFPA105 – Installation of Smoke-Control Door Assemblies – Current/Adopted Edition.
7. ANSI - American National Standards Institute
8. BHMA – Builders Hardware Manufacturers Association
9. UL – Underwriters Laboratory
10. DHI – Door and Hardware Institute
11. Accessibility Standards – Current Adopted Edition
12. Local Building Codes

1.03 SUBMITTALS

A. Comply with pertinent provisions of Division 01.

B. Finish Hardware Schedule to be in vertical format to include:
1. Heading #/Hardware Set
2. Door #, Location, Hand, Degree of Opening, Door Size and Type, Frame Size and Type, Fire Rating
3. Quantity, type, style, function, product, product number, size, fasteners, finish and manufacturer of each hardware item.
4. Location of hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
5. Keying schedule
6. Title Sheet, Index, Abbreviations, Manufacturers List, Template List and Templates.
7. Mounting locations for hardware.
8. Explanation of abbreviations, symbols, and codes contained in schedule.
9. Date of the Finish Hardware Specification and Drawing / Door Schedule used in completing the Finish Hardware Schedule.
10. In Name, Company and Date of Field Verification if required.
11. Door Index; include door number, heading number, and hardware group.

12. Name and phone number for local manufacturer's representative for each product.
13. Submit in conjunction with Door and Frame Submittal.
14. Operation Description of openings with electrified hardware.

C. Product Data: Provide product data in the form of a binder, manufacturer's technical product fact sheets for each item of hardware. Include whatever information may be necessary to show compliance with requirements, including instructions for installation and for maintenance of operating parts and finish.

D. Wiring Diagrams: Provide Riser/Elevation and Point to Point Wiring Diagrams for all openings with electrified hardware. Include all information that is necessary for coordination with other trades.

E. Samples: Provide samples as requested by Owner or Architect with Heading # and Door# marked on boxes. All samples will be returned to the contractor and used on doors for which they were marked.

F. Templates: Provide templates of finish hardware items to each fabricator of doors, frames and other work to be factory or shop prepared for the installation of hardware.

G. Keying Schedule: After meeting with the Owner, a keying schedule shall be submitted using keyset symbols referenced in DHI manual "Keying Systems and Nomenclature." The keying schedule shall be indexed by door number, keyset, hardware heading number, cross keying instructions and special key stamping instructions.

H. Operations and maintenance data: At the completion of the job, provide to the Owner one hard copies or one electronic copy of an Owner's operation and maintenance manual. The manual shall consist of a labeled hardcover three ring binder with the following technical information:
1. Title page containing: Project name, address and phone numbers. Supplier's name, address and phone numbers.
2. Table of Contents.
3. Copy of final (file and field use/as-installed) Finish Hardware Schedule.
4. Final Keying Schedule.
5. Maintenance instruction, adjustment, and preservation of finishes for each item of hardware.
6. Catalog pages for each items of hardware.
7. Installation Instructions for each item of hardware
8. Parts List for each item of hardware.
9. As installed point to point wiring diagrams for electrified hardware.
10. Warranties include Order #.

1.04 QUALITY ASSURANCES

A. Substitutions: Request for substitutions shall not be accepted within this project. Architect, Owner and Finish Hardware Consultant have selected one (1) specified and two (2) equals listed hereinafter in the Hardware Schedule. By this selection process they have established three (3) equal products for competitive pricing, while insuring no unnecessary delays by a substitution process. If any specified product is listed as a "No Substitution" product, this product will be supplied as specified, with no alteration or request of substitution. The reason for this is to comply with the uniformity established at this project. Parts and supplies are inventoried for these particular products for ease and standardization of replacement.

B. Supplier Qualifications: Supplier shall be recognized architectural finish hardware supplier, with warehousing facilities, who have been furnishing hardware in the project vicinity for a period of not less than 2 year and who is or employs a DHI Certified AHC, DHC, DHSC or person with a minimum of 10 years of experience as a hardware supplier. This person shall be available at reasonable times during the course of the work for consultation about products hardware requirements, to the Owner, Architect and General Contractor.

C. Installer Qualifications (Mechanical Hardware): All finish hardware shall be installed by the Finish Hardware Installer with a minimum of at least two (2) years documented experience. Installer shall attend a pre-installation meeting between the General Contractor, Finish Hardware Supplier/s, hardware manufacturer's representative for locks, closers and exit devices, and all door / frame suppliers. The Finish Hardware Installer shall be responsible for the proper installation and function of all doors and hardware.

D. Installer Qualifications (Electrified Hardware): All electrified finish hardware (power source, electrified locking or control device, switching device, through wire device and monitoring device) shall be installed by an Electronic Access Control Installer licensed by the Texas Department of Public Safety. The Electrified Finish Hardware Installer shall have a minimum of at least two (2) years of documented experience. Installer shall attend a pre-installation meeting between the General Contractor, Finish Hardware Supplier/s, Electrical Contractor, Fire Alarm Contractor, Security Contractor, hardware manufacturer's representative for electrified hardware, all door / frame suppliers. The Electrified Finish Hardware Installer shall be responsible for the proper installation, termination and function of all opening with electrified hardware. Installation shall include termination of all electrified products (including the required wire to the power supply and/or junction box).

1.05 DELIVERY, STORAGE AND HANDLING

A. Marking and packaging: Mark each item or package separately, with identification related to hardware set number, door number and keyset symbol.

B. Delivery:
1. Deliver individually packaged and properly marked finish hardware at the proper time and location to avoid any delays in construction or installation.
2. At time of delivery, inventory hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

C. Storage: Store hardware in enclosed, dry and locked area.

1.06 WARRANTY

A. All finish hardware products shall be covered by a 1 year factory warranty from the date of substantial completion of the project.

B. Supply warranty verification to the owner for all products that provide factory warranty. Warranty should include Factory Order # and date.

1.07 MAINTENANCE:

A. Maintenance Service
1. None

B. Extra Materials:
1. All extra screws, fasteners, and all special installation tools furnished with the hardware shall be turned over to the owner at the completion of the job.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Screws and Fasteners:
1. Coordinate with door supplier and manufacturer to ensure proper blocking and reinforcement is provided to support wood or machine screws when mounting panic hardware and door closers. If proper blocking and reinforcement is not included provide through bolts sized to the thickness of the door. All fasteners should be the proper type and length for the product being supplied.

2. All finish hardware shall be installed to manufacturer's recommendations, using screws, attachments and installation tools provided with the hardware. No other screws or attachments are acceptable.
3. All other products to meet door and frame conditions.

B. Hinges:
1. Template: Provide templated units only.
2. Exterior: All exterior hinges shall be stainless steel base with stainless steel pin and stainless steel finish.
3. Interior: All interior hinges steel based.
4. Interior corrosive: All interior hinges at corrosive areas shall be stainless steel base with stainless still pin and stainless steel finish.
5. All hinges on doors over 36" wide, with exit devices, or with push/pull shall be heavy weight.
6. Electric Hinge: Provide minimum 8 wire.
7. Provide non-removable pins for outswinging doors that are locked or are lockable.
8. All hinges on doors with door closers shall be ball bearing.
9. All hinges shall be full mortise.
10. Size: Provide 4 ½ x 4 ½ hinges on doors up to 3'0" in width. Provide 5 x 4 ½ hinges over 3'0" to 4'0" in width. Reference manufacturers catalog for all other sizes.
11. Number of Hinges: Provide number of hinges indicated but not less than 3 hinges for door leaf for doors 90" or less in height and one additional hinge for each 30" of additional height.
12. Adjust hinge width as required for door, frame, trim and wall conditions to allow proper degree of opening.
13. Provide hinges conforming to ANSI/BHMA A156.1.
14. Provide spring hinges where specified. Provide two spring hinges and one bearing hinge per door leaf for doors 90 inches (2286 mm) or less in height. Provide one additional bearing hinge for each 30 inches (762 mm) of additional door height.
15. Supply from the following list of manufacturers:

Ives	IVE
Hager	HAG
Bommer	BOM

C. Continuous Hinges
1. Continuous hinges to be manufactured of 6063-T6 aluminum.
2. Continuous hinge shall be certified to ANSI 156.26, Grade 1
3. Continuous hinge should be tested an approved UL10C.
4. Electrified – Provide minimum 8 wire with removable panel.
5. Provide hinges 1 inch shorter in length than nominal height of door, unless otherwise noted.
6. Provide reinforcing for doors weighing over 450 pounds and up to 600 pounds.
7. Supply from the following list of manufacturers:

Ives	IVE
Select	SEL
Stanley	STA

D. Cylindrical Locks
1. All locks on this project should be manufacturer by the same manufacturer.
2. All locks shall meet the new ANSI/BHMA A156.2, Series 4000, Grade 1.
3. All cylindrical locks shall be UL Listed for 3 hour fire door. Review lock for any height restriction.
4. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with a 1/2 inch (13 mm) latch throw. Provide proper latch throw for UL listing at pairs.
5. Provide standard ASA strikes unless extended lip strike is necessary for frame/trim or 7/8" lip strike is necessary at pair with overlapping astragal.
6. Provide dust box.
7. Lockset shall adjust to fit door thickness from 1 ¾" to 2 1/8".
8. Supply from the following list of manufacturers:
9. Schlage SCH – No Substitutes, match existing standards.

E. Exit Devices
1. All exit device types on this project should be manufactured by the same manufacturer.
2. Exit devices are to be architectural grade touch bar type. Touchpad to extend one half of door width.
3. Mechanism case to be smooth.
4. Exit devices shall meet ANSI A156.3, Grade 1.
5. All exit devices are UL listed Panic Exit or Fire Exit Hardware.
6. All lever trim to match lock trim in design and finish.
7. Dogging: Non-rated devices are to be provided with dogging. Less dogging where shown in Hardware Sets (some exterior, electrical rooms, electrified) Cylinder dogging as shown in hardware sets.
8. Exit devices are to be supplied and installed with thru-bolts for exterior, hollow metal doors, or as required for application.
9. Provide proper power supply for exit devices as required. Coordinate with Fire Alarm, Electrical and Security Contractor.
10. Push pads shall be metal, no plastic inserts allowed.
11. Exit devices shall have a flush end cap.
12. Exit devices shall be ordered with the correct strike for application.
13. Exit devices shall be order in the proper length to meet door width.
14. Exit devices shall have deadlatching.
15. Exit device shall be provided in width/height required based on door size.
16. Install exit devices with fasteners supplied by exit device manufacturer.
17. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits as required.
18. Provide proper concealed vertical rods for wood or hollow metal doors as required.
19. Factory or field drill weep holes for exit devices used in full exterior applications, highly corrosive areas, and where noted in the hardware sets.
20. Supply from the following list of manufacturers:

Von Duprin	VON	33/99 Series - No Substitutes, match existing standards.

F. Flush Bolts
1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.
2. Supply from the following list of manufacturers:

Ives	IVE
Trimco	TRI
Rockwood	ROC

G. Coordinators
1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers and surface vertical rod exit device strikes. Factory-prep coordinators for vertical rod devices and hardware as required.
3. Supply from the following list of manufacturers:

Ives	IVE
Trimco	TRI
Rockwood	ROC

H. Pull Plates/Pulls/Push Plate
1. Pull and Push Plates to meet ANSI 156.6 for .050” thickness.
2. Pull and Push Plate size to 4” x 16”.

3. Pull Plate to have 10” center and 1” round on pull plate with concealed fasteners.
4. Provide straight and offset pulls with fasteners as required
5. Provide concealed fasteners for all applications.
6. Prep plate for cylinder/lock as required.
7. Supply from the following list of manufacturers

Ives	IVE
Trimco	TRI
Rockwood	ROC

I. Door Closers
1. All door closers on this project should be manufactured by the same manufacturer.
2. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
3. Door closers shall be furnished with standard cover. Provide full cover as shown in hardware sets.
4. Size in accordance with the manufacturers recommendations for door size and condition.
5. Door closers shall be furnished with delayed action, hold-open as listed in the Hardware Sets.
6. Door closers shall be mounted out of the line of sight wherever possible (i.e., room side of corridor doors, etc.) with parallel arm mounting on out swinging doors.
7. All closer installation shall include thru bolts on exterior, hollow metal doors or where required for application.
8. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.
9. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
10. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
11. Supply from the following list of manufacturers

LCN	LCN - No Substitutes, match existing standards.

J. Door Protection Plates
1. Protective plates shall meet ANSI A156.6 requirements for .050 thickness.
2. Protection plates should be fabricated from stainless steel.
3. Protection plate shall be height as shown in Hardware Sets. Width shall be 10” by 2” less than door width on single door or pair with a mullion and 1” less than door width on pair of doors without a mullion.
4. Beveled 4 edges.
5. Provide kickplate on all doors with closers, unless not required for aesthetic reasons.
6. Prep protective plates for hardware as required.
7. Supply from the following list of manufacturers:

Ives	IVE
Rockwood	ROC
Trimco	TRI

K. Door Stops and Holders:
1. Supply wall stops at all openings to protect doors or door hardware. Install so lock does not lock unintentionally. Install blocking in wall where wall stop will be mounted.
2. When wall conditions do not permit use of wall stop provide floor stops with risers as needed to adjust for floor conditions.
3. When wall conditions do not permit use of wall stop provide overhead stops. Jamb mount where required to not be visible from Corridor.
4. Exterior Ground Level Doors: Provide security floor stop.
5. Exterior Roof Doors: Provide heavy duty overhead stop.
6. Supply from the following list of manufacturers:

Glynn Johnson	GLY
Rockwood	ROC

Trimco	TRI

L. Silencers
1. Provide silencers on all doors without seal. 3 for single doors and 2 for pairs.
2. Provide silencers as required for frame conditions. SR64 for hollow metal frames. SR65/SR66 for wood frames.
3. At wood frames, insure height of stop is compatible with silencer.
4. Supply from the following list of manufacturer's

Ives	IVE
Rockwood	ROC
Trimco	TRI

M. Thresholds/Weatherstripping

1. Thresholds on doors in the accessible path shall conform to accessibility codes.
2. Threshold should be based on sill detail.
3. Smoke seal shall be teardrop design bulb seal.
4. Exterior seal/thresholds shall be silicone or brush as shown in hardware sets.
5. Drip strips shall protrude 2 ½" and be 4" wider than opening.
6. At S Label single doors provide seals on frame to comply with UL1784
7. At S Label pair of doors provide seals on frame and as meeting stile to comply with UL1784.
8. Automatic Door Bottom shall be mortised to comply with accessibility codes.
9. Supply from the following list of manufacturer's

Zero	ZER
National Guard	NGP
Pemko	PEM

2.03 KEYING:

A. General: Finish Hardware Supplier shall meet in person with owner to finalize keying requirements prior to the locks and exit devices being ordered and match existing Master Key System for the project. During keying meeting all hardware functions should be reviewed with the owner to finalize lock and exit device functions. During keying meeting determine all expansion required.

B. Cylinders: Provide the correct and quantity of cylinders for all applications.

C. Keys: Provide nickel silver keys only. Furnish 2 change keys for each lock: 5 control keys: 5 master keys for each master system and 5 grandmaster keys for each grandmaster key system. Deliver all keys to Owners' Representative.

D. Cores and keys shall be provided with identification stamping.

E. Provide construction keying / construction cores for this project with constructions keys.

F. Provide Bitting List to Owner.

2.04 KEY CONTROL:

A. Key control shall be provided, by supplying a complete key storage and management system. Provide a complete key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers and standard metal cabinet. Size of system to be 150% of the number of locks required for the project.

PART 3 – EXECUTION:

3.01 EXAMINATION:

A. Examine doors, frames and related items for conditions that would prevent the proper application of any finish hardware items. Do not proceed with installation until all defects are corrected.

B. Existing Door and Frame Compatibility: Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.

C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION:

A. Follow Door and Hardware Institute Publication:
Recommended Location for Architectural Hardware for Standard Steel Doors and Frames
Recommended Location for Builder's Hardware for Custom Steel Doors and Frames
Recommended Locations for Architectural Hardware for Wood Flush Door

B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

C.

D. Follow ANSI A117.1-1998 Accessible and Usable Building and Facilities and Texas Accessibility Standards.

E. Review mounting locations with Architect where required.

F. Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers should not be visible in corridors, lobbies and other public spaces where possible.

G. Locate power supplies in accessible location and indicate in as-builts where located.

H. Set threshold in full bed of sealant complying with requirements specified in Division 07.

I. Pre Installation meeting required with attendees to include Architect, General Contractor, Mechanical Hardware Installer, Electrified Hardware Installer, Finish Hardware Supplier and Manufacturer's Representative for Exit Device, Locks and Closers and Door/Frame Suppliers before installation begins.

3.03 FIELD QUALITY CONTROL:

A. After installation has been completed, obtain the services of an Architectural Hardware Consultant to check for proper installation of finish hardware, according to the finish hardware schedule and keying schedule. In addition, check all hardware for adjustments and proper operation.

3.04 ADJUST AND CLEAN:

A. Adjust, clean and inspect all hardware, to ensure proper operation and function of every opening. Replace items, which cannot be adjusted to operate freely and smoothly as intended for the application made.

3.05 PROTECTION:

A. The General Contractor shall use all means at his disposal to protect all finish hardware items from abuse, corrosion and other damage until the owner accepts the project as complete.

3.06 TRAINING

A. After installation has been completed, provide training to the Owner on the operation of the Finish Hardware and programming of any electrified hardware.

3.07 HARDWARE SCHEDULE

A. These hardware set shown below are for use as a guideline. Provide hardware as required to meet the requirements of the openings, security, and code requirements.

END OF SECTION

Hardware set 01

Doors: 105A, 105B, 107A, 107B, 109A, 109B, 204A, 207, 208, 210, 211, 212, 213, 215, 223

3	EA	Hinge, Full Mortise	5BB1 4-1/2" x 4-1/2" 652	IV
1	EA	Cylindrical Lock	ND75 .P6 .RHO .626 .C123	SC
1	EA	Surface Closer	4040XP .RWPA .689 .TBSRT	LC
1	EA	Kick Plate	8400 B-CS 10" x 34" US32D	IV
1	EA	Gasketing	188S-BK 17'	ZE

Hardware set 02

Doors: 100A

Astragal by door supplier

6	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 652	IV
2	EA	Fire Rated Surf Vert Rod	9927.EO.F .626 .4' .SNB	VD
2	EA	Surface Closer	4040XP .RWPA .689 .TBSRT	LC
2	EA	Kick Plate	8400 B-CS 10" x 47" US32D	IV
2	EA	Electromagnetic Holder	SEM7840 .689	LC
1	EA	Gasketing	188S-BK 25'	ZE

Hardware set 03

Doors: 100B, 200A

Card reader and power supply by access control contractor. Coordinate with electrical

1	EA	Continuous Hinge	112HD 83" 628	IV
1	EA	Continuous Hinge	112HD 83" 628 EPT	IV
1	EA	Mullion	KR4954 7'6 .689	VD
1	EA	Rim Exit Device	99.EO .626	VD
1	EA	Rim Exit Device	.QEL .RX 99.NLOP .626 .110MD-NL	VD
1	EA	Vandal Resistant Trim	VR910-DT 630	IV
1	EA	Vandal Resistant Trim	VR910-NL 630	IV
1	EA	Cylinder	20-022 .626 .C123	SC
1	EA	Cylinder	20-001 .626 .1-1/4" .C123	SC
2	EA	Surface Closer	4040XP .SCUSH .689 .TBSRT	LC
2	EA	Kick Plate	8400 B-CS 10" x 34" US32D	IV
1	EA	Threshold	655A x 72"	ZE
1	EA	Gasketing	139A x 72" x 84"	ZE
1	EA	Gasketing	8780N 8'	ZE
2	EA	Sweep	39A x 36"	ZE
1	EA	Wire Harness	CON-192P	VD
1	EA	Wire Harness	CON-12	VD

Hardware set 04

Doors: 119A

FEMA 361 Rated. Must be used with Steelcraft Paladian Doors

6	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 652	IV
2	EA	Surface Vert Rod Exit	.WS 9927.L .626 .996L(Std)	VD
2	EA	Cylinder	20-022 .626 .C123	SC
2	EA	Surface Closer	4040XP .SCUSH .689 .TBSRT	LC
2	EA	Kick Plate	8400 B-CS 10" x 34" US32D	IV
1	EA	Gasketing	188S-BK 20'	ZE

Hardware set 05

Doors: 119B, 119C

FEMA 361 Rated. Must be used with Steelcraft Paladian Doors
Card reader and power supply by access control contractor. Coordinate with electrical

6	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 652	IV
1	EA	Electric Power Transfer	EPT10 .689	VD
1	EA	Surface Vert Rod Exit	.WS 9927.L .626 .996L(Std)	VD
1	EA	Surface Vert Rod Exit	.QEL .RX .WS 9927.L .626 .996L(Std)	VD
2	EA	Cylinder	20-022 .626 .C123	SC
2	EA	Surface Closer	4040XP .SCUSH .689 .TBSRT	LC
2	EA	Kick Plate	8400 B-CS 10" x 34" US32D	IV
1	EA	Threshold	655A x 72"	ZE
1	EA	Gasketing	139A x 72" x 84"	ZE
1	EA	Gasketing	188S-BK 20'	ZE
1	EA	Rain Drip	142AA x 76"	ZE
2	EA	Sweep	39A x 36"	ZE
2	EA	Astragal	8192AA x 84"	ZE
1	EA	Wire Harness	CON-192P	VD
1	EA	Wire Harness	CON-32	VD

Hardware set 06

Doors: 101, 102, 103, 113, 116, 117, 214, 217, 218, 219, 220, 236

3	EA	Hinge, Full Mortise	5BB1 4-1/2" x 4-1/2" 652	IV
1	EA	Cylindrical Lock	ND80 .P6 .RHO .626 .C123	SC
1	EA	Wall Stop	WS406CCV 630	IV
3	EA	Silencer	SR64-GRY	IV

Hardware set 07

Doors: 106, 108, 110, 114B, 115B, 115C, 115D, 221A, 221B, 222A, 222B, 222C, 222D, 222E, 225, 235

3	EA	Hinge, Full Mortise	5BB1 4-1/2" x 4-1/2" 652	IV
1	EA	Cylindrical Lock	ND40 .RHO .626	SC
1	EA	Wall Stop	WS406CCV 630	IV
3	EA	Silencer	SR64-GRY	IV

Hardware set 08

Doors: 114A, 115A

3	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 652	IV
1	EA	Push Plate	8200-4x16 630	IV
1	EA	Pull Plate	8303-0-4x16 630	IV
1	EA	Surface Closer	4040XP .RWPA .689 .TBSRT	LC
1	EA	Kick Plate	8400 B-CS 10" x 34" US32D	IV
1	EA	Floor Stop	FS436 626	IV
3	EA	Silencer	SR64-GRY	IV

Hardware set 09

Doors: 118, 205, 206, 209, 224

3	EA	Hinge, Full Mortise	5BB1 4-1/2" x 4-1/2" 652	IV
1	EA	Cylindrical Lock	ND80 .P6 .RHO .626 .C123	SC
1	EA	Overhead Stop	904S 630	GJ
3	EA	Silencer	SR64-GRY	IV

Hardware set 10

Doors: 122

3	EA	Hinge, Full Mortise	5BB1 4-1/2" x 4-1/2" 652 NRP	IV
1	EA	Mortise Lock	L9473 .P6 .06N .626 .C123	SC
1	EA	Surface Closer	4040XP .SCUSH .689 .TBSRT	LC
1	EA	Threshold	655A x 36"	ZE
1	EA	Gasketing	139A x 36" x 84"	ZE
1	EA	Rain Drip	142AA x 40"	ZE
1	EA	Sweep	39A x 36"	ZE

Hardware set 11

Doors: 123

FEMA 361 Rated. Must be used with Steelcraft Paladian Doors

6	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 652	IV
2	EA	Surface Bolt	SB360 604	IV
1	EA	Classroom Lock	LM9370 .P6 .06B .626	SC
2	EA	Surface Closer	4040XP .SCUSH .689 .TBSRT	LC
		Active door only		
2	EA	Kick Plate	8400 B-CS 10" x 34" US32D	IV
2	EA	Silencer	SR64-GRY	IV

Hardware set 12

Doors: S100, S200

3	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 652	IV
1	EA	Fire Rated Rim Exit	99.L.F .626 .996L(Std)	VD
1	EA	Cylinder	20-022 .626 .C123	SC
1	EA	Surface Closer	4040XP .RWPA .689 .TBSRT	LC
1	EA	Kick Plate	8400 B-CS 10" x 34" US32D	IV
1	EA	Wall Stop	WS406CCV 630	IV
1	EA	Gasketing	188S-BK 17'	ZE

Hardware set 13

Doors: 226A, 226B

Weatherstrip by frame supplier
Card reader and power supply by access control contractor. Coordinate with electrical

1	EA	Continuous Hinge	112HD 83" 628	IV
1	EA	Continuous Hinge	112HD 83" 628 EPT	IV
1	EA	Concealed Vert Cable Exit	.QEL .RX 3349A.NLOP .626 .388(Std)	VD
1	EA	Concealed Vert Cable Exit	3349A.EO .626	VD
1	EA	Cylinder	20-022 .626 .C123	SC
2	EA	Surface Closer	4040XP .SCUSH .689 .TBSRT	LC
2	EA	Drop Plate	4040XP-18PA .689	LC
2	EA	Shoe	4040XP-30 .689	LC
2	EA	Spacer	4040XP-61 .689	LC
1	EA	Threshold	655A x 72"	ZE
2	EA	Sweep	39A x 36"	ZE
1	EA	Wire Harness	CON-192P	VD
1	EA	Wire Harness	CON-32	VD

Hardware set 14

Doors: 200B

6	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 652	IV
2	EA	Push Plate	8200-4x16 630	IV
2	EA	Door Pull	8190EZHD-0 630-316	IV
2	EA	Surface Closer	4040XP .RWPA .689 .TBSRT	LC
2	EA	Kick Plate	8400 B-CS 10" x 34" US32D	IV
2	EA	Wall Stop	WS406CCV 630	IV
1	EA	Gasketing	8780N 8'	ZE

Hardware set 15

Doors: 200C

6	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 652	IV
1	EA	Mullion	KR4954 7'6 .689	VD
1	EA	Rim Exit Device	99.NLOP .626 .110MD-NL	VD
1	EA	Rim Exit Device	99.EO .626	VD
1	EA	Cylinder	20-022 .626 .C123	SC
1	EA	Cylinder	20-001 .626 .1-1/4" .C123	SC
2	EA	Door Pull	8190EZHD-0 630-316	IV
2	EA	Surface Closer	4040XP .RWPA .689 .TBSRT	LC
2	EA	Kick Plate	8400 B-CS 10" x 34" US32D	IV
2	EA	Wall Stop	WS406CCV 630	IV
1	EA	Gasketing	188S-BK 20'	ZE

Hardware set 16

Doors: 201

6	EA	Hinge, Full Mortise	5BB1 4-1/2" x 4-1/2" 652	IV
2	EA	Flush Bolt	FB458 626	IV
1	EA	Dust Proof Strike	DP2 626	IV
1	EA	Cylindrical Lock	ND75 .P6 .RHO .626 .C123	SC
2	EA	Surface Closer	4040XP .RWPA .689 .TBSRT	LC
2	EA	Kick Plate	8400 B-CS 10" x 34" US32D	IV
2	EA	Wall Stop	WS406CCV 630	IV
1	EA	Gasketing	188S-BK 20'	ZE

Hardware set 17

Doors: 202, 203, 233, 234

3	EA	Hinge, Full Mortise	5BB1 4-1/2" x 4-1/2" 652	IV
1	EA	Cylindrical Lock	ND70 .P6 .RHO .626 .C123	SC
1	EA	Wall Stop	WS406CCV 630	IV
3	EA	Silencer	SR64-GRY	IV

Hardware set 18

Doors: 227

3	EA	Hinge, Full Mortise	5BB1 4-1/2" x 4-1/2" 652	IV
1	EA	Cylindrical Lock	ND10 .RHO .626	SC
1	EA	Surface Closer	4040XP .RWPA .689 .TBSRT	LC
1	EA	Kick Plate	8400 B-CS 10" x 34" US32D	IV
1	EA	Wall Stop	WS406CCV 630	IV
3	EA	Silencer	SR64-GRY	IV

Hardware set 19

Doors: 228

6	EA	Hinge, Full Mortise	5BB1 4-1/2" x 4-1/2" 652	IV
2	EA	Flush Bolt	FB458 626	IV
1	EA	Dust Proof Strike	DP2 626	IV
1	EA	Cylindrical Lock	ND70 .P6 .RHO .626 .C123	SC
2	EA	Armor Plate	8400 B-CS 35" x 35" US32D	IV
2	EA	Wall Stop	WS406CCV 630	IV
2	EA	Silencer	SR64-GRY	IV

Hardware set 20

Doors: 230A, 230B, 230C, 230D

3	EA	Hinge, Full Mortise	5BB1 4-1/2" x 4-1/2" 652	IV
1	EA	Cylindrical Lock	ND70 .P6 .RHO .626 .C123	SC
1	EA	Kick Plate	8400 B-CS 10" x 34" US32D	IV
1	EA	Floor Stop	FS41 626	IV
3	EA	Silencer	SR64-GRY	IV

Hardware set 21

Doors: 231

1	EA	Continuous Hinge	112HD 83" 628	IV
1	EA	Mortise Lock	L9473 .P6 .06N .626 .C123	SC
1	EA	Surface Closer	4040XP .SHCUSH .689 .TBSRT	LC
1	EA	Kick Plate	8400 B-CS 35" x 47" US32D	IV
1	EA	Threshold	655A x 48"	ZE
1	EA	Gasketing	188S-BK 20'	ZE
1	EA	Gasketing	139A x 48" x 84"	ZE
1	EA	Rain Drip	142AA x 52"	ZE
1	EA	Sweep	39A x 48"	ZE
1	EA	Viewer	698 626	IV

Hardware set 23

Doors: 120, 121

FEMA 361 Rated. Must be used with Steelcraft Paladian Doors

3	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 652	IV
1	EA	Office and Inner Entry Lock	LM9350 .P6 .06N .626 .C123	SC
1	EA	Surface Closer	4040XP .SCUSH .689 .TBSRT	LC
1	EA	Kick Plate	8400 B-CS 10" x 34" US32D	IV
1	EA	Wall Stop	WS406CCV 630	IV
1	EA	Gasketing	188S-BK 17'	ZE

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide glazing and glazing accessories where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related Work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 08 11 00 - Metal Doors and Frames
3. Section 08 14 16 – Flush Wood Doors
4. Section 08 12 16 - Aluminum Entrance, Fixed Frames, and Windows.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Manufacturer, Supplier, and Installer must each have at least five (5) years experience with all products / requirements of this section.

1.3 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 64 00.

B. During storage and handling of glass, provide cushions at edges to prevent impact damage.

1.4 Submittals

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedure used on the work.
4. Complete samples of all glass, tints, and etc. proposed under this Section.

PART 2 - PRODUCTS

2.1 GLASS

A. General:
1. For all glass, provide the type and thickness shown on the Drawings or specified herein.
2. Where type or thickness, or both, are not shown on the Drawings or specified herein, provide type and thickness directed by the Architect.

B. Plate or float glass: Comply with Fed Spec DD-G-451, type I, class 1, quality q3.
   1. Where plate glass is called for, 1/4" clear plate glass or float glass may be used.

C. Safety glass: (Insulated and tinted where noted on Drawings.)
   1. Provide tempered or heat-strengthened glass where indicated on the Drawings, and elsewhere as required by governmental agencies having jurisdiction. Tint shall be selected by Architect from Manufacturer's Standard color / tints.
   2. Glass for tempering:
      a. For plate glass or float glass, use type I, class 1, quality q3.
   3. Sizes and cutting:
      a. Prior to tempering or heat treating, cut glass to required sizes as determined by accurate measurements of the openings to be glazed, making allowances for required edge clearances.
      b. Cut and process edges in accordance with the glass manufacturer's recommendations.
      c. Do not cut or treat edges in the field.
   4. Fully tempered glass:
      a. Comply with Fed Spec DD-G-1403 and ANSI Z97.1.
      b. Wherever possible, locate tong marks along an edge which will be concealed in the glazing system.
      c. Permit minimum warpage practicable.

D. Insulating Glass
   1. Where noted as "insulating glass" on the Drawings, provide PPG Herculite or equal with 1/4" tinted (if noted) on the exterior, and 1/4" clear on the interior with ½" air space. Tint shall be selected from manufacturer's standards (a bronze tint is anticipated). U-Value = 0.30; Shading Coefficient = 0.46.
   2. All insulating glass shall be supplied by one manufacturer as approved by the Architect.

E. Window Security Film –
   1. Where noted on drawings provide 3M™ Scotchshield™ Ultra Safety & Security Window Film. Combine with 3M Impact Protection Attachment System. See attached data at the end of this section.

2.2 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

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. Clean glazing channels, stops, and rabbets to receive the glazing materials, making free from obstructions and deleterious substances which might impair the work.
   1. Remove protective coatings which might fail in adhesion or interfere with bond of sealants.
   2. Comply with manufacturers' instructions for final wiping of surfaces immediately prior to application of primer and glazing compounds or tapes.
   3. Prime surfaces to receive glazing compounds in accordance with manufacturers' recommendations.

3.2 INSTALLATION

A. Inspect each piece of glass immediately prior to start of installation.
   1. Do not install items which are improperly sized, have damaged edges, or are scratched, abraded, or damaged in any other manner.
   2. Do not remove labels from glass until so directed by the Architect.
   3. Install glass so distortion waves, if present, run in the horizontal direction.

B. Locate setting blocks at sills one quarter of the width of the glass in from each end of the glass, unless otherwise recommended by the glass manufacturer.
   1. Use blocks of proper size to support the glass in accordance with the manufacturer's recommendations.
   2. Provide spacers for all glass sizes larger than 50 united inches, to separate glass from stops; except where continuous glazing gaskets or felts are provided.
      a. Locate spacers no more than 24" apart, and no closer than 12" to a corner.
      b. Place spacers opposite one another.
      c. Make bite of spacer on glass ½" or more.

C. Set glass in a manner which produces the greatest possible degree of uniformity in appearance.

D. Do not use two different glazing materials in the same joint system unless the joint use is approved in advance by the Architect.

E. Mask, or otherwise protect, surfaces adjacent to installation of sealants.

F. Miter-cut and seal the joints of glazing gaskets in accordance with the manufacturer's recommendations, to provide watertight and airtight seal at corners and other locations where joints are required.

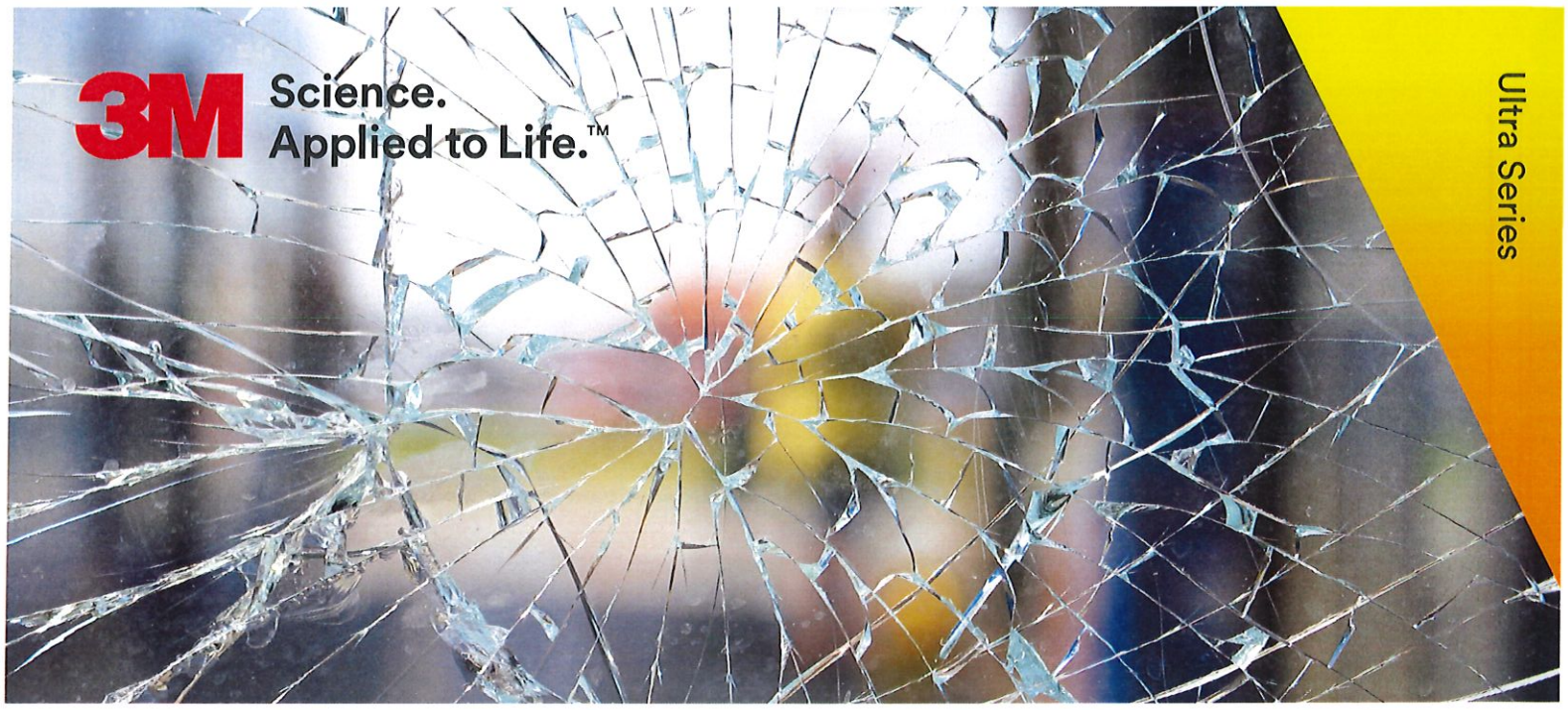
3.3 PROTECTION AND CLEANING

A. Protect glass from breakage after installation by promptly installing streamers or ribbons, suitably attached to the framing and held free from glass. Do not apply warning markings, streamers, ribbons, or other items directly to the glass except as specifically directed by the Architect.

B. Remove nonpermanent labels and clean all surfaces with products as recommended by manufacturer.

C. Remove and replace glass that is broken, chipped, cracked, or abraded, or that is damaged from natural causes, accidents, and vandalism during construction.

END OF SECTION



Keep outside dangers securely outside with 3M™ Scotchshield™ Safety & Security Window Film Ultra Series.

- Co-extruded micro-layered film composite with high graves tear resistance and high energy absorption for enhanced protection of people, property and possessions
- Mitigates hazards from shattered glass due to natural disasters
- Meets and exceeds many industry performance standards for glass fragment retention
- Helps protect people from flying glass shards, one of the most common causes of blast related injuries and fatalities
- Can be combined with 3M™ Impact Protection Attachment Systems for additional safety and security
- Helps extend the life of furnishings by significantly reducing harmful UV rays, the largest cause of fading
- Comprehensive warranty from 3M

	Ultra 800
Blast Mitigation	★★★★★
Break and Entry	★★★★★
Safety Glazing	★★★★★
Seismic	★★★★★

Best ★★★★★
Better ★★★★
Good ★★★
Fair ★★
Not Recommended ★
In comparison to other 3M™ Safety & Security Window Films

Superior protection and clarity.

Valued Associations and Alliances:

IWFA INTERNATIONAL WINDOW FILM ASSOCIATION.

RECOMMENDED SKIN CANCER FOUNDATION

Bomb Blast and Explosion Protection

- Help protect people from flying glass shards, one of the most common causes of blast related injuries and fatalities

Completed Testing

- ASTM F1642
- GSA TS01-2003

Safety Glazing

- Upgrade your glass to meet safety glazing codes*
- Help protect your occupants from broken glass hazards

Completed Testing

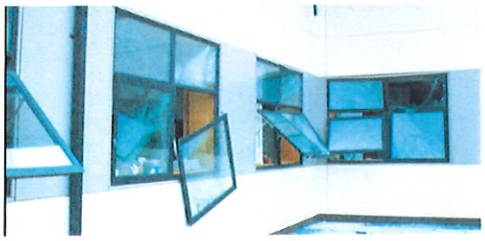
- ANSI Z97.1
- 16 CFR CPSC 1201
- EN 12600

Break and Entry

- Provides precious time by helping to deter unwanted individuals from entering your building or home
- Help protect occupants and assets

Completed Testing

- Independent lab evaluations, contact 3M for details



Seismic and Spontaneous Glass Breakage

- Help keep glass fragments from falling from your windows, helping to protect people and potentially reducing injuries on your property

Completed Testing

- ASTM E 1886

Film Properties (nominal) — not for specification purposes

Film Type	Film Thickness	Construction	Graves Tear Resistance	Tensile Strength	Break Strength	Elongation at Break	Peel Strength	Abrasion Resistance
Ultra 800	8 mil (0.20mm)	Micro-layered	1,075 lbs%	31,500 psi (217 MPa)	253 lbs/in (1,123 N / 25mm)	135%	> 6 lbs/in (27 N / 25mm)	<5%

3M products are tested to multiple industry standards. Glazing systems vary. Contact 3M for more information.
**Building codes vary, please consult with 3M and your local code official.*

3M
Commercial Solutions Division
3M Center, Building 220-12E-04
St. Paul, MN 55144 USA
3M.com/WindowFilm

98-0150-0783-8

3M™ Impact Protection Adhesive Attachment System
Installation Instructions

3M™ Impact Protection Adhesive improves the overall performance of 3M Safety and Security Window Films. This unique window protection system combines the toughness of 3M's patented micro-layer safety film with 3M's world-class expertise in adhesives to help shield against impact energy from severe weather, earthquakes, bomb blasts or forced entry events. The 3M Impact Protection System also helps protect against personal injury from flying glass.

3M Impact Protection Adhesive:

- Commercial and Residential Applications

The following procedure describes the materials and steps that are necessary to install the 3M™ Impact Protection Adhesive attachment system.

Products Recommended:

- 3M™ Citrus Base Cleaner (3M I.D. No. 62-4615-4930-5)
- 3M™ Adhesive Remover, Citrus Base (3M I.D. No. 62-4667-2925-8)
- 3M™ Foaming Glass Cleaner (3M I.D. No. 70-0708-2870-5)
- 3M™ 0000, Super Fine Synthetic Steel Wool Pad (3M I.D. No. 70-0706-5285-7)
- 3M™ Scotch™ Safe Release™ Masking Tape (3M I.D. No. 98-0701-1931-2)
- 3M™ Scotch™ Long Mask™ Masking Tape (3M I.D. No. 98-0701-3183-8)
- 3M™ Impact Protection Adhesive

Window Preparation

A thorough cleaning of the glazing and frame systems before applying film and attachment is required to remove all foreign matter and contaminants such as adhesives, grease, oil, dust, water, surface dirt, old sealant or glazing compounds by using 3M Citrus Base Cleaner, alcohol or commercial cleaning solution. **Detergent or soap and water treatments are not recommended for this step.**

1. **Assess the type of glazing stop and with an Olfa knife, trim as much of the rubber as possible without disturbing the window seal or allowing the rubber to fall into the glazing channel.**
2. Spray the glazing bead, glass and frame surface with an appropriate cleaning product and remove with a lint free cloth. Repeat If necessary to remove all foreign materials from the glass and inside window frame surfaces. If the area is particularly dirty, a light scrub with a 3M 0000 Super Fine Synthetic Steel Wool Pad is recommended to loosen contaminates. Finish with a final cleaning if needed.
3. Spray the glass with 3M Foaming Glass Cleaner or a soap and water solution. Flush the glazing bead to glass area starting at the top and working down to drain or remove any remaining contaminant from the area. Scrape the glass with a razor to remove all foreign matter. Thoroughly clean the glass a final time with soapy water and a window cleaning squeegee. Wipe around the glazing bead and frame area one final time to remove all of the soap and water solution.

Film Installation

1. Apply the 3M™ Ultra Safety & Security Window Film to the glass, making sure that the film is installed as far into the glazing channel as possible. Cut film as you normally would around the remaining glazing bead. **Remember to leave enough spacing between film and glazing bead to facilitate the removal of the slip solution.**
2. Squeegee the film to the glass by pressing firmly to remove as much of the slip solution as possible, especially at the edges of the film. **Two "edge-drying" methods can be used before applying the Impact Protection attachment system.**

   A. The panels can be left for a few weeks to ensure proper drying of the film before the IPA system is applied.

   – OR –

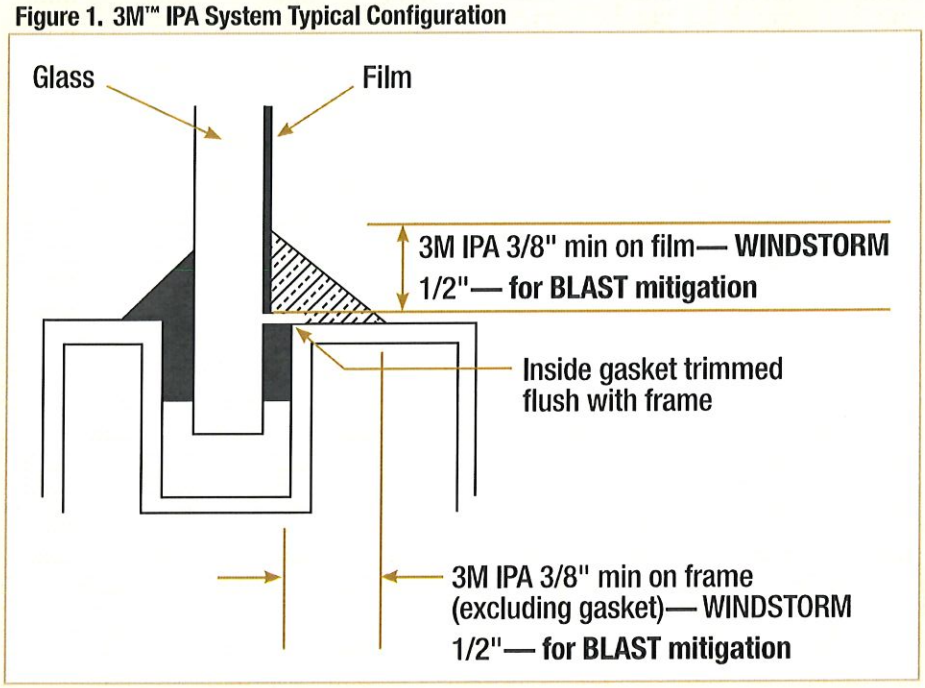
   B. Using a hair dryer, gently heat and bump the edges of the film to hasten the removal and drying of the water from the edges. **Make sure that all of the soap and water solution has been removed from the film/glass/glazing channel before applying the IPA attachment system.**

3M

Impact Protection Adhesive Installation

1. Apply a 1" (25mm) strip of 3M™ Scotch™ Safe Release™ White Masking Tape to the ultra film surface 3/8" (9mm) in from the edge of the film to all four sides.
2. Apply a 1" (25mm) strip of 3M Safe Release Blue Masking Tape to the window frame 3/8" (9mm) from the edge of the trimmed gasket. This will form a parallel sealant channel that will allow a uniform sealant bead to be applied to the glass/frame interface. **Note:** Use a clean drop cloth before proceeding to Step 3.
3. Apply a triangular bead of IPA Impact Protection Adhesive, and tool as needed to form an acceptable finish. Refer to Figure 1. **Read and follow all product information and installation instructions provided by 3M Company.** We recommend you start in a corner and apply the sealant bead out approximately 6". Then turn the gun and push the sealant bead to the next corner where the same method is repeated. **Pushing the sealant bead will insure proper penetration and minimize the chances of air gaps in the bead.** Pulling the gun can also be done if confident no air gaps are formed.
4. Smooth the sealant bead with an appropriate tool, if necessary, to give a finished look. Tooling should be completed in one continuous stroke immediately after adhesive application and before a skin forms.

Figure 1. 3M™ IPA System Typical Configuration



5. Carefully remove the two masking strips from the glass/frame immediately after tooling. Do not allow the excess adhesive to contact the film, frame or flooring surfaces. A light colored drop cloth is needed to protect the work area. **Be careful not to step on adhesive and transfer it to surrounding surfaces.**

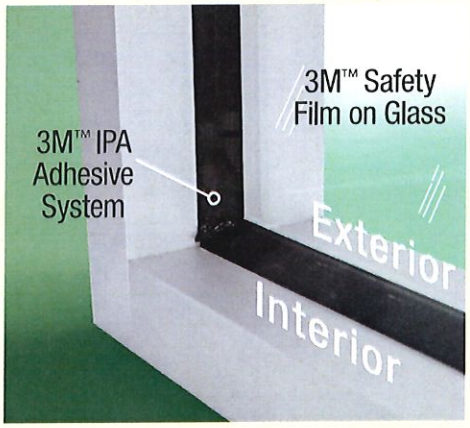
Note: Should you get some of the adhesive on the surrounding surfaces, an application and gentle wipe with a 3M Citrus Based Cleaner is recommended.

Curing time for the IPA will vary depending on temperature and relative humidity. It is not recommended to clean the film/IPA system for at least 36 hours following the installation. Full curing/adhesion can take up to 7 days, depending on conditions.

Table 1

Property	Test Method Used	Units	3M IPA
Curing Time (25°C (77°F), 50% RH)		days	3-7
Full Adhesion		days	7-14
Tack-Free Time (25°C (77°F), 50% RH)	ASTM D5895	minutes	21
Flow, Sag or Slump		inches	0
Working Time (25°C (77°F), 50% RH)		minutes	10–20
Specific Gravity		n/a	1.403
VOC content		g/L	16
As Cured — After 21 Days at 25°C (77°F), 50% RH			
Ultimate Tensile Strength	ASTM D0412	psi (Mpa)	380 (2.62)
Ultimate Elongation	ASTM D0412	%	640
Durometer Hardness, Shore A	ASTM D2240	points	38–39
Tear Strength, Die B	ASTM D0624	ppi	72

Bomb Blast and Windstorm Testing results available upon request.



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SECTION 09 26 00 - GYPSUM WALLBOARD AND METAL STUD SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide gypsum wallboard, metal studs, vinyl-covered gypsum board gypsum wallboard texture and accessories where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 05 40 00 - Cold Formed Metal Framing
3. Section 07 21 00 - Building Insulation

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Standards:
1. American Iron and Steel Institute (AISI) Design of Cold Formed Steel Structural Members, 1980.
2. American Institute of Steel Construction (AISC) Manual of Steel Construction, 8th edition.
3. All pertinent Federal, State and Local codes.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedure used on the work.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 64 00.

PART 2 - PRODUCTS

2.1 GYPSUM PANELS

A. General:
1. Provide gypsum panels complying with Fed Spec SS-L-30D, in 48" widths and in such lengths as will result in a minimum of joints. **NO HORIZONTAL JOINTS SHALL OCCUR BETWEEN FLOOR LINE AND CEILING LINE, WHERE CEILING IS 10' OR LESS ABOVE FINISHED FLOOR.**
a. Gypsum Wallboard: Provide USG 5/8" Firerock brand VH-1 abuse-resistant gypsum fiber interior panels or approved equal, tapered edge, 5/8" thick - at all walls that are exposed unless noted otherwise.
b. Gypsum Wallboard: Provide USG 5/8” non-abuse resistant at ceilings or furr downs as noted on the Drawings, and as substrate where FRP panels are installed. Complying with ASTM C36. All wallboard shall be “Firecode” 1-hour.

2.2 METAL TRIM

A. Form from zinc-coated steel not lighter than 26 gauge, complying with Fed Spec QQ-S-775, type I, class d or e.

B. Corner beads: Provide angle shapes with wings not less than 7/8" wide and perforated for nailing and joint treatment, or with combination metal and paper wings bonded together, not less than 1-1/4" wide and suitable for joint treatment.

2.3 JOINTING SYSTEM

A. Provide a jointing system, including reinforcing tape and compound, designed as a system to be used together and as recommended for this use by the manufacturer of the gypsum wallboard approved for use on this Work.

B. Jointing compound may be used for finishing if so recommended by its manufacturer.

2.4 FASTENING DEVICES

A. For fastening gypsum wallboard in place on metal studs and metal channels, use flat head screws, shouldered, specially designed for use with power-driven tools, not less than 1" long, with self-tapping threads and self-drilling points.

2.5 METAL STUDS AND BRIDGING

A. See light gage framing notes on S0.1 to address exterior metal studs.

B. All framing members shall be manufactured and supplied by Dale/Incor or approved equal, of the sizes as shown on the Drawings (where a gage is not shown on the Drawings, the following applies):
1. 7/8" to 2-1/2" - 20 gage
2. 6" studs at Furrdowns >12'tall- 600S200-43 (6" x 2" x 18 ga) at 16" o.c. Good to 30 feet stud
3. 3-5/8" studs above CMU and at furrdowns - 362S137-33 (3-5/8" x 1-3/8" x 20 ga) at 16" o.c. Good to 16 ft stud height above cmu
5. Interior Partitions (Non-Load Bearing)
   a. 3 5/8" and 6" Non-Structural Metal Studs at 16" o.c. (Max. 12' tall); 20 GA
   b. 3 5/8" Non-Structural Metal Studs up to 20' tall – 362S200-43
6. Provide triple studs at jambs of openings.
7. 7/8" Channels - 20 gage for ceiling gypsum wallboard attachment. Suspended with 18 gage galvanized wire.
8. 7/8" Furring Channels behind exterior metal wall panels – 18 gauge at 16" o.c.

C. Galvanized Materials:
1. All galvanized 18 and 20 gage studs; all galvanized track, bridging, end closures and accessories shall be formed from steel that corresponds to the requirements of ASTM A446, Grade D with a minimum yield of 33,000 psi.
2. All galvanized 12, 14 and 16 gage studs and accessories shall be formed from steel that corresponds to the requirements of ASTM A446, Grade D with a minimum yield of 50,000 psi.
3. All galvanized studs, track, bridging and accessories shall be formed from steel having a G-60 galvanized coating meeting the requirements of ASTM A525.

2.6 CONTROL JOINTS

A. Walls: Provide E-Z Strip Expansion Joint by Gold Bond, every 35 feet (maximum) of corridor(s) length. Install at door jambs, extending from door head to ceiling and as coordinated with Architect.

2.7 DRYWALL TEXTURE

A. Wall Spray Texture as manufactured by Gold Bond, or equal. Texture to be a medium orange peel, as

reviewed and approved by the Architect. (Contractor to prepare samples for review/approval.)

2.8 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

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.

3.2 METAL STUD AND METAL SUPPORT SYSTEM

A. General:
1. Metal stud framing components may be preassembled into panels prior to erecting. Prefabricated panels shall be square, with components attached in a manner to prevent racking.
2. All framing components shall be cut squarely for attachment to perpendicular members, or as required for angular fit against abutting members. Members shall be held positively in place until properly fastened.
3. Provide insulation equal to that specified in Section 07210 in all double jamb studs and all double header members which will not be accessible to the insulation contractor.

B. Installation:
1. Comply with installation standards of ASTM C754.
2. Isolate stud system from transfer of structural loading to system. Provide slip or cushioned type joints to attain lateral support and avoid axial loading at all structural beam-to-metal stud connections.
3. Install runner tracks at floors, ceiling and structural walls and columns where gypsum drywall system abuts other work.
4. Install supplemental framing, blocking and bracing at terminations in the work and for support of fixtures, equipment, heavy trim, grab bars, toilet accessories, furnishings and similar work.
5. Comply with manufacturer's recommendations for horizontal bridging for height and gage of studs.

6. Extend interior partition studs, which are not noted to go to underside of decking or other structure, through ceilings, anchoring using diagonal bracing to the structural system above the ceiling.
7. Space studs at 16" O.C., unless noted otherwise on the Drawings.
8. Ceiling Support Suspension System shall have main runners at 4'-0" o.c. with space hangers (wire) at 3'-0" o.c. and furring members at 16" o.c.

3.3 GYPSUM WALLBOARD

A. General:
1. Install the gypsum wallboard in accordance with the Drawings and with the separate boards in moderate contact but not forced into place.
2. At internal and external corners, conceal the cut edges of the boards by the overlapping covered edges of the abutting boards.
3. Stagger the boards so that corners of any four boards will not meet at a common point except in vertical corners.

B. Suspended Ceilings:
1. Install the gypsum wallboard to ceiling with the long dimension of the wallboard at right angles to the supporting members.
2. Wallboard may be installed with the long dimension parallel to supporting members that are spaced 16" on

centers when attachment members are provided at end joints.
3. Ceilings are to comply with Metal Support Installation Standard: ASTM C754.

C. Walls:
1. Install the gypsum wallboard to studs at right angles to the furring or framing members.
2. Make end joints, where required, over framing or furring members.

3.4 JOINT TREATMENT

A. General:
1. Inspect areas to be joint treated, verifying that the gypsum wallboard fits snugly against supporting framework.
2. In areas where joint treatment and compound finishing will be performed, maintain a temperature of not less than 55 degrees for 24 hours prior to commencing the treatment, and until joint and finishing compounds have dried.
3. Apply the joint treatment and finishing compound by machine or hand tool.
4. Provide a minimum drying time of 24 hours between coats, with additional drying time in poorly ventilated areas.

B. Embedding compounds:
1. Apply to gypsum wallboard joints and fastener heads in a thin uniform layer.
2. Spread the compound not less than 3" wide at joints, center the reinforcing tape in the joint, and embed the tape in the compound. Then spread a thin layer of compound over the tape.
3. After this treatment has dried, apply a second coat of embedding compound to joints and fastener heads, spreading in a thin layer of compound over the tape.
4. Sand between coats as required.
5. When thoroughly dry, sand to eliminate ridges and high points.

C. Finishing compounds:
1. After embedding compound is thoroughly dry and has been completely sanded, apply a coat of finishing compound to joints and fastener heads.
2. Feather the finishing compound to not less than 12" wide.
3. When thoroughly dry, sand to obtain a uniformly smooth surface, taking care to not scuff the paper surface of the wallboard.

D. DRYWALL TEXTURE - ALL WALLS AND CEILINGS TO RECEIVE PAINT:
1. PROVIDE “WALL SPRAY TEXTURE” AS MANUFACTURED BY GOLD BOND, OR EQUAL. TEXTURE TO BE A MEDIUM ORANGE PEEL FINISH. (PROVIDE SAMPLES FOR ARCHITECT’S APPROVAL.)

3.5 CORNER TREATMENT

A. Internal corners: Treat as specified for joints, except fold the reinforcing tape lengthwise through the middle and fit neatly into the corner.

B. External corners:
1. Install the specified corner bead, fitting neatly over the corner and securing with the same type fasteners used for installing the wallboard.
2. Space the fasteners approximately 6" on centers, and drive through the wallboard into the framing or furring member.
3. After the corner bead has been secured into position, treat the corner with joint compound and reinforcing tape as specified for joints, feathering the joint compound out from 8" to 10" on each side of the corner.

3.6 OTHER METAL TRIM

A. General:
1. The drawings do not purport to show all locations and requirements for metal trim.

2. Carefully study the Drawings and the installation, and provide all metal trim normally recommended by the manufacturer of the gypsum wallboard approved for use in this Work.

3.7 CLEANING UP

A. In addition to other requirements for cleaning, use necessary care to prevent scattering gypsum wallboard scraps and dust, and to prevent tracking gypsum and joint finishing compound onto floor surfaces.

B. At completion of each segment of installation in a room or space, promptly pick up and remove from the working area all scrap, debris, and surplus material of this Section.

END OF SECTION

SECTION 09 50 00 – CONCRETE SLAB MOISTURE TESTING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Work included: Provide testing of all concrete slabs, at all floor levels for moisture within slabs.

1.2 QUALITY ASSURANCE

A. Testing shall be accomplished by a qualified independent testing agency.

B. All testing shall be performed to meet ASTM F 1869 (calcium Chloride) and ASTM F2170 (Relative Humidity) and ASTM F710 (pH)

1.3 SUBMITTALS

A. Submit qualifications of testing agency.

B. Submit all tools/instruments to be used for testing

C. Submit reporting and mapping method, and/or examples, to be used.

PART 2 – PRODUCTS

N.A.

PART 3 – EXECUTION

3.1 PROCESS

A. Type of Testing to be Done – ASTM F 1869 and ASTM F 2170 moisture tests and pH testing per ASTM F 710

B. Number of Tests – Three tests for the first 1,000 SF and one test for each 1,000 SF thereafter for each floor.

C. Timing of Testing – The temperature and humidity conditions are important for new construction, thus, testing should be done after the building is enclosed and the HVAC system is up and running. For a renovation and new construction, the testing should be done at least a month prior to the scheduled floor covering installation, so there is adequate time for corrective measures to be taken if they are necessary.

D. Reporting – Test reports should contain as much information as possible about the interior and exterior conditions at the time of testing, methodology of testing and test results. The owner, general contractor and architect shall receive the report.

E. Mapping – Show the test results on a map (floor plans) of the facility, which can help the construction team identify problem areas in the floor.

F. Repair Options – The report should include options for repairing a floor that exceeds the manufacturer’s limits.

END OF SECTION

SECTION 09 51 00 - ACOUSTICAL CEILING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide acoustical ceiling where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 05 40 00 - Cold Formed Metal Framing
3. Section 09 26 00 - Gypsum Wallboard and Metal Stud System

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen, manufacturer, and supplier who are thoroughly trained and experienced with at least five (5) years of similar systems, in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section:
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
3. Samples of items to be used in colors listed.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 64 00.

1.5 EXTRA STOCK

A. Deliver to the Owner for his use in future modifications, an extra stock of approximately 5% of each type of acoustical material installed, packaging each type of material separately, distinctly marked, and adequately protected against deterioration.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Grid System:
1. Lay-in acoustical tile grid system: 15/16" wide - 2' x 4' or 2' x 2' grid with intermediate duty "T" bars. Color: White-typical. Grid system shall be BLACK at Stage 227. Install at all rooms shown to receive 2' x 4' or 2' x 2' acoustical ceiling tile as shown on the Drawings. USG DX/DXL Acoustical suspension system at all rooms, or equal.

B. Acoustical Ceiling Tile:

1. ACT-1 - USG Radar Acoustical Panels - 2' x 2' x 5/8" No. 2207, square lay-in, or equal. Install at all rooms receiving 2' x2' ceiling grid system.

2. ACT-2 - USG Radar Acoustical Panels - 2' x 4' x 5/8" No. 2407, square lay-in, or equal. Install at all rooms receiving 2' x4' ceiling grid system except where ACT-3 and ACT-4 below are used.

3. ACT-3 - USG Sheetrock Brand Lay-in Gypsum Ceiling Panels – 2’ x 4’ x 1/2” No 3270 square edge lay-in or equal. Install at Ware Wash 229, Serving 230, Prep 231.

4. ACT-4 – USG Radar Acoustical Panels – 2’ x 4’ x 5/8” No. 2407 square edge lay-in or equal in “Flat Black”. Install at 227 Stage in black grid.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

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.

3.2 INSTALLATION, GENERAL

A. Except as modified by requirements of governmental agencies having jurisdiction, recommendations of the manufacturer as approved by the Architect, or specific directions of the Architect, install in accordance with ASTM C636 and the pertinent UL design requirements.

B. Lateral bracing:
   1. Provide lateral bracing as required by pertinent codes and regulations.
   2. Secure lateral bracing to structural members. Secure at right angles to the direction of the partition and four ways in large ceiling areas.

C. Install all grid level within a tolerance of one in 1000 and straight within a tolerance of one in 1000.

D. PROVIDE HANGER WIRE AT EACH OF THE (4) CORNERS OF LAY-IN TROFFER LIGHTING FIXTURES.

E. Coordinate all ceiling heights with all gypsum board coffered ceilings.

3.3 INSTALLATION OF ACOUSTICAL MATERIALS

A. If acoustical ceiling tile has linearity of pattern, install facing as directed by Architect.

3.4 CLEANING

A. In addition to other stipulated requirements for cleaning, completely remove finger prints and traces of soil from the surfaces of grid and acoustical materials, using only those cleaning materials recommended for the purpose by the manufacturer of the material being cleaned.

END OF SECTION

SECTION 09 62 40 - MODULAR ATHLETIC FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope
   1. The complete installation of modular sports surfacing system including the interlocking suspended high-impact polypropylene copolymer tile of proprietary formulation, supportive acoustical/resilient underlayment and striping.

B. Related work specified under other sections.
   1. DIVISION 3 -CONCRETE SUBFLOORS
      a. The general contractor shall furnish and install the concrete subfloors.
      b. The slab shall be steel troweled to a medium-dense finish to a tolerance of ±1/8" (3.2mm) in any 10' (3m) radius. Floor Flatness and Floor Levelness (FF and FL) numbers are not recognized. High spots shall be ground level and low spots filled with approved leveling compound.

1.2 REFERENCES

A. ASTM (American Society for Testing & Materials)
   1. ASTM G-21

1.3 SUBMITTALS

A. Sport Court® Defense™ Specifications.
B. One sample of specified system, if requested by Architect.
C. Sport Court Modular Sports Flooring Installation Guide.
D. Sport Court Modular Sports Flooring Care and Maintenance Guide.
E. Sport Court Defense Warranty.

1.4 QUALITY ASSURANCE

A. MATERIAL SUPPLIER:
   1. Shall be Connor Sport Court International, Inc. (manufacturer).
   2. Manufacturer must be ISO 9001:2008 and ISO 14001:2004 Certified to assure proper quality and environmental control.
   3. Manufacturer shall be a Zero Waste company.
   4. Manufacturer shall have produced sports surfaces for a longer period of time than their stated warranty.
   5. Surfaces must be certified for competition by the international federations for basketball (FIBA), volleyball (FIVB), handball (IHF) and badminton (BWF).

B. INSTALLER:
   1. The complete installation of the flooring system as described in these specifications shall be carried out by an experienced installer (Flooring Contractor), and the work shall be performed in accordance with current Sport Court installation instructions.
   2. Installer (Flooring Contractor) shall be liable for all matters related to installation for a period of one year after the floor has been substantially installed and completed.
   3. Successful bidder must submit a minimum of five (5) completed modular projects of similar magnitude and complexity within the last two (2) years.
   4. Bidder must provide all sample tile, accessory products, and documentation.

1.5 DELIVERY, STORAGE AND HANDLING

A. Materials must be delivered in manufacturer's original, unopened and undamaged packaging with identification labels intact.
B. Store material on a clean, dry, and flat surface, protected from exposure to harmful weather conditions or possible damage.
C. Storage conditions shall be 55°F to 80°F (13°C to 27°C).

1.6 SITE CONDITIONS

A. In order to prevent damage and not void the warranty, installation of modular materials shall not

commence until all other finishes and overhead mechanical trades have completed their work in the modular floor areas.

B. Permanent heat, light and ventilation shall be installed and operating during and after installation.
C. Subfloors shall be clean, dry and free from dirt, dust, oil, grease, paint, old adhesive residue or other foreign materials.
D. Flooring installation shall not begin until the levelness requirements of concrete subfloors have been met.
E. The installation area shall be closed to all traffic and activity for a period to be set by the flooring contractor.
F. Product shall be conditioned at temperatures between 55°F to 80°F (13°C to 27°C) and shall be maintained for 72 hours prior to, during, and 72 hours after installation.
G. Environmental Limitations
   1. Comply with the Sport Court requirements.
   2. Adhere to all MSDS requirements for materials employed in the work.
   3. Protect all persons from exposure to hazardous materials at all times.
H. After modular floors are installed and the game lines painted, the area is to be closed to allow curing time for the system, typically 3-5 days. No other trades or personnel are allowed on the floor until it has been accepted by the owner.

1.7 WARRANTY

A. Sport Court provides a limited warranty of fifteen (15) years on the materials it has supplied. (A copy of the full warranty, with its Terms and Exclusions, is available from the authorized Sport Court Dealer.) This 15-Year Limited Warranty is subject to the Indoor Modular Flooring Warranty and all of its provisions. This warranty is expressly limited to the flooring materials (goods) supplied by Sport Court. During the period covered under this Indoor Modular Flooring Warranty, Sport Court shall repair/replace any defective tiles with the same or substantially similar product according to the schedule in the Indoor Modular Flooring Warranty. The Indoor Modular Flooring Warranty does not cover floor damage caused (wholly or in part) by fire, winds, floods, moisture, other unfavorable atmospheric conditions or chemical action, nor does it apply to damage caused by ordinary wear, misuse, abuse, negligent or intentional misconduct, aging, faulty building construction, concrete slab separation, faulty or unsuitable subsurface or site preparation, settlement of the building walls or faulty or unprofessional installation of Sport Court flooring systems.

B. Sport Court shall not be liable for incidental or consequential losses, damages or expenses directly or indirectly arising from the sale, handling or use of the materials (goods) or from any other cause relating thereto, and their liability hereunder in any case is expressly limited to the replacement of materials (goods) not complying with this agreement or, at their election, to the repayment of, or crediting buyer with, an amount equal to the purchase price of such materials (goods), whether such claims are for breach of warranty or negligence. Any claim shall be deemed waived by buyer unless submitted to Sport Court in writing within 30 days from the date buyer discovered, or should have discovered, any claimed breach.

PART 2 - PRODUCTS

2.1 MATERIALS (Contact Patti LaFleur, Sport Court South – 501-316-2255 sportcourtsouth@aol.com.):

A. Sport Court Defense™ Patented Suspended Flooring shall be:
   1. Solid-top design.
   2. Size: 12” x 12” x 1/2” (30.48cm x 30.48cm x 12.7mm).
   3. High-impact polypropylene copolymer suspended modules.
   4. Equilateral triangle support structure.
   5. The tile shall have a patented positive locking system.

B. Standard Colors: Pearl Gold, Pearl Burgundy, Pearl Royal Blue, Ice Blue, Silver, Ultra Red, Black, Pearl Graphite, Pearl Beige, Pearl Evergreen, Pearl Navy Blue, Pearl Orange, Pearl Shamrock Green, Pearl Purple, Pearl Silver Blue, Yellow

C. Color Consistency: $\Delta ECMC < 1.0$

D. Weight - 0.82 ± 0.01 lbs. (372 ± 5 grams).

E. Packaging: Product is shipped in pre-assembled sheets (2x4 modules per sheet, 6 sheets per box).

F. Product Test Results
   1. Flatness: 0.0” +0.029” /-0.0” (0.0mm +0.74mm /-0.0mm)
   2. Lateral Forgiveness™: +0.045” / -0.0” (+1.14mm / -0.0mm)

G. Load Bearing Capacity: 220 psi (1.52 MPa)

H. Dynamic Load: All systems must be able to show verification of passing a minimum 1,000,000 cycles in dynamic load testing with minimum 200 lbs. (91 kg) loading without deviation from flatness specification.

I. Underlayment – Multi-purpose recycled rubber underlayment having a thickness of 0.06” (1.5mm), 0.12” (3mm), 0.20” (5mm), or 0.28” (7mm), and a Durometer of 60 ± 5 on the Shore A scale.

J. Retrofit – existing floor systems, such as synthetic floors, must not exceed a maximum thickness of 0.35” (9mm). Product must have a minimum durometer of 60 ± 5 on the Shore A scale. Flooring representative shall verify that the existing floor system meets these requirements by submitting core samples to the respective manufacturer for analysis and approval.

K. Sanitary Information
   1. Resistance to fungi (when tested in compliance with ASTM G-21 and MIL standard 810-D procedure 508.3). All basic organisms tested (ATCC #6205-11797) and were found to have zero growth.
   2. Resistance to the following:
      a. Bacteria and mildew resistance
      b. Gram-positive bacterial Staphylococcus Aureus
      c. Gram-negative Klebsiella Pneumoniae
      d. Pink-staining organism
      e. STV Reticulum
      f. Surface fungi growth prior to and following leaching

L. Game Line Paint
   1. Sport Court adhesion promoter – proprietary adhesion promoter as supplied by Sport Court.
   2. Paint – aliphatic polyurethane as supplied by Sport Court. Select from standard colors.

M. Wall Base – Sanitary Cove wall base by Johnsonite 4” high – coved profile with 2” long toe continuous lengths to be used. Color – Black.

NOTE: FURNISH ALL LABOR, MATERIALS, AND EQUIPMENT NECESSARY TO COMPLETE THE INSTALLATION OF A SPORT COURT MULTI-PURPOSE FLOORING SYSTEM INCLUDING COVE BASE, TRANSITIONS, SCHOOL LOGO (PLAN FOR 3 COLORS) AND GAME LINES. LOGO AND GAME LINES TO BE COORDINATED WITH THE OWNER.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect concrete slab for contamination, dryness and levelness. Report any discrepancies to the general contractor.
B. Concrete slab shall be broom cleaned, mopped and dust free by the general contractor.
C. Installer (Flooring Contractor) shall document all working conditions as specified in PART 1 – GENERAL prior to starting installation. Report any discrepancies to the general contractor.

3.2 INSTALLATION

A. Underlayment – Rubber underlayment shall be unrolled and allowed to relax. All butt joints shall be properly trimmed, fitted, and seamed together with an approved all-purpose tape.
B. Floor shall be installed to the pre-approved layout.
C. Proper expansion must be at all vertical obstructions minimum of ¾ Inch (19mm).
D. Floor surface shall be clean and dust free.
E. Game Lines
    1. Use only high quality masking tape approved by Sport Court.
    2. Lines shall be primed and painted using Sport Court proprietary adhesion promoter and recommended aliphatic polyurethane paint.
    3. Provide game lines as indicated on drawings.
    4. Room temperature shall be >55°F (13°C) and rising during paint installation.
F. Wall Base (optional) - Install cove base anchored to walls with base cement.
G. Remove all excess and waste materials from the area of work. Dispose of empty containers in accordance with federal and local statutes.

END OF SECTION

SECTION 09 65 00 - RESILIENT FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide resilient flooring and accessories where shown on the Drawings, as specified herein, and as needed for complete and proper installation.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen, manufacturer, and supplier who are thoroughly trained and experienced, with at least five (5) years experience with all products of this sections, and in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit;
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Samples of each item, color, and pattern available in the specified grades from the proposed manufacturers.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 64 00.

1.5 EXTRA STOCK

A. Deliver to the Owner for his use in future modifications an extra stock of approximately 5% of each color and pattern in each material installed under this Section, packaging each type of material separately, clearly marked with item identification, and adequately protected against deterioration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Provide colors and patterns as specified in the Color and Material Schedule in the Drawings.

B. Adhesives: Provide waterproof and stabilized adhesive as recommended by the manufacturer of the material being installed. Asphaltic emulsions and other non-waterproof adhesives will not be acceptable.
1. Luxury Vinyl Tile - as recommended by manufacturer
2. Rubber base - as recommended by manufacturer
3. Sheet Vinyl – as recommended by manufacturer

C. Concrete slab primer: Provide non-staining type as required and as recommended by the manufacturer of the material being installed.

2.2 RESILIENT MATERIALS

A. Rubber Base:
   1. 4" high Rubber Cove Base, standard top set cove, 1/8" thick, with site mitered external and internal corners. Continuous lengths to be used, 4' sections will not be accepted. Colors: See color and material schedule on drawings for manufacturer and color(s).

B. Luxury Vinyl Tile: (LVT on Drawings)
   1. See Color and Material Schedule on Drawings for Manufacturer, sizes, and color(s)

C. Sheet Vinyl: (SV and SR on Drawings)
   1. See Color and Material Schedule on Drawings for Manufacturer and color.

D. Rubber Flooring Transitions:
   1. Solid rubber edge strip matching color range of resilient flooring and carpet, profile(s) as required by conditions. Profile(s) and color(s) to be selected by Architect from manufacturer's standard profile and color line.
   2. **Reducer strips to be used at transition of all dissimilar flooring materials, edges or termination points. (Such as LVT-to-sheet vinyl, LVT-to-Carpet, and etc.)**

2.3 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

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.

3.2 PREPARATION

A. Prepare substrates according to manufacturer’s written instructions to ensure adhesion of floor coverings.

B. Concrete Substrates: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers and hardeners.
   2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
   4. Moisture Testing: Perform one (or both if one fails) tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
      a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb. of water/100 SF (1.36 kg of water/92.9 sq. m) in 24 hours.
      b. Perform relative humidity test using in situ probes, ASTM F 1869. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement. Notify Architect/Designer of results.

c. Fill cracks, holes and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
d. Do not install floor coverings until they are the same temperature as space where they are to be installed.
    1. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
e. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation.

3.3 INSTALLATION

A. General:
1. Install materials only after finishing operations, including painting, have been completed and after permanent heating system is operating.
2. Verify that moisture content of concrete slabs, building air temperature, and relative humidity are within the limits recommended by the manufacturer(s) of the materials used.
3. Maintain reference markers, holes, and openings that are in place or plainly marked for future cutting by repeating on the finish surface as marked in the subfloor. Use chalk or other non-permanent marking device.
4. Install as per layout plan shown on the Drawings.
5. Install each material per the manufacturer’s recommendations.

B. Installing Luxury Vinyl Tile: Install in strict accordance with manufacturer's written instructions.

C. Installing base:
1. Install base where scheduled on the Drawings.
2. Miter cut both field-formed external and internal corners.

D. Installing Sheet Vinyl: Install in strict accordance with manufacturer's written instructions.

3.4 CLEANING AND PROTECTING

A. Remove excess adhesive and other blemishes from exposed surfaces, using neutral cleaner recommended by the manufacturer of the resilient materials.

END OF SECTION

SECTION 09 67 00 – POLYMER FLOOR SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Seamless resinous troweled flooring.

B. Coved seamless troweled wall base.

1.2 RELATED SECTIONS

A. The Contract Documents, as defined in Section 01 01 00-Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

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

C. Section-04 20 00-Masonry (Cmu and Brick)

1.3 SUBMITTALS

A. Surfacing applicator shall submit samples of color and textures for Design Professional's approval.

B. Prior to commencing work, at Design Professional's discretion, applicator shall install a 100 square foot sample on the job of desired color and texture and when approved, this will serve as the standard for the entire project.

C. Conform to requirements of Section 01 33 23 Submittals and Substitutions and Section 01 70 50 Project Closeout.

D. Product Data
1. Provide product sheet, including product description and use, for each product proposed for use.
2. Provide Material Safety Data Sheets (MSDS) for each product proposed for use.
3. Product Data should indicate coating conforms to federal, state, and local regulations, including VOC compliance with the requirements of this Section.

E. Closeout Submittals
1. Provide list of all products provided including:
   a. Manufacturer
   b. Product name/number
   c. Gloss
   d. Color name/number

F. Work Schedule
1. Provide schedule indicating proposed phasing of painting in occupied areas. Coordinate schedule with Owner and Construction Manager.

1.4 QUALITY ASSURANCE

A. All materials must be recommended and manufactured by a single supplier to insure compatibility and proper chemical and mechanical bond.

B. Surfacing shall be applied by a surfacing applicator approved by the Architect, with a minimum of seven (7) years experience installing the brand of surfacing in similar size and function projects. A list of ten (10) completed projects using the specified materials must be submitted proving seven (7) years experience by the lead mechanic.

C. Surfacing applicator shall provide to the Architect a completed list of jobs including the names of the Architect, General Contractor, Owner, telephone numbers of all concerned, materials used, quantity installed and date completed on similar projects.

D. Surfacing applicator must provide a written guarantee for materials and workmanship between applicator and surfacing manufacturer for one (1) year.

E. Surfacing applicator or manufacturer seeking approval of products other than what is specified must supply samples, full product information, technical data with specifications, certification from an independent testing laboratory that the product being submitted for approval meets all requirements of the performance properties specified within this specification, installation instructions and comply with the above quality assurances in writing fourteen (14) days before bid letting. Omission of any item will result in an automatic rejection.

F. Bidders will be notified by addendum of substitute surfacing materials, if approved.

1.5 PRODUCT STORAGE AND ENVIRONMENTAL CONDITIONS

A. Material temperatures shall be a minimum of 55^{o}F before use.

B. Work on seamless flooring shall not commence until the building can be maintained at a minimum temperature of 55^{o}F for 48 hours before, during and 48 hours after application. Areas shall also be broom clean and reasonably dust free and shall have adequately controlled ventilation with bright, uniform lighting.

1.6 PROJECT CONDITIONS

A. Before commencing work, ensure environmental and site conditions are suitable for application and curing.

B. Surfaces shall be acceptable in accordance with flooring manufacturer's recommendations.

C. Notify Architect and Contractor in writing of unsuitable surfaces and conditions. Commencement of work shall imply acceptance of surfaces and working conditions.

D. Recommended Moisture Vapor Transmission Considerations:
1. Placement of on-grade slabs over a Class A vapor retarder as defined by ASTM E-145.
2. A water cement ratio of 0.45 and 0.5.
3. Curing by ASTM C-171 sheet materials for curing concrete.
4. A slump in the range of 3 to 4 inches, which can be increased by the use of Super plasticizers.

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E. Substrate requirements (See Appendix A).

1.7 PROTECTION

A. Protect adjacent surfaces from damage resulting from work of this trade. If necessary, mask and/or cover adjacent surfaces, fixtures, cabinet work, equipment, etc. by suitable means.

1.8 WARRANTY

A. Applicator shall notify manufacturer of project requirements before bidding. Manufacturer shall provide written statement before bidding to the Architect that they accept single source warranty for entire installation including labor for one year. Warranty shall include removal and replacement if proven defective. Defective items are, but not limited to debonding, regionalized discoloration, excessive wear and staining by bodily fluids. Non-acceptance in writing by manufacturer is grounds for rejection of product.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Troweled Floor Covering where called for on the drawings:

1. **Install a Desco Quartz Cremona TG** Floor manufactured by Desco Coatings, Inc. 1-800-426-4164. Color shall be “Rip Tide”

   See Color and Material Schedule on Drawings.

B. Provide 4" high turned up coved base with 1" radius cove and metal edge as indicated on drawings.

C. Provide elastomeric waterproof membrane.

D. Binder and all successive grout and top coats shall be 100% solids clear/epoxy resin. Ceramic coated quartz aggregates as supplied by Desco Coatings are to be used to achieve all color. No pigmented epoxy base or top coats allowed.

E. Minimum Performance Characteristics:
1. See product data at the end of this section.

PART 3 – EXECUTION

3.1 TESTING OF CONCRETE SUBSTRATE

One of the following three methods shall be used to determine moisture content of slab at time of application. These tests only measure the specific area tested at the time of the test and are not predictors of future substrate conditions.

A. Using a Tramax concrete moisture detection device, firmly apply the test apparatus to concrete that has had sealers or other subsequent coatings removed. The readings shall be 4.2% or less. If readings are higher, use ASTM F-2170 for non-conditional spaces and/or ASTM F1869 for conditioned spaces.

B. ASTM F-2170 in site Relative Humidity Test. Follow test procedures of manufacturer of testing equipment. Reading should be below 80%. If above 80%, use the next test method below.

C. ASTM F-1869 Calcium Chloride Moisture Vapor Transmission Test. Follow test procedures of manufacturers of MVT kits. Results should be below 3 to 4 lbs/1,000 square feet/24 hours. (Only if space is conditioned.)

3.2 FLOORING PREPARATION

A. Surface must be clean, sound and dry.

B. Effectively remove concrete laitance on accessible floor surfaces by mechanical shot blast. Acid etching is not acceptable.

C. Areas where there is existing flooring must be cleaned to remove all floor material, grease or any residue that might retard interfacial adhesion between substrate and surfacing.

3.3 FLOORING APPLICATION

A. Apply flooring in accordance with manufacturer's printed instructions, employing lead mechanic qualified under the quality assurance portion of this specification, using equipment specifically designed for this purpose.

B. Desco Quartz Cremona TG is a hand troweled system. The system should be hand troweled to 3/16" thickness over epoxy primer. **Final slip resistance will be determined in the field.**

C. Install integral cove base to height of 4" with 1" radius cove with metal edge at top.
   1. Trowel apply vertical cove base.
   2. Hand sand cove base.
   3. Apply three coats of resin to assure a smooth surface and cove.
   4. Do not allow resin to puddle in cove.

D. **Install waterproof membrane to a dry mil thickness of 20 mils.**

E. Finished work shall match approved samples; be uniform in thickness, sheen, color, pattern, and texture; and be free from defects detrimental to performance.

3.4 PROTECTION

A. After completion of flooring the General Contractor/Owner shall protect flooring from damage by other trades.

END OF SECTION

APPENDIX A

GENERAL SUBFLOOR REQUIREMENTS

CONCRETE -- Section 03 30 00

1. Concrete should have been designed and installed to minimize random cracking and slab deflections; provide sufficient control joints and isolation joints.

2. Placement of on-grade slabs over a Class A vapor retarder as defined by ASTM E-1745.

3. A water cement ratio of 0.45 and 0.5.

4. Curing by ASTM C-171 sheet materials for curing concrete.

5. A slump in the range of 3 t o 4 inches which can be increased by the use of super plasticizers.

6. Variation in plane shall be determined by the specifier and be in accordance with ACI 302, Guide for Concrete Floor and Slab, as well as ASTM E 1155-87, Determining floor Flatness and Levelness Using the F Number System.

7. Proper slope to drain(s) must be maintained.

8. Steel trowel finish, but not burnished to a high sheen

9. Concrete to be clean, crack free, sound and durable (minimum compressive strength of 3,500 psi) and dry (3% maximum moisture content by mass.)

10. Concrete must be free of hydrostatic and/or capillary moisture pressure and should not be in direct contact with the ground. An effective vapor barrier and properly engineered soil are required.

11. Allow concrete to cure 28 days minimum before applying floor system.

12. Concrete after surface preparation is to be free from sealers or membrane curing agents.

13. Light weight and insulating concrete not recommended under flooring system. (See applicator and manufacturer for alternate recommendations.)

CONTROL JOINTS

1. Install control and expansion joints in accordance with standard practice per ACI-501.

2. The floor contractor may fill non-moving control joint(s) with approved elastomeric sealant or full depth semi-rigid two-component epoxy joint filler, designed specifically for this purpose (use full depth joint filler when reinforcement of the joint edges is desirable), or two-component epoxy and filler (epoxy to be same material as flooring). Movement may crack surfacing unless proper detailing has been done.

3. Filling of moving isolation joints or expansion joints is not recommended.

4. Filling of non-moving isolation joints with elastomeric caulking and sealants or with a semi-rigid epoxy joint filler or two-component epoxy and filler is acceptable. Movement may crack surfacing unless proper detailing has been done.

5. Joint identified by owner/designer or contract manager as moving joints shall be treated by terminating flooring on each side of joint. After flooring is completed, joint shall then be filled by sealant contractor.

BACKING FOR COVE BASE

Surface to receive cove and/or base shall be strong, durable and dry. Suitable backings include; concrete, cement plaster, standard light-weight block, clay, sand-lime, cement bricks and drywall with a toe plate. Masonry surface(s) to be free of voids, irregularities and recessed joints (if present, fill with recommended epoxy plaster).

QUARTZ CREMONA TG

DESCO

DESCO CREMONA TG is a trowel applied resin with multi-sized aggregates. It delivers a mosaic look with synthetic aggregates in vivid colors.Available in varying sizes of factory colored aggregates. Top coats are offered in different sheens, textures and color stability. Desco Quartz Cremona TG is a hand troweled system offering unsurpassed physical and chemical resistance with an aesthetic appearance. In wet areas it can be applied full height at 1/8" thickness to offer impact and water protection eliminating grout joints associated with tile prroducts.

TYPICAL USES

- **Biotech**
- **Hospitals**
- **Schools**
- **Laboratories**
- **Stairs**

PHYSICAL PROPERTIES

Compressive Strength
ASTM C-579 ..... 12,000 psi
Tensile Strength
ASTM C-307 ..... 2,850 psi
Flexural Strength ..... 4,000 psi
Shore D Hardness
ASTM D-2240 ..... 85 – 90
Bond Strength
ASTM D-4541 ..... 425 psi
Abrasion Resistance
ASTM D-4060 ..... 0.08 mg

Pot Life ..... 35 min
Cure Time
@ 77°F ..... 10-12 hours

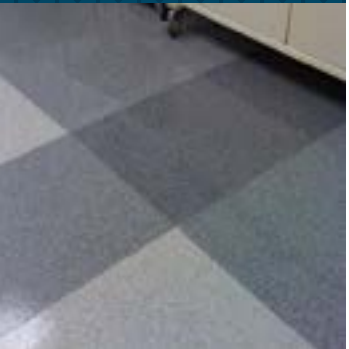
Color Stability by X-Rite Colorimeter: No detectable change after 500 hours using the "b" axis

The data shown above reflects typical results based on laboratory testing under controlled conditions. Reasonable variations from the data shown above may result.

TEXTURES

Orange Peel: Offers a smooth easily cleaned surface with a slight texture.

Translucent Aggregates: Can be incorporated into the top coats to offer a degree of slip resistance to meet the needs of the end user.



UV RESISTANCE:

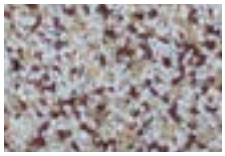
Normal: Recommended for dark or Medium colors, except blue.

Ultra U.V. Resistant: Recommended for whites, blues and other light color combinations.

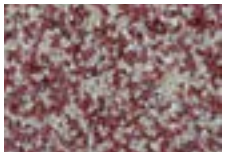
COLORS

15 Standard Colors. Custom colors available.

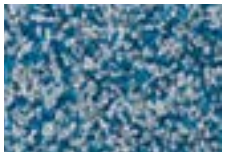

Caldera


Diamondback


Eclipse


Ember


Fen


Gale

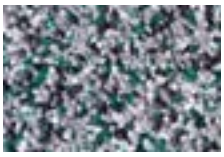

Frost Point


Kestrel


Meadow


Seashore


Sequoia


Spruce


Whitewater


Wolfhound

MOISTURE SLAB TEST

One of the following three methods shall be used to determine moisture content of slab at time of application. These tests only measure the specific area tested at the time of the test and are not predictors of future substrate conditions.

ASTM F-2170 in situ Relative Humidity Test. Follow test procedures of manufacturer of testing equipment. Reading should be below 80%. If above 80%, refer to HydraBond.

SURFACE PREPARATION

Concrete: Apply only to clean, dry and sound concrete substrates that are free of all coatings, sealers, curing compounds, oils, greases or any other contaminants. New concrete should be cured until moisture content is below manufacturers recommended standards. Concrete that has been contaminated with chemicals or other foreign matter must be neutralized or removed. Remove any laitance or weak surface layers. Surface shall be prepared by recirculating vacuum Shotblast equipment and/or diamond grinder to a profile of CSP-3 (ICRI standard). Moisture vapor transmission should be tested as directed in MOISTURE SLAB TESTS SECTION. All surface irregularities, cracks, expansion joints and control joints should be properly addressed prior to application.

PRECAUTIONS

Substrate should be sloped to drain to prevent standing water or chemicals. As with any surface, all spills should be removed as soon as possible to prevent a slipping hazard

A sheet good moisture barrier as designated by ASTM E-1745 Class A should be in contact with bottom side of concrete slabs on grade. A lacking or ineffective vapor barrier may cause moisture related problems, debonding, bubbling or discoloration.

Concrete should be poured with a water cement ratio of 0.45 and 0.5.

A slump in the range of 3 to 4 inches, which can be increased by the use of super plasticizers.

Curing by ASTM C-171 sheet materials for curing concrete.

Do not apply granite systems when temperature is less than 50°F above the dew point.

Do not apply when substrate temperatures are below 50°F or above 95°F. (Material cures slower at cooler temperatures and working time will be substantially reduced at higher temperatures.)

Water from outside sources can cause water whitening of uncured polymer material.

Confirm product performance in specific chemical environment prior to use.

St. Louis: 9587 Dielman Rock Island | St. Louis, MO 63132 | 800-373-8128
Kansas City: 19890 W. 156th St. | Olathe, KS 66062 | 800-426-4164
Arkansas: 6131 Carnegie Dr. | North Little Rock, AR 72117 | 501-819-0415

www.DescoCoatings.com

SECTION 09 68 00 - CARPET

PART 1 - - GENERAL

1.1 DESCRIPTION

A. Work included: Provide carpet accessories where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related work:
1. Documents affecting Work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 09 65 00 - Resilient Flooring.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.
4. Samples of manufacturer's products requiring selection of pattern, texture or color.
5. Carpet layout and seaming plan.

C. **Manufacturer’s Testing Requirements for new and/or existing concrete slabs, prior to installation of carpet products.**

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 64 00.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not install carpet tiles until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. DO NOT INSTALL CARPET TILES AND/OR “ROLLED” CARPET, OVER CONCRETE SLABS UNTIL SLABS HAVE CURED AND ARE SUFFICIENTLY DRY TO BOND WITH ADHESIVE AND CONCRETE SLABS HAVE PH RANGE RECOMMENDED BY CARPET TILE MANUFACTURER.

1.6 TESTING

A. **Perform manufacturer’s recommended procedures for concrete slabs, for testing them for proper levels of Relative Humidity and Calcium Chloride as a minimum. Testing equipment, procedures and test reports shall be submitted to the Architect in writing. Reports shall be submitted at least thirty (30) days prior to the carpet’s installation.**

PART 2 - PRODUCTS

2.1 CARPET

A. Carpet #1 – J & J Invision Commercial, Color Zone 7479, 24” x 24” Modular Carpet Tile. See Color and Material Schedule on the drawings.
B. Carpet #2 - – J & J Invision Commercial, Color Zone 7479, 24” x 24” Modular Carpet Tile. See Color and Material Schedule on the drawings.
C. Carpet #3 – Walk-Off Carpet: J&J Invision Commercial, Incognito 24” x 24” modular walk-off tile. See Color and Material Schedule on the drawings.

2.2 OTHER MATERIALS

A. Adhesives:
   1. Provide white latex carpet adhesive as recommended by the manufacturer.
   2. Provide seam adhesive as recommended by the manufacturer.

B. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

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.

3.3 SURFACE PREPARATION

A. Immediately prior to installation of the Work of this Section, thoroughly clean substrate and remove oil, grease, paint, varnish, hardeners and other items which would adversely affect the bond of adhesive.

B. Make substrate level and free from irregularities. Assure one constant floor height after carpet is installed, filling low spots and grinding high spots as required.

C. Additionally, follow all “Preparation” and “Testing” (of concrete substrates) Articles/Paragraphs of Section 09 65 00 - Resilient Flooring.

3.4 INSTALLATION OF CARPET

A. General:
   1. Install as per layout plan shown on Drawings. If not shown, then assume that selected carpet(s) will be a “field” carpet without any borders or etc.

2. Install per manufacturer recommendation using “Tile Tabs”.
3. Scribe the carpet accurately to vertical surfaces.
4. Align the lines of carpet, as woven, using no fill strips less than 6" wide, laying all carpet in the same direction unless specifically directed otherwise by the Architect.

B. Seams:
   1. Locate seams to the maximum extent practicable out of the way of traffic.

C. In addition to the cleaning requirements stated elsewhere, thoroughly clean carpet and adjacent surfaces as per manufacturer’s directions prior to final acceptance of the carpeted areas by the Owner. Any areas which are damaged and/or cannot be cleaned prior to final acceptance shall be replaced.

D. Inspect all materials prior to cutting to ensure no visible variation between dye lots. Do not mix dye lots.

3.5 PROTECTION OF CARPET

A. Provide a heavy non-staining paper or plastic walkway as required over carpeting in direction of traffic, maintaining intact until carpeted space is accepted by the Owner.

3.6 SURPLUS CARPET MATERIAL

B. Provide the Owner with 5% Attic Stock of each carpet specified, but not less than 10 sq. yds. Box and store in location directed by the Owner.

3.7 UNIT PRICE

A. Should the concrete slab not meet the requirements of Paragraph 1.6, above, then remediation to the slabs shall be performed. Remediation shall be as required / recommended by the tile manufacturer. This work shall include, but not be limited to, mechanical preparations of slab (shot blasting) and then installation of 2-part epoxy moisture barrier, then self-leveling patch, then glue and then carpet.

B. The Unit Price shall be for all work described above (Paragraph 3.7.A) and shall cover all labor materials, taxes, overhead profit and etc. for all slabs which are shown on the Drawings to receive carpet.

END OF SECTION

SECTION 09 77 20 – DECORATIVE FIBERGLASS REINFORCED WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Prefinished polyester glass reinforced plastic sheets and adhered to unfinished gypsum wallboard.
   1. Aluminum trim.
   2. PVC Wall base.

B. Products Not Furnished or Installed under This Section:
   1. Gypsum substrate board.
   2. Resilient Base.

1.2 RELATED SECTIONS

A. Section 09260 – Gypsum wall board system and metal studs.

1.3 REFERENCES

A. American Society for Testing and Materials: Standard Specifications (ASTM)
   1. ASTM D 256 - Izod Impact Strengths (ft #/in)
   2. ASTM D 570 - Water Absorption (%)
   3. ASTM D 638 - Tensile Strengths (psi) & Tensile Modulus (psi)
   4. ASTM D 790 - Flexural Strengths (psi) & Flexural Modulus (psi)
   5. ASTM D 2583- Barcol Hardness
   6. ASTM D 5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
   7. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

A. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specifications, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

B. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.

C. Selection Samples: Submit manufacturer’s standard color pattern selection samples representing manufacturer's full range of available colors and patterns.

D. Samples for Verification: Submit appropriate section of panel for each finish selected indicating the color, texture, and pattern required.
   1. Submit complete with specified applied finish.
   2. For selected patterns show complete pattern repeat.
   3. Exposed Molding and Trim: Provide samples of each type, finish, and color.

E. Manufacturers Material Safety Data Sheets (MSDS) for adhesives and sealants prior to their delivery to the site.

1.5 QUALITY ASSURANCE

A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:
   1. ASTM E 84 (Method of test for surface burning characteristics of building Materials)
      a. Wall Required Rating – Class A.

B. Sanitary Standards: System components and finishes to comply with:
   1. United States Department of Agriculture (USDA) requirements for food preparation facilities, incidental contact.
   2. Food and Drug Administration (FDA) 1999 Food Code 6-101.11.
   3. Canadian Food Inspection Agency (CFIA) requirements.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials factory packaged on strong pallets.

B. Store panels and trim lying flat, under cover and protected from the elements. Allow panels to acclimate to room temperature (70°) for 48 hours prior to installation.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Building are to be fully enclosed prior to installation with sufficient heat (70°) and ventilation consistent with good working conditions for finish work

B. 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.
   1. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

1.8 WARRANTY

A. Furnish one year guarantee against defects in material and workmanship.

PART 2 - PRODUCTS (NOTED “FRP” ON DRAWINGS)

2.1 ACCEPTABLE MANUFACTURER

A. Marlite; 202 Harger Street, Dover, OH 44622. 800-377-1221 FAX (330) 343-4668 Email: info@marlite.com www.marlite.com, or other approved manufacturer and product.

B. Product:
   1. Standard FRP

2.2 PANELS

A. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.
   1. Coating: Multi-layer print, primer and finish coats or applied over-layer.
   2. Dimensions:
      a. Thickness – 0.090 inch nominal
      b. Width - 4'-0” nominal
      c. Length –10’-0” nominal

3. Tolerance:
   a. Length and Width: +/-1/8 inch (3.175mm)
   b. Square - Not to exceed 1/8 inch for 8 foot (2.4m) panels or 5/32 inch (3.96mm) for 10 foot (2.4m) panels

B. Properties: Resistant to rot, corrosion, staining, denting, peeling, and splintering.
1. Flexural Strength - 1.0 x 10^4 psi per ASTM D 790. (7.0 kilogram-force/square millimeter)
2. Flexural Modulus - 3.1 x 10^5 psi per ASTM D 790. (217.9 kilogram-force/square millimeter)
3. Tensile Strength - 7.0 x 10^3 psi per ASTM D 638. (4.9 kilogram-force/square millimeter)
4. Tensile Modulus - 1.6 x 10^5 psi per ASTM D 638. (112.5 kilogram-force/square millimeter)
5. Water Absorption - 0.72% per ASTM D 570.
6. Barcol Hardness (scratch resistance) of 35 55 as per ASTM D 2583.
7. Izod Impact Strength of 72 ft. lbs./in ASTM D 256

C. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.

D. Front Finish: As Indicated below
Specifier Note: Marlite's Standard FRP Panels are available in several configurations, including Class A (I) and Class C (III) Fire-rated, along with various surface textures. All Marlite FRP products can be made available with standard surface grooving and customized groove layouts to match architectural specifications.

1. Color: Architect to choose from manufacturer's standard selections. Anticipated color: P440N "Biscuit"
2. Surface Marlite Standard FRP to be Pebble Texture.
3. Fire Rating Class A (I)
4. Size: 48" x 120".

2.3 MOLDINGS

A. PVC Trim: Thin wall semi-rigid extruded PVC.

1. Profiles : (Provide all profiles as required for a complete installation)
   a. M 350 Inside Corner
   b. M 360 Outside Corner
   c. M 365 Division
   d. M 370 Edge
2. Color: to be selected by Architect from Manufacturer's standards. Match Biscuit P 440N

2.4 ACCESSORIES

A. Fasteners: Non-staining nylon drive rivets.
1. Match panel colors.
2. Length to suit project conditions.

B. Adhesive: Either of the following construction adhesives complying with ASTM C 557.
1. Marlite C-551 FRP Adhesive - Water- resistant, non-flammable adhesive
2. Marlite C-375 Construction adhesive flexible, water-resistant, solvent based adhesive formulated for fast, easy application.

C. Sealant:
1. Marlite Brand - Color Match Sealant.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.
   1. Verify that stud spacing does not exceed 24 inch (61cm) on-center.

B. Repair defects prior to installation.
   1. Level wall surfaces to panel manufacturer’s requirements. Remove protrusions and fill indentations.

3.2 INSTALLATION

A. Comply with manufacturer's recommended procedures and installation sequence.

B. Cut sheets to meet supports allowing 1/8” inch (3 mm) clearance for every 8 foot (2.43m) of panel.
   1. Cut and drill with carbide tipped saw blades or drill bits, or cut with shears.
   2. Pre-drill fastener holes 1/8 inch (3.175mm) oversize with high speed drill bit.
      a. Space at 8 inches (20.32cm) maximum on center at perimeter, approximately 1 inch from panel edge.
      b. Space at in field in rows 16 inches (40.64cm) on center, with fasteners spaced at 12 inches (30.48 cm) maximum on center.

C. Apply panels to board substrate, above base, vertically oriented with seams plumb and pattern aligned with adjoining panels.
   1. Install panels with manufacturer's recommended gap for panel field and corner joints.
      a. Adhesive trowel and application method to conform to adhesive manufacturer’s recommendations.
      b. Drive fasteners for snug fit. Do not over-tighten.

D. Apply panel moldings to all panel edges using silicone sealant providing for required clearances.
   1. All moldings must provide for a minimum 1/8 inch (3.18mm) of panel expansion at joints and edges, to insure proper installation.
   2. Apply sealant to all moldings, channels and joints between the system and different materials to assure watertight installation.

3.3 CLEANING

A. Remove excess sealant from panels and moldings. Wipe panel down using a damp cloth and mild soap solution or cleaner.

B. Refer to manufacturer's specific cleaning recommendations Do not use abrasive cleaners.

3.4 EXTRA STOCK

A. Provide 5% of each material used as extra stock.

END OF SECTION

SECTION 09 84 50 – CEMENTITIOUS WOOD FIBER WALL PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Cementitious wood fiber plank acoustical wall and ceiling panel system and installation accessories. (Referred to as TECTUM on the drawings)

B. Related Sections:
1. Division 9 Sections: Acoustical Suspension.
2. Division 9 Sections: Acoustical Ceilings.
3. Section 06160: Rough Carpentry

1.2 REFERENCES

A. ASTM International:
1. ASTM C635 Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
2. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
3. ASTM E1264 Standard Classification for Acoustical Ceiling Products.

B. Ceilings and Interior Systems Construction Association (CISCA):
1. CISCA Code of Practices.

1.3 SYSTEM DESCRIPTION

A. Performance Requirements:
1. Provide acoustical wall panel assembly designed and tested to provide surface burning characteristics (ASTM E84) as follows:
a. Flamespread: 0.
b. Smoke Developed: 0.
2. Provide acoustical wall panel system which has been manufactured, fabricated and installed to provide Noise Reduction Coefficient (NRC) rating as follows:
a. 0.85 NRC rating.

1.4 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Product Data: Submit manufacturer’s product data and installation instructions.
1. Recommended procedures for normal cleaning and removal of stains including precautions in use of cleaning materials that may be detrimental to surfaces.

C. Samples: Submit selection and verification samples: 6 inch × 6 inch (152 × 152 mm) sample for each wall panel unit required, showing full range of exposed texture to be expected in completed work, and One 8 inch × 10 inch (203 × 254 mm) sample for each fabric color available.

D. Quality Assurance/Control Submittals: Submit the following:
1. Test Reports: Upon request, submit certified test reports from recognized test laboratories.
2. Certificates: Submit manufacturer’s certificate that products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity.

1.6 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirement Section.

B. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
1. Prevent soiling, physical damage or wetting.
2. Store cartons open at each end to stabilize moisture content and temperature.

1.7 PROJECT/SITE CONDITIONS

A. Environmental Requirements:
1. Do not install acoustical panels until building is closed in and HVAC system is operational.
2. Locate materials onsite at least 24 hours before beginning installation to allow materials to reach temperature and moisture content equilibrium.
3. Maintain the following conditions in areas where acoustical materials are to be installed 24 hours before, during and after installation:
a. Relative Humidity: 65 - 75%.
b. Uniform Temperature: 55 - 70 degrees F (13 - 21 degrees C).

1.8 MAINTENANCE

A. Extra Materials: Provide 5% additional material for use by owner in building maintenance and repair.

B. Provide new unopened cartons of extra materials, packaged with protective covering for storage, identified with appropriate labels.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Manufacturer: Tectum Inc.
1. Contact: 105 South Sixth Street, Newark, OH 43055; Telephone: (888) 977-9691, (740) 345-9691; Fax: (800) 832-8869; E-mail: info@tectum.com; website: www.tectum.com.

B. Proprietary Systems. Acoustical Wall panel systems, including the following:
1. Tectum Standard Interior Wall Panels:
a. Material: Aspen wood fibers bonded with inorganic hydraulic cement.
b. Thickness: 1 inch
c. Edge: All Edges Beveled.
d. Width: See drawings
e. Length: See drawings
f. Color: Natural.
g. Mounting Style: “C-40”. Provide all fasteners, Furring strips and OCF Batt fiberglass insulation for a complete single source installation. **INSULATION SHALL NOT BE EXPOSED ON ANY EXPOSED SIDES.**

C. Paint all tectum panels AND SCREW HEADS as indicated on Drawings. Refer to specification section 09 90 00- Painting.

2.2 PRODUCT SUBSTITUTIONS

A. Substitutions: No substitutions permitted.

2.3 ACCESSORIES

A. Provide accessories as follows:
   1. Tectum Painted Head Drywall Screws:
      a. Material: Steel.
      b. Length: 2¼ inches.
      c. Color: Natural.
   2. Tectum Plastic Spline:
      a. Material: Plastic.
   3. Tectum Z-clips:
      a. Material: Plastic.
   4. Tectum Moulding:
      a. Material: Plastic.
      b. Designation: To be determined by Architect.
   5. Tectum Touch-Up Paint:
      a. Color: See drawings
      b. Natural.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Comply with the instructions and recommendations of the acoustical wall panel system manufacturer.

B. Install materials in accordance with governing regulations, fire resistance rating requirements and industry standards applicable to work.
   1. Comply with CISCA Code of Practices.

3.2 EXAMINATION

A. Site Verification of Conditions:
   1. Examine surfaces scheduled to receive suspended or directly attached acoustical units for unevenness, irregularities and dampness that would affect quality and execution of work.
   2. Do not proceed with installation of wall panel system until unacceptable conditions are corrected.

3.3 INSTALLATION

A. Screw head to be flush with panel surface.

B. Securely affix wall panels by means of splines attached vertically to smooth wall or furring strips. Engage vertical kerfs on the edges of the wall panels with splines. Apply adhesive or use Velcro hook and loop fastening where necessary.

C. Cover field cut edges by means of trim or other moldings.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel, trim, moldings and suspension members to comply with manufacturer's instructions for cleaning.

B. Touch up any minor finish damage.

C. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.5 PROTECTION

A. Protect installed work from damage due to subsequent construction activity, including temperature and humidity limitations and dust control, so that the work will be without damage and deterioration at the time of acceptance by the Owner.

END OF SECTION

SECTION 09 90 00 - PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Paint and finish the exterior and interior exposed surfaces listed on the Painting Schedule in Part 3 of this Section, as specified herein, and as needed for a complete and proper installation.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and Sections in Division 1 of these Specifications.
2. Priming or priming and finishing of certain surfaces may be specified to be factory-performed or installer performed under pertinent other Sections.

C. Work not included:
1. Unless otherwise indicated, painting is not required on surfaces in concealed areas and inaccessible areas such as furred spaces, foundation spaces, utility tunnels, pipe spaces, and duct shafts.
2. Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze, and similar finished materials will not require painting under this Section except where indicated.
3. Do not paint moving parts of operating units; mechanical or electrical parts such as valve operators; linkages, sensing devices; and motor shafts, unless otherwise indicated.
4. Do not paint over required labels or equipment identification, performance rating, name, or nomenclature plates, including labels on fire-rated doors.
5. Do not paint concrete which has been sandblasted.
6. Do not paint rubber door silencers at hollow metal frames.

D. Definitions:
1. "Paint," as used herein, means coating systems materials including primers, emulsions, epoxy, enamels, sealers, fillers, and other applied materials whether used as prime, intermediate, or finish coats.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

B. Paint coordination:
1. Provide finish coats which are compatible with the prime coats actually used.
2. Review other Sections of these Specifications as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various substrata.
3. Upon request, furnish information on the characteristics of the specific finish materials to assure that compatible prime coats are used.
4. Provide barrier coats over incompatible primers, or remove the primer and reprime as required.
5. Notify the Architect in writing of anticipated problems in using the specified coating systems over prime coatings supplied under other Sections.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section, referenced to the Painting Schedules.
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
3. Manufacturer’s complete color samples for both interior and exterior stains and paints.

4. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams “Custodian Project Color and Product Information” report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touchup procedures, and color samples of each color and finish used.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 64 00.

1.5 JOB CONDITIONS

A. Do not apply solvent-thinned paints when the temperature of surfaces to be painted and the surrounding air temperatures are below 45 degrees F, unless otherwise permitted by the manufacturers' printed instructions as approved by the Architect.

B. Weather conditions:
1. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces, unless otherwise permitted by the manufacturers' printed instructions as approved by the Architect.
2. Applications may be continued during inclement weather only within the temperature limits specified by the paint manufacturer as being suitable for use during application and drying periods.

1.6 EXTRA STOCK

A. Upon completion of the work of this Section, deliver to the Owner an extra stock equaling 5% of each color, type, and gloss of paint used in the Work, tightly sealing each container, and clearly labeling with contents and location where used.

PART 2 - PRODUCTS

2.1 PAINT MATERIALS

A. Acceptable materials:
1. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
a. Glidden Coatings and Resins, Division of SCM Corporation (Glidden)
b. Benjamin Moore and Co. (Moore)
c. Polomyx Industries, Inc.
d. PPG Industries, Pittsburgh Paints (Pittsburgh)
e. The Sherwin-Williams Company (SW)

B. Undercoats and thinners:
1. Provide undercoat paint produced by the same manufacturer as the finish coat.
2. Use only the thinners recommended by the paint manufacturer, and use only to the recommended limits.
3. Insofar as practicable, use undercoat, finish coat, and thinner material as parts of a unified system of paint finish.

2.2 COLOR SCHEDULE

A. The Architect will prepare, during construction, a Color Schedule with samples for guidance in painting.

B. The Architect may select, allocate, and vary colors on different surfaces throughout the Work, subject to the following:
1. Exterior work: A maximum of three (3) different colors will be used, with variations for trim, doors, miscellaneous work, and metal work.

2. Interior work: A maximum of five (5) different paint and two (2) different stain colors will be used, with variations for trim, wall surfaces and ceiling surfaces.

2.3 APPLICATION EQUIPMENT

A. For application of the approved paint, use only such equipment as is recommended for application of the particular paint by the manufacturer of the particular paint, and as approved by the Architect.

B. Prior to use of application equipment, verify that the proposed equipment is actually compatible with the material to be applied, and that integrity of the finish will not be jeopardized by use of the proposed equipment.

2.4 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

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.

3.2 MATERIALS PREPARATION

A. General:
1. Mix and prepare paint materials in strict accordance with the manufacturers' recommendations as approved by the Architect.
2. When materials are not in use, store in tightly covered containers.
3. Maintain containers used in storage, mixing, and application of paint in a clean condition, free from foreign material and residue.

B. Stirring:
1. Stir materials before application, producing a mixture of uniform density.
2. Do not stir into the material any film which may form on the surface, but remove the film and, if necessary, strain the material before using.

3.3 SURFACE PREPARATION

A. General:
1. Perform preparation and cleaning procedures in strict accordance with the paint manufacturers' recommendations as approved by the Architect.
2. Remove removable items which are in place and are not scheduled to receive paint finish; or provide surface-applied protection prior to surface preparation and painting operations.
3. Following completion of painting in each space or area, reinstall the removed items by using workmen who are skilled in the necessary trades.
4. Clean each surface to be painted prior to applying paint of surface treatment.
5. Remove oil and grease with clean cloths and cleaning solvent of low toxicity and flash point in excess of 200 degrees F, prior to start of mechanical cleaning.
6. Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall onto wet newly painted surfaces.

B. Preparation of wood surfaces:
   1. Clean wood surfaces until free from dirt, oil, and other foreign substance.
   2. Smooth finished wood surfaces exposed to view, using the proper sandpaper. Where so required, use varying degrees of coarseness in sandpaper to produce a uniformly smooth and unmarred wood surface.

C. Preparation of metal surfaces:
   1. Thoroughly clean surfaces until free from dirt, oil, and grease.
   2. On galvanized surfaces, use solvent for the initial cleaning, and then treat the surface thoroughly with phosphoric acid etch. Remove etching solution completely before proceeding.
   3. Allow to dry thoroughly before application of paint.

3.4 PAINT APPLICATION

A. General:
   1. Touch up shop-applied prime coats which have been damaged, and touch up bare areas prior to start of finish coats application.
   2. Slightly vary the color of succeeding coats.
      a. Do not apply additional coats until the completed coat has been inspected and approved.
      b. Only the inspected and approved coats of paint will be considered in determining the number of coats applied.
   3. Sand and dust between coats to remove defects visible to the unaided eye from a distance of five feet.
   4. On removable panels and hinged panels, paint the back sides to match the exposed sides.

B. Drying:
   1. Allow sufficient drying time between coats, modifying the period as recommended by the material manufacturer to suit adverse weather conditions.
   2. Consider oil-base and oleo-resinous solvent-type paint as dry for recoating when the paint feels firm, does not deform or feel sticky under moderate pressure of the thumb, and when the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

C. Brush applications:
   1. Brush out and work the brush coats onto the surface in an even film.
   2. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, and other surface imperfections will not be acceptable.

D. Spray application:
   1. Except as specifically otherwise approved by the Architect, confine spray application to metal framework and similar surfaces where hand brush work would be inferior.
   2. Where spray application is used, apply each coat to provide the hiding equivalent of brush coats.
   3. Do not double back with spray equipment to build up film thickness of two coats in one pass.

E. Miscellaneous surfaces and procedures:
   1. Exposed mechanical items:
      a. Finish electric panels, access doors, conduits, pipes, ducts, grilles, registers, vents, and items of similar nature to match the adjacent wall and ceiling surfaces, or as directed.
      b. Paint visible duct surfaces behind vents, registers, and grilles flat black.
      c. Wash metal with solvent, prime, and apply two coats of alkyd enamel.

   2. Exposed pipe and duct insulation:
      a. Apply one coat of latex paint on insulation which has been sized or primed under other Sections; apply two coats on such surfaces when unprepared.
      b. Match color of adjacent surfaces.
      c. Remove band before painting, and replace after painting.
   3. Hardware: Paint prime coated hardware to match adjacent surfaces.
   4. Wet areas:
      a. In toilet rooms and contiguous areas, add an approved fungicide to paints.

b. For oil based paints, use 1% phenolmercuric or 4% tetrachlorophenol.
c. For water emulsion and glue size surfaces, use 4% sodium tetrachlorophenate.

5. Interior: Use "stipple" finish where enamel is specified.
6. Exposed vents: Apply two coats of heat-resistant paint approved by the Architect.

F. **Identification of Fire Rated Partitions:**

1. As described in the Arkansas Fire Prevention Code, Para. 703.7, fire walls, fire barriers, fire partitions, smoke barriers, and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling. All interior partitions noted as fire rated walls on the Drawings shall have the following identification:

Option a. Permanently affixed signs constructed of a permanent material such as plastic or metal with 3" minimum height lettering with minimum 3/8 inch stroke contrasting with the signage background. Signage shall have the following text (or approved equivalent):

Typical: **FIRE AND SMOKE BARRIER - PROTECT ALL OPENINGS**
2-Hour: **2-HOUR FIRE WALL – PROTECT ALL OPENINGS**

Signage shall be located in accessible concealed floor, floor-ceiling or attic spaces and located within 15 feet of the end of each wall and at intervals not exceeding 30 feet measured horizontally along the wall or partition.

Option b. A rectangular painted background with contrasting stenciled lettering, such as red lettering on a white rectangle meeting criteria above may be used in lieu of permanent signage at the Contractor's option..

3.5 EXTERIOR PAINTING SCHEDULE

A. Provide the following finishes with materials manufactured by Sherwin-Williams or equal products by manufacturers listed in 2.1, A.1 of this Section. NOTE: NOT ALL MAY APPLY.

B. Ferrous Metal (Misc. Steel, Doors and Frames, Handrails and Bollards)
1. Painted (GLOSS FINISH/Acrylic Base) Wide Range of Color
a. 1st coat: Pro-Cryl Universal Primer, B66-310 Series (5.0-10.0 mils wet, 2.0-4.0 mils dry)
b. 2nd coat: Pro Industrial Acrylic Gloss, B66-600 Series (6.0-12.0 mils wet, 2.5-4.0 mils dry)
c. 3rd coat: Pro Industrial Acrylic Gloss, B66-600 Series (6.0-12.0 mils wet, 2.5-4.0 mils dry)

C. Galvanized Metal
1. Painted (Gloss Finish/Acrylic Base)
a. 1st coat: Pro-Cryl Universal Primer, B66-310 Series (5.0-10.0 mils wet, 2.0-4.0 mils dry)
b. 2nd coat:Pro Industrial Acrylic Gloss, B66-600 Series (6.0-12.0 mils wet, 2.5-4.0 mils dry)
c. 3rd coat: Pro Industrial Acrylic Gloss, B66-600 Series (6.0-12.0 mils wet, 2.5-4.0 mils dry)

D. Concrete Masonry Units (Block)
1. Painted (Satin Finish/Latex Base)
a. 1st coat: PrepRite Block Filler, B25W25 (16 mils wet, 8.0 mils dry)
b. 2nd coat: A-100 Exterior Latex Satin, A82 Series (4.0 mils wet, 1.3 mils dry)
c. 3rd coat: A-100 Exterior Latex Satin, A82 Series (4.0 mils wet, 1.3 mils dry)

3.6 INTERIOR PAINTING SCHEDULE

A. Provide the following finishes with materials manufactured by Sherwin-Williams or equal products by manufacturers listed in 2.1, A.1 of this Section. NOTE: NOT ALL MAY APPLY.

B. Wood and Plywood: Cabinetry, Doors, Windows and Trim Noted “Stain” on Drawings
   1. Stained and Varnished (Clear Finish)
      a. Open Grained Wood
         1) 1st coat: Wood Classics Interior Oil Stain, A49-200 Series
         2) 2nd coat: Sherwood 100 Fast Dri Semi-Paste Filler D70T1
         3) 3rd coat: Wood Classics FastDry Oil Base Satin Varnish, A66F90
         4) 4th coat: Wood Classics FastDry Oil Base Satin Varnish, A66F90

C. Wood and Plywood: Miscellaneous trim noted “Paint” on Drawings.
   1. Painted (Semi-Gloss Finish/Alkyd Base) Color Answers: Interior
      a. 1st coat: Premium Wall & Wood Primer, B28W811 (4.0 mils wet, 1.8 mils dry)
      b. 2nd coat: Solo 100% Acrylic Semi-Gloss, A76 Series (4.0 mils wet, 1.5 mils dry)
      c. 3rd coat: Solo 100% Acrylic Semi-Gloss, A76 Series (4.0 mils wet, 1.5 mils dry)

D. Gypsum Wallboard: Walls - Typical
   1. Painted (SEMI-GLOSS FINISH/Acrylic Base) Color Answers: Interior
      a. 1st coat: ProMar 200 Zero VOC Latex Wall Primer, B28W2600 (4.0 mils wet, 1.5 mils dry)
      b. 2nd coat: ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series (4.0 mils wet, 1.6 mils dry)
      c. 3rd coat: ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series (4.0 mils wet, 1.6 mils dry)

E. Gypsum Wallboard Walls - At Restrooms, Toilets, or Janitor rooms
   1. Painted (Gloss Finish/Acrylic Epoxy) Wide Range of Color
      a. 1st coat: PrepRite Block Filler, B25W25 (16.0 mils wet, 8.0 mils dry)
      b. 2nd coat: Water Based Catalyzed Epoxy, B73-300 Series (7.0 mils wet, 3.0 mils dry)
      c. 3rd coat: Water Based Catalyzed Epoxy, B73-300 Series (7.0 mils wet, 3.0 mils dry)

F. Gypsum Wallboard: Ceilings
   1. Painted (Flat Finish/LATEX BASE) Color Answers: Interior
      a. 1st coat: ProMar 200 Zero VOC Latex Wall Primer, B28W2600 (4.0 mils wet, 1.5 mils dry)
      b. 2nd coat: ProMar 200 Zero VOC Latex Flat, B30-2600 Series (4.0 mils wet, 1.6 mils dry)
      c. 3rd coat: ProMar 200 Zero VOC Latex Flat, B30-2600 Series (4.0 mils wet, 1.6 mils dry)

G. Ferrous Metal (Hollow Metal Frames; Misc. Metal, Structural Steel)
   1. Painted (SEMI-GLOSS FINISH/Acrylic Base) Color Answers: Interior
      a. 1st coat: Pro-Cryl Universal Primer, B66-310 Series (5.0-10.0 mils wet, 2.0-4.0 mils dry)
      b. 2nd coat: Pro Industrial Acrylic Semi-Gloss, B66-650 Series (6.0-12.0 mils wet, 2.5-4.0 mils dry)
      c. 3rd coat: Pro Industrial Acrylic Semi-Gloss, B66-650 Series (6.0-12.0 mils wet, 2.5-4.0 mils dry).

H. Interior Exposed Structural Steel and Ceiling Deck
      a. Spot Prime: B66W01310 – PI PROCRYL. PR OF W
      b. 1st coat: B42W00001 – Waterborne Acrylic Dry Fall Flat
      c. 2nd coat: B42W00001 – Waterborne Acrylic Dry Fall Flat

I. CMU Walls - Not at Restrooms / Locker Rooms, Toilets, or Janitor rooms
   1. Painted Eg-Shell Finish/Acrylic Base) Color Answers: Interior
      a. 1st coat: PrepRite Block Filler, B25W25 (16.0 mils wet, 8.0 mils dry)
      b. 2nd and 3rd coat: ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series (4.0 mils wet, 1.7 mils dry)

J. CMU Walls - At Restrooms / Locker Rooms, Toilets, or Janitor rooms.
   1. Painted (Gloss Finish/Acrylic Epoxy) Wide Range of Color
      a. 1st coat: PrepRite Block Filler, B25W25 (16.0 mils wet, 8.0 mils dry)
      b. 2nd coat: Water Based Catalyzed Epoxy, B73-300 Series (7.0 mils wet, 3.0 mils dry)
      c. 3rd coat: Water Based Catalyzed Epoxy, B73-300 Series (7.0 mils wet, 3.0 mils dry)

K. Acoustical Wall Treatment (Cementitious Wood Fiber Panels)
   1. Painted Eg-Shell Finish/Acrylic Base) Color Answers: Interior
      a. 1st coat: PrepRite Block Filler, B25W25 (16.0 mils wet, 8.0 mils dry)
      b. 2nd and 3rd coat: ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series (4.0 mils wet, 1.7 mils dry)

L. Interior Exposed concrete walls
   1. Painted (EG-SHEL FINISH/Acrylic Base)
      a. 1st coat: Loxon Block Filler, LX02W0050 (8.0 mils wet, 3.0 mils dry)
      b. 2nd and 3rd coat: Pro Industril Pre-Catalized Waterbased Epoxy Eg-Shel K45-1150 Series (4.0 mils wet, 1.4 mils dry)

END OF SECTION

SECTION 10 90 00 - MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide miscellaneous specialty items where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 64 00.

1.4 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements, including fire ratings;
3. Samples of the full range of colors and patterns available from the proposed manufacturer in the specified products.

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHER CABINETS AND FIRE EXTINGUISHERS

A. Where noted "FEC" on Floor Plan, J.L. Industries, (or equal) Cosmopolitan Series #1837V10 (Provide Fire-FX fire rated tub for use in fire rated walls), semi-recessed 3” rolled edge, stainless steel cabinet door and trim with Cosmic Extinguisher, 10E. (Mount bottom of cabinet at 2'-6" above finished floor.)

B. Where noted “FE” on Floor Plan, J.L. Industries (or equal) Class K extinguisher on bracket (in Kitchen).

2.2 BUILDING SIGNAGE (IDENTIFYING DEVICES)

A. The Architect will select and advise Contractor of exterior and interior building signage, as scheduled below.

1. Exterior:
a. Handicapped Symbol parking sign: Metal sign on metal post. Sign posts are to be steel tubes, factory painted. Size of posts and heights of signs are as indicated on the drawings. Sign face background is 0.063 inch aluminum plate, cut to size and attached to sign post with non-corrosive 3/8” machine bolts with washers. Standard reflective white symbol on blue background. See civil drawings.

b. Metal letters: Cast Aluminum letters by A.R. K..Ramos (or equal). Font style -ROMAN, standard flush mounting. See Building Elevations for letter heights. NOTE: VERIFY LETTER SIZE AND FONT WITH ALLOWABLE SPACE.

2. Interior:
   a. Interior signage to be wall mounted, ImPact Series Thermoformed ADA signs by DFI Architectural Signs, North Little Rock, AR or equal. In addition to “Elevator” sign at each elevator door, provide safety signage at each elevator location indicating: ”IN CASE OF FIRE USE STAIRS”. Occupant load sign shall be installed at each assembly occupancy (118 PE Area and 226 Student Dining) – see plans. Restroom signs shall be sized to accommodate verbiage and symbol. Signs shall be engraved, have “Rebel” logo, and braille. Room signs - one sign shall be furnished and installed adjacent to each room door shown on the Plans. (Two or three signs required at rooms having 2 or 3 doors.) Sign size shall be standard shape, 8-1/2” w x 6-1/2” h with one window, Raised Characters (room name and room number), Braille, “Rebel” Logo (custom colors). “Blue" Background and White raised lettering and symbols with color “Rebel” logo. Owner provided updateable graphic film or paper insert. Interior signage shall meet accessibility guidelines as to raised letter, san serif, Grade 2 Domed Braille, mounted on wall at strike side of door – braille at 60" AFF and etc. Wall Mounting – concealed, double sided foam tape. A final Signage Schedule with final room names and numbers will be provided after receipt of shop drawings.

   b. Plaque: Cast Metal Plaque 24"x32" as manufactured by A.R.K. RAMOS, Oklahoma City, OK, 1-800-725-7266,

1.Plaque Material	-	Cast Bronze
2. Plaque Size	-	24" x 32"
3. Letter Style	-	Condensed Classic
4. Border Style _	-	512
5. Background Texture	-	Matte
6. Plaque Finish	-	BR roo Satin bronze raised areas with dark oxidized background
7. Plaque Mounting	-	1 (Verify with wall type)

Plaque to have name of school, superintendent, school board members, Architect, Contractor, date, school logo as a minimum.

2.3 TOILET AND CLOSET ACCESSORIES

A. Provide items per the following schedule, as manufactured by Bobrick or approved equal. See Sheet A1.2.1 for mounting heights. See plans for location of accessories.

GB-1	18" Grab Bar - Vertical	B5806 x 18
GB-2	36" Grab Bar	B5806 x 36
GB-3	42" Grab Bar	B5806 x 42
M1	18" x 36" Welded Frame Mirror	B290-1836
RH	Robe Hook	B6727
MBH	Mop and Broom Holder	B-223

2.4 SHEET METAL “REBEL” LOGO

A. 1/8 inch thick powder coated sheet metal logo (see drawings for dimensions) attached to metal panel wall or brick veneer wall where shown on building elevations. Provide blocking as required for installation. Logo shall consist of minimum of five colors anticipated. Contact: Advanced Welding, Inc., 4802 Oliver Springs Rd, Rudy, AR 72952. Phone 479-474-8159.

2.5 CORNER GUARDS

A. At locations noted “CG” on Floor Plan, INPRO, 2-1/2" x 2-1/2" wings X 4’-0” high, Clear Corner Guards .100” thickness with panhead self-tapping screws and pre-drilled screw holes. Install from top of wall base to 4 feet above finished floor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all materials in this Section in strict accordance with manufacturer’s instructions.

END OF SECTION

SECTION 11 13 00 AUDIO-VIDEO SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements for the visual display, processing, routing, interface, audio support, control, and other peripheral and support equipment for audiovisual (AV) systems.

1.2 SUBSTITUTIONS

A. Requests for substitution of equipment/materials shall comply with Section 01300 regarding the proposed substitute item(s), specifications, and front/rear views.

1.3 REFERENCES

A. InfoComm International and Building Industry Consulting Service International (BiCSi), "AV Design Reference Manual".
B. InfoComm International, "Basics of Audio and Visual Systems Design", Revised Edition.
C. InfoComm F501.01:2015 Cable Labeling for Audiovisual Systems (CLAS)
D. Building Industry Consulting Service International (BiCSi), "Telecommunications Distributions Methods Manual" (TDMM), 12th Edition.
E. Telecommunications Industry Association (TIA), "TIA Wiring Standards" (Includes TIA-568-1, TIA-568-2, TIA-568-3, TIA-569, TIA-570, TIA-598, TIA-606, J-STD-607, TIA-758, 526-7 & TIA-526-14).
F. National Fire Protection Agency (NFPA) 70, "National Electric Code 2005" F McGraw Hill, "Architectural Acoustics", M. David Egan.
G. McGraw Hill, "Master handbook of Acoustics", 5th Ed., F. Alton Everest.
H. Focal Press, "Audio Systems Design and Installation", Philip Giddings I Focal Press, "Sound System Engineering", 3rd Ed., Don Davis & Eugene Patronis, Jr.
I. Hyatt Brand Standards (ER & MS 4.0)

1.4 DEFINITIONS

A. The Term "OFE" shall refer to "Owner Furnished Equipment" which will be provided by the Owner to the Installer. This equipment will be integrated as required.
B. The term "shall" is mandatory; the term "will is informative; the term "should" is advisory; and the term "provide" means furnish and install.
C. The term "Engineer" refers to COMMERCIAL AUDIO SYSTEMS.
D. The term "Installer", "Integrator" or "Contractor" refers to the successful AV contractor and installer.

1.5 SYSTEM DESCRIPTION

A. These specifications and the associated AV-series drawings describe the sound reinforcement and audiovisual systems (AV Systems) to be furnished and installed at Palestine School district. This specification defines the minimum requirements for the equipment and associated items for the AV systems to be furnished and installed in the specified areas.
B. The successful AV Contractor shall provide all equipment, materials, associated hardware, power supplies, labor, transportation and incidentals, and all work needed for the installation and testing of the AV systems.
C. The AV systems equipment will be installed within the equipment racks indicated within these specifications, associated drawings, and within the Owner provided areas associated with the specified systems. It is the responsibility of the AV Contractor to verify space within racks, rooms, and cabinetry prior to installation as a portion of the Submittal Documents.
D. It is the purpose of this specification to require the furnishing of the highest quality materials, equipment and workmanship. The work shall be in accordance with this specification and in conformity with the designs, layouts and descriptions shown on the drawings.

E. Any and all structural, mounting or rigging details within this package is strictly conceptual. It is the responsibility of the AV Contractor to coordinate with design team Structural Engineer as necessary. Calculations shop drawings, and details of any structural modifications or additions shall be submitted to the Architect for approval.
F. Unless stated otherwise on the drawings, the work shall include everything necessary or incidental to complete the installation EXCEPT wire raceway (including conduit), raceway fittings, outlet boxes, pull boxes, terminal cabinets, 120v AC power circuits, lightning systems and insulated ground cables. Such excluded equipment shall be furnished and installed by the Owner. The AV Contractor shall furnish all necessary information to the Owner to insure that a proper AV conduit system will be installed.
G. The AV Contractor shall cooperate with all other Contractors engaged in this project and shall coordinate the installation of the AV systems so that all work will proceed in a manner which is in the best interests of the Owner.

1.6 DESIGN REQUIREMENTS

A. Work under this section of the specifications includes all labor, equipment, and installation as required to provide a complete technical system in compliance with the contract documents.
B. The technical system installation does not include conduit, outlet boxes, junction boxes, pull boxes, terminal cabinets, 120-volt AC power circuits, or insulated ground cables, which shall be furnished and installed by the project Electrical Contractor. The AV Contractor shall provide low-voltage "on/off" control system wiring, low-voltage "on/off" control switches and certain AC power/ground requirements internal to the equipment racks as specifically noted herein and/or on the drawings.
C. Except when plenum rated cabling is used above finished ceilings, it is required that cabling for microphone and line inputs, wideband RGBHS, video, control and other AV related cabling be routed inside the comprehensive system of conduit indicated on the drawings and installed by others. Floor and wall boxes shall serve as the primary interface points to the AV system.
D. provide and install cover plates, connectors and associated cabling to link all floor and wall boxes to all affiliated local and remote AV components. The Owner will provide no additional conduit, power pr workboxes. If additional infrastructure is required, include provisions for what is additionally required in the proposal. No wiremold or surface mounted raceway will be permitted.
E. All touch panel layouts are to comply with the owners AV touch panel standards in both ascetics and programming types.
F. Remote Control and Digital Signal Processing Standards:
    1. At a minimum, the remote control system for the AV system shall be programmed to include the following:
        a. Full function control of all source components, display units, processing devices and switching electronics.
        b. Per function status feedback indicating active/passive modes of operation.
        c. Separate program and microphone audio level control with mute function.
        d. 50% audio level default.
        e. Panel layout to include user screens as well as password protected technician pages.
        f. Raise and lower projection screens where present.
        g. Owner logo on first page.
        h. Automatic system shutdown.
        i. AM/PM Clock settings.
        j. Intellectual property release for installing editable, uncompiled source code for the entire remote control system and associated panel layouts on OFE computer(s). Editable, uncompiled source doe is intended for the Owner to make additions, modifications and changes to the remote control system after the warranty period has expired.
        k. Provide and load onto Owner's dedicated computer, editable versions of all configuration files for an digital signal processing as well as the associated software required for editing those files. Provide editable and uncompiled versions of all master source code for the control system on CD-ROM.

1.7 PERFORMANCE REQUIREMENTS

A. Performance Standards: Unless restricted by the published specification of a particular piece of equipment, or unless otherwise required, the following minimum performance standards shall be met by the AV system:

1. Audio:
    a. S/N (including crosstalk and hum): 75dB minimum.
        1) Total Harmonic Distortion: 0.5% maximum from 30Hz to 15,000Hz.
            a) Frequency Response: Flat within +1.0dB, 30 Hz to 15,000 Hz.
2. Display:
    a. Minimum 150:1 contrast ratio.
3. Video:
    a. S/N (peak to RMS), unweighted DC to 4.2 MHz; 45 dB minimum.
    b. Crosstalk, unweighted DC to 4.2 MHz: 45 dB minimum.
    c. Frequency Response (RGBHV): Within +0.5 dB to 300 MHz.
    d. Frequency Response (composite): Within +0.5 dB to 10 MHz.
    e. Frequency Response (component): Within +0.5 dB to 100 MHz.
    f. Line and Field Tilt: 2% maximum.
    g. Differential Gain: 3% maximim.
    h. Differential Phase: 2 degrees maximum.
4. Performance Test Signal Paths: The signal paths for the above Performance Standards shall be as follows:
    a. Audio: From any and all source inputs (microphones, audiotape units, videotape units, etc.) through all audio mixers, switchers, distribution amplifiers, codec's etc., to all signal destinations.
    b. Video: From all source inputs (cameras, computers, videotape units, etc.) through all switchers, processors, distribution amplifiers, etc., to all signal destinations.

1.8 SUBMITTALS

A. Comply with the requirements of project General Conditions. Verify with the Architect, the quantity of copies required for each submittal package to allow copies to be: retained by the AV Engineer (and, as applicable, any other reviewing party); distributed to the Architect (and, as applicable, the Owner, Design Team members, and General Contractor or Construction Manager); and returned to the AV Contractor. Quantity shall be minimized by limiting distribution only to persons have a need-to-know.
B. Submittals shall comply with the overall project schedule. Failure to make timely, complete submittals is considered to be a lack of substantial progress of the work in the section.
C. For the first submittal, also referred to as Shop Drawings, the AV Contractor shall provide the following:
    1. A complete list of all equipment and materials intended for the project, and with the list arranged in the same order as in the specifications. The material and equipment lists shall be submitted and reviewed before any equipment and material is purchased.
    2. The equipment list shall be accompanied by manufacturer's specification sheets on all MAJOR pieces of equipment, signal processing, loudspeakers, control system and other MAJOR components of the audiovisual system. Unless directed otherwise in the front-end portion of the contract documents, cut sheets for minor items such as headphones, audio and video adapter, and audio and video connectors shall not be included. However, complete cut sheets shall be required for all substitutes or other equipment not specified herein.
D. Sufficiently prior to installation of each respective portion of work, the AV Contractor shall submit the following:
    1. All panel and plate layouts (such as for wall boxes and for rack/cart-mounting) indicating locations of connectors, engraving, labeling, nomenclature, panel material and finish.
    2. All Equipment racks, cabinets, consoles, tables and cart front elevations showing equipment and panel layout.
    3. Control system button/panel/screen layouts.
    4. All non-factory equipment modifications.
    5. All cable labeling plans.
    6. For any permanent exposed cable applications, written authorization from the Architect (or Architect's designated Engineer) as to which locations are approved in addition to cable pathway being utilized.
    7. Shop drawings as indicated elsewhere in these specifications and/or on the project drawings.
E. Copies of all reviewed submittals shall be kept at the project site during the construction of the project for reference.
F. If the submittal is technically disapproved, the Engineer will return necessary copies to the PM with written explanation attached indicating the areas the submittal deviated from the system specifications.

G. Equipment Manuals
   1. At the completion of the project, the AV Contractor shall compile a minimum of three (or quantity as described under the General Conditions, plus one copy) complete, identical copies (sets) of the items listed below.
      a. All shop drawings of physical details (corrected to take into account any submittal review notations).
      b. Original copies of manufacturer's catalogue sheets on ALL supplied equipment;
      c. Original copies of manufacturer's engineering data sheets on ALL supplied equipment;
      d. Original copies of ALL literature supplied with each item of equipment, including operating instructions and maintenance manuals. Manuals not routinely supplied with an item of equipment will not be required;
      e. Other "as installed" Contractor-generated or vendor-generated drawings of the system which are not otherwise reflected in the project drawings.
   2. CD ROM's shall include the programming files for each of the systems within the project. These files shall be utilized to return the systems to the base line of operation established at the time of Final Systems Test and Equivalentization. Source Code files shall become property of the Owner with no license limitations.

H. As-Installed Wiring Diagrams
   1. Five working days prior to the proof of performance test, the Contractor shall deliver to the Owner, two complete sets of as-installed wiring diagrams of the system. The diagrams shall show all inputs and outputs of electronic and passive equipment correctly, identified according to the markers installed on the interconnecting cables, equipment and room/area locations.

I. System Operation Manual
   1. Produce this manual specifically for the system detailed herein. The manual shall describe all procedures necessary to activate the system to provide for the functional requirements, except as specifically excluded by the Owner. This section shall provide a non-technical graphic and narrative "how-to" users guide for the procedures needed to operate the system. The document shall contain a section on operating the system's equipment in the event of control system failure. Control system touchpanel layouts shall be accompanied by narrative text describing step-by-step function engagement.

1.9 QUALITY ASSURANCE

A. Contractor Qualifications:
   1. Work in this section shall be performed by an AV Contractor who: complies with the requirements of Division 01, and is licensed to perform work of this type in the project jurisdiction, and has at least five (5) years of verifiable direct experience with the devices, equipment and systems of the type and scope specified herein, and has a minimum of one full-time staff member who has attended technical system engineering courses talk by Syn-Aud-Con in the past 10 years, or has an active membership in the National Systems Contractors Association (NSCA), or has achieved Silver level membership in the International Communications Industries Association (InfoComm), or has a minimum of one full-time NICET certified Level II audio systems technician or one full-time NSCA Certified Electronics Systems Technician (C-EST), and has a minimum of one InfoComm CTS-I (Certified Technology Specialist - Installation) systems technician, and has a fully staffed and equipped maintenance and repair facility.
      a. The AV Contractor shall include, with his bid, a list of credentialed staff who will be actively involved in this project including specific tasks each will perform.
      b. The AV Contractor shall use sufficient numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this sections. These personnel shall have at least three (3) years direct experience in similar work, evidence of which shall be verified in writing with appropriate references.
      c. The AV Contractor shall appoint a designated supervisor who shall have at least five (5) years direct experience in similar work. The supervisor shall be present and in responsible charge of all work in the fabrication shop and on the project site during all phases of the installation and testing of the system(s). To assure continuity, this supervisor shall be the same individual throughout the execution of the work unless illness, loss of personnel, or other reasonable circumstances intervene.

d. The AV Contractor shall have a minimum of one full-time staff member, who has a minimum of three (3) years direct experience, and who is factory-certified on the most recent version of the selected Integrated Processing System (IPS) and technology. This individual shall be responsible for the implementation of the system including software. This individual shall be the same throughout the execution of the work unless illness, loss of personnel, or other reasonable circumstances intervene.
e. The AV Contractor shall have a minimum of one full-time staff member, who has a minimum of three (3) years direct experience and be a factory certified programmer on most recent version of Crestron control system software and technology. This individual shall be the same throughout the execution of the work unless illness, loss of personnel, or other reasonable circumstances intervene. The replacement shall be approved by the AV Engineer.
f. The AV Contractor shall be a factory-authorized dealer for the major components specified including items such as loudspeakers, video projector, control system, power amplifiers, video switcher, integrated processing system, and console mixer.

2. The AV Contractor must maintain a suitable staffed and equipped service organization and must regularly offer maintenance services for systems of this type and size.
3. Proof of Insurance for an on or off site storage shall be provided. The Owner shall be listed as co-insured.
4. The AV Contractor shall demonstrate to the satisfaction of the Owner that the AV Contractor has:
    a. Adequate staff and technical experience;
    b. Adequate plant and equipment to pursue the work properly and expeditiously;
    c. Suitable financial status to meet the obligations of the work.

B. Maintenance Proximity: Not more than 4 hours normal travel time from Installer's place of business to Project site.
C. Source Limitations: Obtain display equipment through a single source authorized by manufacturer to distribute each product.
D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
E. The entire installation shall comply with all applicable electrical and safety codes. All applicable equipment shall be listed by Underwriter's Laboratories, Inc.
F. The equipment design, installation and testing shall meet or exceed the requirements of this specification. Local Government Building Codes, OSHA Publications, the National Electrical Code and the Federal Communications Commission (FCC) Rules and Regulations.
G. The Contractor's AV Technicians assigned to the systems shall be fully trained, qualified, and carry valid and current industry certifications regarding the engineering, installation, operation and testing of AV technologies. At least one (CTS-D or CTS-I shall be assigned to oversee the complete design and installation of the system. The contractor shall provide formal written evidence of current industry certifications for the designer(s) and installer(s) dedicated to this project as part of their submittal or to the Engineer before being allowed to commence work on the system.
H. Certifications
    1. After the system has been provided, pretested, and found to meet the requirements of this specification, the Contractor shall submit a letter to the AV Engineer certifying that the system is ready for the formal proof of performance test to be accomplished in the presence of the Engineer or Engineer's representative.
        a. In the interim, the systems shall be left operating to "burn-in".
        b. A copy of each recorded system pretest measurements shall be submitted to the AV Engineer with the certification. The Contractor shall submit one copy of the measurements to the Engineer for review 15 working days prior to the test.
I. Test Equipment List
    1. Each Contractor is responsible for furnishing all test equipment required to test the system in accordance with the parameters specified. Unless otherwise stated, the test equipment shall not be considered part of the system. Each Contractor shall furnish test equipment of accuracy better than the parameters to be tested.
    2. The test equipment furnished by each Contractor shall have a calibration tag of an acceptable calibration service dated not more than 12 months prior to the test. As part of the submittal, a test equipment list shall be furnished that includes the make and model number of the following type of equipment as a

minimum. A sample of each of the following items shall be furnished to the AV Engineer for approval prior to installation. The samples may be returned to each Contractor at the discretion of the Owner:

a. Two foot section of each cable and/or wire to be used with connectors installed and original equipment manufacturer's cable sweep compliance and/or certification tags as specified herein.
b. Back Boxes and junction boxes.
c. Cover plates used for wall and floor boxes
d. AV outlets with back box, cover plate, and outlets installed.
e. UPS equipment (if required by system design).

1.10 DELIVER, STORAGE AND PROTECTION

A. The AV Contractor shall protect all work, materials and equipment from damage due to any cause. He shall provide for the safety and new condition of the equipment and materials until final acceptance by the Owner. The AV Contractor will replace all damaged or defective materials and/or equipment as directed by the Architect or AV Engineer.
B. Equipment racks and other exposed equipment shall be kept covered and protected from airborne contaminates. The AV Contractor shall clean all debris from the equipment room(s) and control console area, and shall clean all equipment and the interior rack floor, prior to system commissioning activities.

1.11 PROJECT CONDITIONS

A. This project represents construction of a new facility.
B. During the course of project construction, the AV Contractor shall personally examine the site of the proposed work and verify the conditions which involve his work.
C. Prior to equipment installation all AV equipment that requires an IP address shall be turned over to the owner for IP registration. The owner shall be setting up an onsite area for this IP registration.
D. By the act of submitting a bid, the AV Contractor will be deemed to have made reasonable allowances for site examinations and site conditions, and included all costs in his proposal. Failure to verify site conditions will not be considered a basis for the granting of additional compensation.
E. The AV Contractor shall comply with all applicable national and local codes, ordinances, and obtain all required permits. The AV Contractor shall be held responsible for any violations of the law within the scope of his work.
F. All equipment shall be new and in proper operating condition. All workmanship shall be of the finest quality by experienced installation technicians.
G. The AV Contractor shall contact Architect, in writing, regarding the selection of colors for all equipment such as loudspeaker grilles, exposed loudspeaker boxes, wall plates, millwork, laminate, and other items specific to the project prior to ordering equipment.
H. In addition to a complete set of the system project drawings and specifications, the AV Contractor shall maintain at the job site a complete set of manufacturer's original operation, instruction, installation and service manuals for each equipment item, for reference.
I. The AV Contractor shall schedule and sequence the AV system rough-in work to coordinate with the established general construction sequence as updated from time to time by Architect.
J. Once the AV Contractor begins work at the project site, the company shall maintain a project manager for the duration of the work to supervise the work force and to provide coordination with other trades and/or Architect.
K. The project manager shall attend any regularly scheduled construction progress meetings. These meetings will include, but not be limited to Owner Architect Meetings, walk through meetings with the Owner and Engineer, and weekly construction meetings.
L. The AV Contractor shall conform to all site policies regarding safety, job site hours, and any additional policy which may affect site conditions.

1.12 WARRANTY

A. The AV Contractor shall warrant all work executed under this contract, including all in-shop and onsite material, parts and labor, for a period of twelve months.
B. Warranty period to start after the date of final acceptance of the system by the Owner.

C. The Contractor shall provide original equipment manufacturers equipment warranty documents, to the Owner (or Facility Contracting Officer if the Facility has taken possession of the building), that certifies each item of equipment installed conforms to each original equipment manufacturers published specifications.
D. The Owners maintenance personnel shall have the ability to contact the AV Contractor and original equipment manufacturers for emergency maintenance and logistic assistance, remote diagnostic testing, and assistance in resolving technical problems. This contact capability shall be provided by the Contractor and each original equipment manufacturer at no additional cost to the Owner.
E. All AV Contractor maintenance and supervisor personnel shall be fully qualified by the original equipment manufacturers and must provide copies of current and qualified original equipment manufacturer training certificates and original equipment manufacturer certification upon request.
F. The warranty services are limited to normal business hours, unless additional agreements are made between the Owner and the AV Contractor.
G. The AV Contractor shall visit the job just prior to the end of the warranty period to check all equipment for proper system operation. Any defective equipment found shall be replaced or repaired under the terms of the system warranty.
The AV Contractor shall provide alternate pricing for second year and third year on-site services, and supply specific detail of the services and warranties that would be provided.
H. Response time during the one year warranty period:
    1. The Owner or Facility Contracting Officer is the AV Contractor's reporting and contact official for system trouble calls, during the warranty period.
        a. A standard work week is considered 8:00 am to 5:00 pm, Monday through Friday.
            1) The Contractor shall respond and correct on-site trouble calls, during the standard work week to:
            2) Trouble call within one working day of its report. A routine trouble is considered a trouble which causes a single interface, projector or loudspeaker component to be intermittent or inoperable.
            3) An emergency trouble call within four hours of its report. An emergency trouble is considered a trouble which causes the entire display or audio system to be inoperable at any time.
I. Work not included
    1. Maintenance and repair service shall not include the performance of any work due to improper use; accidents; other vendor, Contractor or Owner tampering or negligence, for which the Contractor is not directly responsible and does not control. The Contractor shall immediately notify the Owner or Facility Contracting Officer upon the discovery of these incidents, in writing. The Owner or Facility Contracting Officer will investigate all reported incidents and render findings concerning any AV Contractors responsibility.

1.13 MAINTENANCE SERVICE

A. The AV Contractor shall visit the job just prior to the end of the warranty period to check all equipment for proper system operation. Any defective equipment found shall be replaced or repaired under the terms of the system warranty.

PART 2 PRODUCTS

2.1 MATERIALS

A. General
    1. Passive and electronic components and cabling shall be provided under the original equipment manufacturers recommendations and guidance, to prevent damage to any system equipment from electrostatic discharges. The Contractor shall contact the Engineer for technical review and approval for this requirement in case of system redesign or change of technical approved system equipment that may require substitution.
    2. It is the intention of these specifications to form a guide for complete and properly operating AV systems. These specifications equipment and hardware listings herein represent only some of the major items of

the systems prerequisites. The major items of equipment shall be furnished in the quantity indicated by the one-line diagrams on the drawings or in the quantity as specified herein. However, where an item of equipment or hardware that may not be specifically shown on the single line drawings or specified herein this general and/or a specific section, but is required for complete and properly operating AV systems operations or installation, it shall be furnished by the AV Contractor.

3. Any item necessary for the operation of the systems within this document but not specifically listed or drawn shall be included by the bidder to the bidders pricing which includes pricing for all incidentals and labor necessary to complete the installation.
4. In any case, where a specific specification has not been included herein or shown on the drawings for any item that is required, the AV Contractor shall furnish only the highest quality equipment or material consistent with the quality of other specified equipment and material.
5. Unless otherwise designated, the AV Contractor shall provide all of one type of equipment from one manufacturer; for example, power amplifiers of one type to be provided by one manufacturer; all loudspeakers of one type by one manufacturer.
6. All major components of technical system equipment shall be provided and installed by a qualified AV Contractor as outlined in Part 1 of this section.
7. All equipment shall be of professional quality. All electronic audio devices shall have electronic or transformer balanced inputs and outputs except for specific program source equipment and specific mixing console inputs and/or outputs. If an electronic device specified or furnished has an unbalanced input and/or output, the AV Contractor shall make provisions to balance said input/output (i.e., outboard line-level transformer as approved) unless other arrangements have been agreed upon with Architect.
8. Some items listed in these specifications are custom-made products. Ensure when pricing and ordering equipment that the exact part number called out is used. If there is a discrepancy, the AV Contractor shall contact the Architect for clarification.
9. Each digital or digital-controlled equipment component, such as audio delay units or equivalentizers, shall have its power cord connected via a 120VAC spike suppressor (Furman PL-8 Pro).
10. Each software programmable device furnished (i.e. integrated processing system, control system, etc.) shall include most recent software and appropriate computer interface cable - minimum 25' (device to IBM PC). Cable, software, source (uncompiled) code, binary code, and all related aspects of all software-controlled equipment shall become the property of the Owner and will be furnished as a portion of the Operation & Maintenance (O&M) manuals (see Operation & Maintenance Manuals near the end of Part 3).
11. Each item of equipment to be supplied under this specification shall be new and the current model of a standard product of an original equipment manufacturer of record.
12. Specifications of equipment as set forth in this document are salient and minimum requirements, unless otherwise stated and shall not be construed as limiting the overall quality, quantity or performance characteristics of items furnished in the system. When the Contractor furnishes and item of equipment for which there is a specification contained herein, that item of equipment shall meet or exceed the specification for that item of equipment.
13. The systems shall be provided so that the installation, integration, and combination of equipment actually employed does not produce any undesirable visual effects such as key stoning, banding and shimmering as well as any undesirable aural effects such as signal distortion, noise pulses, glitches, audio hum, poling noise, voltage or spike transients, etc.
14. While individual items of equipment may meet the equipment specifications, and in fact, meet the system specifications; when electrically associated with other equipment, the total system shall be designed and installed so that the installation, interfacing, integration, combing, and/or consolidation of equipment actually employed does not produce any undesirable visual or aural effects such as signal distortions, noise pulses, glitches, audio or video hum bars, transients, ghosting, etc.
15. The Contractor shall produce verification, in writing to Architect at time of installation, that the type of wire/cable actually being provided is recommended and approved by the original equipment manufacturers and will provide a total system free of undesirable effects. The Contractor is responsible for the providing the correct protection cable duct and/or conduit and wiring even though the actual item installation may be by another subcontractor.
16. The Contractor is responsible for interfacing the systems with each required sub-system. The Contractor shall continually employ interfacing methods that are approved by the original equipment manufacturer and industry best practices. At a minimum, the acceptable interfacing method requires not only a

physical and mechanical connection; but a matching of signal, voltage, and processing levels, with regard to signal quality and impedance.

17. Active electronic component equipment shall consist of sold state components and be rated for continuous duty service in the areas where provided.
18. All passive equipment and cables shall meet or exceed -80dB radiation shielding specifications.
19. All signaling and communication circuits shall be sold state except for projection screen relays.
20. Each system shall utilize microprocessor components for all signaling and programming circuits and functions. Program memory shall be non-volatile or protected from erasure from power outages for a minimum of five minutes.
21. All voltages, except for the primary power to the power supply circuits, shall not exceed 70.7 VAC Root Mean Squared (RMS) or 100 V direct current (DC).
22. Color code all distribution wiring to conform to the respective system industry standard, TIA/EIA, and this document, whichever is the more stringent. At a minimum, all equipment, cable duct and/or conduit, enclosures, wiring, terminals, and cables shall be clearly and permanently labeled according to and using the provided as-installed drawings, to facilitate installation and maintenance. Reference Specifications Sections 16127, CABLES LOW VOLTAGE 600 VOLTS AND BELOW.
23. All equipment face plates utilized in the system shall be stainless steel, anodized aluminum, or ABS plastic for the areas where provided.
24. Noise filters and surge protectors shall be provided for the AV system including equipment racks and display devices to ensure protection from input primary AC power surges and noise glitches are not induced into low voltage data circuits.

See Equipment list at the end of this section

2.2 Video

A. Provide the following:
1. NEC NP-P547UL Laser Projector
2. Chief RPAU Ceiling Mount
3. Chief CMS 0306 Adjustable Pipe
4. Chief CMA395 Ceiling Mount
5. Dalite –DL 15275L Projector Screen (110 x 160” WIRELINE ADVANTAGE)
6. Crestron HD-TX-4KZ-101-1G-B HDMI-HDBT single gang Transmitter
7. Crestrom PWE-4803RU POE injector

2.3 Audio and Audio Related Equipment

A. Provide the following:
1. (9) JBL Control 26CT Recessed ceiling speaker (white in dining space; black at stage)
2. (1) Crown DCI4/300 Power Amplifier
3. (1) Biamp Tesira Forte AI digital signal processor DSP 12 x 8
4. (1) Biamp Tec-2000x Remote ethernet device
5. (1) Netgear POE Switch
6. (1) Denon DN-300BR Blue tooth
7. (1) Lowell LWR-1623 Wall Rack
8. (1) Lowell LFD-16FV Front door fully vented
9. (1) Juice Goose JG NS Power Center
10. (1) Edcore S2M Stereo to Mono balanced transformer
11. CAS misc rack blanks

2.4 Microphones and Related

A. Provide the following:

1. (2) Shure SLX24/SM58 Handheld (or body pack) Wireless Microphone
2. (1) Shure UA844+WSB Antenna Combiner
3. (4) Shure PGS58XLR Handheld “wired” microphones with 25’cables
4. (6) TMPpro MS 7701B microphone stands

2.4 Floor Boxes

A. Provide the following:
1. (3) Ace Backstage 122SLBK floor pockets (black unless otherwise noted)
2. (3) ACE Backstage ISO102BBX Pour Boxes for above
3. (3) Ace Backstage PE Electrical Outlet for floor box
4. (3) ACE Backstage PNL-106 Connection mounting plates for floor boxes
5. (3) ACE Backstage Connectors as required

2.5 MISC

A. Provide the following:
1. (1) CAS prg programming
2. (40) CAS LB installation, parts, wire connectors
3. Cable as required
4. Hardware as required
5. Labor as required

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify all conduits, back boxes and pathways.
B. Verify correct power requirements have been supplied based on equipment load and device requirements.
C. Verify video installation sightlines and possible obstructions.

3.2 PREPARATION

A. Coordinate with low voltage Electrical Contractor for required location of junction boxes, outlets, and conduit.
B. Carefully inspect areas where equipment will be installed. Notify the Architect of any conditions that would adversely affect the installation and subsequent operation of the system.
C. Coordinate with Architect for requirements for locations where AV equipment is mounted in millwork or cabinetry.

3.3 INSTALLATION

A. New wiring: Install wiring in raceways except within consoles, cabinets, desks and counters and except in accessible ceiling spaces and in gypsum-board partitions where cable wiring method may be used. Use plenum cable in environmental air spaces including plenum ceilings. Where possible for all audio cabling except microphone cables, microphone cables shall be installed in conduit. Conceal cables and raceways except in unfinished spaces. Cable shall be installed continuous with no splices or cuts.
B. Install exposed cables parallel and perpendicular to surfaces or exposed structural members, and follow surface contours. Secure and support cables by straps, staples, or similar fittings so designed and installed to avoid damage to cables. Secure cable at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, or fittings.
C. Wiring within Enclosures: Bundle, lace and train conductors to terminal points with no excess. Use lacing bars in cabinets and racks.

D. Separation of Wires: Separate speaker-microphone, line-level, speaker-level and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least 12 inches for speaker microphones and adjacent parallel power and telephone wiring.
E. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.
F. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so the identify media in coordination with system wiring diagrams.
G. Wall-Mounting Outlets: Flush mounted.
H. Weatherproof Equipment: for units that are mounted outdoors, in damp locations, or where exposed to weather, install consistent with requirements of weatherproof rating.
I. All terminations shall be installed per manufacturer's specifications and recommendations.
J. All audio circuits shall be two-wire circuits, with a separate grounding shield conductor, unless noted otherwise. All circuits shall have either the red or white wires as the "high" side of the line and connector to pin 2 of microphone-type XLR audio connectors and the tip of 3-conductor phone connectors. The black wire of the two-wire circuit shall be the "low" side of the line and connect to pin 3 of microphone connectors and the ring of 3-conductor phone connectors. The shield conductor shall connect to pin 1 of microphone connectors or to the sleeve of phone connectors. In the case of unbalanced lines, the low side shall connect to the shield connection.
K. Identify al audio and video wire and cable clearly with permanent labels wrapped about the full circumference within one (1) inch of each connection. Indicate the number designated on the associate field or shop drawing or run sheet as applicable. Assign wire or cable designations consistently throughout a given system. Each wire or cable shall carry the same labeled designation over its entire run, regardless of intermediate terminations.
L. Each conduit shall include a minimum of one spare cable or 10%, whichever is greater for each type of cable pulled including line-level, microphone-level, intercom, loudspeaker, control, video and control system. Neatly bundle a minimum of 10-feet of cable at each end of each spare circuit. All spare circuits shall be labeled and noted on the AV Contractor's field drawings for inclusion into the record drawings.
M. Where the design location requires that products, materials, or equipment are visible to the public, no manufacturer's logos shall be visible. Unless otherwise directed, neatly remove or permanently paint out such logos.
N. Grounding
    1. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
    2. Signal Ground Terminal: Locate at all equipment display locations. Isolate from power system and equipment grounding.
    3. Shields shall be connected at each end of each wire to the pin 1 of each XLR, shield connection for each electronic device, etc. No shield wires shall be left unconnected except where noted on the drawings, nor shall any shield come in contact with conduit, pullboxes, or other building steel. Audio line-level circuit shield wires shall be grounded to rack sheet metal only via rack-mounted equipment. Shields shall be electrically isolated in multiconductor cables. Shields for audio line-level circuits connected to audio transformers shall be connected to transformer electro-static shields and case ground. In the case of unbalanced audio lines the shield wire shall connect to the low side of the line (black wire)
    4. Equipment rack ground shall be only via the insulated ground wire provided by the Electrical Contractor for technical system ground. Equipment racks shall be isolated from other ground paths such as building steel and from ground via conduit.
    5. Each equipment rack within a row of racks shall be electrically bonded to each other using a minimum 1/4-inch diameter unfinished bolt and nut with star washers. Bolts shall fasten to each equipment rack unpainted sheet metal. Each row of equipment racks shall be electrically bonded to adjacent row(s) via a No. 6 AWG insulated ground wire. This work shall be performed by the AV Contractor.
O. Circuit Routing
    1. All audio circuits shall be separated according to function: e.g. microphone circuits shall be separated from line-level circuits which are separated from video circuits which are separated from loudspeaker circuits. Where audio and video circuits are installed in conduit or other raceway, separate conduits are required for the various circuit functions.
    2. Control and intercom circuits, and video circuits can be routed with line-level circuits, if separate conduit is not furnished for these circuits.

3. Where circuits are exposed in the equipment racks or large junctions or pull boxes, the circuits shall be bundled according to function. Use plastic cable ties to bundle cables and provide as much separation as reasonable.

P. Wire Splicing
1. Audio and video circuits shall not be spliced except as shown on approved shop drawings.
2. All solder connections shall be made with soldering iron and rosin core solder. All solder connections shall be checked for "cold "solder joints by the AV Contractor.
3. All audio circuits terminating to screw-type connectors shall be installed with non-insulated brazed seam spade lugs of the proper size for wire and screw connection.
4. All crimped audio connections shall be installed with a Thomas * Betts WT111 M or Klien 1006 crimping tool with the notch opposite the barrel seam. All crimped video connections shall be installed with a ratchet style crimper such as the West Penn TL-SNS (screw-on BNC connectors will not be accepted). Ensure crimper is sized for connectors and cabling that is being installed.

Q. Cabling
1. Cable within equipment racks, and where service loops are indicated, shall be separated and routed in neat groups according to function: microphone circuits, intercom circuits, line level audio circuits, loudspeaker circuits, video circuits, control circuits and 120 volt AC power circuits. Cable shall be neatly arranged, but tight bundling, which makes modifications difficult, shall be avoided. Two sided hooks and loop wrap ties shall be used for grouping of circuits.
2. Cable in conduit or other raceway - microphone circuits, intercom circuits, line level audio circuits, loudspeaker circuits, control circuits, video circuits shall be separated from any 120 volt AC power circuits.
3. Care shall be exercised in wiring so as not to damage cables and equipment. Circuits shall not be spliced.

R. Video installation
1. Soldering of video connectors will not be permitted.
2. A qualified technician by the AV Contractor shall perform the testing and setup of the video system for proper operation, without hum, distortion, oscillations, etc. Each video source device will be checked for proper tracking and each video projector or monitor will be checked for sync stability, proper gray scale, convergence, and color temperature.
3. All video Switchers, sources and Processors shall be labeled with engraved labels as to the function, type and room that it serves. Video switchers inputs and outputs shall be labeled with printed labels in a logical manner which describes source and destination. Hand written labels shall not be permitted.

S. Audio Installation
1. Unless otherwise noted, all audio circuits shall be two wires with shield, with the red or white wire used for the "high" side of the line and connected to pin 2 of microphone connectors or to the "tip" of patch panel and other phone jacks. The black wire shall be used for the "low" side of the line and shall connector to pin 3 of microphone connectors or to the "ring" of phone jacks. The shield (drain) wire shall connector to pin 1 of microphone connectors or to the sleeve of phone jacks.
2. All audio circuits (red or white and black conductors) shall be ungrounded except as provided by single ended amplifier inputs and where grounding of unbalanced circuits is directed during system tests. Shields for line level audio circuits shall be grounded to rack sheet metal at each cable termination. Where line level audio circuits connect to audio transformers, shields shall connector to transformer electrostatic shields and case grounds. At each cable termination shield or shield drain, wire length shall be approximately equivalent to the length of the insulated conductors. Shield drain wires shall be sheathed in green PVC sleeking or clear Teflon sleeving sized appropriately for conductor gauge. Circuit shields shall not otherwise connector to each other nor ground to electrical conduit at wall boxed, etc. Microphone circuit shields shall be grounded only at mixer inputs.
3. Where resistors are indicated to terminate an audio circuit, install each resistor at the end of the line at the input to the following transformer or amplifier. High impedance circuits shall not extend more than 20 feet.

4. All wire joints and connections in the audio system shall be made with rosin core solder and a small soldering iron; or with the approved mechanical connectors. Soldering shall be neat and shall not exhibit "cold" solder joints. Connections to screw type terminals shall be made with mechanically connected, un-insulated, spade type lugs selected for the particular wire size in use.
5. Connections made with miniature screw actuated, pressure type terminal strips shall be made by stripping approximately 1/4-inch of insulation from stranded conductor, inserting the untinned wire into the pressure terminal, and tightening the terminal screw using a small screwdriver which securely fits the screw head.
6. All crimp type connectors, including non-insulated butt connectors for inline loudspeaker circuit connections, shall be crimped with a Thomas & Betts model WT111 M tool. Spade tongue terminals shall be crimped with the notch on the barrel opposite the seam.
7. Loudspeakers shall be installed so there are no obstructions to the loudspeaker coverage pattern and shall be connected "in phase" and proper impedance matching shall be maintained between amplifiers and loudspeakers. As required for proper acoustic levels and proper aiming, re-tap selected loudspeaker transformers and re-orientate selected loudspeakers or loudspeaker clusters during final system tests and adjustments. High frequency drivers shall be installed in such a manner as to allow at least 10 degrees of aiming in the horizontal plane.
8. Tie-wrap and secure all loudspeaker line matching transformer leads and loudspeaker cable away room loudspeakers to prevent "rattling" when loudspeakers are energized. All cut transformer inputs shall be individually protected from shorting against one another or other metal objects.

T. Physical Installation
   1. Equipment Racks:
      a. Racks will be installed plumb and square without twists in the frames or variation in level between the racks.
      b. Firmly secure all equipment in place unless requirements of portability dictate otherwise.
      c. Install appropriate factory or custom rack mount adapters for all equipment installed in equipment rack, whether specifically itemized or not. Utility or one size fits all rack shelves shall not be utilized unless specifically noted on the AV construction documents.
      d. Install rear support for any equipment that exhibits mount stress or tilt caused by the depth or weight of the equipment.
      e. The front of the rack will have the appropriate vented blanks and grills installed to fill in areas not used for equipment mounting.
      f. Mounting hardware used in racks will be identical in color, size and manufacturer as dictated by function, i.e. rack screws will be from the same manufacturer with identical fiber washers.
      g. Vertical lacing bars shall be installed in all equipment racks in order to facilitate neat wiring and proper signal separation. Horizontal lacing bars shall be utilized in sufficient quantity to ensure that cables traveling horizontally do not sag, but not in such quantity to limit access for testing and maintenance.
   2. Cabling Harness:
      a. Any exposed cabling harnesses are to be concealed and neatly bundled in black expandable "Tech Flex" type harnessing sheath. Before installation sheath shall be cut to length and ends burned to prevent unravel. When installed the ends shall be turned into itself and secured with flush-cut tie-wraps.
   3. Floor and Wall Plates:
      a. All connection plates (wall, floor, etc.) will be secured with appropriate fasteners and installed plumb and level. All plate and panel finishes shall be coordinated with the Architect prior to order entry and installation. Each connection type shall be labeled in a logical manner consistent with the organizational standards of the Owner. Labeling shall be engraved into plate material. Adhesive or mechanically fastened labels shall not be permitted.
   4. Mounting To Building Structure
      a. Building structural members shall not be modified without consultation with and approval of the Architect and Structural Engineer.
      b. Do not fabricate or install supports that will overload the building structure. Supports shall not be installed to overhead structure not capable of supporting five times the weight of the sub-mount, mount and equipment combined.

c. All Mounting methods of each device type and mounting type shall be shown on submittal drawings and approved by the project Architect prior to installation.
d. Do not drill or cut concrete beams, joists or structural steel, and do not weld to structural steel.
e. Beam clamps are to be used to anchor strut and threaded rod to structure such as I beams, Z bar, etc.
f. Attachment hardware with a minimum SAE Grade 8 load rating and a safety factor of at least 5 are to be used.
g. Screens, wall mounted devices, projector/display mounts, or sub-mounts are to be installed plumb and level.

3.4 INTERFACE WITH OTHER WORK

A. Coordinate all required interfaces with other trades and systems as required.

3.5 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:
B. Schedule tests with at least seven days advance notice of test performance.
C. After installing display equipment and after input signals are available and calibrated after electrical circuitry has been energized, test for compliance with requirements.
D. Operational Test: Perform test and calibration video display and sound per manufacturer installation training. Verify proper signal levels and that system is free of noise and distortion with all signals provided at outlet.
E. Retesting: Correct deficiencies in video and audio display and retest. Prepare a written record of tests.
F. Inspection: Verify that units and controls are properly labeled and all interconnecting wires and terminals are identified.

3.6 STARTING EQUIPMENT AND SYSTEMS

A. Upon completing installation of each system, the Contractor shall align, balance and completely pretest each entire system under full operating conditions.
B. Verify that electrical wiring installation complies with manufacturers submittal and installation requirements.
C. System test and adjustments shall include but not be limited to the following:
    1. Functional tests of all individual audio, video and control equipment.
    2. Alignment, convergence and source input settings for each video monitor.
    3. Functional tests of all AV control system software functions.
    4. Room Equivalentization and audio gain structure set up providing the maximum possible dynamic range and gain before feedback. These settings shall be documented and submitted to the AV Engineer prior to Final System Tests and Equivalentization.
    5. All functional tests of the installed system as required assuring that the system is ready for final inspection.
D. The AV Contractor shall be responsible for notifying the Owner of any unresolved malfunctions encountered during system tests and of any equipment not at the site sufficiently prior to final system testing and inspection.
E. If troubles are encountered, the AV Contractor shall continue tests and adjustments until the system operates in a satisfactory manner.

3.7 TRAINING

A. Furnish the services of a factory-trained Engineer or technician for two (2), two-hour periods to instruct the Facility's personnel. Instruction shall include corrective and preventative maintenance of each system's equipment. Training shall be accomplished before the system can be accepted by Owner. Additionally, training will be scheduled at the convenience of the owner for these two (2) periods.
B. Furnish the services of a representative of the systems, familiar with the functions and operation of the equipment, for two four-hour periods to train selected Facility personnel. Instructions shall be provided for staff personnel in each area where new equipment is provided under this contract. When multiple locations are

involved, classes will be grouped. Periods of training shall be coordinated with Owner to ensure all shifts receive the required training.

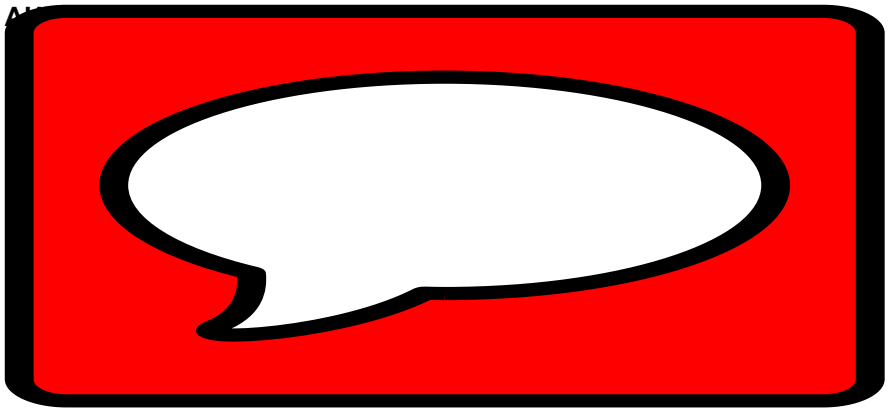
3.8 CLEANING AND PROTECTION

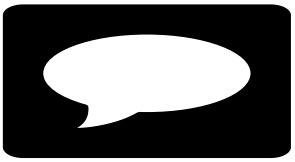
A. Jobsite to remain organized during construction. All efforts must be made to protect existing finishes and equipment. Any devices altered during construction to be brought back to existing or better condition upon completion of construction.

3.9 SCHEDULE

A. All work to be scheduled with Construction Manager, Owner and Architect.

END OF SECTION





Commons Audio Video

Quantity	Brand	Model	Description
Video			
1	NEC	NP-P547UL	laser projector
1	Chief	RPAU	projector mounting hardware
1	Chief	CMS 0306	Adjustable pipe
1	Chief	CMA395	Angled ceiling mount
1	Dalite	DL15275L	projection screen 100X160 WIRELINE ADVANTAGE
1	Crestron	HD-TX-4KZ-101-1G-B	HDMI-HDBT single gang
1	Crestron	PWE-4803RU	POE injector
Audio and Related			
9	JBL	Control 26CT	Recressed ceiling speaker
1	Crown	DCI-4/300	power amplifier
1	Biamp	Tesira Forte AI	digital signal processor 12x8
1	Biamp	TEC-2000x	Remote ethernet device
1	Netgear		POE switch
1	Denon	DN-300BR	Blue tooth
1	Lowell	LWR-1623	Wall rack
1	Lowell	LFD-16FV	Front door fully vented
1	Juice Goose	JG NS	Power center
1	Edcore	S2M	stereo to mono balanced transformer
1	CAS	misc	rack blanks
Microphones and Related			
2	Shure	SLXD24/SM58	Hand held (or Body Pack) wireless mic systems
1	Shure	UA844+WSB	antenna combiner
4	Shure	PGA58XLR	Handheld "wired" microphones w/25' cables
6	TMPpro	MS 7701B	microphone stands
Floor boxes			
3	Ace Backstage	122SLBK	floor pockets (black unless otherwise by architect)
3	Ace Backstage	ISO102BBX	pour boxes for above
3	Ace Backstage	PE	electrical outlet for floor box
3	Ace Backstage	PNL-106	Connection mounting plates for floor boxes (see drawing for details)
3	Ace Backstage	MISC	Connectors for PNL-106 (budget)

SECTION 11 45 20 – COMMERCIAL KITCHEN EQUIPMENT

1.1 DRAWINGS AND CONTRACT DOCUMENTS:

A. The Drawings and Specifications constitute a full and complete Food Service Equipment Contract Document. The Contract Document for the Kitchen Equipment Contractor(s) consideration shall include, but not be limited to the following:

1. Equipment Layouts
2. Rough-In Plans and Special Details
3. Instruction to Bidder
4. General Conditions
5. Specifications and Details
6. Any Addendum Issued Prior to Execution of this Contract

B. All Drawings prepared by Food Service are definitive only and should not be used as construction documents or building shop details.

C. Drawings and Equipment Specifications are intended to complement each other and form one Contract Document. Therefore, neither should be considered complete without the other.

D. K.E.C. should not submit Cost Bids, Proposal **Contract** Document, or enter into agreements without complete knowledge or access to all Contract Documents.

E. Drawings are for reference, assistance and guidance only for the K.E.C. They indicate the preferred final location of equipment. The exact final location will be dictated by the building condition. K.E.C. should understand and accept this Contract with this understanding.

F. See list of equipment at the end of this section.

1.2 GENERAL CONDITIONS AND REQUIREMENTS:

A. The General Conditions, Supplementary General Conditions and the General Requirements of the Specifications, including mechanical and electrical, and any other pertinent documents issued by the Architect, apply to this Section.

B. It shall be the responsibility of the K.E.C. to avail themselves of a complete set of Drawings and Specifications and be familiar with all parts thereof. Failure to do so shall not relieve responsibility in the fulfillment of the Contract in any respect.

1.3 DESCRIPTION OF WORK:

A. The work required by this Section of the Specifications consists of furnishing all material, labor, plant, tools and equipment in performing all operations necessary to assemble, deliver and install the Kitchen/Food Service Equipment, complete and ready

for use and all related work in accordance with the Drawings and Specifications and subject to the Terms and Conditions of the Contract.

1. Refer to General Conditions, Supplementary Conditions, and applicable provisions of Division 01 for additional instructions.

2. Refer to Division 05, 06 and 09-Interior Design; for applicable provisions and sections regarding interior design finish, applications, details and special instructions relating to items specified in this Section.
K.E.C. is responsible for obtaining these Sections and any associated drawings, and coordinating the pertinent information contained in them, with the applicable manufactures and fabricators. (Applicable to projects with items specified in this section, with decor construction and/or finishes.)

3. Refer to Division 22-Mechanical; for applicable provisions and sections regarding mechanical services, including, but not limited to, rough-ins, grease traps, insetting of floor troughs, steam traps, drain traps, atmospheric vents, check valves, valves, pipes and pipe fittings, ductwork, and other materials necessary to complete final connections to individual items as specified in this Section. Not work of this Section.

4. Refer to Division 26-Electrical; for applicable provisions and sections regarding electrical services, including but not limited to, rough-ins, wiring, disconnects and other materials necessary to complete final connections to individual items as specified in this section. Not work of this Section.

5. Work included in other Divisions: Provision of all wall, floor, and/or ceiling/roof openings, recesses, sleeves and/or conduits; and equipment pads, as required for installation of items included in this section. Inclusive shall be the sealing of these openings, recesses, sleeves, etc., after installation of the equipment items, as required. Not work of this Section.

B. No Kitchen Equipment will be delivered to the Project until the Project is ready to receive the same.

1. Kitchen Equipment shall be delivered to the Project only after the building is weather and vandal safe.

2. Kitchen Equipment shall be stored in an area convenient to the point of installation in such a way that it can be protected from the weather and job hazards.

3. Wrapping and protective coverings shall remain on all items of Kitchen Equipment until ready for use, inclusive shall be the custom fabricated items, until installation is complete and the job is ready for cleaning.

C. Work included; Kitchen Equipment Contractor (K.E.C.):

1. K.E.C. shall furnish all labor, Union or Non-Union, materials and services necessary for the assembly and setting in place (installation) of the kitchen equipment in strict compliance and in accordance with the Contract Document.

2. K.E.C. shall have on site a competent supervisor, representing their firm and any subsequent employed sub-contractors, present at <u>all times</u> during progress of

their work.

3. Sequence installation and erection to ensure correct mechanical and electrical utility connections are achieved.

4. Install Items in accordance with manufacturer(s) instructions.

5. K.E.C. will provide the G.C. / C.M. with reinforcements, special support locations and /or blocking for attachment of the prescribed equipment in a manner such that will carry the weight of the unit and it's intended use as so noted in the Itemized Specification and/or Detail Drawings.

6. Furnish all faucets, overflow fittings, quick opening waste with rotary handles and chrome plated or polished stainless steel tailpieces (as applicable to the project), floor trough and grates, special valves, regulators, pressure reducing valves, pressure type relief valves, control valves, vacuum breakers, thermometers, pressure gauges, Gas and Water Hose/Coupling units and all equipment items as required to support the installation of the equipment or required by governing codes, shipped loose for field installation by the Mechanical Trade. Refer to the Itemized Specifications for clarification and required compliance.

7. Provide refrigeration systems completely piped and controlled to refrigeration units. All installers shall hold a current Class A Certified Air Conditioning and Refrigeration Contractors License, registered with the State Of Oklahoma. Installers/Contractors shall have a minimum five (5) years in refrigeration as their primary business, and shall provide walk-in cooler/freezer installation reference documentation to the Owner/Architect/Consultant upon request.

8. Fabricated equipment requiring mechanical services shall be provided with mechanical services piped internally to a point of single final connection for each utility.

9. Furnish all cords and plugs, special devices including electrically operated controls, thermostats, contactors, overload and thermal protective starters, and all the equipment items required to support the installation of the equipment or required by governing codes, shipped loose for field installation by the electrical trade. Refer to the Itemized Specifications for clarification and required compliance.

10. Fabricated equipment requiring electrical services shall be provided with electrical devices such as receptacles, junction boxes, faceplates and special devices attached and wired internally to a point of single final connection.

11. Install each Item of non-mobile and non-portable equipment securely in place,leveled and adjusted to correct height. Anchor to supporting substrate where indicated, and where required for sustained operation and use without shifting or dislocation. Conceal anchorages wherever possible. Adjust counter tops and other work surfaces to a level tolerance of 1/16" (1.6mm) (maximum offset, and plus or minus on dimension, and maximum variation in 24' (610mm) run from level or indicated slope). Provide anchors, supports, bracing, clips, attachments, etc., as required to comply with the local seismic restraint requirements. The Guidelines for Seismic Restraint of Kitchen Equipment, as prepared for the Sheet Metal Industry Fund of Los Angeles and endorsed by S.M.A.C.N.A., is to be followed.

12. Complete field assembly joints in the work (joints which cannot be completed in the shop) by welding, bolting-and-gasketing, or similar methods as indicated, refer to the Itemized Specifications for compliance and clarification. Grind welds smooth and restore finish. Set or trim flush, except for "T" gaskets as indicated.

13. Provide closure plates and strips where required, with joints coordinated with units of equipment.

14. Provide sealants and gaskets all around each unit to make joints airtight, waterproof, vermin-proof, and sanitary forcleaning purposes.

15. Joints up to 3/8" (9.5mm) wide, to be stuffed with backer rod, to shape sealant bead properly, at¼" (6mm) depth.

16. At internal comer joints, apply sealant or gaskets to form a sanitary cove, of not less than 3/8" (9.5mm) radius.

17. Shape exposed surfaces of sealant slightly concave, with edges flush with face of materials at joint.

18. Provide sealant filled or gasketed joints up to 3/8" (9.5mm) joint width. Wider than 3/8" (9.5mm), provide matching metal closure strips, with sealant application each side of strips. Anchor gaskets mechanically, or with adhesives to prevent displacement.

19. Treat enclosed spaces, inaccessible after equipment installation, by covering horizontal surfaces with powdered borax at a rate of 4 ounces per square foot. "Verify" with Owner prior toapplication.

20. Insulate to prevent electrolysis between dissimilar metals.

21. Cut and drill components for service outlets, fixtures, piping, conduit, and fittings.

22. Verify that the intended locations of approved dry pendent sprinkler heads in Walk-In Coolers/Freezers, does not conflict with panel joints or refrigeration equipment installation. (Note: Sprinkler heads shall be installedin Coolers/Freezers ***only*** if required by Local Codes. It shall be the responsibility of the K.E.C to verify such.).

23. Verify and coordinate the mounting heights of all wall shelves and equipment, with equipment located below them, for proper clearances.

24. . Coordinate with Division 22 & 26 Contractors respectively, and provide holes in Food Service Equipment for plumbing and electrical service through the fixtures as required. This includes welded sleeves, collars, ferrules, or escutcheons. These services are to be located so that they do not interfere with intended use and/or servicing.

25. Provide to the other contractors parts to be built into the concrete or masonry work, such as pass-thru opening frames, etc., said parts to be delivered to the other Contractor by the K.E.C in time for inclusion in the concrete or masonry

work. The K.E.C. shall provide necessary setting plans and instructions, shall superintend the installation of parts to be included in the masonry or concrete work, and shall be responsible for the correctness and accuracy of their location and installation.

26. Test and adjust equipment, controls and safety devices to ensure proper working order and conditions.

27. Repair or replace equipment which is found to be defective in its operation, including units which are below capacity or operating with excessive noise or vibration.

28. Be responsible for patching and repair of all damage to the building resulting from work of this Section. Have such work performed by Trades skilled in that work.

29. After completion of installation, and completion of other major work in food service areas, remove protective coverings and clean food service equipment, internally and externally.

30. Restore exposed and semi-exposed finishes, to remove abrasions and other damages; polish exposed metal surfaces and touch-up painted surfaces. Replace work which cannot be successfully restored.

31. Polish glass, plastic, hardware and accessories, fixtures and fittings.

32. Wash and clean equipment, and leave in a condition ready for the Owner/Operator to sanitize and use.

33. Throughout the progress of work the K.E.C. shall keep the working area free from debris, and remove rubbish from premises resulting from work being done by their workmen and/or sub-contractors. At the completion of their work, the K.E.C. shall leave the premises in a clean and finished condition.

D. Work Not Included; Kitchen Equipment Contractor (K.E.C.):

1. Wall reinforcing (interior/exterior), backing and bracing for wall mounted equipment unless otherwise specified; refer to Part 1, General Requirements, Section 1.12, Job Conditions, Paragraph F, and/or the Itemized Specifications for clarification.

2. Masonry work such as housekeeping pads, trenches, vibration mounts, core drilling and sleeves, unless otherwise specified, refer to the Itemized Specifications for clarification.

3. Electrical Services: provision by Division 26 Contractor unless otherwise specified, refer to the Itemized Specifications for clarification and required compliance. Inclusive shall be all upstream of the service island electrical panel, in association with, wiring from rough-in location to equipment where direct connections are indicated on the Section 114000 Electrical Requirement Drawings, motor starters, disconnects and distribution panels not integral with equipment items, refer to Itemized Specifications for clarification and required compliance, fused disconnect switch or circuit breaker for equipment not provided with built- in circuit breaker or disconnect switch to be directly connected to the building electrical system, receptacles and junction boxes mounted in ceilings, walls, partitions and floors, conduit and wiring between

disposer, solenoid valve and control panel, conduit and wiring for all control wiring between components of Food Service Equipment, conduit and wiring for installation of electrical components furnished by the Food service Equipment Contractor and connection thereto.

4. Mechanical Services: provision by the, Division 22 Contractor unless otherwise specified, refer to the Itemized Specifications for clarification and required compliance. Inclusive shall be all piping for steam, water, gas and waste from rough-in location to equipment where direct connections are indicated on the Section 114000 Mechanical Requirement Drawings, i.e. Plumbing, Gas, Ventilation etc... nipples, couplings, union traps, strainers shut- off valves, check valves, floor drains, the installation of Gas and Water Hose/Coupling Units, piping for water between disposer and solenoid valve(s), vacuum breaker, pre- rinse spray, piping for water between waste pulper and trough inlet, connection thereto, piping for installation of mechanical components furnished by the K.E.C. and connection thereto, final connection of equipment to service lines, final connection to equipment ductwork above the finished ceiling. In addition to such, all fixtures furnished by the K.E.C., Division 22 Contractor shall provide all ancillary parts and additional fixtures required to complete installation of such.

5. It shall be noted that K.E.C. along with Division 22 & 26 Contractor(s) shall not exclude themselves of coordination between each other. Hence it is noted that all respective trades shall thoroughly review and inspect all submittal documents and bring any discrepancies so noted to the attention of the Architect/Food Service Consultant/General Contractor/Construction Manger/Project Team for review, consideration and clarification.

1.4 SUBMITTING OF BID:

A. Pursuant to Arkansas Law, all Food Service Bidders are required to be licensed in the State of Arkansas as provided by Act 142 of 1967, amended by Act 293 of 1969, Act 397 of 1971 and Act 546 of 1971, as enacted by the General Assembly of the State of Arkansas. The State of Arkansas makes no distinction between General Contractors and Subcontractors and requires that all Contractors be duly licensed.

B. Each K.E.C. bidding the work shall carefully read the Specifications, examine the Drawings and submit their Bid subject to all conditions therein contained.

C. The submitting of a Bid shall constitute full evidence that the K.E.C. is fully cognizant of all conditions under which the work must be done. Failure to examine the Bid Documents and the site shall not relieve the Bidder from any obligation with respect to his Bid. The K.E.C. will not be given extra payments for conditions, which can be determined by examining the documents and the site.

D. K.E.C. shall do no work in connection with those items shown in the Itemized Specifications, to be "BY OTHERS' or "EXISTING" or "BY OWNER" except to provide required space in the equipment layout, and except as noted in the Itemized Specifications. If EXISTING Equipment is included as a part of the K.E.C. Contract and Scope Of Work, refer to Itemized Specifications and Section 3.4; Special Fabrication, Existing (Reused) Equipment for clarification and required compliance.

E. All Kitchen Equipment Bids:

1. Shall be submitted in a single Lump Sum Bid covering all items as

specified.

2. Shall indicate that the Owner reserves the right to reject any or all Bids at any time.

3. Shall indicate that after the selection of the K.E.C. for the Project that the Owner reserves the right to deduct any item(s) from the Lump Sum Bid.

4. If a Bidder chooses to quote an "Alternate" brand, proof of equality must be submitted for approval no later than Ten (10) days prior to bid date. It shall be noted there are Specified Items with the notation "As per Owners directive no alternates for this Item shall be accepted". This is based on the Owners request, and the continuation of maintaining continuity of the products specified, thus alleviating multiple maintenance issues, reducing employee down time through re-training. OnlyFood Service Equipment Contractors may request approval for alternates. Note: There will be NO EXCEPTIONS. Any and all variances in construction, design performance, and accessories from the item specified must be submitted "in writing". This information shall be submitted in addition to the Manufacturer's cut sheet with complete illustrations, specifications, capacities and utilities, as well as operational data. It is the K.E.C. responsibility to prove that the Item or Items substituted are equal to the specified items. List separately, construction and performance features that do not meet or exceed the specified item.It should be noted that the Project Documents are designed and engineered using the Primary Manufacturer and Model listed. If Custom Fabricated items are submitted and accepted as a substitute to standard manufactured items, these items are to meet the specifications of the specified manufacturer items, and in general, the fabrication sections which follows. If so listed, inclusion of an alternate Manufacturer in the Itemized Specifications is not intended to indicate that there is an equal alternate unit to match every primary specified unit. It is the responsibility of the K.E.C. to insure that the alternate unit submitted matches the primary specified unit; and meets the intended design format of the Specified Primary Manufacturer. K.E.C. shall be responsible for all cost associated with the approved alternate item if the item requires additional space or specific utilities which differ from the Specifications; K.E.C. shall be responsible to the Owner and General Contractor for any retrofitting such as building changes, utility changes and engineering changes.
   Failure to obtain prior approval will result in rejection of the proposal. Alternate/Substitutes shall be subject to the approval of the Architect, Food Service Consultant and the Owner. All Kitchen Equipment Bidders will be advised of the approved alternate/substitutions by Addendum only so as to assure all bidders have equal opportunities.

5. Must represent the full and complete price, including all taxes required on Kitchen Equipment, excise, sales and use taxes.

6. Shall be F. 0. B. destination, full freight prepaid and allowed.

7. Hold the Bidder responsible for delivery of all Kitchen Equipment to the job site, including freight claims and installation for the Project; as per Contract Documents, i.e. Plans and Specifications.

E. Successful Bidder shall agree to purchase all items of Kitchen Equipment, not

requiring field measurements, at current prices. Those items for which the Bidder has secured price protection at current price levels may be purchased within the price protection time limit. No allowances shall be neither made nor considered for unexpected/unknown price increases, material surcharges and/or fuel surcharges due to Governmental influences and tariffs, inclusive of both Domestic and International secured products.

F. Successful Bidder shall agree to warehouse all items of Kitchen Equipment and to coordinate with the General Contractor and/or Construction Manager, delivery and installation of said equipment so as not to impede the Project construction schedule.

1.5 SCHEDULE AND SPECIAL HANDLING:

A. Time is of essence in this agreement and acceptance constitutes a guarantee that the K.E.C. can and will obtain all materials, equipment and manpower, upon notice to proceed, to permit overall completion of the entire building Project on schedule. K.E.C. shall coordinate their work with the progress schedule, as prepared and updated periodically by the G.C. /C.M.

B. Anticipated delays not within the realm of control of the K.E.C. shall be the subject of "written notification" to the Architect and Food Service Consultant immediately upon K.E.C. realization that delays are imminent.

C. Failure of the Manufacturers to meet promised delivery dates will not grant relief to the K.E.C. for failure to meet schedules unless K.E.C. can establish, in writing, that orders were received by the Manufacturer with reasonable lead times.

D. Extra charges resulting from special handling or air shipment shall be paid by the K.E.C.

1.6 QUALITY ASSURANCE OF SUPPLIES:

A. Commercial Food Service Equipment Supplier shall submit satisfactory evidence of compliance with the following qualifications and conditions to be approved.

1. Successful completion of jobs of comparable scope.

2. Have Manufacturer's authorization to distribute and install specified factory items of equipment. There will be no exceptions.

3. Maintain a permanent staff experienced in the installation of Food Service Equipment, licensed and registered with the "Arkansas Department of Health", Slot 29 - HVACR Section, and preparation of professional style Shop Drawings and brochures.

4. Maintain or have access to a fabrication shop meeting NSF/UL Requirements. All alternates are subject to Part 1, General Requirements, Section 1.5, Submitting of Bid, Paragraph E, and Number 4.

5. Maintain or have access to a readily available stock of repair and replacement parts, together with Authorized Service Personnel.

6. Pursuant to Arkansas Law, all Food Service Bidders are required to be licensed in the State of Arkansas as provided by Act 142 of 1967, amended by Act 293 of 1969, Act 397 of 1971 and Act 546 of 1971, as enacted by the General Assembly of the State of Arkansas. The State of Arkansas makes no distinction between General Contractors and Sub-Contractors and requires that all Contractors beduly licensed.

7. Refrigeration Personnel are to be licensed and registered with the Arkansas Department of Health, Slot 29 - HVACR Section.

1.7 , BRAND NAMES:

A. Whenever a brand name or type of equipment is specified, the term "Or Approved Equal" shall be understood. Inclusion of an alternate manufacture in the Itemized Specifications is not intended to indicate that there is an equal alternate unit to match every primary specified unit. It is the K.E.C. responsibility to insure that the alternate unit submitted matches the primary specified unit and meets the intended Design Format of the Specified Primary Manufacture. The Proposal Bid Form shall be based only on items specified with any suggested alternate items listed separately as additions or deductions from the Base Bid. The alternate is to include brand name, specification sheets, validated performance data, price differentials and samples, if requested, for each proposed alternate as it differs from that specified in the Base Bid. All alternatesare subject to Part 1, General Requirements; Section 1.5; Submitting of Bid; Paragraph E, Number 4.

B. Architect, Food Service and the Owner, will investigate all such proposals, consult with the Owner when necessary or desirable and render final decision. The burden of proof of equality of any proposed alternate shall rest with the Bidder. It shall be the responsibility of the Bidder to ascertain if the substitute items will fit into the space allowed as conveniently as the item specified.

C. Architect, Food Service and the Owners, approval of a substitute is for performance and/or design only. Any changes necessary to the building or system design shall be arranged for "in writing" before material is ordered.

1. All costs involved in making such changes shall be borne by the Kitchen Equipment Contractor. If such changes are deemed inadvisable by the Architect/ Owner/Food Service Consultant, the K.E.C. shall install items specified even though substitute item had been previously approved. Should an alternate be accepted under the provisions of the above clauses and should this alternate prove defective or otherwise unsatisfactory for the service for which it was intended, within the guarantee period, the K.E.C. shall replace the defective or unsatisfactory item with the item specified, on which the Specifications require him to base his Bid Proposal.

D. The K.E.C. shall bear all cost for engineering services, construction adjustments, changes in utilities and the installation that occurs and becomes necessary due to the replacement of a defective or unsatisfactory item.

1.8 COORDINATION:

A. Should any error or omission occur in either or both the Plans and Specifications, the

K.E.C. shall not avail themselves of such an unintentional error, omission or conflict; but, shall have same explained and adjusted prior to bidding.

B. The K.E.C. is to provide access to shop fabrication areas during regular working hours to facilitate inspection of the equipment, during construction, by the Architect, Food Service, General Contractor/Construction Manager and Owner or their Authorized Representative; this shall also be inclusive of stored "claimed" materials and job site review during installation. Errors found during these inspections shall be corrected to the extent required within the scope of the Plans, Specifications and approved Drawings.

C. After all utility connections to equipment are made by Mechanical / Electrical Contractors, the K.E.C. shall adjust all equipment and conduct final tests. K.E.C. shall provide factory trained Engineers for start up and demonstration of equipment. Demonstration shall include all relevant personnel i.e., Operator/Maintenance, if so required, inclusive to the demonstration shall be actual, correct operation, maintenance, cleaning, upkeep, adjustments, along with any special requirements of the equipment herein specified. Inclusive shall be an explanation of service requirements and simple on site service procedures, as well as, information concerning the name, address, and telephone number of the local source of service. The individual(s) performing the demonstration shall be knowledgeable of operating and service aspects of the equipment. K.E.C. shall provide a written report of the demonstration, to the Owner, outlining the equipment demonstrated and malfunctions or deficiencies noted. Indicate individuals present at demonstration. Such shall take place in the presence of the Food Service Consultant and Owner/Owners Representative. Such service shall be provided as per the written schedule from the Architect/Owner and shall not exceed five (5) separate days.

D. After completion of final connections, thoroughly test all equipment for proper operation.

1. Repair or replace any equipment producing objectionable noise.

2. Finish marred during installation shall be repaired to the Architect/Food Service Consultant's satisfaction or replaced.

E. If it becomes necessary to schedule construction so that all partitions will be erected prior to delivery of the Food Service Equipment, all K.E.C. are cautioned that all equipment must be fabricated so that it can be handled through finished openings. Maintain close contact with the project and be cognizant of all conditions including vertical handling limitations within the building (elevator cabs or openings, stairs, etc.) and possible hoisting requirements. Coordinate all procedures with General Contractor (G.C.), Construction Manger (C.M.) and Project team.

1.9 SUBMITTALS:

A. All materials and equipment shall be new, of current production models, at the time of installation.

1. Kitchen Equipment furnished requiring services other than those originally specified must be brought to the attention of the Architect/Food Service "in writing". If so deemed acceptable, the K.E.C. shall bear all cost for engineering services, construction adjustments, changes in utilities and the installation that occurs and becomes necessary due to such negligence and unsatisfactory performance.

B. The K.E.C. shall submit all Floor Plans, Electrical, Plumbing, and Mechanical Rough-In Drawings. All Drawings shall be prepared at a minimum scale of¼" (6mm/l :50) to the foot, if the size of the Project is such that the designated minimum scale is not relevant, the K.E.C. shall follow the format as set forth by the Architect/Food Service Consultant respectively. Item numbers are to be the same as shown in the Contract Documents, and are to include Spare Numbers and associated Items provided "By Others", such as the Owner, General Contractor, or other Contractors; as shown on the Contract Food Service Equipment Plans. It is imperative that if such Plans constitute multiple sheets to form a Plan, that "match lines" be provided in a standard AIA format. All Rough-In Drawings are to be fully dimensioned from finished-room surface to point of stub- up through floor and stub-out through wall or ceiling for all mechanical, electrical and plumbing services. These Drawings shall also include all necessary Special Condition Drawings consisting of sizing and locating wall openings, block-outs for pass-through equipment, recessed control panels, in wall fire- protection system components, etc. In the event Rough-Ins have been accomplished before award of this contract, the K. E. C. is to examine the existing facility and make adjustments to their equipment to suit building conditions and utilities, where possible. If not possible, so state in a letter form with detailed reasons, along with an alternate method, inclusive with pricing, to the Architect/Food Service Consultant for review and consideration.

C. The K.E.C. shall submit detailed Shop Drawings prepared at a minimum scale of ¾" (I9mrn/1:20) to the foot, plus necessary cross sections at a scale of 1½" (38mrn/1:10) to the foot, showing complete details of each item of fabricated equipment. All custom fabrication shall have dimensions, fabrication materials, and thickness, detail of construction, installation and method of field joints, especially for large counters. Shop details must indicate reinforcements, methods of anchorage and quality of finishing's, as a minimum of required information.
Along with such K.E.C. shall submit manufactures shop drawings for ventilators/fire protection systems along with fans both exhaust and make-up air (if so specified in itemized specifications). The Drawings shall be based on the Kitchen Equipment Plans and the following Specifications. Drawings shall include accurately dimensioned layouts and locations for all masonry bases or recessed, if required, or called for hereinafter, and shall furthermore, if applicable, include accurately dimensioned details and locations of any special wall openings that are required where items of equipment extend through walls. The K.E.C. shall submit brochures containing illustrations, specifications, line drawings and rough- in information on all brand name items.

D. Brochures of regularly manufactured items are to be submitted with the following:

1. Cover with identifying label as follows:

    - Cover page listing name of Project and Architectural Project Number (as applicable); Architect; General Contractor/Construction Manager; Food Service Equipment Consultant and Food Service Equipment Supplier, bound in loose leaf manner such as a three (3) ring binder or spiral back brochure. If the project is of such a magnitude that there are separate areas, each area shall be issued as a separate brochure.

Index of items:

1. Individual descriptive cover sheet to include: Item Number; Model Manufacturer(s); description; accessories and options; finishes,N.E.M.A. plug and receptacle configuration for applicable items and notes for Owner to select any color, finish, lettering, signage, etc., as required (include color charts and/or relevant samples if selections are required)..

2. Manufacturer's specification sheet with complete illustrations, dimensions, specifications, capacities, utilities, as well as operational data.

3. For Custom Fabricated items, list name, address, phone and facsimile number of qualified fabricator selected for the Project.

4. Cover sheets must be included for Items that are Spare Number; "By Others", such as the Owner, General Contractor, or other Contractors, Vendor (Purveyor) furnished, and is to be noted as "Not in Section 114000 Contract Division".

5. Buy out items such as walk-in cooler/freezer, ventilation systems, and sneeze guards; serving counters, floor troughs, architectural case work, solid polymer components, along with any specialty items shall be prepared on sheet sizes and in the manner as Shop Drawings. Refer to Part 1, General Requirements, Section 1.10, Submittals, Paragraph C.

6. The K.E.C. shall furnish for review, with reasonable promptness, all samples required. Food Service Consultant/Owner shall review such samples, with reasonable promptness, only for conformance with the design concept of the Project. The work shall be in accordance with selected samples. The K.E.C. shall be responsible for furnishing Manufacturers with samples necessary for their fulfillment of their obligations.

E. The K.E.C. shall furnish one (1) copy of the foregoing brochures and one (1) reproducible transparency of the foregoing Drawings to the Food Service Consultant, through the respective chain of documentation command for review and approval before proceeding with fabrication, within fifteen (15) days after notification of award of the Contract and/or a written "Notice to Proceed" by the Architect and/or

Owner. Send notification of submittal transmission to Architect and General Contractor (G.C.)/Construction Manager (C.M.). After the Food Service Consultant's review, six (6) additional copies of the brochures and six (6) blue line copies of the Shop Drawings shall be supplied to the Food Service Consultant through the chain of documentation command for distribution. Partial submittals will not be reviewed until all Drawings are submitted. Architects/Engineers/Food Service Consultant/Owners/General Contractors/Construction Mangers review markings or comments are not to be construed as relieving the K.E.C. from compliance with the contract documents, or departures therefore. The K.E.C. remains responsible for details and accuracy, confirming and correlating all quantities and dimensions, selecting fabrication process, techniques of assembly, and performing their work in a safe, satisfactory, and professional manner.

- Note: All submitted Drawings shall be delivered in a tube for protection, folded blue-lines and transparencies shall be returned for re-submittal. There shall be no exceptions.

G. The K.E.C. shall furnish two (2) sets of operating instructions for each piece of mechanically operated equipment, with name, address and telephone number and facsimile along with electronic address (if applicable) of the Manufacturer's Authorized Service Agency (Refer to Part 3; Special fabrication: section 3.24, Authorized Factory trained Service Agency, Paragraph A in its full context for clarification and required compliance.), data sheets, spare parts list and dimensional prints to the Food Service Consultant for review and approval before demonstration of equipment to the Owner. These operating instructions shall be bound in loose-leaf binders with hard durable covers bearing the job name and the date of submission.

Instruction Manuals shall include:

a. Cover with identifying label as follows:
Cover page listing name of Project and Architectural Project Number (if applicable); Architect; General Contractor / Construction Manager; Food Service Equipment Consultant and Food Service Equipment Supplier, bound in loose leaf manner such as a Three (3) ring binder or spiral back brochure.

b. Complete operating instructions and recommendations as materials used by item.

c. Complete cleaning instructions and recommendations as to cleaning materials.

d. Complete lubrication data and schedules.

e. Maintenance, repair, and adjustment data. It should be noted that periodic routine maintenance, service, adjustments, cleaning, etc., as required by the various Manufacturers included in this Project, are the responsibility of the Owner. The Owner on their own behalf, and if desired, may negotiate with the K.E.C. for a separate and additional cost Maintenance Agreement.

f. Parts list with numbers and prices.

g. Advise as to what parts, (if any), and in what quantities the Owner would find it advisable to stock.

h. Assembly Drawings, wiring and mechanical diagrams, and such other data as would aid in the service and maintenance of equipment.

i. Factory issued operational videos/DVD's or CD's, if so available.

j. Factory issued cookbooks, bound or in an electronic format, if available.

k. Operational manuals are to be prepared and submitted to the General Contractor/Construction Manager, whom in tum shall submit them to the Architect/Food Service Consultant for review and approval. These documents are to be provided on/or before the date of the first event to occur of the following: demo/start-up, start-up for intended use by the Owner/Operator, completion of installation of kitchen equipment contract package, or final acceptance of installation by Owner.

G. AS-BUILT/RECORD DOCUMENTS:

1. Maintain one (1) record sets of Food Service Equipment Plans with any related corrections, revisions, additions, deletions, changes, etc... noted during construction and installation. Provide an "as-built" set in reproducible transparency form and/or electronic computer disc form.

2. Provide Two (2) final set of product data Submittal Manual with any related corrections, revisions, additions, deletions, changes, etc... noted during construction and installation as a specifications record set.

3. These documents are to be provided on/or Two (2) weeks prior to the date of the first event to occur of the following: Demo/Start-Up for intended use by the Owner/Operator, completion of installation of kitchen equipment contract package, or final acceptance of installation by the Owner.

1.10 CODES AND STANDARDS:

A. The K.E.C. shall certify that all work and materials comply with Federal, State and Local Laws, Ordinances and Regulations, and is confirmed by the Local Inspector having jurisdiction.

1.11 JOB CONDITIONS:

A. Before ordering any material, equipment or doing any work, the K.E.C. shall verify all measurements at the job site and shall be responsible for fitting all Kitchen Equipment into space provided. No extra charge or compensation will be allowed on account of the differences between

dimensions. Measurements shown on the Drawings accompanying the Specifications are approximate and are for estimating purposes only. It shall be the K.E.C. responsibility to obtain actual and/or guaranteed measurements for proper fit of all equipment supplied. Inclusive shall be wall, column, door, window, and ceiling locations and dimensions, all wall reinforcement or backing has been provided, and is correct for wall supported equipment, ventilation ducts are of the correct characteristics, and in required locations and that all utilities are available, of the correct characteristics, and in the required locations. It shall be noted that the proper fit of fabricated equipment is such that a "gap" shall not exceed ¼" between walls and adjunct equipment along with equipment fitting the contour of walls including the fitting of comers at actual angles of walls. Failure to obtain proper fit of equipment may result in rejection of equipment. Excessive use of trim pieces shall not be acceptable. Where necessary, the K.E.C. shall confer with the Architect/Food Service Consultant to coordinate and establish such finished dimensions as are required and furnish Drawings to confirm these established dimensions. The K.E.C. will assume cost of any changes due to errors in their work. At time of checking measurements, the K.E.C. shall carefully examine spaces and existing conditions and report to the Architect/Food Service Consultant any work performed BY OTHERS or planned BY OTHERS, which prevents them from executing their work as required under the Contract, and obtain Architect's/Food Service Consultant's final decision and instructions before proceeding.

B. The K.E.C. shall erect the equipment at the job site in full compliance with the current Rules and Regulations of the State Board of Health. If, because of any jurisdictional trade agreements or other conditions, any work specified to be performed under this Contract must be done by others, the K.E.C. shall sublet such work to those who may be qualified to do such work, subject to the approval of the Architect/Food Service Consultant. Refer to Part 1, General Requirements, Section 1.1, Definitions, Food Service Equipment Contractor, and Paragraph E, Number 2. and Section 1.7, Quality Assurance of Supplies, all sections in their full context.

C. The K.E.C. shall clean up all debris made by their workmen immediately upon completion of installation and is to remove same from the premises. The Kitchen Equipment shall be received on the job site in a clean condition and shall be cleaned, having all tags, labels, stickers, protective coatings and markings removed, with each piece of Kitchen Equipment washed with soap and water and rinsed clean, just prior to Owner's use of the Kitchen Equipment, so as to be free from dirt and dust accruing from the building's construction.

D. The K.E.C. shall start the work no later than fifteen (15) days after notification of award of the Contract and/or written "Notice to Proceed" by the Owner and shall fully complete the Project within forty five consecutive calendar days and/or within the prescribed time limit as set forth by the Architect's timing schedule after obtaining the field measurements and the building being ready to set and install the Kitchen Equipment.

E. The K.E.C. shall provide a competent Foreman on the job site at all times when the Kitchen Equipment is being installed to supervise erection and placing of Kitchen

Equipment and to counsel with other Contractors in reference to connections at time of installation. The K.E.C. shall deliver to other Contractors all plumbing and electrical parts that are furnished loose and/or specified under the individual items as a part of the Kitchen Equipment and to counsel with other trades for proper installation by them, if requested to do so.

F. The K.E.C. shall furnish and install all clips or angles necessary for wall mounting of equipment as detailed and specified. The K.E.C. shall furnish and install all anchor bolts, flanges, sleeves, wall hangers and other parts of equipment which must be imbedded in concrete or built into the building structure prior to installation of equipment, or make arrangements with other trades for such installation. In the event of a failure to install, (or to arrange for installation), such parts in sufficient time to be included in the building construction, the K.E.C. shall be completely responsible for the installation of such parts, and do all cutting and patching required, without additional cost to the Owner.

G. All motors shall be voltage and phased as required by these Specifications. All 3-phase motors shall be provided with individual over current protection and where one piece of equipment has more than one motor, all motors shall have the same electrical characteristics and each motor shall have individual short circuit protection. All motors and Kitchen Equipment shall be provided with necessary starters, controls, protective devices, pilot lights, switches, etc., completely wired ready for connection to the building service.

1.12 GUARANTEE:

A. The K.E.C. shall be responsible for verifying all available utility services at the job site for the Kitchen Equipment prior to issuing Purchase Order(s) to the Manufacturer(s). The K.E.C. shall notify the Architect/Food Service Consultant/General Contractor/Construction Manger of any discrepancy between specified utility characteristics and the actual utility characteristics available. Inclusive, as applicable, but not limited to shall be Electrical, Gas, Steam, and Water.

B. The K.E.C. shall guarantee the material and workmanship of the Kitchen Equipment specified herein and furnished by them under this Specification for a period of One (1) year from the date of Substantial Completion as defined in the General Conditions. Should a Temporary Certificate of Occupancy be issued for partial completion of work, the items furnished within the designated area are to be under warranty from the date of issue of that Certificate. The K.E.C. or their service agent will make necessary repairs and replacements without charge to the Owner, and within a reasonable time. This guarantee shall cover replacements at the K.E.C. expense, including transportation and labor, but it shall not cover any cost whatsoever for the replacement of parts or work made necessary by carelessness or misuse of equipment.

C. The Owner shall be furnished with the Manufacturer's written and registered Warranty Certificates covering all refrigeration systems. The Manufacturer shall warrant that any part of the refrigeration system and their related accessories is free from defects in material or workmanship under normal use and service. The Manufacturer shall be obligated to repair or replace any part, which proves to be defective within a period of one (1) year from the date of acceptance, by the Architect/Food Service Consultant at this site and for the original Owner only. The warranties shall not apply to equipment, which has been subjected to any accident, alternation, abuse, misuse or improper installation; and shall not include any labor charges for replacement or repair of defective parts or refrigerants. Further, the K.E.C. shall warrant their work to include labor, replacements and transportation for a period of One (1) year from the date of acceptance by the Architect/Food Service Consultant/Owner.

D. Manufacturers of standard items of equipment as supplied under this Contract is to provide a One (1) year warranty on parts and labor. fu addition, connected pieces of equipment requiring calibration shall be so calibrated by a qualified person as part of this Contract.

E. The K.E.C. shall pay all royalties and license fees required for their Equipment. The K.E.C. agrees as part of their guarantee to indemnify all parties to this Contract from the payment of any royalties, damages, losses or expenses for suits, claims or otherwise, growing out of alleged infringement of patents, materials, methods and Subcontractors used in the execution of this Contract.

1.13 EXHAUST HOOD FIRE SUPPRESSION SYSTEM:

A. System: fustalled in accordance with the Manufacturer's Recommendations and applicable Codes or Standards. Submit fustallation Certification Form to Contracting Officer. System shall be field tested and certified by a local factory representative as so designated by the manufacturer after inspection.

B. Automatic Chemical System: fu each filtered exhaust hood/duct assembly and also surface protection in/above all equipment required by N.F.P.A. Bulletin No. 96, 17A; UL Standard 300, 2092, along with State and Local Fire Marshall's Regulations. Refer to Contract Drawings/Itemized Specifications for quantity of exhaust fan(s) units serving single or multiple exhaust hoods and coordinate with hood/fan controls.

C. Locate chemical cylinders as indicated on Drawings and install piping to exhaust hood(s) in totally concealed manner. Set cylinders and cabinets to 6'0" (1829mm) clear A.F.F., or as otherwise called for in the Itemized Specifications. Exposed piping/fittings within cylinder location and exhaust hood; chrome- plated or sleeved with tight fitting stainless steel tubing and/or stainless steel tubing polished to a 180 grit finish, refer to the Itemized Specifications for required compliance. Exposed pipe threads in/above food zone shall not be acceptable. Submit schematic diagram of installation and confirm critical distances from cylinders to nozzles.

D. System Components: Ansultex Liquid Fire Suppressant® Model No. R-102, Pyro-Chem®, Kitchen Knight No. 2 system assemblies, in system increments required by dimensions and configuration of equipment and hoods, or as otherwise called for in the Itemized Specifications. System shall embellish automatic controls to flood ducts and surface areas as required. Nozzles shall be self closing with variable stream patterns.

E. It shall be noted that "Wet" chemical fire suppression system(s) shall comply with U.L. 300 Standards, "Water" fire suppression system(s) shall comply with U.L. Category Subject 199E. Refer to Itemized Specifications for clarification and required compliance.

F. Remote manual release (pull station(s)) located in path of degrees from protected exhaust hood area and/or as required by Code. Provide "dry contact" connections for inter-connection (by other contractor) to building monitoring system.

G. Each System: Ansultex®/Pyro-Chem® Automan cylinder control assembly with electric switch.

H. Fusible links installed in each duct collar of filtered hood/ducts.

I. Fusible links located directly above each cooking appliance required by Code, in quantity required by length of protected appliance.

J. "Quick-Seal" adaptor fitting at all ventilator penetrations for distribution pipes or detection lines.

K. Required quantity and sizes of mechanically operated gas valves.

L. Required quantity of electrical fuel shut-off switches and controls.

M. Note that Fire Suppression System nozzles and piping within the Exhaust Ventilator shall be accomplished by the K.E.C. This contractor shall provide all necessary and required mechanical or electrical solenoids, relays, valves, controls, etc., to provide for fuel shut-off of all cooking equipment. Note:

Installation of the fuel shut-off device(s) is by the Division 22 Contractor. K.E.C. shall inter-wire between terminals on electric equipment and Fire Suppression cabinet. Conduit shall be provided by Division 26 Contractor at time of floor and wall erection.

N. File inspection report from date system is put into continuous operation with rating bureau having jurisdiction. System shall be supplied and installed in strict compliance with N.F.P.A. Bulletin No. 96, 17A; UL Standard 300, 2092, along with State and Local Fire Marshall's Regulations and prescribed performance criteria. Food Service Equipment Contractor shall verify requirements prior to installation.

0. All exhaust hoods not furred-in to ceiling: Furnished with 18 gauge (1.23mm) stainless steel seamless duct risers to 6" (150mm) above finished ceiling for final connection. The duct; trimmed at ceiling with 16 gauge (1.52mm) stainless steel angle flange with all comers welded and polished to a #4finish.

P. Exhaust hoods which are furred-in to ceiling: 2" (50mm) high duct collar for final connection to duct system.

1.14 REMOTE REFRIGERATION SYSTEM(S):

A. The systems, as indicated, shall be complete and shall include all necessary labor to make a first class installation. The Kitchen Equipment Contractor shall furnish units of the stated capacities indicated, arranged to respond to multiple-evaporators thermostats and defrosting timers. Include coils, receivers, compressors, motors, and motor starters, mounting bases, vibration isolation units, fans, dryers, insulation, gauges, hand shutoff valves, sight glasses, solenoid valves, heat exchangers, winter control equipment and complete automatic control system (high/low). Provide schematic or proposed hookup to Architect/Food Service Consultant prior to installation for approval, if so requested.

B. Heat exchangers are to be furnished and installed by the K.E.C. for all direct installations. Crankcase heaters are to be provided by the K.E.C. in compressors for outside installation. The minimum outdoor operating ambient temperature for design of units is -10 degrees Fahrenheit, or lower as applicable for extreme local conditions. The maximum indoor design temperature for operation of compressor units is 95 degrees Fahrenheit. The maximum outdoor ambient design temperature is to be determined by the K.E.C. with prevailing conditions at mounting location of compressors; such as sun exposure, limited ventilation, high fences/walls, roof color and materials, local climatic extremes, etc.; but in no case is to be less than 100 degrees Fahrenheit.

C. K.E.C. to furnish and install at each unit, a liquid and suction line shut-off valve as closely as practical to the equipment. In addition K.E.C. to install in each system a pump down valve takeoff connection. Refrigeration suction lines shall have "P" traps as close to the exit of the evaporator coils as possible and at the bottom of all vertical rises. If the vertical rise exceeds 20'-0" an additional "P" trap shall be installed every 15'-0". The refrigeration piping shall be sloped downward, from directly above each evaporator coil to the area where the piping rises to meet the remote refrigeration system, 1" (25mm) for each 20' -0" ofhorizontal distance.

D. Expansion valves shall be thermostatic type, adjustable super-heat provided by the K.E.C. Back pressure regulating valves shall be used on multiplexed systems, furnished and installed by the K.E.C.

E. All refrigerant lines shall be Type "L" hard copper tubing as required by approved installation practices. Where conduits are provided by others, the tubing shall be soft copper pulled through this conduit. For exposed areas, hard copper tubing shall be run in such a manner as to not subject it to undue damage. All refrigerant lines in pipe sleeves or conduits shall be effectively caulked at ends to prevent entrance of water or vermin. All lines not in conduit shall be insulated with Armstrong Armaflex foamed plastic l" (25mm) insulation. The insulation shall fit the tubing snugly, with no gaps and shall be applied and sealed in accordance with the

manufactures written instructions. All refrigerant piping shall be joined by use of Sil-Fos 15 high temperature, (Flow Pt. Temp.1300°F, Solidus 1190°F, Liquidus 1475°F) silver solder with proper fittings. Lead solder products are not acceptable.

F. Sizing of liquid and suction lines shall be according to ACRMA Standards. All systems shall be subjected to a 20" vacuum for a period of24 hours with no regain. Utmost care must be taken to prevent moisture from getting into the refrigeration system. The maximum moisture content after complete installation shall be no more than 80 parts per million (PPM). After running the system, the system moisture level shall be no more than l O PPM. Support all suspended lines with adjustable hangers, 6' O" (1829mm) o. c. maximum.

G. K.E.C. shall provide Freon and oil, charge the system and run an operational check of five (5) days duration prior to Owners/Operators use, and provide oil separators in all instances where the condensing units are located above the refrigeration coils (remote). All refrigerants used for any purpose is to comply with the 1995 requirements of the Montreal Protocol Agreement, and subsequent revisions and amendments. No "CFC" refrigerants will be permitted on this Project. HFC refrigerants and components shall be used where available. HCFC refrigerants and components, with a minimum 2010 phase-out date, and intermediate replacement refrigerants are to be used only when HFC refrigerants are not available. K.E.C. is responsible for coordinating these requirements with manufactures.

H. REFRIGERATION:

1. ADDITIONAL GUARANTEE:

Refrigeration systems shall include start-up and one-year service and maintenance contract in addition to the regular one-year guarantee as

stated in the General Conditions, plus an additional four-year guarantee on sealed portion of hermetic-type compressors. This includesrefrigerators, ice cream cabinets, ice -makers, freezers, dispensers, or any other refrigerated item. If so stated/listed in the Itemized Specifications.

2. COLD PANS:

Ice pans, refrigerated pans and cabinets shall be provided with breaker strips where adjoining top or cabinet face materials, to prevent transfer of cold.

3. VENTILATION OF REFRIGERATED EQUIPMENT:

a. Adequate ventilation shall be provided for custom fabricated equipment with integral refrigeration condensing units, both built-in and drop-in. If flow through ventilation cannot be provided, provide flow direction partitions and an additional fan capable of cooling the condensing unit. Refer to AMCA Fan Application Manual #B200-3, Technical Publications; Air Systems, #200-95; Fans and Systems, #201-90; Troubleshooting, #202-88; Field Performance Measurement of Fan Systems, #203-90.

b. If, in the opinion of the K.E.C., additional ventilation is required to ensure correct operating temperatures of standard buy-out, custom fabricated, or remote refrigeration condensing units, or compressor

rack assemblies, they shall so state "in writing" to the Architect/Food Service Consultant for evaluation and decision before installation.

J. COMPONENTS:

1. COILS:

Coils for standard and fabricated refrigerators shall have vinyl plastic coatings, stainless steel housings and shall be installed in such a manner as to be replaceable.

2. EXPANSION VALES:

Standard reach-in refrigerators and freezers for remote refrigeration system shall be complete with thermostatic expansion valve at the evaporator.

3. THERMOMETERS:

a. Refrigerated compartments, fabricated and standard, shall be fitted with flush dial-type thermometers with chrome-plated bezels, and/or digital dependent upon item specified and design content. Refer to Itemized Specifications for clarification.
b. Thermometers shall be adjusted and shall be calibrated after installation.
c. Thermometers shall have an accuracy of +2°F (1°C).

4. HARDWARE:

a. Refrigerator hardware for standard and fabricated refrigerator compartments shall be heavy-duty components.

b. Hinges shall be self-closing.

c. Latches to be magnetic edge mount-type unless specified or detailed otherwise.

5. LOCKS:

Doors and drawers for reach-in refrigerated compartments, both fabricated and standard, shall be fitted with cylinder locking-type latches, keyed and master keyed.

1.15 ELECTRICAL WORK - GENERAL REQUIREMENTS:

A. Before ordering equipment, the K.E.C. shall confirm with the serving electric utility all pertinent electrical requirements such as actual voltages available, number of phases and numbers of wires in the system.

B. Electric work for fabricated equipment shall be completely wired by Equipment Manufacturer, to a junction or pull box, wholly accessible, mounted internally and/or externally to the equipment. Wiring shall be labeled for outlet or item served.

C. Components and assemblies shall bear the UL Label or be approved by the prevailing authority.

D. Custom fabricated and standard refrigerator units shall be provided with vapor- tight receptacles, shatterproof lamps and automatic switches. All wiring shall be concealed.

1.16 INTERNAL WIRING OF FIXTURES AND EQUIPMENT:

A. K.E.C. shall be responsible for internal wiring of electrical devices, built into or forming an integral part of fabricated equipment items.

Wiring shall be in metal conduit to a pull box tagged for intended use. Check with Electrical Engineer for color-coding of wiring.

B. Each standard item shipped in sections shall be properly connected internally and verified by K.E.C. Examples: Ovens, dishwashers, conveyors, broilers, etc.

C. Provide dishwashers and conveyors internally wired to junction box or distribution panel as specified, including push button switches, motors, immersion heaters, solenoids, etc.

D. Where light fixtures are specified or detailed as part of counters or cases of fixtures, light fixtures and lamps shall be provided unless otherwise specified. If fluorescent light fixtures are specified, all ballasts shall be included.

1. All lighting provided shall be fully coated with DuPont "Surlyn®" coating and/or "Teflon®" coating or equal so as to provide safe containment of all glass shards, filaments and gases i.e., phosphors, mercury, in the event of accidental breakage. "Surlyn®" shall have a minimum acceptable

coating thickness of 16 mils (.016 inches) with tensile strength of 23.4 MPA (3.4KPSI); "Teflon®" shall have a minimum acceptable coating thickness of 16 mils (.016 inches) with a tensile strength ofD-638/D-651 (ASTM). Lamps shall be USDA Approved, and meet OSHA and FDA Standards for worksite safety in food zones (Chapter 6, Section 202.11).

2. Incandescent lighting shall be halogen rated 3050 degrees Kelvin with a Color Rendering Index (CRI) of <95%: Sylvania #lO0NHAL/RP 100 watt mid break tungsten halogen capsylite lamp inside frosted lense rated 2250 hours life 1850 lumens, 3050K, 95CRI.

3. Compact fluorescent lighting with a remote ballast as an alternative to the tungsten noted above, shall be four (4) pin rated for dimming and/or electronic ballast, 3000 degree Kelvin with a Color rendering Index of <81%: Sylvania #CF26DD/E/830 compact fluorescent, 26 watt, 14, g24q2 base, rated 10,000 hours, 1800 lumens3000K, 82CRI.

4. Linear fluorescent lighting as used at under shelf lighting at service and display counters with remote ballast shall be rated 3000K with a Color Rendering Index of <81%: Sylvania #FO32/830 48" Linear fluorescent, 32 watt, T8, bi-pin base rated 20,000 hours, 2950 lumens, 3000K, 82CRI, or as otherwise called for in the Itemized Specifications.

1.17 CONVENIENCE AND POWER OUTLETS:

A. K.E.C. shall make cut-outs and install appropriate boxes or outlets in fabricated fixtures complete with wiring conduit, outlet and cover plate.

8. All outlets and plugs shall conform to N.E.M.A. Standards.

C. All electrical outlets and devices shall be quality "Specification Grade."

1.18 PLUGS AND CORDS:

A. Where cords and plugs are used, they shall comply with National Electrical Manufacturers Association (NEMA) Requirements.

8. Cords: Three (3) or Four) 4) wire type "SO" or "SJO" with one (1) leg grounded to equipment. All equipment not indicated to be direct connected shall be provided with appropriate 6'-0" (1829mm) cord and plug assembly or adjusted to eliminate excess. All non-portable equipment furnished with a cord and plug assembly shall have the cord length adjusted to a minimum of 6" (26mm) above the floor or provided with a stainless steel cord hanger bracket.

1.19 HEATING EQUIPMENT:

A. Electric and heating equipment shall be so installed as to be easily cleanable or removable for cleaning.

1.20 STARTERS, SWITCHES AND CONTROLS:

A. The K.E.C. shall furnish all starters, motor controls, remote controls and transformers as required.

B. All switches shall be located out of heat zone.

1.21 LOAD CENTERS/PANEL BOARDS:

A RELATED DOCUMENTS:

1. Drawings and General Conditions of Contract, including General and Supplementary Conditions and Division 1 Specifications Sections apply to the work in this Section.

2. This Section is a Division 26 Basic Electrical Materials and Methods Section, and is part of each Division 26 Section making reference to panel boards specified herein. It shall be referred to for clarification and required compliance by the Section 114000; U.L. and/or E.T.L. Listed pre-qualified and accepted Custom Fabricated Equipment Manufacturer.

B. SUMMARY:

1. Extent of panel board and enclosure work, including cabinet and cutout box, is indicated by Drawings and schedules and as specified herein

2. Types of panel board and enclosure required for this Project included in the following:

a. Lighting and appliance panel boards

2. Refer to the other Division 26 Sections for wires/cables, electrical boxes and fittings and raceway work required in conjunction with installation of panel boards and enclosures

C. SUBMITTALS:

1. Product Data: Submit Manufacturer's data on panel board and enclosures. Shop Drawings shall indicate arrangement ofbusses, branch circuits, enclosures, dimensions, etc.

D. QUALITY ASSURANCE:

1. Manufacturer's Qualifications: Firms regularly engaged in the manufacturing of panel boards and enclosures of types, sizes, and rating required, whose products have been in satisfactory use, in similar service for not less than five (5) years.

2. Installers Qualifications: A firm with at least three (3) years of successful installation experience on Project utilizing panel boards similar to that/those required on this Project.

3. Codes and Standards:

a. Electrical Code Compliance: Comply with applicable Local Code Requirements of the authority having jurisdiction and N.E.C. Article 384 as applicable to the installation and construction of electrical panel boards and enclosures.

b. U.L. Compliance: Comply with applicable Requirements ofU.L. 67, "Electric Panel Boards" and U.L. Codes 50, 869, and 1053 pertaining to panel boards, accessories and enclosures. Provide panel board units, which are U.L. Listed and Labeled.

E. MANUFACTURERS:

1. Available Manufacturers: Subject to compliance with Requirements, Manufacturers offering electrical panel board products which may be incorporated in the work included but are not limited to the following:

General Electric Company Square D Company
Cutler-Hammer

F. PANEL BOARDS:

1. General: Except as otherwise indicated, provide panel boards, enclosures, and ancillary components, of types, sizes, and ratings indicated, which comply with Manufacturer's standard materials, with the design and construction in accordance with published product information. Equip with proper number of unit panel board devices as required for complete installation where types, sizes, amp ratings are not indicated, comply with NEC, UL, and established industry Standards for those applications indicated.

2. Lighting and Appliance Panel Boards: Provide dead-front safety type lighting and appliance panel boards as indicated with switching and protective devices in quantities, ratings, types and arrangements shown; with anti-bum solderless

pressure type lug connectors approved for use with copper conductors. Construct unit for connecting feeders at top of panel. Equip with copper bus bars, full-sized neutral bar, with bolt-in type heavy-duty, quick-make, quick- break, circuit breakers, with toggle handles that indicate when tripped. Provide suitable lugs on neutral bus for each outgoing feeder required and provide bare un-insulated grounding bars suitable for bolting to enclosures. Select enclosures fabricated by the same Manufacturer as panel boards which mate and match properly with panel boards:

a. Panel boards shall be General Electric A-Series, Square D type "NQOD", or Cutler-Hammer type PRL2. Panel boxes shall be five and three-fourths inches (5 ¾") (146mm) deep. Voltage shall be as indicated.

3. Panel Board Enclosures: Provide galvanized sheet steel cabinet type enclosures, in sizes and NEMA types as indicated; code-gauge, minimum 16 gauge (1.52mm) thickness. Cabinets shall be furnished without knockouts and all holes for raceways shall be drilled and punched on the job. Panel board enclosures shall be five and three- fourths inches (5¾") (146mm) deep. Provide fronts with adjustable trim clamps and doors with flush locks and keys, all panel board enclosures keyed alike with concealed piano door hinges and door swings as indicated. Provide baked gray enamel finish over a rust inhibitor coating. Design enclosures for recessed mounting. Provide enclosures that are fabricated by same Manufacturer as panel boards that mate and match properly with panel boards to be enclosed.

4. All panel boards shall have connected distributed phase with circuit numbering as indicated on the Drawings. Panel boards shall be numbered with odd numbers on the left side of the panel and even numbers on the right side of the panel. Panel boards shall have a circuit directory card mounted in a frame with plastic cover, mounted on the inside of the door, and directory cards shall be completed with a typewriter and/or printed labels to indicated areas and/or devices served by each circuit. Handwritten labels will not be accepted. All new and existing panel boards being used for this Project shall have new typed directories.

5. Molded-Case Circuit Breakers: Provide factory-assembled, bolt-on, molded- case circuit breakers of frame sizes, characteristics, and ratings, including RMS symmetrical interrupting ratings indicated. Select breakers with permanent thermal and instantaneous magnetic trip. And with fault-current limiting protection; ampere ratings as indicated. Multi- pole breakers shall have a common trip bar so that the tripping of one pole will automatically trip all poles of the breaker. Construct with over- center, trip-free, toggle-type operating mechanisms with quick-make, quick-break action and positive handle trip indication. Construct breakers for mounting and operating in any physical position and operating in an ambient temperature of 40°C. Provide breakers with mechanical screw- type removable connector lugs, AL/CU rated. Amperage interrupting current (A.LC.) rating shall be a minimum of22,000.

a. Individual Enclosed Circuit Breaker: Circuit breakers shall be molded case type. Breakers shall have thermal-magnetic trip units and magnetic trip shall be adjustable. Breakers shall have a common trip bar so that the tripping of one pole will automatically trip all poles of the breaker. Breakers shall be trip free and trip indicating and shall have quick- make,

quick-break contacts. Enclosure shall have insulated, groundable neutral.

6. Panel boards shall be installed complete with connectors and associated hardware for all circuit breakers and circuit breaker spaces listed in the panel board schedule.

7. When connecting equipment to existing panel boards, the new and existing circuit breakers shall be identified. A new circuit directory card shall be provided.

8. K.E.C. to coordinate panel size and location with Food Service Consultant. NEC and Local Clearance Codes must be maintained.

G. EXAMINATION:

1. Examine areas and conditions under which panel boards and enclosures are to be installed and notify Contractor in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

H. INSTALLATION OF PANEL BOARDS:

1. Install panel boards and enclosures as indicated, in accordance with Manufacturer's written instruction applicable Requirements of N.E.C. Standards, N.E.C.A. "Standards of Installation", and in compliance with recognized industry practices to ensure that products fulfill Requirements.

2. Panel boards or any other electrical equipment located in smoke or fire- rated walls shall be mounted on unistrut channels. Channels shall be supported from floor and structure above ceiling. There shall be penetrations of the fire- rated assembly pursuant to the equipment installation.

3. Tighten connectors and terminals, including screws and bolts, in accordance with equipment Manufacturer's published torque tightening values for equipment connectors.

4. Fasten enclosures firmly to walls and structural surfaces, ensuring that they are permanently and mechanically anchored.

I. GROUNDING:

1. Provide equipment-grounding connections for panel board enclosures as indicated.

2. Prior to energizing, check panel boards for electrical continuity of circuits and for short-circuits.

J. ADJUSTING AND CLEANING:

1. Adjust operating mechanisms for free mechanical movement.

2. Touch-up scratched or marred surfaces to match original finishes.

PART 2 RELATED WORK BY OTHERS:

2.1 SUMMARY OF WORK:

A. All plumbing, electrical and ventilation work required in connection with the Kitchen Equipment shall be by others unless specifically called for in the Itemized Specifications. The work to be done by others shall include rough-in to points, indicated on the Mechanical and Electrical Plans, and connection from rough-in point to various pieces of Kitchen Equipment requiring such connections and the supplying of necessary materials and labor for this work except as hereinafter noted.

1. All refrigeration work shall be done by the K.E.C. except for electrical and plumbing connections to compressors, blower coils, controls, etc. Those final connections shall be made by the respective trades.

B. The necessary flues and/or vents and fans of size and capacity required to operate fixtures specified, together with connection between rough-in openings and fixtures shall be furnished and installed by the Mechanical Contractor (Division 23) unless specifically called for under the Itemized Specifications.

C. All traps, grease traps, steam traps, line strainers, tailpieces, valves, stops, shut- offs and fittings necessary for equipment specified shall be furnished and installed by the Mechanical Contractor (Division 22) unless specifically called for under the Itemized Specifications. All such ancillary items to be chrome plated where exposed.

D. Mechanical Contractor (Division 22) shall see that all lines are flushed free of foreign matter before connecting to food service fixtures.

E. All lines, disconnect switches, convenience outlets, outlet boxes, wiring, conduit, safety cut-offs, control panels, fuse boxes or other electrical controls, fittings and connections shall be furnished and installed by the Electrical Contractor, (Division 26). Those starting switches furnished loose as standardize by the "Food Service Equipment Manufacturer", (other than fabricated items), shall be mounted and wired complete under the Electrical Contract, (Division 26).

F. All interior wiring for fabricated Kitchen Equipment, including all electrical devices, wiring controls, switches joined into or forming an integral part of these items, shall be furnished and installed by the K.E.C., having wiring complete to junction box within fixture and ready for connection to building lines by the Electrical Contractor (Division 26).

G. All cords and plugs shall be specified under the Itemized Specifications.

H. Any sleeves or conduit required for installation of refrigeration lines, syrup lines or CO tubing shall be furnished and installed by the Mechanical Contractor under Division 22.

I. Mechanical/Electrical Contractor (Division 22 & 26 respectively) to disconnect and re-connect existing Kitchen Equipment as applicable and/or noted in the Section 114000 Itemized Specifications.

J. Necessary stainless steel seamless exhaust ducts of size and capacity required to operate fixtures specified, together with final approved connection between roughed-in vent openings and the ceiling connection will be furnished and installed by the K.E.C. unless otherwise noted in the Itemized Specifications.

K. Water inlets shall be located above the positive level to prevent siphoning of liquids into the potable water system. Wherever conditions shall require submerged inlet, a suitable approved type of check valve and vacuum breaker shall be placed on the fixture by the Contractor under Division 22 to form part of same to prevent siphoning. If exposed and design dictates, piping and fittings shall be chrome plated.

PART3 SPECIAL FABRICATION:

3.1 GENERAL:

A. All items, such as food service units, tables, sinks, counters etc... , described in the Itemized Specifications other than by name and catalog numbers, shall be Manufactured by a Food Service Equipment Fabricator whom has the plant, personnel and engineering facilities to properly design, detail and manufacture first class, high quality Food Service Equipment. All work shall be of new, commercially best-grade materials of standard unit assembly and manufactured by one Manufacturer with uniform design, material and finish.

B. Unless otherwise specified or shown on the Drawings, all material shall be new, of best quality and without flaws. Material shall be delivered and maintained on the job in an undamaged condition.

a. Fabrication shall be equal to the standards of the Manufacturer used by all first class Equipment Manufacturers, performed by qualified, efficient and skilled Mechanics of the trades involved.

D. All fabrication shall meet or exceed National Sanitation Foundation Standards #1, #2 or #7 as applicable, including the latest editions and revisions, and shall bear the NSF Seal.

E All standard cataloged, heated and refrigerated units shall be tested to meet the National Underwriters Laboratory Standards and shall bear the UL Standard Label of Compliance. Such equipment shall be of the latest model available at the time of delivery.

F. All stainless steel shall be U.S. Standard gauges as indicated, as specified hereinafter, shall be ASTMA 666 Type #304 with 18% chrome, 8% nickel analysis, not over 0.08% maximum carbon with hardest workable temper. Material shall be polished to comply with N.A.A.M.M. "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes. A)
Remove or blend tool and die marks and stretch lines
into finish. B) Grind and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. Run grain with long dimension each piece. C) Concealed Surfaces provide a No. 2B finish, bright, cold-rolled, unpolished finish. D) Exposed Surfaces provide a No. 4 finish, bright, directional polish. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter

and leave surfaces chemically clean. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment. When hi-lited finish is specifically indicated on Elevations, Details and/or Itemized Specifications for horizontal/vertical edges of stainless steel tops, splashes, raised rolled

rims, shelf edges, exposed doors, handles and related trim, the standard #4 finish shall be ground to #240 grit and shall be polished with the appropriate compounds to ensure a mirror finish.

G All galvanized steel shall be Armco, A.S.T.M. A653, 653M, A525, A526, A527 (for extensive forming), and G90 (2275) electro-galvanized, A.S.T.M. A123 or equal. Coating designation; commercial quality, cold-rolled steel that is zinc coated by the hot-dip process and chemically treated. Unless otherwise specified, shall be of 14 gauge (1.90mm) or greater. Galvanized steel pipe; shall be A.S.T.M., A53 or A.S.T.M., A120, welded or seamless. Schedule 40. Galvanized steel shall only be used in non-exposed areas, areas that have no contact with food or food serving items and in framework; when used in framework, galvanized steel shall be welded. Construction: All welds shall be ground smooth and where galvanizing has been burned off, the weld shall be touched up with high gloss aluminum paint.

H Wherever sheared edges occur, they shall be free of burrs, projections and fins to obviate all danger of a cutting laceration when the hand is drawn over such edges. In addition wherever tops, shelves, backsplashes are cut out or penetrated for service lines or supports such cut-outs shall be ferruled and close fitting to penetrating element.

I All seams and joints shall be shop welded as the nature of the material used may require. Welds shall be ground smooth and polished to match the original finish. Welding shall fall under the guidelines of the American Welding Society (A.W.S.), Section Dl. l.

J Wherever bolts are used to fasten trim to the paneling and body of equipment or to secure any exposed sheet metal surface, such bolts shall be of the concealed type.

K Stainless steel bolts and screws of the same alloy composition as the metal to which they are fastened shall be used.

L Wherever threads of bolts and screws occur on the inside of fixtures and are either visible or might come in contact with a wiping cloth, such bolt or screw threads shall be capped with a suitable washer and stainless steel or chrome acorn cap nut.

M Where channel underbracing is exposed to view, channels shall be a minimum of 14 gauge (1.90mm) stainless steel; exposed edges shall bear a #4 finish.

N If rivets are used to fasten rear paneling to the body of the fixture, such rivets shall be stainless steel. In no case shall iron rivets be used.

0. The following fasteners and joints will not be accepted:

1. Exposed screw or bolt heads.
2. Rivets (refer to Itemized Specifications for acceptance)
3. Butt joints made by riveting straps under seams and filled with solder.

3.2 SOUND DEADENING/ ELASTOMERIC JOINT SEALANT:

A. K.E.C. must ensure quiet operation of food service and related equipment.
K.E.C. must provide sound deadening on all tables, counters and undershelves.
K.E.C. must ensure that bumper gaskets stop and any other needed protection is installed on all fabricated equipment so as to ensure quiet operation and to prevent an

"oil-canning" effect.

B. Schnee Buty1-Sealant ½"(13mm) wide rope continuously between all frame members and underside of stainless steel table tops, overshelves and undershelves.

C. Tighten stud bolts for maximum compression of sealant.

D. Liquid Elastomeric Joint Sealant: One (1) part or Two (2) parts, polyurethane or silicone based, A.S.T.M. C 920: Type S (single component), non-solvent release type, Shore A, hardness of 30, except 45 if subject to traffic. Grade NS (non- sag), Class 25, use NT (non-traffic) related to exposure, and use M, G, A, or O as applicable to joint substrates indicated. Sealants shall be N.S.F. Listed for use in food zones. Surfaces cleaning and sealants installation to comply with applicable requirements ofN.S.F. Standards, and accepted food service installation practices.

E. Cylindrical Sealant Backing: A.S.T.M. C 1330, Type C, closed cell polyethylene, m diameter larger than joint width i.e. 3/8" (9.5mm).

F. Gaskets: Solid or hollow (but not cellular) neoprene or polyvinyl chlorite; light grey, minimum of 40 Shore A Hardness, self-adhesive or prepared for either adhesive application or mechanical anchorage.

G. All vertical and horizontal seams to be caulked with an F.D.A. approved, N.S.F. listed, and U.L. recognized silicone sealant for use in food zones, which meets F.D.A. extraction requirements No. 21 CFRl 77.2600, color shall be aluminum and/or clear dependent upon setting.

H. Verify sound deadening requirements or restrictions with Local Governing Health Authorities/Agencies.

3.3 PAINTING / POWDER COATING:

Painting:

A. All fixtures, unless made of stainless steel, shall be finished in gray hammertone enamel, glossy and without blemish, unless so otherwise noted in the Itemized Specifications and or is so noted as a "factory issued finish" i.e. .....Ranges, Ovens etc...

B. All materials shall be of the highest quality, air dried and applied in accordance with Manufacturer's directions.

C. Where baked enamel finishes are specified, they shall be oven baked on the fixtures for a minimum of 1½ hours at a minimum temperature of 300°F.

Powder Coating:

A. Items are to be bead blasted with ultra fine glass beads, chemically washed and then primed with a 2-mill base coat. They are then to be Powder Coated with a standardized RAL coating consisting of a 3-mill application. Color selection shall be by Architect/Owner and/or Interior Designer, respectively.

B. After the final coating, the items are to be sealed with a SKF clear polymer that is UV resistant with an outstanding resistance to most inorganic acids, alkaline, organic acids halogenated solvents and strong oxidizing agents. The polymer finish is to be one of the following designations Verify with Architect/Owner and/or Interior Designer, respectively. A gloss of 85% and higher is considered full gloss, semi-gloss is

60% +/-, 5% and matte is 15% or less.

C. All accessories parts, i.e., screws, shields, spacers, etc., are to be processed under the same guidelines.

D. Baking of the item(s) i.e., temperature settings and length of time shall be dependent on the item(s) structural stability and its intended use.

3.4 STAINLESS STEEL TOPS:

A. All metal tops shall be 14 gauge; (1.90mm) stainless steel and shall be one-piece welded construction. Freestanding edges shall either roll down 1¾" (45mm) radius with resulting comers rounded; turned straight down 1 ½" (38mm) and straight back ½" (13mm) against base with comers welded; turned straight down 1½" (38mm) and back½" (13mm) on a 75 degree angle, with comers welded and/or a marine type edge with comers welded. Edges shall be as shown on the Drawings and/or as called for in the Itemized Specifications.

B. Where tops fit adjacent to walls or columns, they shall be turned up to the height indicated on the Detail Drawings and/or Itemized Specifications and shall be finished at the top with either a 180 degree, 1½" (38mm) diameter semi-roll, sloped on a 45 degree angle at 2" deep (50mm), and turned down at the rear (against the wall)½" (13mm) at 135 degrees, turned up to a raw edge or turned straight back on a 90 degree angle forming a splash. Splash backs shall be as shown on the Drawings or as called for in the Itemized Specifications. Ends of splash backs shall be enclosed and shall extend the full length of the fixture, including rolls and rims. All horizontal and vertical corners of the splash backs shall be enclosed and shall extend the full length of the fixture, including rolls and rims. All horizontal and vertical corners of the splash backs shall be coved on a minimum%" (16mm) radius.

C. Stainless steel tops shall be reinforced on the underside with galvanized steel angle and/or stainless steel or galvanized channel framework of suitable size and location required to hold top flat and support heavy weights without deflection, refer to Itemized Specifications for clarification.

D. Cross members (channels) shall be of 14 gauge stainless steel construction, 1" x 4" x 1", edges ground and polished. Spacing shall be a maximum of30" (762mm) on center and located to accommodate drawer enclosures, enclosed bases and leg gussets as required. Such shall be attached in "legs down" position. Full perimeter shall be sealed to table top with clear silicone mastic sealant. Sealant shall be F.D.A. Approved, N.S.F. Listed, U.L. Recognized silicone sealant that meets F.D.A. Extraction Requirements No. 21 CFRl 77.2600, color shall be aluminum and/or clear dependent upon setting. Where cross members (channels) intersect, they shall be fully welded, ground smooth and polished. Top surface shall be free of bolts and rivets.

E. At areas where countertop equipment penetrates the surface top and/or impacts the integrity of the top and base related to weight and/or size, special attention shall be given to additional bracing as required. K.E.C. shall reflect such additional bracing on their shop drawings and details as part of the submittals.

3.5 FIELD JOINTS:

A. Field joints in stainless steel tops, required due to equipment size(s) or installation requirements, shall be field welded, ground smooth and polished to match original finish.

B. Field joints in enclosed bases, required due to equipment sizes or installation requirements, shall be drawn tight and covered with a suitable pilaster. Pilasters shall be of like material and finish as the base.

3.6 CORNERS:

A. All dishtables, drain tables, splash backs and turned-up edges shall have%" (16mm) minimum radius bends in all horizontal and vertical corners and shall be coved at intersections, unless specified otherwise in the Itemized Specifications.

3.7 ENCLOSED BASES:

A. Enclosed cabinet type bases shall be made of formed 18 gauge (1.23mm) stainless steel sheets, reinforced with formed section to create a rigid structure. Base shall be welded construction throughout with front rails, mullions, etc., welded to appear as one-piece construction, unless otherwise called for in the Itemized Specifications. Bases shall be free of open cracks and ledges. Vinyl clad enameled steel, Colortex® stainless steel, as per Itemized Specifications.

B. Bottom front rail ofbase(s) set on masonry platforms and/or raised-floor base shall be continuously closed and sealed to platform. In such applications all vertical and horizontal seams are to be caulked with an F.D.A. Approved, N.S.F. Listed, U.L. Recognized silicone sealant that meets F.D.A. Extraction Requirements No. 21 CFRI 77.2600, color shall be aluminum and/or clear dependent upon setting.

3.8 DOORS / HARDWARE:

A. Doors, Dry-hinged: to be double-cased stainless steel. Outer pan(s) shall be 18 gauge (1.23 mm) stainless steel with comers welded, ground smooth and polished. Inner pan shall be 20 gauge (.91 mm) stainless steel fitted tightly into outer pan with a sound deadening material such as Celotex®, Styrofoam®, Polyurethane®, or Semi-rigid High-Density Fiberglass® used as a core. Refer to the Itemized Specifications for clarification and required compliance. The two pans are to be tack welded together and all vertical and horizontal seams are to be solder filled and/or caulked with an F.D.A. Approved, N.S.F. Listed, U.L. Recognized silicone sealant that meets F.D.A. Extraction Requirements No. 21 CFRI 77.2600, color shall be aluminum and/or clear dependent upon setting.
Doors to finish out approximately ¾" (19mm) thick. Exposed catches and latches will not be acceptable.

B. Hinged doors shall be mounted on heavy-duty, N.S.F. approved hinges, as noted on Plans or Itemized Specifications.

C. Hardware:

1. Shall be solid, heavy-duty type.

2. Door hardware shall be locking type, keyed and master keyed.

3. Doors shall have concealed hinges of 12 gauge (3.17mm) stainless steel and the stainless steel hinge pins shall be hardened to Rockwell 42-C (150 Kg F load).

4. Shall be identified with Manufacturer's name and number so that broken or worn parts may be replaced.

4. Submit samples for approval, when requested.

5. Pulls/Latches shall be Component Hardware Group Inc., or equal.

D. Keys and Locks
1. Key locks to one (1) master key
2. Supply two (2) keys for each lock and a total of four (4) master keys
3. Locks shall be interchangeable core, master keyed system as manufactured by: Best Lock Corporation, P.O. Box 103, Indianapolis, Indiana 46206, 317-849-2250.

3.9 LEGS AND CROSSRAILS:

A. Equipment legs and crossrails shall be 1¾" (41mm) o.d., 16 gauge (1.52mm) stainless steel tubing. All welds at crossrails shall be continuous and ground completely smooth without indentations. Legs shall be fitted with sanitary, stainless steel, bullet feet 1½" (37mm) diameter having not less than 2" (50mm) adjustment. Space legs so as to provide ample support for tops, precluding any possibility of buckling and/or sagging, and in no case shall they be more than 6'- O" (1829mm) on centers.

B. Top of legs for sinks and open base tables shall be fitted with sanitary, circular, stainless steel gussets. Gussets shall have an outer shell of 16 gauge (1.52mm) stainless steel reinforced with 12 gauge (3.17mm) mild steel insert welded to exterior shell and shall have an Allen screw for fastening and adjustment. Gussets shall be no less than 2½" (64mm) diameter at the top and 3¼" (82mm) long. Gussets shall be fully welded to sink bottom or table underbracing.

C. Legs for enclosed base cabinets shall be l½" (41mm) o.d., 16 gauge (1.52mm) stainless steel tubing, having a heavy gauge 3½" (89mm) square stainless steel plate completely welded at the top for attachment to cabinet underbracing. Legs shall be fitted with adjustable bullet feet as specified above.

3.10 SHELVES:

A. Shelves in enclosed base fixtures shall be 18 gauge, (1.23mm) stainless steel and shall be turned up on back and sides and feathered slightly to insure a tight fit to enclosure panels. Comers of shelves shall be fully welded and ground smooth. Bottom shelves shall be a continuation of the front crossrail with back and sides turned up as above.

B. Shelves in open base fixtures shall be 18 gauge, (1.23mm) stainless steel. Edges of shelves shall be turned straight down 1½" (38mm) and back½" (13mm) on a 75 degree angle, having comers notched and completely welded to legs. Welds shall be ground smooth without indentations. Shelves shall be reinforced on the underside with galvanized steel channels of suitable size and located where required to hold shelf flat and support heavy weights without deflections.

C. Undershelves specified to be removable shall be 18 gauge, (1.23mm) stainless steel, built in such a way as to be easily removable, using a rolled tum down at front, back and end section so that shelving will fit perfectly over the tubular frame. At end sections or otherwise where table legs occur, comers at legs are to be notched out to form a perfect fit around legs. At intersections of shelving, not over 28" (711mm) long, shelving to run straight down 1" (25mm) for strength. If required by width, shelves to have additional reinforcement on the underside with galvanized steel channels of suitable size as required to hold shelf flat and support heavy weights without deflection. All

outside turn down comers of removable undershelves to have rounded comers and shall be champhered at a 45° angle.

D. Removable interior shelves in cabinet bodies, enclosed bases and overhead cabinets, shall be of 18 gauge, (1.23 mm) stainless steel. Such shelves as called for shall be made in removable sections and rest in 1½" x 1½" x ¼" (38mm x 38mm x 3mm) stainless steel angle frame, having all horizontal comers coved and constructed in full accordance with National Sanitation Foundation (N.S.F.) Requirements.

E. Stationary interior shelves shall have a 2" (50mm) tum-up on back and ends and shall have the joint between shelf tum-up and the body sealed and ground smooth to form a one-piece interior free of any crevices. The front edge shall be flanged straight down 1½" (38mm) and back½" (13mm) on a 75 degree angle and finished with "Z" bar, forming completely enclosed edge for maximum strength and sanitation. Shelves further braced with galvanized steel channels of suitable size and located as required to hold shelf flat, and support heavy weights without deflections.

F. All elevated shelves shall be of 16 gauge, (1.52mm) stainless steel, size and shape as shown on the Drawings. All edges shall be rolled or turned down 1½" (38 mm), except where shelves are adjacent to walls or other fixtures where they shall be coved up 1½" (38mm). All outside comers of rolled shelves shall be spherical. All exposed ends and backs of shelves shall be capped. Underbracing shall be of stainless steel of sufficient gauge to prevent deflections, refer to Itemized Specifications for style and application.

G. Table mounted shelves shall be supported by 1½" (41mm) o.d., 16 gauge, (1.52mm) stainless steel tubing unless otherwise called for in the Itemized Specifications. Tubing supports shall be attached to the fixture top in a concealed sanitary manner and shall be braced to form a rigid structure. Refer to Itemized Specifications and/or Detail Drawings for application and clarification.

H. Wall shelves shall be mounted on 14 gauge, (1.90mm) stainless steel wall brackets being securely anchored to building wall and attached to shelf leaving top surface free of bolts and rivets. Brackets shall be a maximum of 48" (1219mm)o.c.

I. All shelves shall be reinforced to support a load of forty (40) pounds per square foot (2 kPa) without visible distortion

3.11 CASTERS:

A. Shall be heavy-duty type, N.S.F. approved for the type and weight of equipment supported. Ball bearing, solid or disc wheel with non-marking greaseproof rubber, neoprene or polyurethane tire unless otherwise specified. Casters shall comply with the load rating standards of the Casters & Floor Truck Manufacturers Association, and with N.S.F. sanitary requirements

B. Wheels to be 5" (127mm) diameter, minimum width of tread 1 3/16" (30mm) with a minimum capacity per caster of250 lbs. (113.4kg).

C. Solid material wheels to be provided with stainless steel rotating wheel guards.

D. To be sanitary, have sealed wheel and swivel bearings and polished plated finish (per NSF).

E. Unless otherwise indicated, equip each item with two (2), swivel-type casters and two (2), fixed casters, with foot brakes on two (2)casters.

F. Unless equipment item is equipped with another form of all-around protective bumper, provide circular rotating bumper above each caster, 5" (127mm) diameter tire oflight grey synthetic rubber (hollow or closed-cell) on cadmium- plated disc.

G. Refer to Itemized Specifications for caster style/application and required compliance.

3.12 DRAWERS:

A. The drawer housing shall be pre-assembled, 18 gauge (1.23mm) stainless steel, with enclosed front, sides and back, to extend from underside of table or counter top, down to bottom of drawer front. Front of housing fitted with opening (with edges turned in ½" (13mm)) and comers welded to accommodate drawer body and slides. Top tum-in provided with holes for receiving studs welded to underside of table or counter top for bolting housing thereto.

B. Slide assembly consists of one pair of 200 pound, (90 kg) capacity, full- suspension self closing type, fitted with four (4) case-hardened ball bearing rollers. Track attached to drawer, upper edge shaped to fit contour of roller rim to provide a position drawer guide and prevent jarring, outer track fastened to the drawer housing and provided with limit stops.

C. Drawers intended for tools and general non-food products storage are to have 20" x 20" x 5" deep (508mm x508mm x 152mm), 18 gauge, (1.23mm) stainless steel pan. Vertical and horizontal comers shall have¾" (19mm) minimum coved radius. Top of pan to flange out, be removable without the use of tools

D. Drawers intended to hold food products shall be removable type with 12" x 20" (305mm x 508mm) stainless steel assembly.

E. Drawer fronts are double cased,¾" (19 mm) thick, with 18 gauge (1.23 mm) stainless steel welded and polished front pan. Steel back pan is tightly fitted and tack welded. Sound deaden with rigid insulation.

F. All drawers shall be provided with replaceable soft neoprene bumpers, or for refrigerated drawers, all full perimeter soft gaskets.

G. Where so listed in the Itemized Specifications, provide a removable 25" x 25" x ¾" thick (635mm x 635mm x 19mm) cutting board, with finger grooves on four (4) sides mounted below drawer on stainless steel angle slides integral with the drawer housing. Fit angle slides with stops set so that front edge of board lines up with front face of drawer front.

H. Drawer(s) shall be equal to and/or greater than those as manufactured by Component Hardware Group, Inc. and shall be of the following series:

15" Stainless Steel Drawer Assemblies
*Model No. S90-0015-N
*Model No. S90-0015-C-N (cylinder lock)

20" Stainless Steel Drawer Assemblies
*Model No. S90-0020
*Model No. S90-0020-C-N (cylinder lock)

Stainless Steel Cash Drawer Assembly
*Model No. S95-1000 (complete with currency tray & cylinder lock)

I. Refer to Itemized Specifications for drawer style and application.

3.13 SINKS, STEAM TABLES, BAIN MARIES AND DRAINBOARDS:

A. All sinks and drain boards shall be constructed of 14 gauge (1.90mm) stainless steel with all horizontal and vertical corners formed on a¾" (19mm) radius. Where two or more sink compartments are adjacent, partitions shall be double walled with ¾" (19mm) radius corners,¾" (19mm) radius top edges, welded in place ground smooth and polished. Solder in filleted corners will not be acceptable.

B. Multiple compartment sinks shall be continuous on the exterior (front, bottoms and back) without applied facing strips or panels. Bottom of each compartment shall be creased to center and fitted with lever operated waste with overflow, strainer plate and a brass tailpiece for slip connection. Lever waste to be set into½' deep recess assuring complete drainage. Overflow shall be fitted in back of sink so that the constant water level is l" (25mm) below sink rim and/or adjoining drainboard level, and shall be factory installed.

C. Sink inserts shall be 14 gauge, (1.90mm) stainless steel welded into tops, forming an integral part of the unit. Where inserts are exposed, the exterior shall also be ground smooth and polished to a No. 4 finish.

D. Drain boards shall be integral with sink compartments forming a single unit fixture.

E Partitions between compartments shall be double thickness continuous and welded, refer to Itemized Specifications and/or Detail Drawings for application.

F Waste to be equal to Component Hardware Model No. D50-7210 with 4½" (11mm) flat strainer, 2" (50mm) NPS chrome plated with connected overflow pipe 19" (48mm) x 21" (53mm) with chrome plated fittings, ¼ turn full open valve, unless otherwise called for in the Itemized Specifications.

G Lever handle waste drains shall embellish a rotary handle that shall be of sufficient length to extend to the front edge of the sink. Handle/shaft shall extend through a lever handle bracket. No riveting, screws or soldering permitted to fit drains to sinks, with all parts of drains easily removable for servicing and replacement.

H. Furnish faucets for all sinks, Bain Maries, water stations and other fixtures. Refer to Itemized Specifications for listing. All faucets furnished with equipment in this Section to be lead free and comply with NSF Standard #61, Section #9 and as/when applicable shall meet or exceed AB1953-compliance. Where the Itemized Specifications list a faucet by Manufacturer and Model, the K.E.C. is to verify that the listed faucet complies with this requirement. If the listed faucet does not comply, the K.E.C. is to submit a similar model which does comply, from the same manufacturer where available, or one from one of the other pre- approved manufactures.

I. Unless otherwise specified, two (2) faucet holes on 8" (203mm) centers are to be provided over the centerline of partitions between compartments, 4" (102mm) down

from the top of the splash. Refer to Itemized Specifications and/or Detail Drawings for variance application if required.

- **3.14** DISPLAY SHELYES / TEMPERED GLASS / POLYCARBONATE: Display Shelves:

A. All display glass shelving shall be set into 18 gauge (1.23 mm) stainless steel formed channels. Top shelves shall be of the same width as the shelf below. All shelves shall be provided with appropriate sneeze or breath guards having stainless steel protective edges.

B. The shelves over bread, pastry and/or salad sections shall be glass. All shelving shall be¼" (6mm) fully tempered glass and protected with stainless steel channel edging where required.

C. The supporting channels for all glass shelving shall have rubber isolation "buttons" secured to framework ofsupporting angles.

D. Serving shelf over hot food sections and/or bread sections shall be 18 gauge, (1.23mm) stainless steel with lights for the length of the sections. Refer to Itemized Specifications for applications and clarification.

E. All display shelving will have lights controlled by switch mounted in base of counter on operator's side. Lights shall be of manufacture and design approved by Food Service Consultant and located as design dictates. All lights are to have bulbs covered with plastic shields, refer to Part 1, General Requirements, Section 1.16, Electrical Work; General Requirements, All Sections, Section 1.17, Internal Wiring of Fixtures and Equipment, all sections.

F. Refer to Detail Drawings and/or Itemized Specifications for setting, application and clarification.

Tempered Glass:

A. Fully tempered glass shall be used in place of other glass products on all manufactured and custom fabricated equipment, including architectural casework. All tempered glass to bear the etched logo indicating tempered glass and the Manufacturer's number. The Manufacturer shall meet the Requirements of A.N.S.I.-Z57.1 Standard along with Federal Standard Number CPSC16FR- 1201, as well as prevailing State and Local Codes, safety glazing material shall be applied where glazing might reasonably be exposed to human impact. Applicable State and Local Codes, along with Rules and Regulations of the governing State Board of Health shall be checked by the Kitchen Equipment Contractor for specific information and requirements.

B. Handling and installation of tempered glass should receive the same as annealed glass. Careless handling and improper installation can produce edge damage. The tempered glass shall be replaced if such damage were to occur. It is noted that tempered glass cannot be cut or modified following heat treatment.

C. Provide a bevel and/or radius edge around the perimeter of the tempered glass to eliminate all sharp areas that may cause injury to a person.

Polycarbonate:

A. Any and all exposed edges shall be polished and rounded 180 degrees. All

acrylic material must conform to U.L. 723 or A.S.T.M.E. 162, 1990 codes in addition to Acrylic Safety Glazing, 16CPSC-CFR1201, I andll; A.N.S.I. Z97.l-1984,
B.O.C.A. RR #91-24; I.C.B.O. ER #1084; S.B.C.C.I. RR #9180, U.L. #UL94HB; LIGHT Transmission Classification #CC-2.

3.15 ACCESS PANELS:

A. Access panels in enclosed bases shall be pan type construction, flush mounted, having all comers fully welded and ground smooth. Panels shall be tight fitting and shall be removable without the use of tools. Panels shall be fitted with Component Hardware Group, Inc. Model No. M22-2430 heavy-duty door catches, concealed type attachment, 4 way with adjustable spring loaded ball tension, material shall be solid brass with satin nickel finish and stainless steel balls. Panels enclosing refrigeration condensing units shall be slat type with perimeter frames. Refer to the Itemized Specifications for additional applications and clarifications.

3.16 CLOSURES/ TRIM STRIPS:

A. Ends of all fixtures, splash backs, shelves, etc., shall be filled by forming the metal or welded sections to finish the unit completely.

B. K.E.C. to provide openings in top and base as required, for utility connections. Openings on the top and base to be provided with die stamped raised openings and/or satin chrome grommet sets ZZSG series as manufactured by Doug Mockett & Company, Inc. of Manhattan, California. Refer to the Itemized Specifications and/or Detail Drawings for application, clarification. Applications of inverted gussets and/or oversized tubing welded to the top and base are not acceptable.

C. Trim strips are not an acceptable substitute for accuracy and neatness. When the Architect/Food Service Consultant elects to accept a trim strip in lieu of rebuilding an item, it is the responsibility of the K.E.C. to provide same at no cost to the Owner.

3.17 INSULATION MATERIALS:

A. For normal temperature applications, such as fabricated under counter refrigerators, use urethane material 2" (50mm) thick, bounded at all joints.

B. For heated-type applications, such as plate warmers, use block style rock wool, minimum I" (25mm) thick.

Specifications

06/17/2024

Project
Johnson County Westside Primary

From
Markham Restaurant Supply, Inc.
Matt Sengel
420 South Fresno Street
P. O. Box 6356 (72906-6356)
Ft. Smith, AR 72916-9085
(479)782-3233

ITEM 1 - COOLER/FREEZER (1 REQ'D)

American Panel Corporation

see cooler/freezer drawing

ITEM 2 - WIRE SHELVING (4 REQ'D)

Metro Model 2448NK3 Dimensions: 48(w) x 24(d)

Quick Ship - Super Erecta® Shelf, wire, 48"W x 24"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF

8 ea	Model 2460NK3 Quick Ship - Super Erecta® Shelf, wire, 60"W x 24"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF
8 ea	Model 2454NK3 Quick Ship - Super Erecta® Shelf, wire, 54"W x 24"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF
20 ea	Model 74PK3 Quick Ship - Super Erecta® SiteSelect™ Post, 74-1/2"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3 Green epoxy coated corrosion-resistant finish with Microban® antimicrobial protection

---

ITEM 3 - WIRE SHELVING (4 REQ'D)

Metro Model 2448NK3 Dimensions: 48(w) x 24(d)

Quick Ship - Super Erecta® Shelf, wire, 48"W x 24"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF

8 ea	Model 2454NK3 Quick Ship - Super Erecta® Shelf, wire, 54"W x 24"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF
20 ea	Model 74PK3 Quick Ship - Super Erecta® SiteSelect™ Post, 74-1/2"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3 Green epoxy coated corrosion-resistant finish with Microban® antimicrobial protection
8 ea	Model 2460NK3 Quick Ship - Super Erecta® Shelf, wire, 60"W x 24"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF

ITEM 4 - WIRE SHELVING (12 REQ'D)

Metro Model 2448NK3 Dimensions: 48(w) x 24(d)

Quick Ship - Super Erecta® Shelf, wire, 48"W x 24"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF

- 8 ea Model 2460NK3 Quick Ship - Super Erecta® Shelf, wire, 60"W x 24"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF
- 8 ea Model 2442NK3 Quick Ship - Super Erecta® Shelf, wire, 42"W x 24"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF
- 28 ea Model 74PK3 Quick Ship - Super Erecta® SiteSelect™ Post, 74-1/2"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3 Green epoxy coated corrosion-resistant finish with Microban® antimicrobial protection

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ITEM 5 - DUNNAGE RACK (1 REQ'D)

Channel Manufacturing Model ADE2448 Dimensions: 12(h) x 48(w) x 24(d)

Dunnage Rack, Tubular Dunnage Rack, Promo Series, 48"W x 24"D x 12"H, Aluminum Construction, (2,000) lb. distributed weight capacity per shelf, Made in USA, NSF, 14lbs. (ITEM WEIGHT ONLY)

- 1 ea Lifetime warranty against rust and corrosion

ITEM 6 - MIXER (1 REQ'D)

Hobart

60 qt mixer - EXISTING

ITEM 7 - STAINLESS TABLE (2 REQ'D)

Existing

30" x 72" table - EXISTING

ITEM 8 - STAINLESS TABLE (1 REQ'D)

Existing

30" x 96" table with pot rack - EXISTING

ITEM 9 - EXHAUST HOOD (1 REQ'D)

Captive-Aire

Per CaptiveAire Drawings. Provided by KEC, installed by Mechanical Contractor.

ITEM 10 - UDS (1 REQ'D)

Captive-Aire

see UDS drawing

ITEM 11 - HEATED HOLDING PROOFING CABINET, MOBILE (1 REQ'D)

Existing Model NHPL-1836C Dimensions: 70(h) x 24(w) x 32(d)

Non-Insulated Heater Proofer Cabinet, mobile, full height, 20-3/4"W x 34-1/8"D x 67-1/8"H, aluminum construction, forced air, accommodates (35) 18" x 26" pans, dual proof/heat control, lift-off clear door, removable analog drawer, digital thermostatic control, circuit breaker, LED digital thermometer display, includes corner bumpers, (4) casters, NEMA 5-15P, 120v/60/1-ph, cETLus, NSF (order #684684) - EXISTING

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	120	60	1			5-15P					

ITEM 12 - RANGE, 36", 6 OPEN BURNERS (1 REQ'D)

Vulcan Model 36S-6BN Dimensions: 58(h) x 36(w) x 34(d)

Endurance™ Restaurant Range, natural gas, 36", (6) 30,000 BTU burners, lift-off burner heads, standard oven, stainless steel front, sides, backriser, & lift-off high shelf, fully MIG welded chassis, 6" adjustable legs, 215,000 BTU, CSA, NSF

1 ea 1 year limited parts & labor warranty, standard
1 ea Stainless steel backriser & lift-off high shelf, standard
1 ea Stainless steel backriser & lift-off high shelf, standard
1 ea Model CASTERS-RR4 Casters, 5" (set of 4) (2 with locks)

GAS

	SIZE	MBTU	KW	CONN
1	3/4"	215.0		

STEAM

	INLET SIZE	RETURN SIZE	LB/HR	PSIG (MIN)	PSIG (MAX)
1					

ITEM 13 - TILTING SKILLET (1 REQ'D)

Existing

EXISTING

ITEM 14 - STAINLESS STEEL WORK TABLE (2 REQ'D)

MRS Fab

Provide the following:
1. 14 ga., stainless steel one-piece 36” high to top, length and depth per plan
2. Top turned down 1 ½” and back ½” on a slight angle on all free sides
3. 14 ga., stainless steel 1"X4"X1" 'C' channels full full depth at legs.
4. Two (2) 14 ga., stainless steel 1"X4"X1" 'C' channels full length. Channels shall be welded to each other with a 1” x 1” x 4” x 1” x 1” continuous weld, typical.
5. ¾” tacky tape between all metal surfaces
6. Stainless steel gussets fully welded 360 degrees to channels, typical
7. 1 5/8” 16 ga., stainless steel tubing legs
8. Stainless steel adjustable bullet feet

9. 18 ga., stainless steel undershelf where space allows notched and fully welded to legs. Free sides turn down 1 ½" and back ½" on slight angle
10. All welding and stainless-steel surfaces grind smooth and polished to a number 4 finish

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ITEM 15 - COMBI OVEN (1 REQ'D)

Existing Model BLCP102

EXISTING

ITEM 16 - CONVECTION OVEN, GAS (1 REQ'D)

Existing Model E102-G Dimensions: 72.5(h) x 38(w) x 39.5(d)

EXISTING

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1									1/2		
2									1/2		

GAS

	SIZE	MBTU	KW	CONN
1	3/4"	40		
2	3/4"	40		

STEAM

	INLET SIZE	RETURN SIZE	LB/HR	PSIG (MIN)	PSIG (MAX)
1					
2					

ITEM 17 - PAN RACK, BUN (1 REQ'D)

Existing

EXISTING

ITEM 18 - TWO-COMPARTMENT PREP SINK W/OVERSHELF & POT RACK (1 REQ'D)

MRS Fab

Provide the following:
1. 14 ga., stainless steel one-piece 36" high to top with marine edge on free sides
2. Top turned down 1 ½" and back ½" on a slight angle on all free sides
3. 8" high splash at wall, free ends closed
4. 18 ga., stainless steel undershelf where space allows notched and fully welded to legs. Free sides turn down 1 ½" and back ½" on slight angle and turned up 1-1/2" at wall
5. Two (2) 14 ga., stainless steel 'C' channels full length, 14 ga., stainless steel 'C' channels full depth at legs, Channels shall be welded to each other with a 1" x 1" x 4" x 1" x 1" continuous weld, typical.
6. Stainless steel gussets fully welded 360 degrees to channels
7. 1 5/8" 16 ga., stainless steel tubing legs
8. Stainless steel adjustable bullet feet
9. Two (2) 20" x 20" x 10" deep 14 ga., stainless steel coved corner sink
10. Z clip splash to walls, unexposed
11. 16 ga. 304 stainless steel Overshelf with Pot Rack wall mounted, depth and length per plan, mount height per elevation, 2" x 3/16" stainless steel band full length fully weld to brackets and stainless steel double

sided pot hooks 8” on center.
12. 14 ga. 304 stainless steel gusset shelf supports; mount to wall with non-corrosive fasteners
13. Top turned down 1 ½” and back ½” on a slight angle on all free sides
14. 1-1/2” high flat splash at wall on overshelf
15. Vacuum Breaker holes in splash
16. 14 gauge stainless steel disposer control bracket; mount to underside of top
17. All welding and stainless-steel surfaces grind smooth and polished to a number 4 finish
18. ¾” tacky tape between all metal surfaces

1 ea (2) Cutting Board Sink Bowl Covers w/Stainless Steel Corner brackets welded into bowls at all 4 corners & stainless steel double storage bracket welded to legs

1 ea T&S Brass Model B-0455 Vacuum Breaker Unit, 1/2" IPS piping, slip flanges for mounting on 45° surface, 6" between piping

1 ea T&S Brass Model B-3952 Waste Valve, twist handle, 3-1/2" sink opening, 2" drain outlet (replaces B-3913, B-3917)

1 ea Component Hardware Model S90-0020-N S90 Series Heavy Duty Drawer Assembly, 20"W front, full extension, self-closing, 200 lbs capacity, includes removable stainless steel pan, welded stainless steel construction, NSF

1 ea T&S Brass Model B-0231 Sink Mixing Faucet, wall mount, 8" centers, 12" swing nozzle, lever handles, quarter-turn Eterna cartridges, 1/2" NPT female inlets, low lead, ADA Compliant

WATER

	HOT SIZE	HOT AFF	HOT GPH	COLD SIZE	COLD AFF	FILTERED SIZE	FILTERED AFF	CONDENSER INLET SIZE	CONDENSER OUTLET SIZE
1				1/2"					
2									
3	1/2"			1/2"					

WASTE

	INDIRECT SIZE	DIRECT SIZE
1		
2	1-1/2" to 2"	
3		

PLUMBING 2 REMARKS

2" NPT Male Thread, 1-1/2 NPT Female Thread Outlet

ITEM 18A - DISPOSER (1 REQ'D)

Salvajor Model 100-SA-3-MRSS

Disposer, Sink Assembly, 3-1/2" sink collar, 1 Hp motor, start/stop push button manual reversing MRSS control, includes fixed nozzle, chrome plated vacuum breaker, solenoid valve, sink stopper & flow control, heat treated aluminum alloy housing, UL, CSA, CE (**Effective 6-1-17 all MRSS control panel dimensions will be 9-1/4" x 10-1/4" x 5-7/16"**)

1 ea 208v/60/3-ph, 4.9 amps

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1									1		
2	208	60	3	Direct			4.9				

WATER

	HOT SIZE	HOT AFF	HOT GPH	COLD SIZE	COLD AFF	FILTERED SIZE	FILTERED AFF	CONDENSER INLET SIZE	CONDENSER OUTLET SIZE
1				1/2"					

WASTE

	INDIRECT SIZE	DIRECT SIZE
1		2"

ITEM 19 - SLICER (1 REQ'D)

Existing

existing

ITEM 20 - HAND SINK (2 REQ'D)

By Plumbing Contractor

ITEM 21 - ICE MAKER, CUBE-STYLE (1 REQ'D)

Ice-O-Matic Model CIM0530FA Dimensions: 21.25(h) x 30.25(w) x 24.25(d)

Elevation Series™ Modular Cube Ice Maker, air-cooled, self-contained condenser, dual exhaust top/side air discharge, 30" W, approximately 561 lb production/24 hours at 70°/50° (432 lb at 90°/70°), full-size cubes, PURE ICE® built-in antimicrobial protection, LED status display, one touch sanitize/descaling controls, dishwasher safe food zone components, cULus, NSF, CE, BPA Free

- 1 ea 3M Purification Model ICE120-S 3M™ Water Filtration Products Water Filter System, with gauge, 17"H x 4.5"D, valve-in-head, standard water, single vessel, 1/4-turn shut off valve, max pressure of 125 psi at 100°F, 0.5 micron, 1.5 gpm flow rate, 9,000 gallons capacity, for sediment, chlorine taste & odor, cyst, scale, includes: (1) integral mounting bracket and (1) o-ring seal cartridge filter, 3/8" FNPT connections, NSF certified (for ice machines - cubers up to 750lbs, flakers up to 1200lbs
- 1 ea 3 yr. parts & labor warranty, standard
- 1 ea 5 yr. evaporator warranty, standard
- 1 ea 5 yr. parts on the compressor warranty, standard
- 1 ea 115v/60/1-ph, 17.8 amps, standard
- 1 ea Model B55PS Ice Bin, 510 lb storage capacity, 30"W x 31"D x 50"H, top-hinged, slope front door, for top-mounted ice maker, polyethylene interior, durable aluminum exterior, 6" legs, NSF
- 1 ea 2 yr. parts & labor warranty, standard

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	115	60	1	Direct			17.8				

WATER

	HOT SIZE	HOT AFF	HOT GPH	COLD SIZE	COLD AFF	FILTERED SIZE	FILTERED AFF	CONDENSER INLET SIZE	CONDENSER OUTLET SIZE
1				3/8"					
2				3/8"					
3									

WASTE

	INDIRECT SIZE	DIRECT SIZE
1	3/4"	
2		
3	3/4"	

PLUMBING 1 REMARKS

Ice Maker Drain

ITEM 22 - PASS-THRU HEATED CABINET (2 REQ'D)

Continental Refrigerator Model DL2WE-PT Dimensions: 83.25(h) x 57(w) x 38.75(d)

Designer Line Heated Cabinet, extra wide pass-thru, two-section, 52 cu. ft. capacity, (3) shelves per section, stainless steel front, aluminum ends, standard depth, hinged doors, electronic control with digital display, hi-low alarm, cETLus, NSF

- 2 ea Standard warranty (for the United States & Canada Only): 3 year parts and labor
- 2 ea 208-230v/60/1-ph, 10.6 amps, 2.25 kW, cord & plug supplied by others
- 2 ea Left Door hinged on left & right door hinged on right
- 2 ea Left Door hinged on left & right door hinged on right
- 2 ea 6" stainless steel adj. legs, standard
- 1 ea Model 50-P008A-E Universal Pan Slide Assembly, full section universal slides for 18 x 26 or

(2) 12 x 20 pans on 5" centers, bottom support, stainless steel angles (E Models only) (holds 10 pans per full section); on control side right

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	208-230	60	1				10.6	2.25			

ITEM 24 - STAINLESS STEEL WORK TABLE, MOBILE (2 REQ'D)

MRS Fab

Provide the following:
1. 14 ga., stainless steel one-piece 36” high to top, length and depth per plan
2. Top turned down 1 ½” and back ½” on a slight angle on all free sides
3. 14 ga., stainless steel 1"X4"X1" 'C' channels full full depth at legs.
4. Two (2) 14 ga., stainless steel 1"X4"X1" 'C' channels full length. Channels shall be welded to each other with a 1” x 1” x 4” x 1” x 1” continuous weld, typical.
5. Stainless steel gussets fully welded 360 degrees to channels, typical
6. 1 5/8” 16 ga., stainless steel tubing legs
7. 5" HD swivel casters; 2 locking; Component Hardware model CMS4-5RBB
8. 18 ga., stainless steel undershelf where space allows notched and fully welded to legs. Free sides turn down 1 ½” and back ½” on slight angle
9. ¾” tacky tape between all metal surfaces
10. All welding and stainless-steel surfaces grind smooth and polished to a number 4 finish

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ITEM 25 - FLATWARE & TRAY CART (2 REQ'D)

Piper Products/Servolift Eastern Model PTS/1014MO2 Dimensions: 52.63(h) x 25.13(w) x 19.38(d)

Mobile Tray & Silverware Dispenser, double stack, open style, (10) cylinders, holds (300) 10-3/8" x 15-1/4" trays, stainless steel, NSF (silverware cylinders are not included)

2 ea 1 year warranty parts and labor from date of purchase

20 ea Model 159-2701 Silverware Cylinder, 4-1/2" dia. x 5-5/8"H, beige plastic (each)

ITEM 26 - SERVING LINE (2 REQ'D)

MRS Fab

Provide the following:
1. 14 gauge stainless steel top; fully welded, 36"H
2. Top turned down 1 ½” flat tight against cabinet body on front and sides
3. Top turned down 1 ½” and back ½” on server side
4. 14 gauge stainless steel 1”x4”x1” ‘C’ channels to provide underbracing where space allows
5. 18 gauge stainless steel semi-enclosed body, open on server side unless otherwise noted
6. 18 gauge stainless steel louvered lift-off panel at cold well refrigeration
7. Hot/Cold well bodies to be hidden by counter apron
8. All controls to be recessed
9. 18 gauge stainless steel undershelf, omit at cold well refrigeration
10. Enclosed utility chase in front of counter
11. Two (2) 14 ga., stainless steel 1"X1”X4"X1"X1” channels full length in base
12. Component Hardware 6” equipment legs, fully welded threaded plate to channel in base of counter to allow legs to be removable
13. Provide fully welded & polished recess in counter top where shown on plan for 18”x26” sheet pan
14. Provide an approx. 16” tray pass area where shown on plan
15. 1” 16 gauge stainless steel ribbed tray slide with knock down brackets
16. ¾” tacky tape between all metal surfaces
17. All welding and stainless-steel surfaces grind smooth and polished to a number 4 finish
18. Custom Fabricated full-Service sneeze guard, 1” square stainless steel tubing frame, ¼” tempered glass with 18 gauge stainless steel top shelf, with led lighting. Glass should be separated into sections 60" and shorter.

2 ea Alto-Shaam Model 500-HWI/D6 Halo Heat® Hot Food Well Unit, Drop-In, Electric, (5) 12" x 20" full-size pan capacity (pans NOT included), 6-3/8" deep well, holds 6" deep pans, includes (10) half/third-size divider bars, (5) individual adjustable thermostatic

controllers, stainless steel construction, EcoSmart®, cULus, UL EPH Classified, CE, IPX3, TUV NORD

2 ea Alto-Shaam Model 200-CW Coldwell Drop-in Refrigerated Cold Display Unit, self-contained, utilizing R-290 refrigerant, mounted on corrosion resistant framework, suspended below unit body, includes expansion valve, thermostatic control, sliding shroud, dual air movement louver, and (3) pan divider bars for side support, (2) 12" x 20" full-size pan capacity (pans NOT included), 6-1/4" deep well, holds 6" deep pans, 1/4 hp, 600 watts, 115v/60/1, 5.0 amps, 9' cord, NEMA 5-15P, cULus, NSF

1 ea Alto-Shaam Five (5) year limited compressor warranty standard

1 ea Alto-Shaam 120v/60/1-ph, 25.0 amps, 3.0kW, 6 ft. cord, NEMA L5-30P, standard

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	115	60	1	Cord & Plug		5-15P	5.0	0.6	1/4		
2	120	60	1	Cord & Plug		L5-30P	25.0	3.0			

WATER

	HOT SIZE	HOT AFF	HOT GPH	COLD SIZE	COLD AFF	FILTERED SIZE	FILTERED AFF	CONDENSER INLET SIZE	CONDENSER OUTLET SIZE
1									

WASTE

	INDIRECT SIZE	DIRECT SIZE
1	1"	

ITEM 27 - MILK BOX (1 REQ'D)

By Others

by owner

ITEM 28 - CASHIER'S STAND (2 REQ'D)

Existing

existing

ITEM 29 - SINK, (3) THREE COMPARTMENT (1 REQ'D)

MRS Fab

Provide the following:
1. 14 ga., stainless steel one-piece coved corner top, length and depth per plan
2. 14 ga., stainless steel fully welded channels, cap front
3. Channels shall be welded to each other with a 1” x 1” x 4” x 1” x 1” continuous weld, typical. Gussets shall be welded to channels or plate with a 360 degrees continuous weld, typical
4. 3” high with a 1 ½” dia. semi-roll at free sides
5. 8” high splash at walls, capped, typical
6. Two approximately 27” long 14 ga., stainless steel coved corner integral drainboards
7. Three 22” x 24” x 15” deep (12” deep from table top) 14 ga., stainless steel coved corner sinks
8. Weld-in split bowl construction
9. Stainless steel gussets fully welded 360 degrees to channel
10. 1 5/8” 16 ga., stainless steel tubing legs
11. 1 5/8” 16 ga., stainless steel tubing crossrails fully welded 360 degrees to legs
12. Stainless steel bullet feet
13. Stainless steel adjustable flange feet with two holes at all front corner legs secure to floor with two non-

corrosive anchors
14. Z clip splash to walls, unexposed
15. 14 gauge stainless steel disposer control bracket; mount to underside of top
16. 16 ga. 304 stainless steel Overshelf with Pot Rack wall mounted, depth and length per plan, mount height per elevation, 2" x 3/16" stainless steel band full length fully weld to brackets and stainless steel double sided pot hooks 8" on center.
17. 14 ga. 304 stainless steel gusset supports for overshelf; mount to wall with non-corrosive fasteners
18. Top turned down 1 ½" and back ½" on a slight angle on all free sides
19. 1-1/2" high flat splash at wall on overshelf
20. ¾" tacky tape between all metal surfaces
21. All welding and stainless-steel surfaces grind smooth and polished to a number 4 finish

1 ea T&S Brass Model B-0455 Vacuum Breaker Unit, 1/2" IPS piping, slip flanges for mounting on 45° surface, 6" between piping

2 ea T&S Brass Model B-3952 Waste Valve, twist handle, 3-1/2" sink opening, 2" drain outlet (replaces B-3913, B-3917)

1 ea T&S Brass Model B-0184 Pre-Rinse Unit, with add-on faucet, wall mount mixing faucet with 8" adjustable centers, EasyInstall add-on faucet with 12" swing nozzle with stream regulator outlet (062X), quarter-turn Cerama cartridges with check valves, lever handles with color-coded indexes, 90° swivel adapter arm with vacuum breaker, 20" flexible stainless steel hose with heat-resistant gray handle & hold down ring, 1.15 GPM spray valve (B-0107), hose hanger hook, polished chrome-plated brass faucet body, 1/2" NPT female inlets, CSA

1 ea T&S Brass Model B-0231 Sink Mixing Faucet, wall mount, 8" centers, 12" swing nozzle, lever handles, quarter-turn Eterna cartridges, 1/2" NPT female inlets, low lead, ADA Compliant

WATER

	HOT SIZE	HOT AFF	HOT GPH	COLD SIZE	COLD AFF	FILTERED SIZE	FILTERED AFF	CONDENSER INLET SIZE	CONDENSER OUTLET SIZE
1				1/2"					
2									
3	1/2"			1/2"					
4	1/2"			1/2"					

WASTE

	INDIRECT SIZE	DIRECT SIZE
1		
2	1-1/2" to 2"	
3		
4		

PLUMBING 2 REMARKS

2" NPT Male Thread, 1-1/2 NPT Female Thread Outlet

ITEM 30 - DISPOSER (1 REQ'D)

Salvajor Model 100-SA-3-MRSS

Disposer, Sink Assembly, 3-1/2" sink collar, 1 Hp motor, start/stop push button manual reversing MRSS control, includes fixed nozzle, chrome plated vacuum breaker, solenoid valve, sink stopper & flow control, heat treated aluminum alloy housing, UL, CSA, CE (**Effective 6-1-17 all MRSS control panel dimensions will be 9-1/4" x 10-1/4" x 5-7/16"**)

1 ea 208v/60/3-ph, 4.9 amps

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1									1		
2	208	60	3	Direct			4.9				

WATER

	HOT SIZE	HOT AFF	HOT GPH	COLD SIZE	COLD AFF	FILTERED SIZE	FILTERED AFF	CONDENSER INLET SIZE	CONDENSER OUTLET SIZE
1				1/2"					

WASTE

	INDIRECT SIZE	DIRECT SIZE
1		2"

ITEM 31 - DISHTABLE, SOILED (1 REQ'D)

MRS Fab

Provide the following:
1. 14 ga., stainless steel one-piece coved corner top
2. 3" high with a 1 ½" dia. semi-roll at free sides
3. 8" high splash at walls with vacuum breaker holes, free end closed
4. Flat splash at roll-up door track and pass-thru
5. Integrated pass-thru ledge with marine edge at front
6. 14 ga., stainless steel fully welded channels, full depth, cap front, typical
7. Disposal system to be welded into top.
8. Stainless steel gussets fully welded 360 degrees to channel
9. 1 5/8" 16 ga., stainless steel tubing legs
10. 1 5/8" 16 ga., stainless steel tubing crossrails fully welded 360 degrees to legs
11. Stainless steel bullet feet
12. Stainless steel adjustable flanged feet with two holes at all front legs secure to floor with two non-corrosive anchors
13. Z clip splash to walls, unexposed
14. Channels shall be welded to each other 1" x 1" x 4" x 1" x 1" continuous weld, typical. Gussets shall be welded to channels or plate with a 360 degrees continuous weld, typical
15. All welding and stainless-steel surfaces grind smooth and polished to a number 4 finish
16. ¾" tacky tape between all metal surfaces
17. Turn down top into dish machine, verify sizing with dish machine model specified

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ITEM 32 - ROLL UP DOOR (1 REQ'D)

By Others

by others

ITEM 33 - PASS-THRU REFRIGERATOR (2 REQ'D)

Continental Refrigerator Model D2RENPT Dimensions: 83.25(h) x 57(w) x 38.75(d)

Designer Line Wide Refrigerator, pass-thru, 57"W, two-section, self-contained refrigeration, aluminum exterior & interior, stainless steel front, standard depth cabinet, wide full-height stainless steel doors, cylinder locks, electronic control with digital display, hi-low alarm, 6" stainless steel legs, R290 hydrocarbon refrigerant, 1/3 HP, ENERGY STAR®

2 ea	Standard warranty (for the United States & Canada Only): 6 year parts and labor; additional 1 year compressor part
2 ea	115v/60/1-ph, 6.9 amps, cord, NEMA 5-15P, standard
2 ea	Left door hinged on left & right door hinged on right
2 ea	Left door hinged on left & right door hinged on right
2 ea	6" stainless steel adj. legs standard
1 ea	Model 50-P008A-E Universal Pan Slide Assembly, full section universal slides for 18 x 26 or (2) 12 x 20 pans on 5" centers, bottom support, stainless steel angles (E Models only) (holds 10 pans per full section), on control side right

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1									**1/3**		
2	**115**	**60**	**1**	**Cord & Plug**		**5-15P**	**6.9**				

ITEM 33 - HOSE REEL (1 REQ'D)

T&S Brass Model B-7132-U02TS3

Hose Reel Assembly, table-mount, open stainless steel hose reel with 3/8" x 35' heavy-duty non-marking hose, ratcheting system, high flow rear trigger water gun and swivel with 5/16" orifice and 3/8" NPT female inlet, stainless steel table leg swing bracket and adjustable hose bumper, 72" flexible water hose connector with stainless steel quick disconnect, wall-mounted chrome-plated brass mixing faucet with 3" concealed escutcheon, compression cartridges with spring checks, lever handles, 1200mm stainless steel flexible hose with 1/2" NPSM and 3/8" NPSM female ends, continuous pressure vacuum breaker

- 1 ea Model G016652-45 Pivot Bracket, universal, epoxy coated steel, black, (mounting hardware not included) (for 3/8",& 1/2" hose reels)
- 1 ea 1 year limited warranty for hose, standard
- 1 ea 2 year limited warranty for hose reel, standard

WATER

	HOT SIZE	HOT AFF	HOT GPH	COLD SIZE	COLD AFF	FILTERED SIZE	FILTERED AFF	CONDENSER INLET SIZE	CONDENSER OUTLET SIZE
1	3/8"			3/8"					

WASTE

	INDIRECT SIZE	DIRECT SIZE
1		

ITEM 34 - WASTE COLLECTOR (1 REQ'D)

Salvajor Model S914 Dimensions: 35.88(h) x 24.81(w) x 22.25(d)

Scrap Collector™, scrapping, pre-flushing & collecting system (widely accepted in areas where disposers are restricted), NEMA 4 HYDROLOGIC® control panel with patented operator sensor, two water saving modes (timed run & auto start/stop), safety line disconnect, LCD readout, salvage basin & silverware trap, scrap basket, 3/4 HP corrosion-resistant pump, pump intake screen, stainless steel construction, UL, CSA, CE, NSF

- 1 ea Collector top is available to ship to the fabricator in advance of unit (additional shipping charges will apply). Please provide instructions on order
- 1 ea 208v/60/3-ph, 3.2 amps
- 1 ea Model 992013 Additional scrap basket

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1									3/4		
2	208	60	3	Direct			3.2				

WATER

	HOT SIZE	HOT AFF	HOT GPH	COLD SIZE	COLD AFF	FILTERED SIZE	FILTERED AFF	CONDENSER INLET SIZE	CONDENSER OUTLET SIZE
1	3/4			3/4					

WASTE

	INDIRECT SIZE	DIRECT SIZE
1		2"

PLUMBING 1 REMARKS

3⁄4" hot & cold water supply and reduce to 1⁄2" at connection

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ITEM 35 - DISHMACHINE (1 REQ'D)

Existing

ITEM 36 - CONDENSATE HOOD (1 REQ'D)

Captive-Aire

Per CaptiveAire Drawings. Provided by KEC, installed by Mechanical Contractor.

ITEM 37 - CLEAN DISHTABLE (1 REQ'D)

MRS Fab

Provide the following:
1. 14 ga., stainless steel one-piece coved corner top
2. 3” high with a 1 ½” diameter semi-roll at free sides
3. 8” high splash at walls, free end closed
4. 14 ga., stainless steel fully welded channels, full depth, cap front, typical
5. ¾” tacky tape between all metal surfaces
6. 1 5/8” dia. 16 ga., stainless steel tubing crossrails fully welded 360 degrees to legs
7. Stainless steel gussets fully welded 360 degrees to channels
8. 1 5/8” dia. 16 ga., stainless steel tubing legs
9. Stainless steel adjustable bullet feet
10. Stainless steel adjustable flanged feet with two holes at front corner legs secure to floor with two non-corrosive anchors
11. Channels shall be welded to each other with a 1” x 1” x 4” x 1” x 1” continuous weld, typical. Gussets shall be welded to channels or plate with 360 degrees continuous weld, typical
12. All welding and stainless-steel surfaces grind smooth and polished to a number 4 finish
13. Z-clip splash to walls, unexposed
14. 18 gauge 304 stainless steel undershelf if applicable where shown on plan, notched and fully welded to legs, 1-1/2" turn down with 1/2" turn back at slight angle, turn up 1-1/2" at walls
15. Turn down top into dish machine, verify sizing with dish machine model specified

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ITEM 38 - SOAK SINK (1 REQ'D)

MRS Fab

Provide the Following;
1. 14 gauge stainless steel coved corner soak sink bowl; fully welded with 1-½” diameter semi-roll at free sides; 17" A.F.F. to top of roll
2. 25" x 25" x 6"D Bowl
3. Stainless steel gussets fully welded 360 degrees to 12 gauge corner plates welded to underside of sink bowl
4. 1 5/8” dia. 16 ga., stainless steel tubing legs
5. 5" HD Swivel Casters; 2 Locking
6. 14 gauge stainless steel 6" x 12" silver chute; fully welded with beauty ring
7. Bottom edge of silver chute to be at 24" A.F.F. penetrating wall at an approximately 67 degrees downward slope
8. Silver Chute to extend 6" beyond interior face of wall
9. 18 gauge stainless steel trim at interior wall.
10. ¾” tacky tape between all metal surfaces
11. All welding and stainless-steel surfaces grind smooth and polished to a number 4 finish

1 ea T&S Brass Model B-3952 Waste Valve, twist handle, 3-1/2" sink opening, 2" drain outlet (replaces B-3913, B-3917)

WATER

	HOT SIZE	HOT AFF	HOT GPH	COLD SIZE	COLD AFF	FILTERED SIZE	FILTERED AFF	CONDENSER INLET SIZE	CONDENSER OUTLET SIZE
1									

WASTE

	INDIRECT SIZE	DIRECT SIZE
1	**1-1/2" to 2"**	

PLUMBING 1 REMARKS

2" NPT Male Thread, 1-1/2 NPT Female Thread Outlet

ITEM 39 - LOCKERS (6 REQ'D)

Global Industrial Model 652138GY

one tier, 12" x 15" x 78" locker, grey assembled

1 ea KEC to secure to wall
6 ea Model 652080GY front base
6 ea Model 652083GY end base, left and right
2 ea Model 652706GY slope top kit

ITEM 40 - MOP SINK (1 REQ'D)

By Plumbing Contractor

Mop Sink and Faucet provided and installed by Plumbing Contractor.

ITEM 41 - WIRE SHELVING (4 REQ'D)

1880 Hospitality Model FF2442G Dimensions: 42(w) x 24(d)

Focus Foodservice - Wire Shelf, 800 lb. weight capacity, 24"W x 42"L, for wet or dry storage, zinc underplated steel wire, green epoxy coated finish, NSF

4 ea Model FG074G Focus Foodservice - Post, 74"H, stationary, grooved at 1" increments, Sanigard™ anti-microbial protection, for wet or dry storage, zinc plated leveling feet, green epoxy finish, NSF

ITEM 42 - 20 QT MIXER (1 REQ'D)

Existing Model A200

existing

ITEM 43 - FLOOR TROUGH (1 REQ'D)

IMC/Teddy Model ASFT-2436-SQ Dimensions: 12.25(h) x 36(w) x 24(d)

ASFT Anti-Spill Floor Trough, 36"W x 24"D, 6" deep receptacle, (1) 4" OD tailpiece, stainless steel beehive strainer, 14/304 stainless steel, brushed satin finish, (SQ) grid grating, NSF, Made in USA

	WATER									WASTE		
	HOT SIZE	HOT AFF	HOT GPH	COLD SIZE	COLD AFF	FILTERED SIZE	FILTERED AFF	CONDENSER INLET SIZE	CONDENSER OUTLET SIZE		INDIRECT SIZE	DIRECT SIZE
1										1		4"

ITEM 44 - FLOOR TROUGH (1 REQ'D)

IMC/Teddy Model FWR-72-SG Dimensions: 7(h) x 72(w) x 7.5(d)

FWR Floor Water Receptacle, 72"W x 7-1/2"D, 4" deep receptacle, (1) 4" OD tailpiece, stainless steel beehive strainer, 16/304 stainless steel construction, brushed satin finish, (SG) subway grating, NSF, Made in USA

WATER

	HOT SIZE	HOT AFF	HOT GPH	COLD SIZE	COLD AFF	FILTERED SIZE	FILTERED AFF	CONDENSER INLET SIZE	CONDENSER OUTLET SIZE
1									

WASTE

	INDIRECT SIZE	DIRECT SIZE
1		4"

SECTION 11 64 20 - STAGE CURTAINS

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 track and pipe battens for manually operated stage curtains and the following types of stage curtains:
1. Front-setting curtains including front curtain, and valance.

1.3 SUBMITTALS : Submit all within 60 days of Agreement/Contract with Owner

A. Product Data: Include types, styles, materials, operating instructions, and maintenance recommendations.

B. Shop Drawings: Include plans, elevations, and detail sections of typical track and rigging elements. Show anchors, hardware, operating equipment, and other components not included in manufacturer's Product Data. Include the following:
1. Calculations: Calculate requirements for supporting curtains, track, and equipment and verify capacity of each curtain, track, and rigging component to support loads.

C. Samples for Verification: Not less than 36 inches (900 mm) square of each fabric from dye lot to be used for the Work, with specified treatments applied, and showing complete pattern repeat, if any. Mark top and face of fabric.

D. Product Certificates: Signed by manufacturers of stage curtains certifying that products furnished comply with requirements. Give name of flame-retardant chemical used, identification of applicator, treatment method, application date, allowable life span for treatment, and details of any restrictions and limitations. Include certificates in the Operation and Maintenance manual as specified.

E. Submit three (3) hard-bound copies of Operation and Maintenance manuals permanently affixed with spine and cover labels indicating the project name, location and date of installation. First sheet of the manual shall indicate the Stage Curtain Contractor's company name, address, phone number, and service contact. Other items shall include a complete Bill of Materials for each dead hung set, catalog cut sheets for all system components, curtains sizes and details, and written recommendations for maintenance of all curtains and tracks.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed installation of stage curtains similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.

B. Fire-Test-Response Characteristics: Provide stage curtains with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or a testing and inspecting agency acceptable to authorities having jurisdiction. Permanently attach label to each fabric of curtain assembly indicating whether fabric is inherently and permanently flame resistant, or treated with flame-retardant chemicals, and whether it will require retreatment after designated time period or cleaning.
1. Flame-Resistance Ratings: Passes NFPA 701.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify stage curtain openings and dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2-PRODUCTS

2.1 CURTAIN FABRICS

A. General: Provide fabrics inherently and permanently flame resistant or chemically flame resistant by immersion treatment to comply with requirements indicated. Provide fabrics from the same dye lot.

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

1. Woven Cotton Velour: For front setting curtains, including front curtain and valance.
   a. #2703 Overture; JB Martin Ltd.
   b. #31010 Metro; J. L. de Ball America, Inc.
   c. Memorable; KM Fabrics, Inc.

2.2 FRONT-SETTING CURTAIN FABRIC

A. Woven Cotton Velour: Napped fabric of 100 percent cotton; 54-inch (1372-mm) minimum width; and other characteristics as follows:

1. Heavyweight: Fabric weighing not less than 25 oz. /linear yard (775 g/linear meter) before flame-retardant treatment, with pile height not less than 79 mils (2 mm).

2.6 METAL

A. Steel Tube: ASTM A 500, standard weight (Schedule 40), painted black, 1-1/2-inch (40-mm) nominal diameter, unless otherwise indicated.

B. Supports, Clamps, and Anchors: Sheet steel in manufacturer's standard thicknesses, galvanized after fabrication according to ASTM A 153/A 153M, Class B.

C. Trim and Support Chain: For all curtain track and battens use # 4 galvanized Double Loop chain with a breaking strength of 350 lb. Use Hanging Clamps on the curtain track and Pipe Clamps on the batten piping with a threaded quick link to attach the chain to the track or batten. The quick link shall be rated at 800 lb. Always screw the threaded turn-buckle down of the quick link. Leave at least 1 foot of chain at each clamp for future leveling. Cable tie extra chain up out of the way. All track and battens shall be level with the curtains hanging 2 inches off the stage floor.

D. Inserts, Bolts, Rivets, and Fasteners: Manufacturer's standard corrosion-resistant units.

2.7 CURTAIN FABRICATION

A. Valance to be constructed as follows:

1. Vertical Hems: Curtain shell be constructed with nap running down. All Seams shall be vertical, smooth and pucker-free.

2. Top Hems: Reinforce top hems by double-stitching 3-1/2-inch wide, heavy jute webbing to top edge with not less than 2 inches of face fabric turned under.

3. Pleat: Provide 50 percent fullness in curtains, spaced pleats at 12 inches O.C. along top hem reinforcement.

4. Fasteners: Use No. 3 brass grommets. Put one grommet centered in each box pleats and one grommet, 1 inch from each corner end of the curtain.

5. Tie Lines: Use braided soft cotton, black or white to best match curtain color. Tie a 24 inches long tie line in each grommet. In the center grommet of the curtain tie an opposite color tie line to mark the center of the curtains.

6. Side Hem: The sides shall be finished with a 2 inch hem.

7. Bottom Hem: For the curtains that do not hang to the floor, provide a 3 inch hem with a separate interior chain pocket containing plated #8 jack chain. The bottom interior pocket shall ride 1 inch higher then the bottom of the curtain hem. The chain will be fastened only at the ends. For the floor-length curtains, provide a 5 inch hem with a separate interior chain pocket containing plated #8 jack chain. The bottom interior pocket shall ride 1 inch higher than the bottom of the curtain hem. The chain will be fastened only at the ends.

B. Main Curtains shall be constructed as follows:

1. Vertical Hems: Curtain shell be constructed with nap running down. All Seams shall be vertical, smooth and pucker-free.

2. Top Hems: Reinforce top hems by double-stitching 3-1/2-inch wide, heavy jute webbing to top edge with not less than 2 inches of face fabric turned under.

3. Pleat: Provide 50 percent fullness in curtains, spaced pleats at 12 inches O.C. along top hem reinforcement.

4. Fasteners: Use swivel snap hooks. Put one swivel snap hook centered in each box pleat and and one swivel snap hook, 1 inch from each corner end of the curtain. Attach the snap hooks with webbing and 3 rivets to the reinforced top hem. A-line the top of the snap hook with the top of the curtain.

5. Side Hem: The sides shall be finished with a 2 inch hem.

6. Bottom Hem: For the floor-length curtains, provide a 5 inch hem with a separate interior chain pocket containing plated #8 jack chain. The bottom interior pocket shall ride 1 inch higher than the bottom of of the curtain hem. The chain will be fastened only at the ends.

2.8 STRAIGHT CURTAIN TRACK FABRICATION

A. Steel-Track Channels: Fabricate of roll-formed galvanized steel sheet, with continuous bottom slot, and with each half of track in one continuous piece.

1. Minimum Base-Metal Thickness: Not less than 0.0528 inch (1.35 mm).

B. Heavy-Duty Track System: Equip tracks for traveler curtains with heavy-duty, live-end, double-wheel pulley; heavy-duty, dead-end, single-wheel pulley; and adjustable, heavy-duty floor block; each with not less than 5-inch (125-mm) molded-nylon- or glass-filled-nylon-tired ball-bearing wheels, enclosed in steel housings. Provide single curtain carders of molded nylon with a pair of neoprene-tired ball-bearing wheels riveted parallel to body. Provide one master carrier, for each leading curtain edge, of plated steel with two pairs of nylon-tired ball-bearing wheels and with two line guides per carrier. Equip carriers with neoprene or rubber bumper to reduce noise, and heavy-duty, plated-steel swivel eye and manufacturer's standard trim chain for attaching curtain snap or S-hook. Provide end stops for track. Include

a detachable, adjustable floor block to maintain proper tension on operating line. The floor block base for each traveler curtain shall be neatly fastened into the stage floor.

1. Operating Line: Manufacturer's standard 3/8-inch (9-mm) stretch-resistant operating cord consisting of braided synthetic-fiber jacket over solid, synthetic-fiber, linear, center filaments.

2. Curtain to be manual operation.

3. Track Lap Clamp: Metal to match track channel for attaching double-sectioned track at center overlap.

C. Products: Subject to compliance with requirements, provide one of the following:

1. Silent Steel Model No. 281 with No. 2863, No. 2864, and No. 2866 pulleys; Automatic Devices Company.

2. Atlas Silk Model No. 418S; H & H Specialties, Inc.

2.9 CURTAIN DIMENSIONS

Type	Dimension	Quantity	Hangs From	Lengths
Valance	4’-0” H x ±53’-0” W*	1	Track	±48’
Main Curtain	±13’-0” H x ±27’-0” W*	2	Track	±48’

*Finished width including 50% fullness. **VERIFY DIMENSIONS IN FIELD**.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Provide one site visit to examine areas and conditions, with the Construction Manager’s site superintendent present, for compliance with requirements for supporting members, blocking, installation tolerances, clearances, exact measurements, and other conditions affecting performance of stage curtain work. Submit a written list of items to be corrected to the Architect and the Construction Manager within two working days of the site visit. Proceed with installation only after items on the list have been corrected.

3.2 PREPARATION

A. Examine inserts, clips, blocking, or other supports required to be installed by others to support tracks and battens. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Install stage curtain system according to track manufacturer's and curtain fabricator's written instructions.

3.4 BATTEN INSTALLATION

A. Install curtain battens by suspending at heights indicated with #4 double loop chain spaced to support load, but do not exceed 7 feet O.C. between chain.

B. Secure chain directly to I-beam provide for hanging stage equipment. Attach the other end of the chain to the pipe clamps using a quick link.

3.5 TRACK INSTALLATION

A. Install curtain track by suspending at heights indicated with #4 double loop chain spaced to support load, but do not exceed 7 feet O.C. between chain.

B. Secure chain directly to I-beam provide for hanging stage equipment. Attach the other end of the chain to the hanging clamps using a quick link.

C. Install track for center-parting curtains with not less than 24-inch overlap of track sections at center, supported by special lap clamps.

3.6 CURTAIN INSTALLATION

A. Track Hung: Secure curtains to track carriers with track manufacturer's special heavy-duty swivel snap hooks.

B. Batten Hung: Secure curtains (valance) to pipe battens with tie lines.

3.7 DEMONSTRATION

1. Engage a Production Consultant representative to test system and to train Owner's personnel to rig, adjust, operate, and maintain stage curtains and tracks.

2. Schedule training with Owner, through Architect, with at least fourteen days' advance notice.

END OF SECTION

SECTION 12 21 13 - WINDOW TREATMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide window treatments as scheduled below and where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related work:
1. Documents affecting Work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

1.3 SUBMITTALS

A. Comply with pertinent provision of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Samples of the slats, showing colors available in the products proposed to be used.
4. Manufacturer's recommended installation procedure which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used in the Work.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 64 00.

PART 2 - PRODUCTS

2.1 HORIZONTAL BLINDS (MINI-BLINDS)

A. At each exterior window and where noted "MB" on the Drawings, provide 1" metal, 0.08" thick horizontal mini-blinds, with valance and control rod as manufactured by SWF Contract or approved equal. Color shall be selected from manufacturer’s standard colors. “Lamplight 904” is anticipated.

2.2 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

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.

3.3 INSTALLATION

A. Install window treatment items in accordance with manufacturer's recommendations.

B. Install the work of this Section in strict accordance with the manufacturer's recommendations as approved by the Architect, anchoring all components firmly into position, plumb, level, and in proper operating condition.

C. Upon completion of the installation, put each operating component through at least five complete cycles, adjusting as required to achieve optimum operation.

D. Touch up scratches and abrasions to be completely invisible to the unaided eye from a distance of five feet.

END OF SECTION

SECTION 12 49 40 - ROLLER SHADES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrically operated sunscreen roller shades.

B. Local group and master control system for shade operation.

1.2 RELATED SECTIONS

A. Division 16 - Electrical: Electric service for motor controls.

1.3 REFERENCES

A. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. NFPA 70 - National Electrical Code.

C. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.

1.4 SUBMITTALS

Submit under provisions of Section 01 33 23.

A. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
3. Storage and handling requirements and recommendations.
4. Mounting details and installation methods.
5. Typical wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable.

B. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.

C. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

D. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.

F. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.

B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.

C. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

D. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.

E. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.8 WARRANTY

A. Roller Shade Hardware, Chain and Shadecloth (except EcoVeil™): Manufacturer's standard non-depreciating twenty-five year limited warranty.

B. Roller Shade Motors and Motor Control Systems: Manufacturer's standard non-depreciating five-year warranty.

C. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: MechoShade Systems, Inc.; 42-03 35th Street, Long Island City, NY 11101. ASD. Tel: (718) 729-2020. Fax: (718) 729-2941. Email: info@mechoshade.com, www.mechoshade.com.

2.2 APPLICATIONS/SCOPE

A. Roller Shade Schedule:

1. Shade Type 1: Motorized interior “Electro/3”solar roller shades in all exterior windows of Student Dining B105 and related motor control systems.

2.3 SHADE CLOTH

A. Vinyl Room Darkening Shadecloth (Single-Fabric): MechoShade Systems, Inc., "0700 series", blackout material, washable and colorfast laminated and embossed vinyl coated fabric, 0.012 inches thick (0.30 mm) blackout material and weighing 0.81 lbs. per square yard, with a minimum of 62 threads per square inch in colors selected from manufacturer's available range.

1. Color: Selected from manufacturer's standard colors.

2.4 SHADE FABRICATION

A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.

B. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as follows:

2.5 COMPONENTS

A. Access and Material Requirements:

1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
2. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.

B. Motorized Shade Hardware and Shade Brackets:

1. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel, or heavier, thicker, as required to support 150 percent of the full weight of each shade.
2. Provide shade hardware system that allows for field adjustment of motor or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).
3. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 8-45 degrees from the motor axis between shade bands (4-22.5 degrees) on each side of the radial line, by a single shade motor (multi-banded shade, subject to manufacturer’s design criteria).

C. Drive Chain: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.

2.6 SHADE MOTOR DRIVE SYSTEM

A. Shade Motors:

1. Tubular, asynchronous (non-synchronous) motors, with built-in reversible capacitor operating at 110v AC (60hz), single phase, temperature Class A, thermally protected, totally enclosed, maintenance free with line voltage power supply equipped with locking disconnect plug assembly furnished with each motor.
2. Conceal motors inside shade roller tube.
3. Maximum current draw for each shade motor of 2.3 amps.
4. Use motors rated at the same nominal speed for all shades in the same room.

B. Total hanging weight of shade band shall not exceed 80 percent of the rated lifting capacity of the shade motor and tube assembly.

2.7 MOTOR CONTROL SYSTEMS

A. IQ/MLC: Specifications and design of shade motors and motor control system are based on the IQ/MLC motor logic control system manufactured by MechoShade Systems, Inc. Other systems may be acceptable provide that all of the following performance capabilities are provided. Motor logic control systems not in complete compliance with these performance criteria shall not be accepted as equal systems.

1. Motor Control System:
   a. Provide power to each shade motor via individual 3 conductor line voltage circuits connecting each motor to the relay based motor logic controllers (IQ/MLC).

b. Control system components shall provide appropriate (spike and brown out) over-current protection (+/- 10 percent of line voltage) for each of the four individual motor circuits and shall be rated by UL or ETL as a recognized component of this system and tested as an integrated system.
c. Motor control system shall allow each group of four shade motors in any combination to be controlled by each of four local switch ports, with up to fourteen possible "sub-group" combinations via local 3 button wall switches and all at once via a master 3 button switch. System shall allow for overlapping switch combinations from two or more local switches.
d. Control system shall have two standard operating modes: Normal mode allowing the shades to be stopped anywhere in the window's opening height and uniform mode, allowing the shades to only be stopped at the predefined intermediate stop positions. Both modes shall allow for all up / all down positioning.
e. Reconfiguration of switch groups shall not require rewiring of the hardwired line voltage motor power supply wiring, or the low voltage control wiring. Reconfiguration of switch groups shall be accomplished within the motor control device (IQ/MLC).

2. Wall Switches:
a. Three-button architectural flush mounted switches with metal cover plate and no exposed fasteners.
b. Connect local wall switches to control system components via low voltage (12V DC) 4-conductor modular cable equipped with RJ-11 type connectors supplied, installed and certified under Division 16 - Electrical.
c. Connect master wall switches to control system components via low voltage (12V DC) 6-conductor modular cable equipped with RJ-12 type connectors supplied, installed and certified under Division 16 – Electrical.

2.8 ACCESSORIES

A. Fascia:

1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
2. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
3. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.
4. Notching of Fascia for manual chain shall not be acceptable.

B. Room Darkening Side and / or Sill Channels:

1. Extruded aluminum with polybond edge seals and SnapLoc-mounting brackets and with concealed fastening. Exposed fasting is not acceptable. Channels shall accept one-piece exposed blackout hembar with vinyl seal to assure side light control and sill light control.
a. ElectroShade side channels, 2-1/2 inches (63.5 mm) wide by 1-3/16 inches (30.1 mm) deep; two-band center channels 5 inches (127 mm) wide by 1-3/16 inches (30.1 mm) deep. The 2-5/8-inch (66.6 mm) double-center channels may be installed at center-support positions of multi-band-shade ElectroShades. MechoShade side channels 2-5/8 inches (66.6 mm) may be used as center supports for ElectroShades. Also provide for use with manually operated room darkening MechoShades over 8 feet (2438 mm) in height.
b. Color: Selected from manufacturer's standard colors.

PART 3 EXECUTION

3.1 EXAMINATION

A. 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. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.

B. Turn-Key Single-Source Responsibility for Motorized Interior Roller Shades: To control the responsibility for performance of motorized roller shade systems, assign the design, engineering, and installation of motorized roller shade systems, motors, controls, and low voltage electrical control wiring specified in this Section to a single manufacturer and their authorized installer/dealer. The Architect will not produce a set of electrical drawings for the installation of control wiring for the motors, or motor controllers of the motorized roller shades. Power wiring (line voltage), shall be provided by the roller shade installer/dealer, in accordance with the requirements provided by the manufacturer. Coordinate the following with the roller shade installer/dealer:

1. Main Contractor shall provide power panels and circuits of sufficient size to accommodate roller shade manufacturer’s requirements, as indicated on the mechanical and electrical drawings.
2. Main Contractor shall coordinate with requirements of roller shade installer/dealer, before inaccessible areas are constructed.
3. Electrical Contractor shall provide and run all line voltage from the circuit panel to the motor controllers, wire all roller shade motors to the motor controllers, and provide and run low voltage control wiring from motor controllers to switch/ control locations designated by the Architect. All above-ceiling and concealed wiring shall be plenum-rated, or installed in conduit, as required by the electrical code having jurisdiction.
4. Main Contractor shall provide conduit with pull wire in all areas, which might not be accessible to roller shade contractor due to building design, equipment location or schedule.

C. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

D. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

E. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 14 24 00 - MACHINE ROOM-LESS HYDRAULIC PASSENGER ELEVATORS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Machine room-less hydraulic passenger elevators as shown and specified. Elevator work includes:
   1. Standard pre-engineered hydraulic passenger elevators.
   2. Elevator car enclosures, hoistway entrances and signal equipment.
   3. Operation and control systems.
   4. Jack(s).
   5. Accessibility provisions for physically disabled persons.
   6. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
   7. Materials and accessories as required to complete the elevator installation.

B. Related Sections:
   1. Division 1 General Requirements: Meet or exceed all referenced sustainability requirements.
   2. Division 3 Concrete: Installing inserts, sleeves and anchors in concrete.
   3. Division 4 Masonry: Installing inserts, sleeves and anchors in masonry.
   4. Division 5 Metals:
      a. Providing hoist beams, pit ladders, steel framing, auxiliary support steel and divider beams for supporting guide-rail brackets.
      b. Providing steel angle sill supports and grouting hoistway entrance sills and frames.
   5. Division 9 Finishes: Providing elevator car finish flooring and field painting unfinished and shop primed ferrous materials.
   6. Division 16 Sections:
      a. Providing electrical service to elevators, including fused disconnect switches where permitted. (note: fused disconnect switch to be provided as part of elevator manufacture product, see section 2.11 Miscellaneous elevator components for further details.)
      b. Emergency power supply, transfer switch and auxiliary contacts.
      c. Heat and smoke sensing devices.
      d. Convenience outlets and illumination in control room (if applicable), hoistway and pit.
   7. Division 22 Plumbing
      a. Sump pit and oil interceptor.
   8. Division 23 Heating, Ventilation and Air Conditioning
      a. Heating and ventilating hoistways and/or control room.

C. Work Not Included: General contractor shall provide the following in accordance with the requirements of the Model Building Code and ANSI A17.1 Code. For specific rules, refer to ANSI A17.1, Part 3 for hydraulic elevators. State or local requirements must be used if more stringent. The cost of this work is not included in the TK Elevator's proposal, since it is a part of the building construction.
   1. Elevator hoist beam to be provided at top of elevator shaft. Beam must be able to accommodate proper loads and clearances for elevator installation and operation.
   2. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports and bracing including all setting templates and diagrams for placement.
   3. Hatch walls require a minimum two hours of fire rating. Hoistway should be clear and plumb with variations not to exceed 1/2" at any point.

4. Elevator hoistways shall have barricades, as required.
5. Install bevel guards at 75° on all recesses, projections or setbacks over 2" (4" for A17.1 2000 areas) except for loading or unloading.
6. Provide rail bracket supports at pit, each floor and roof. For guide rail bracket supports, provide divider beams between hoistway at each floor and roof.
7. Pit floor shall be level and free of debris. Reinforce dry pit to sustain normal vertical forces from rails and buffers.
8. Where pit access is by means of the lowest hoistway entrance, a vertical ladder of non-combustible material extending 42" minimum, (48" minimum for A17.1-2000 areas) shall be provided at the same height, above sill of access door or handgrips.
9. All wire and conduit should run remote from the hoistways.
10. When heat, smoke or combustion sensing devices are required, connect to elevator control cabinet terminals. Contacts on the sensors should be sided for 12 volt D.C.
11. Install and furnish finished flooring in elevator cab.
12. Finished floors and entrance walls are not to be constructed until after sills and door frames are in place. Consult elevator contractor for rough opening size. The general contractor shall supply the drywall framing so that the wall fire resistance rating is maintained, when drywall construction is used.
13. Where sheet rock or drywall construction is used for front walls, it shall be of sufficient strength to maintain the doors in true lateral alignment. Drywall contractor to coordinate with elevator contractor.
14. Before erection of rough walls and doors; erect hoistway sills, headers, and frames. After rough walls are finished; erect fascias and toe guards. Set sill level and slightly above finished floor at landings.
15. To maintain legal fire rating (masonry construction), door frames are to be anchored to walls and properly grouted in place.
16. The elevator wall shall interface with the hoistway entrance assembly and be in strict compliance with the elevator contractor's requirements.
17. General Contractor shall fill and grout around entrances, as required.
18. All walls and sill supports must be plumb where openings occur.
19. Locate a light fixture (200 lx / 19 fc) and convenience outlet in pit with switch located adjacent to the access door.
20. Provide telephone line, light fixture (200 lx / 19 fc), and convenience outlet in the hoistway at the landing where the elevator controller is located. Typically this will be at the landing above the 1st floor. Final location must be coordinated with elevator contractor.
21. As indicated by elevator contractor, provide a light outlet for each elevator, in center of hoistway.
22. For signal systems and power operated door: provide ground and branch wiring circuits.
23. For car light and fan: provide a feeder and branch wiring circuits to elevator control cabinet.
24. Controller landing wall thickness must be a minimum of 8 1/2 inches thick. This is due to the controller being mounted on the second floor landing in the door frame on the return side of the door. For center opening doors, the controller is located on the right hand frame (from inside the elevator cab looking out). These requirements must be coordinated between the general contractor and the elevator contractor.
25. Cutting, patching and recesses to accommodate hall button boxes, signal fixtures, etc..

1.02 SUBMITTALS

A. Product data: When requested, the elevator contractor shall provide standard cab, entrance and signal fixture data to describe product for approval.

B. Shop drawings:
   1. Show equipment arrangement in the corridor, pit, and hoistway and/or optional control room. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.
   2. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
   3. Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.
   4. Indicate electrical power requirements and branch circuit protection device recommendations.

C. Powder Coat paint selection: Submit manufacturer's standard selection charts for exposed finishes and materials.

D. Plastic laminate selection: Submit manufacturer's standard selection charts for exposed finishes and materials.

E. Metal Finishes: Upon request, standard metal samples provided.

F. Operation and maintenance data. Include the following:
   1. Owner's manuals and wiring diagrams.
   2. Parts list, with recommended parts inventory.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: An approved manufacturer with minimum 15 years of experience in manufacturing, installing, and servicing elevators of the type required for the project.
   1. The manufacturer of machines, controllers, signal fixtures, door operators cabs, entrances, and all other major parts of elevator operating equipment.
      a. The major parts of the elevator equipment shall be manufactured by the installing company, and not be an assembled system.
   2. The manufacturer shall have a documented, on-going quality assurance program.
   3. ISO-9001:2000 Manufacturer Certified
   4. ISO-14001:2004 Environmental Management System Certified
   5. LEED Gold certified elevator manufacturing facility.

B. Installer Qualifications: The manufacturer or an authorized agent of the manufacturer with not less than 15 years of satisfactory experience installing elevators equal in character and performance to the project elevators.

C. Regulatory Requirements:
   1. ASME A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.
   2. Building Code: National.
   3. NFPA 70 National Electrical Code.
   4. NFPA 80 Fire Doors and Windows.
   5. Americans with Disabilities Act - Accessibility Guidelines (ADAAG)
   6. Section 407 in ICC A117.1, when required by local authorities
   7. CAN/CSA C22.1 Canadian Electrical Code
   8. CAN/CSA B44 Safety Code for Elevators and Escalators.
   9. California Department of Public Health Standard Method V1.1–2010, CA Section 01350

D. Fire-rated entrance assemblies: Opening protective assemblies including frames, hardware, and operation shall comply with ASTM E2074, CAN4-S104 (ULC-S104), UL10(b), and NFPA Standard 80. Provide entrance assembly units bearing Class B or 1 1/2 hour label by a Nationally Recognized Testing Laboratory (2 hour label in Canada).

E. Inspection and testing:

1. Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.
2. Arrange for inspections and make required tests.
3. Deliver to the Owner upon completion and acceptance of elevator work.

F. Sustainable Product Qualifications:
    1. Environmental Product Declaration:
        a. GOOD: If Product Category Rules (PCR) are not available, produce a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that has at least a cradle to gate scope.
        b. BEST: If Product Category Rules (PCR) are available, produce and publish an Environmental Product Declaration (EPD) based on a critically reviewed life-cycle assessment conforming to ISO 14044, with external verification recognized by the EPD program operator.
    2. Material Transparency:
        a. GOOD: Provide Health Product Declaration at any level
        b. BETTER: Provide Health Product Declaration (HPD v2 or later). Complete, published declaration with full disclosure of known hazards, prepared using the Health Product Declaration Collaborative's "HPD builder" on-line tool.
        c. BEST: Cradle to Cradle Material Health Certificate v3, Bronze level or higher.

1.04 DELIVERY, STORAGE AND HANDLING

A. Manufacturing shall deliver elevator materials, components and equipment and the contractor is responsible to provide secure and safe storage on job site.

1.05 PROJECT CONDITIONS

A. Temporary Use: Elevators shall not be used for temporary service or for any other purpose during the construction period before Substantial Completion and acceptance by the purchaser unless agreed upon by Elevator Contractor and General Contractor with signed temporary agreement.

1.06 WARRANTY

A. Warranty: Submit elevator manufacturer's standard written warranty agreeing to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care for 12 months after final acceptance.

1.07 MAINTENANCE

A. Furnish maintenance and call back service for a period of 12 months for each elevator after completion of installation or acceptance thereof by beneficial use, whichever is earlier, during normal working hours excluding callbacks.

1. Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevators in proper operation. Maintenance work, including emergency call back repair service, shall be performed by trained employees of the elevator contractor during regular working hours.
2. Submit parts catalog and show evidence of local parts inventory with complete list of recommended spare parts. Parts shall be produced by manufacturer of original equipment.
3. Manufacturer shall have a service office and full time service personnel within a 100 mile radius of the project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer: Design based around TK Elevator's endura Machine Room-Less hydraulic elevator.

2.02 MATERIALS, GENERAL

A. All Elevator Cab materials including frame, buttons, lighting, wall and ceiling assembly, laminates and carpet shall have an EPD and an HPD, and shall meet the California Department of Public Health Standard Method V1.1–2010, CA Section 01350 as mentioned in 1.03.9 of this specification.

B. Colors, patterns, and finishes: As selected by the Architect from manufacturer's full range of standard colors, patterns, and finishes.

C. Steel:
   1. Shapes and bars: Carbon.
   2. Sheet: Cold-rolled steel sheet, commercial quality, Class 1, matte finish.
   3. Finish: Factory-applied baked enamel for structural parts, powder coat for architectural parts. Color selection must be based on elevator manufacture's standard selections.

D. Plastic laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050" thickness. Laminate selection must be based on elevator manufacture's standard selections.

E. Flooring by others.

2.03 HOISTWAY EQUIPMENT

A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood sub-floor. Underside of the platform shall be fireproofed. The car platform shall be designed and fabricated to support one-piece loads weighing up to 25% of the rated capacity.

B. Sling: Steel stiles bolted or welded to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.

C. Guide Rails: Steel, omega shaped, fastened to the building structure with steel brackets.

D. Guides: Slide guides shall be mounted on top and bottom of the car.

E. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.

F. Jack: A jack unit shall be of sufficient size to lift the gross load the height specified. Factory test jack to ensure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Provide the following jack type: Twin post holeless telescopic 2-stage. Two jacks piped together, mounted one on each side of the car with each having two telescopic sections designed to extend in a synchronized manner when oil is pumped into the Assembly. Each jack section will be guided from within the casing or the plunger assembly used to house the section. Each plunger shall have a high pressure sealing system which will not allow for seal movement or displacement during the course of operation. Each Jack Assembly shall have a check valve built into the assembly to allow for automatically re-syncing the two plunger sections by moving the jack to its fully contracted position. The jack shall be designed to be mounted on the pit floor or in a recess in the pit floor. Each jack section shall have a bleeder valve to discharge any air trapped in the section..

G. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the floor landings and correct for over travel or under travel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.

H. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary code compliant pipe and fittings shall be provided to connect the power unit to the jack unit. Provide proper grade inherently biodegradable oil as specified by the manufacturer of the power unit (see Power Unit section 2.04.G for further details)

I. Pit moisture/water sensor located approximately 1 foot above the pit floor to be provided. Once activated, elevator will perform “flooded pit operation”, which will run the car up to the designated floor, cycle the doors and shut down and trip the circuit breaker shunt to remove 3 phase power from all equipment, including pit equipment.

J. Motorized oil line shut-off valve shall be provided that can be remotely operated from the controller landing service panel. Also a means for manual operation at the valve in the pit is required.

2.04 POWER UNIT

A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit located in the elevator pit consisting of the following items:
   1. NEMA 4/Sealed Oil reservoir with tank cover including vapor removing tank breather
   2. An oil hydraulic pump.
   3. An electric motor.
   4. Electronic oil control valve with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and electro-magnetic controlling solenoids.

B. Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with minimum pulsation to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.

C. Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating – motors shall be capable of 80 starts per hour with a 30% motor run time during each start.

D. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.
   1. Relief valve shall be adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.
   2. Up start and stop valve shall be adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.
   3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.
   4. Lowering valve and leveling valve shall be adjustable for down start speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling after slowdown is initiated.
   5. Provided with constant speed regulation in both up and down direction. Feature to compensate for load changes, oil temperature, and viscosity changes.
   6. Solid State Starting: Provide an electronic starter featuring adjustable starting currents.
   7. A secondary hydraulic power source (powered by 110VAC single phase) must be provided. This is required to be able to raise (reposition) the elevator in the event of a system component failure (i.e. pump motor, starter, etc.)
   8. Oil Type: Provide a zinc free, inherently biodegradable lubricant formulated with premium base stocks to provide outstanding protection for demanding hydraulic systems, especially those operating in environmentally sensitive areas.

2.05 HOISTWAY ENTRANCES

A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening bolted\knock down construction.
   1. Manufacturer's standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates (where required), sight guards, and necessary hardware.
   2. Main landing door & frame finish: Stainless steel panels, no. 4 brushed finish with no. 4 brushed finish entrance frame.
   3. Typical door & frame finish: Stainless steel panels, no. 4 brushed finish with no. 4 brushed finish entrance frame.

B. Integrated Control System: the elevator controller to be mounted to hoistway entrance above 1st landing. The entrance at this level, shall be designed to accommodate the control system and provide a means of access to critical electrical components and troubleshooting features. See section 2.09 Control System for additional requirements.

C. At the controller landing, the hoistway entrance frame shall have space to accommodate and provide a lockable means of access (group 2 security) to a 3 phase circuit breaker. See section 2.11 Miscellaneous Elevator Components for further details

D. Interlocks: Equip each hoistway entrance with an approved type interlock tested as required by code. Provide door restriction devices as required by code.

E. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway horizontal sliding door.
   1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
   2. Hangers: Provide an adjustable device beneath the track to limit the up-thrust of the doors during operation.
   3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.

F. Hoistway Sills: Extruded metal, with groove(s) in top surface. Provide mill finish on aluminum.

2.06 PASSENGER ELEVATOR CAR ENCLOSURE

A. Car Enclosure:
   1. Walls: Cab type TKAP, reinforced cold-rolled steel with two coats factory applied baked enamel finish, with applied vertical wood core panels covered on both sides with high pressure plastic laminate. **Plastic Laminate shall be: #8906 "Danish Maple"**
   2. Reveals and frieze: a. Reveals and frieze: Stainless steel, no. 4 brushed finish
   3. Canopy: Cold-rolled steel with hinged exit.
   4. Ceiling: Suspended type, LED lighting with translucent diffuser mounted in a metal frame. Framework shall be finished with a factory applied powder coat finish.
   5. Cab Fronts, Return, Transom, Soffit and Strike: Provide panels faced with brushed stainless steel
   6. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic sliding guides.
      a. Door Finish: Stainless steel panels: No. 4 brushed finish.
      b. Cab Sills: Extruded aluminum, mill finish.
   7. Handrail: Provide 1.5' diameter cylindrical metal on side and rear walls on front opening cars and side walls only on front and rear opening cars. Handrails shall have a stainless steel, no. 4 brushed finish.
   8. Ventilation: Manufacturer's standard exhaust fan, mounted on the car top.
   9. Protection pads and buttons: Not required

B. Car Top Inspection: Provide a car top inspection station with an "Auto-Inspection" switch, an "emergency stop" switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperative. The station shall give the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.

2.07 DOOR OPERATION

A. Door Operation: Provide a direct or alternating current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously. The door control system shall be digital closed loop and the closed loop circuit shall give constant feedback on the position and velocity of the elevator door. The motor torque shall be constantly adjusted to maintain the correct door speed based on its position and load. All adjustments and setup shall be through the computer based service tool. Door movements shall follow a field programmable speed pattern with smooth acceleration and deceleration at the ends of travel. The mechanical door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval

or when the car is dispatched to another landing. AC controlled units with oil checks, or other deviations are not acceptable.

1. No Un-Necessary Door Operation: The car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as a dispatch car.
2. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.
3. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel shall reverse and the door shall reopen to answer the other call.
4. Nudging Operation: The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door closing is prevented for a field programmable time, a buzzer shall sound. When the obstruction is removed, the door shall begin to close at reduced speed. If the infra-red door protection system detects a person or object while closing on nudging, the doors shall stop and resume closing only after the obstruction has been removed.
5. Door Reversal: If the doors are closing and the infra-red beam(s) is interrupted, the doors shall reverse and reopen. After the obstruction is cleared, the doors shall begin to close.
6. Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors shall recycle closed then attempt to open six times to try and correct the fault.
7. Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors shall recycle open then attempt to close six times to try and correct the fault.
8. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.

B. Door Protection Device: Provide a door protection system using microprocessor controlled infra-red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen.

2.08 CAR OPERATING STATION

A. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation mounted in an integral swing return panel requiring no applied faceplate. Wrap return shall have a brushed stainless steel finish. The main car operating panel shall be mounted in the return and comply with handicap requirements. Pushbuttons that illuminate using long lasting LED’s shall be included for each floor served, and emergency buttons and switches shall be provided per code. Switches for car light and accessories shall be provided.

B. Emergency Communications System: Integral phone system provided.

C. Auxiliary Operating Panel:

D. Column Mounted Car Riding Lantern: A car riding lantern shall be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.

E. Special Equipment: Not Applicable

F. Digital Services: Cloud-based IoT monitoring system comes standard with these options:

Remote Monitoring with Application Programming Interface (API) Integration

ADA Phone - Code Compliant Cellular Connectivity

A17.1 2019 Code - Enhanced Communications

Smart Device Elevator Calling with occupant app API integration

2.09 CONTROL SYSTEMS

A. Controller: Shall be integrated in a hoistway entrance jamb. Should be microprocessor based, software oriented and protected from environmental extremes and excessive vibrations in a NEMA 1 enclosure. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings.

B. Service Panel – to be located outside the hoistway in the controller entrance jamb and shall provide the following functionality/features:
   1. Access to main control board and CPU
   2. Main controller diagnostics
   3. Main controller fuses
   4. Universal Interface Tool (UIT)
   5. Remote valve adjustment
   6. Electronic motor starter adjustment and diagnostics
   7. Operation of pit motorized shut-off valve with LED feedback to the state of the valve in the pit
   8. Operation of auxiliary pump/motor (secondary hydraulic power source)
   9. Operation of electrical assisted manual lowering
   10. Provide male plug to supply 110VAC into the controller
   11. Run/Stop button

C. Automatic Light and Fan shut down: The control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings shall be field programmable.

D. Emergency Power Operation: (10-DOA) Upon loss of the normal power supply, building-supplied standby power is available on the same wires as the normal power supply. Once the loss of normal power is detected and standby power is available, the elevator is lowered to a pre-designated landing and the doors are opened. After passengers have exited the elevator, the doors are closed and the car is shut down. When normal power is restored, the elevator automatically resumes operation.

E. Special Operation: Not Applicable

F. Digital Services:

Cloud-based IoT Monitoring System (standard): Contractor shall provide a cloud-based IoT (internet of things) monitoring system capable of tracking door movements and timing, trips, power cycles, car calls, out-of-service events and modes. This observation will continue 24/7 and it shall be capable of providing service technicians a minimum of three recommended solutions for defined failure events and automatically dispatch service technicians in the event of failure(s) while sending notifications to end users of changes in their equipment's state via both email and mobile device. Access to IoT and related equipment data and status will be made available in both a web portal and mobile application secured by password and username with at least two-factor authentication. Finally, this system must be self-contained and not require internet provision by others.

Along with the monitoring system, options are available.

Remote Monitoring with Application Programming Interface (API) Integration: Contractor shall provide a portal and mobile device application (app) that communicates relevant service and operational information such as elevator operational status, open service call tickets, call ticket history and performance and service history. This system shall provide a REST application programming interface (API) capable of transmitting relevant information from the cloud-based IoT monitoring system. This data includes equipment operational status, door movements, service and maintenance history, traffic statistics and failure alerts.

ADA Phone – Code Compliant Cellular Connectivity: Contractor shall provide a phone service through a self-contained cellular based VoIP system. This system shall meet code, include a backup battery capable of powering the emergency communication equipment for 4+ hours in the event of a power outage. The solution shall have remote monitoring capability to ensure continuous connectivity with a means of remote troubleshooting. Remote monitoring capability shall include, at a minimum, the ability to monitor connectivity and power supply. Remote monitoring shall be capable of providing local alerts to response personnel when on-site intervention is required.

A17.1 2019 Code – Enhanced Communications: For jobs installed under enforcement of 2018 International Building Code or ASME A17.1-2019/CSA B44:19 Safety Code, contractor will provide a video camera necessary for viewing the elevator cab interior floor as well as a position indicator display in the cab operating panel capable of providing means of two-way, text-based communication when the emergency call button is engaged in the elevator car. These components, and associated cloud-based monitoring platform, will be non-proprietary in nature, allowing customization on where to direct emergency calls, while offering capability for any party to provide the emergency monitoring services.

Smart Device Elevator Calling with Occupant app API Integration: Contractor will provide an elevator calling application for smart devices (app) that can be accessed through Android and IOS smart device operating systems. This calling service shall be accomplished on both, Destination Dispatch and Traditional ETA elevator control system applications. Furthermore, a single, common and consistent app shall have the same user experience and user interface on both Destination Dispatch and Traditional ETA dispatching control systems. To enable mobile calling functionality without creating unnecessary wear on elevator components resulting from false calls, proximity detection beacons shall be installed in the elevator lobby at each floor. These beacons shall detect user smart devices and restrict calling of elevators when the user is not within a pre-configured range of elevator entrance. Beacon-based proximity detection distance must be configurable to accommodate various building and floor layouts. Once Bluetooth signal is detected, the user can place a floor call directly from their handheld or wearable device. The elevator calling app shall remove the need for interaction with hall fixtures, buttons or kiosks. This system shall be capable of placing an automatic call to a user-configured destination floor automatically based on both location in building (floor) and time of day. App users shall be able to configure their own source or starting floor, destination floor and schedule of automatic calling service, and be able to configure

multiple automatic calling services and routines. System shall have reasonable ability to auto-provision users from access control system and not require duplicate entry of users for access control purposes. Finally, all services above shall be made available via an application programming interface (API) so that a 3rd party or tenant occupant app could be integrated with elevator smart device calling service so that users could receive multiple occupant experience-based services in a single, common, 3rd party mobile device application (app).

2.10 HALL STATIONS

A. Hall Stations, General: Buttons shall illuminate to indicate call has been registered at that floor for the indicated direction.
   1. Provide one pushbutton riser with faceplates having a brushed stainless steel finish.
      a. Phase 1 firefighter's service key switch, with instructions, shall be incorporated into the hall station at the designated level.

VERIFY WITH OWNER IF ACCESS KEY-SWITCH AT TOP FLOOR AND LOWER LEVEL IS PREFERRED

B. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.

C. Hall Position Indicator: Not Applicable

D. Hall lanterns: Not Applicable

E. Special Equipment: Not Applicable

2.11 MISCELLANEOUS ELEVATOR COMPONENTS

A. Oil Hydraulic Silencer: Install multiple oil hydraulic silencers (muffler device) at the power unit location. The silencers shall contain pulsation absorbing material inserted in a blowout proof housing.

B. Lockable three phase circuit breaker with auxiliary contact with shunt trip capability to be provided. Circuit breaker to be located behind locked panel (Group 2 security access) at controller landing entrance jamb and should be sized according to the National Electrical Code.

C. Lockable single phase 110V circuit breaker for cab light and fan to be provided. Circuit breaker to be located behind locked panel (Group 2 security access) at controller landing entrance jamb should be sized according to the National Electrical Code

PART 3 EXECUTION

3.01 EXAMINATION

A. Before starting elevator installation, inspect hoistway, hoistway openings, pits and/or control room, as constructed, verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

A. Install elevator systems components and coordinate installation of hoistway wall construction.
   1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.
   2. Comply with the National Electrical Code for electrical work required during installation.

B. Perform work with competent, skilled workmen under the direct control and supervision of the elevator manufacturer's experienced foreman.

C. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports, and bracing including all setting templates and diagrams for placement.

D. Welded construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualification of welding operators.

E. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.

F. Install machinery, guides, controls, car and all equipment and accessories to provide a quiet, smoothly operating installation, free from side sway, oscillation or vibration.

G. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.

H. Erect hoistway sills, headers, and frames before erection of rough walls and doors; erect fascia and toe guards after rough walls finished. Set sill units accurately aligned and slightly above finish floor at landings.

I. Lubricate operating parts of system, where recommended by manufacturer.

3.03 FIELD QUALITY CONTROL

A. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required and recommended by Code and governing regulations or agencies. Perform other tests, if any, as required by governing regulations or agencies.

B. Advise Owner, Contractor, Architect, and governing authorities in advance of dates and times tests are to be performed on the elevator.

3.04 ADJUSTING

A. Make necessary adjustments of operating devices and equipment to ensure elevator operates smoothly and accurately.

3.05 CLEANING

A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided. Stainless steel shall be cleaned with soap and water and dried with a non-abrasive surface; it shall not be cleaned with bleach-based cleansers.

B. At completion of elevator work, remove tools, equipment, and surplus materials from site. Clean equipment rooms and hoistway. Remove trash and debris.
   1. Use environmentally preferable and low VOC emitting cleaners for each application type. Cleaners that contain solvents, pine and/or citrus oils are not permitted.

3.06 PROTECTION

A. At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

3.07 DEMONSTRATION

A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.

B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

3.08 ELEVATOR SCHEDULE

A. Elevator Qty. 1
   1. Elevator Model: endura MRL Twinpost above-ground 2-stage
   2. Elevator Type: Hydraulic Machine Room-Less, Passenger
   3. Rated Capacity: 2100 lbs.
   4. Rated Speed: 110 ft./min.
   5. Operation System: TAC32H
   6. Travel: 22'-0"
   7. Landings: 2 total
   8. Openings:
      a. Front: 2
      b. Rear: 0
   9. Clear Car Inside: 5'-8" wide x 4'-3" deep
   10. Inside clear height: 7'-4" standard
   11. Door clear height: 7'-0" standard
   12. Hoistway Entrance Size: 3'-0" wide x 7'-0" high
   13. Door Type: One-speed | LH Side opening
   14. Power Characteristics: 208 volts, 3 Phase, 60 Hz.
   15. Seismic Requirements: Zone

16. Hoistway Dimensions: 7'-4" wide x 5'-9" deep
17. Pit Depth: 4'-0"
18. Button & Fixture Style: Traditional Signal Fixtures
19. Special Operations: None
20. Digital Services:
    Remote Monitoring with Application Programming Interface (API) Integration

    ADA Phone - Code Compliant Cellular Connectivity

    A17.1 2019 Code - Enhanced Communications

    Smart Device Elevator Calling with occupant app API integration

END OF SECTION

SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Cover system for sprinkler piping.
3. Specialty valves.
4. Sprinklers.
5. Manual control stations.
6. Pressure gages.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For wet-pipe sprinkler systems.

1. Include plans, elevations, sections, and attachment details.
2. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Sprinkler systems, drawn to scale, on which items of other systems and equipment are shown and coordinated with each other, using input from installers of the items involved.

B. Qualification Data: NICET Level III or greater.

C. Design Data:

1. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.

D. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional design services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:

1. NFPA 13.

B. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

1. Minimum Density for Automatic-Sprinkler Piping Design:
   a. Light-Hazard Occupancy: **0.10 gpm over 1500-sq. ft.** area.
   b. Ordinary-Hazard, Group 1 Occupancy: **0.15 gpm over 1500-sq. ft.** area.
   c. Ordinary-Hazard, Group 2 Occupancy: **0.20 gpm over 1500-sq. ft.** area.

2. Maximum Protection Area per Sprinkler: According to UL listing.

2.2 STEEL PIPE AND FITTINGS

A. Standard-Weight, **Galvanized- and Black-**Steel Pipe: ASTM A 53/A 53M, **Type E**, **Grade B**. Pipe ends may be factory or field formed to match joining method.

B. Thinwall **Galvanized- and Black-**Steel Pipe: ASTM A 135/A 135M or ASTM A 795/A 795M, threadable, with wall thickness less than Schedule 30 and equal to or greater than Schedule 10. Pipe ends may be factory or field formed to match joining method.

C. Schedule 10, Black-Steel Pipe: ASTM A 135/A 135M or ASTM A 795/A 795M, Schedule 10 in NPS 5 and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10, plain end.

D. **Galvanized- and Black-**Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.

E. **Galvanized- and Uncoated-**Steel Couplings: ASTM A 865/A 865M, threaded.

F. Malleable- or Ductile-Iron Unions: UL 860.

G. Cast-Iron Flanges: ASME 16.1, Class 125.

H. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

2.3 CPVC PIPE AND FITTINGS

A. CPVC Pipe: ASTM F 442/F 442M and UL 1821, SDR 13.5, for 175-psig rated pressure at 150 deg F, with plain ends. Include "LISTED" and "CPVC SPRINKLER PIPE" markings.

B. CPVC Fittings: **UL listed or FM Global approved**, for 175-psig rated pressure at 150 deg F, socket type. Include "LISTED" and "CPVC SPRINKLER FITTING" markings.

1. NPS 3/4 to NPS 1-1/2: ASTM F 438 and UL 1821, Schedule 40, socket type.
2. NPS 2 to NPS 3: ASTM F 439 and UL 1821, Schedule 80, socket type.
3. CPVC-to-Metal Transition Fittings: CPVC, one piece, with dimensions equivalent to pipe; one end with threaded brass insert, and one socket end.

4. CPVC-to-Metal Transition Unions: CPVC, with dimensions equivalent to pipe; one end with threaded brass insert, and one socket end.
5. Flanges: CPVC, one or two pieces.

C. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F 493 solvent cement recommended by pipe and fitting manufacturer, and made for joining CPVC sprinkler pipe and fittings. Include cleaner or primer recommended by pipe and fitting manufacturer.

D. Plastic Pipe-Flange Gasket and Bolts and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

E. Installer must have current certification from the manufacturer to install CPVC piping or fittings.

2.4 COVER SYSTEM FOR SPRINKLER PIPING

A. Description: System of support brackets and covers made to protect sprinkler piping.

B. Brackets: Glass-reinforced nylon.

C. Covers: Extruded-PVC sections of length, shape, and size required for size and routing of CPVC piping.

2.5 SPECIALTY VALVES

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Specialty Valves Pressure Rating: 175-psig minimum.

C. Body Material: Cast or ductile iron.

D. Size: Same as connected piping.

E. End Connections: Flanged or grooved.

F. Alarm Valves:
1. Standard: UL 193.
2. Design: For horizontal or vertical installation.
3. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, and fill-line attachment with strainer.
4. Drip Cup Assembly: Pipe drain with check valve to main drain piping.

G. Automatic (Ball Drip) Drain Valves:
1. Standard: UL 1726.
2. Pressure Rating: 175-psig minimum.
3. Type: Automatic draining, ball check.
4. Size: NPS 3/4.
5. End Connections: Threaded.

2.6 SPRINKLER PIPING SPECIALTIES

A. Branch Outlet Fittings:
1. Standard: UL 213.
2. Pressure Rating: **175-psig minimum**.
3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.

4. Type: Mechanical-tee and -cross fittings.
5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
7. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Flow Detection and Test Assemblies:
1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
2. Pressure Rating: **175-psig minimum**.
3. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded or grooved.

C. Branch Line Testers:
1. Standard: UL 199.
2. Pressure Rating: 175 psig.
3. Body Material: Brass.
4. Size: Same as connected piping.
5. Inlet: Threaded.
6. Drain Outlet: Threaded and capped.
7. Branch Outlet: Threaded, for sprinkler.

D. Sprinkler Inspector's Test Fittings:
1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
2. Pressure Rating: **175-psig minimum**.
3. Body Material: Cast- or ductile-iron housing with sight glass.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded.

E. Flexible Sprinkler Hose Fittings:
1. Standard: UL 1474.
2. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
3. Pressure Rating: **175-psig minimum**.
4. Size: Same as connected piping, for sprinkler.

2.7 SPRINKLERS

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Pressure Rating for Automatic Sprinklers: 175-psig minimum.

C. Automatic Sprinklers with Heat-Responsive Element:

1. Early-Suppression, Fast-Response Applications: [**UL 1767**].
2. Nonresidential Applications: [**UL 199**].
3. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

D. Sprinkler Finishes: **Chrome plated**.

E. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

F. Sprinkler Guards:
1. Standard: UL 199.

2. Type: Wire cage with fastening device for attaching to sprinkler.

2.8 PRESSURE GAGES

A. Standard: UL 393.

B. Dial Size: 3-1/2- to 4-1/2-inch diameter.

C. Pressure Gage Range: **0 to 300 psig**.

D. Label: Include "WATER" label on dial face.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.

C. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

D. Install grooved coupling adjacent to each valve in pipes NPS 2 and smaller.

E. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

F. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.

G. Install sprinkler piping with drains for complete system drainage.

H. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

I. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.

J. Install alarm devices in piping systems.

K. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.

L. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft-metal seated globe valve,

arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they are not subject to freezing.

M. Fill sprinkler system piping with water.

N. Install sleeves for piping penetrations of walls, ceilings, and floors

O. Install sleeve seals for piping penetrations of concrete walls and slabs.

P. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.2 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install grooved coupling adjacent to each valve in pipes NPS 2 and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.

I. Steel-Piping, Pressure-Sealed Joints: Join lightwall steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

J. Schedule 40 Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

K. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

L. Steel-Piping, Pressure-Sealed Joints: Join Schedule 5 steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

M. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

N. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

O. Plastic-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.

3.3 INSTALLATION OF COVER SYSTEM FOR SPRINKLER PIPING

A. Install cover system, brackets, and cover components for sprinkler piping according to manufacturer's "Installation Manual" and NFPA 13 for supports.

3.4 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

D. Specialty Valves:

1. Install valves in vertical position for proper direction of flow, in main supply to system.
2. Install alarm valves with bypass check valve and retarding chamber drain-line connection.
3. Install deluge valves in vertical position, in proper direction of flow, and in main supply to deluge system. Install trim sets for drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.

3.5 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of **narrow dimension of** acoustical ceiling panels.

B. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.

3.6 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Identify system components, wiring, cabling, and terminals.

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections **with the assistance of a factory-authorized service representative**:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
4. Energize circuits to electrical equipment and devices.
5. Coordinate with fire-alarm tests. Operate as required.
6. Verify that equipment hose threads are same as local fire department equipment.

B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.8 CLEANING

A. Clean dirt and debris from sprinklers.

B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.9 PIPING SCHEDULE

A. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe and fittings.

B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.

3.10 SPRINKLER SCHEDULE

A. Use sprinkler types in subparagraphs below for the following applications:

1. Rooms without Ceilings: **Upright sprinklers**.
2. Rooms with Suspended Ceilings: **Pendent, recessed, flush, and concealed sprinklers as indicated**.
3. Wall Mounting: Sidewall sprinklers.

B. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
2. Flush Sprinklers: Bright chrome, with painted white escutcheon.
3. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
4. **Upright, Pendent and Sidewall** Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 211313

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic hot-water piping.
2. Roof drains and rainwater leaders.
3. Supplies and drains for handicap-accessible lavatories and sinks.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Products shall not contain asbestos, lead, mercury, or mercury compounds.

B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

D. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells.

E. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

2.2 INSULATING CEMENTS

A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

2.3 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:
1. Description: Manufactured plastic wraps for covering plumbing fixture **hot- and cold-water supplies** and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at [**2 inches**] o.c.

a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.3 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

C. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.

3.4 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

END OF SECTION 220719

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper tube and fittings.
2. Transition fittings.
3. Dielectric fittings.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."

C. Comply with NSF 372 for low lead.

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: **ASTM B 88, Type L and ASTM B 88, Type M** water tube, drawn temper.

B. Soft Copper Tube: **ASTM B 88, Type K and ASTM B 88, Type L** water tube, annealed temper.

C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

F. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

G. Copper Pressure-Seal-Joint Fittings:

1. Fittings for NPS 2 and Smaller: Wrought-copper fitting with EPDM-rubber, O-ring seal in each end.
2. Fittings for NPS 2-1/2 to NPS 4: Cast-bronze or wrought-copper fitting with EPDM-rubber, O-ring seal in each end.

H. Copper Push-on-Joint Fittings:

1. Cast-copper fitting complying with ASME B16.18 or wrought-copper fitting complying with ASME B 16.22.
2. Stainless-steel teeth and EPDM-rubber, O-ring seal in each end instead of solder-joint ends.

2.3 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

2.4 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:
1. Standard: ASSE 1079.
2. Pressure Rating: **125 psig minimum at 180 deg F**.
3. End Connections: Solder-joint copper alloy and threaded ferrous.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance.

D. Install shutoff valve immediately upstream of each dielectric fitting.

E. Install domestic water piping level and plumb.

F. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

G. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

H. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

I. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

J. Install piping to permit valve servicing.

K. Install piping free of sags and bends.

L. Install fittings for changes in direction and branch connections.

M. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

N. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump.

3.2 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

3.3 HANGER AND SUPPORT INSTALLATION

A. Support vertical piping and tubing at base and at each floor.

B. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

C. Install supports for vertical copper tubing every 10 feet.

3.4 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

    a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.

2. Piping Tests:

    a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
    b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.

c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.6 CLEANING

A. Clean and disinfect potable domestic water piping per Authority Having Jurisdiction.

B. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 221116

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-iron soil pipe and fittings.
2. PVC pipe and fittings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: **10-foot head of water**.

2.2 PIPING MATERIALS

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

2.3 CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service class.

B. Gaskets: ASTM C 564, rubber.

C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.4 PVC PIPE AND FITTINGS

A. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

B. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

C. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.

D. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.

1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
2. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.

1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
2. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.

    a. Straight tees, elbows, and crosses may be used on vent lines.

3. Do not change direction of flow more than 90 degrees.
4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.

    a. Reducing size of waste piping in direction of flow is prohibited.

J. Lay buried building waste piping beginning at low point of each system.

1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.
2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
3. Maintain swab in piping and pull past each joint as completed.

K. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

L. Install aboveground PVC piping according to ASTM D 2665.

M. Plumbing Specialties:

1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary waste gravity-flow piping.

2. Install drains in sanitary waste gravity-flow piping.

N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

O. Install sleeves for piping penetrations of walls, ceilings, and floors.

P. Install sleeve seals for piping penetrations of concrete walls and slabs.

Q. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.2 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect waste and vent piping to the following:

1. Plumbing Fixtures: Connect waste piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect waste and vent piping in sizes indicated, but not smaller than required by plumbing code.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

3.3 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Test sanitary waste and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.

2. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing-in.

    a. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water.
    b. From 15 minutes before inspection starts to completion of inspection, water level must not drop.
    c. Inspect joints for leaks.

3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

3.4 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect sanitary waste and vent piping during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Repair damage to adjacent materials caused by waste and vent piping installation.

END OF SECTION 221316

SECTION 230100 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Dielectric fittings.
3. Vibration Isolators
4. Mechanical sleeve seals.
5. Sleeves.
6. Escutcheons.
7. Grout.
8. Equipment installation requirements common to equipment sections.
9. Concrete bases.
10. Supports and anchorages.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.3 SUBMITTALS

A. Submit for approval, Manufacturer’s technical data sheets including performance specifications for all equipment and air devices shown on the schedules. Also, provide data on all system accessories and all materials. Include all piping, ductwork and insulation materials. Accessories to be submitted on shall include valves and all piping accessories, and all ductwork accessories including extractors, turning vanes, control dampers and balancing dampers.

B. Submit for approval, contractor’s original shop drawings of all assemblies of manufactured items including control diagrams. Submit all items called out in individual sections, in addition to those called for in this section.

C. Indicate all pertinent dimensions on scale drawings necessary for clarity and/or coordination of the installation between trades.

D. Provide complete electrical wiring diagrams.

E. Make submittals for all work contained in Division 15 at one time except by special permission.

F. Bind submittals in durable covers with contents conveniently organized and properly indexed with index tabs.

G. Obtain approval on product manufacturers not specifically named prior to making bidding.

H. Each mechanical section contains a listing of required submittals only for convenience.

I. Submit for approval a schedule of nameplates and manufacturer's data sheets and shop drawings on special supports and seals.

J. Provide performance data on all substituted items to demonstrate equality to those scheduled. Include all sound levels, rpm, velocity and other data as applicable.

K. Submit proposed changes in ducts, piping, and equipment layout before ordering or fabrication as stated below under intent.

1.4 INTENT

A. It is intended that the contractor provide a complete and operating mechanical system including all incidental items and connections necessary for proper operation or customarily included even though each and every item may not be indicated.

B. The drawings indicate the general layout requirements for equipment, fixtures, piping, ductwork, etc. Final layout will be governed by actual field conditions with all measurements verified at the site. Contractor shall verify that all equipment, piping, ducts and other components will fit in the space provided before fabrication or ordering. Contractor shall submit any proposed changes to the Engineer for approval before fabrication or ordering.

C. It is intended that the mechanical installation be safe, reliable, energy efficient, and easily maintained with adequate provisions allowed for access to equipment.

D. It is intended that the mechanical system operate quietly with noise levels below the criteria recommended for the application by ASHRAE. Provide corrective action as required to reduce objectionable noise or vibration.

1.5 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS

A. Furnish only new standard products of a manufacturer regularly engaged in the production of said products.

B. Support all products by service organizations with adequate spare parts inventory and personnel located reasonably close to the site.

C. Where multiple units of the same type or class of product are required, provide all units of the same manufacturer.

D. Store products in the original containers and shelter in a suitable environment at an approved location. Make readily accessible for inspections and inventory accounting.

E. For products specified by generic reference standard, select any product meeting such standard.

F. For products specified by naming one or more products or manufacturers, select any named. Submit request, in writing, for substitution of any product or manufacturer not specifically named and obtain approval at least five working days prior to bid date.

G. Provide all information to support claim of equality of product proposed for substitution. Substitutions will be considered only if equivalent in quality, efficiency, performance, size, weight, reliability, appearance, and ease of maintenance to the specified product.

H. Where approved product substitutions alter the design, space requirements, electrical requirements, connections, etc. include all work necessary to provide a complete installation of quality equal to or better than that which would have been achieved with products or manufacturers as specified.

2.2 MECHANICAL IDENTIFICATION

A. Identify each major component as to manufacturer’s name, address, model and serial number, and pertinent ratings on a durable nameplate attached to the component in a conspicuous place.

B. Identify each major component as it is named on the drawings or referred to herein with engraved nameplates made from laminated plastic sheets.

C. Identify each valve, except obvious equipment isolation valves, with black filled coded numbers engraved on brass nametags attached with brass jack chains. Provide typewritten legend of numbered valves.

D. Identify each pipe or exposed duct in equipment rooms or above accessible ceilings with permanent markers as manufactured by Seton. Indicate fluid conveyed and direction of flow. Install on each pipe or duct where it enters or leaves a wall or floor and at other intervals not to exceed 20 feet.

E. Identify each major outdoor underground line with continuous strips of plastic utility marker tape as manufactured by Seton stating at regular intervals “CAUTION (identify utility) PIPE BELOW”. Install one foot directly above pipe before backfilling to grade.

2.3 AIR FILTRATION

A. Filter media shall be blend of polypropylene/polyethylene fibers, multi-layered incorporating mechanical efficiency and a post-manufacturer electric charge. The media shall be formed in a radial pleat design to ensure full utilization of the media area. When tested in accordance with ASHRAE standard 52.2-1999, the filter shall

have a minimum efficiency reporting value (MERV) of 8. When tested in accordance with ASHRAE Standard 52.1-1992, the filter shall have a dust spot efficiency of 25-30%, arrestance of 90-92%, and a minimum dust holding capacity of 170 grams.

2.4 VIBRATION ISOLATORS

A. Double deflection neoprene mounting shall have a minimum static deflection of 0.35 inches. All metal surfaces shall be neoprene covered to avoid corrosion and have friction pads both top and bottom so they need not be bolted to the floor. Bolt holes shall be provided for these areas where bolting is required. On equipment such as small vent sets and close coupled pumps, steel rails shall be used above the mountings to compensate for the overhang. Mountings shall be type ND or rails type DNR as manufactured by Mason Industries.

B. Spring type isolators shall be free standing and laterally stable without any housing and complete with ¼" neoprene acoustical friction pads between base plate and support. All mountings shall have leveling bolts that must be rigidly bolted to the equipment. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Submittals shall include spring diameters, deflections, compressed spring height and solid spring height. Mounting shall be type SLF as manufactured by Mason Industries.

C. Vibration Hangers shall contain a steel spring and 0.3" deflection neoprene element in series. The neoprene element shall be molded with a rod isolation bushing that passes through the hanger box. Spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30 degree arc before contacting the hole and short circuiting the spring. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Hangers shall be type 30N as manufactured by Mason Industries.

D. Install vibration isolators on all motor driven equipment.

2.5 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 15 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.6 JOINING MATERIALS

A. Refer to individual Division 15 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12.

G. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.

3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
4. PVC to ABS Piping Transition: ASTM D 3138.

2.7 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.8 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

B. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

C. Pressure Plates: Stainless steel. Include two for each sealing element.

D. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.9 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. PVC Pipe: ASTM D 1785, Schedule 40.

E. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.10 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

2.11 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 MANUFACTURER'S DIRECTIONS

A. Handle, install, connect, test, and operate all products, assemblies, and systems in accordance with manufacturer's recommendations.

B. In case of conflicting requirements between the manufacturer's directions and the Contract Documents, obtain specific instructions before proceeding with any work.

3.2 WORKMANSHIP

A. Keep the premises clean and free from debris, dirt, etc. Upon completion of work, clean and polish all fixtures, equipment, etc.

B. Seal all ductwork during construction to prevent construction dust from entering ductwork.

C. Perform all work in accordance with best practices of the trade and provide a "neat" installation by mechanics skilled in their respective trades and properly licensed.

D. Accurately install piping, ductwork and other equipment plumb, level and true to line with runs parallel or perpendicular to building lines. Make bends and offsets uniform.

E. Do not cut any structural members without specific approval. Do not cut mechanical or electrical lines that may be concealed.

F. Coordinate with other trade's work and install all work so that systems and components can be easily maintained and can be removed for replacement in the future.

3.3 FAN SHUTDOWN CONTROLS

A. Provide fan shutdown control smoke detector in the return duct of units greater than 2000 cfm. The detector shall be installed prior to mixing with outside air. The smoke detectors shall shut down the respective unit.

B. This building contains a fire alarm system, the smoke detectors shall be furnished by the fire alarm supplier. The smoke detectors shall also signal the fire alarm control panel.

C. The mechanical contractor shall install the smoke detector in the ductwork as appropriate. The controls contractor shall provide a dry contact on the outside of each unit to shut the unit down. The fire alarm contractor shall wire the detector to the dry contacts and to his own system. Mechanical contractor shall provide the smoke detectors if they are not provided by the fire alarm contractor.

3.4 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors.

M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.

Q. Verify final equipment locations for roughing-in.

R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.5 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 15 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
5. PVC Nonpressure Piping: Join according to ASTM D 2855.
6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End Pipe and Fittings: Use butt fusion.

2. Plain-End Pipe and Socket Fittings: Use socket fusion.

M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.6 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.7 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.8 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 3.

3.9 GROUTING

A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

3.10 POST CONSTRUCTION SUBMITTALS

A. Deliver special tools, lubricants, and other products necessary for proper operation and maintenance of the mechanical system.

B. Deliver spare parts called for under other mechanical sections contained herein or on drawings.

C. Submit project record documents indicating all changes made during construction.

D. Submit certificates of Final Inspection from the administrative authority.

E. Submit Operations and Maintenance manuals covering all phases of equipment and systems provided. Include complete spare parts data. With a source of supply. Include a copy of the shop drawings required in the “Pre-Construction Submittals”.

F. Submit extended warranties in excess of the standard one year construction warranty where required by other mechanical sections.

G. Submit Test, Adjust and Balance (TAB) report on approved record forms.

3.11 INSTRUCTIONS TO OWNER

A. Provide competent instruction to Owner’s personnel covering operation and maintenance of all mechanical systems. Provide specialized training by manufacturer’s technical representatives when required.

B. Make provisions to record all Owner instruction in video form, and provide three sets of the video training the Owner.

END OF SECTION 230100

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Testing, adjustment, and balancing of air systems.
2. Measurement of final operating condition of HVAC systems.
3. Sound measurement of equipment operating conditions.
4. Vibration measurement of equipment operating conditions.

B. Related Documents: The Contract Documents, as defined in Section 01110 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

A. Associated Air Balance Council (AABC):
1. AABC - National Standards for Total System Balance.

B. National Environmental Balancing Bureau (NEBB).

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Procedures for submittals.
1. Assurance/Control Submittals:
a. Test Reports:
1) Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
2) Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for inclusion in operating and maintenance manuals.
3) Provide reports in binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
4) Indicate data on AABC National Standards for Total System Balance forms.
b. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
c. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

B. Section 01780 - Closeout Submittals: Procedures for closeout submittals.
1. Project Record Documents: Accurately record the following:
a. Actual locations of balancing valves and rough setting.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Company specializing in testing, adjusting, and balancing. Company to be certified by one of the following.
a. AABC Certified Independent Testing and Balancing Agency.
b. National Environmental Balancing Bureau Certified Independent Agency. (NEBB).

B. Testing, Adjusting, and Balancing Reports: Use testing, adjusting, and balancing Agent's standard forms.

PART 2 - PRODUCTS

(Not Used.)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
1. Systems are started and operating in a safe and normal condition.
2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Air coil fins are cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage is minimized.

3.2 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Contracting Officer to facilitate spot checks during testing.

B. Provide additional balancing instruments as required.

3.3 INSTALLATION TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.4 ADJUSTING

A. Ensure recorded data represents actual measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by Contracting Officer.

F. Check and adjust systems approximately six months after final acceptance and submit report.

3.5 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities. Perform this work with cooling system energized where applicable to obtain the extra resistance of wet coils.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

END OF SECTION 230593

SECTION 230700 - HVAC INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Insulation Materials:

a. Cellular glass.
b. Flexible elastomeric.
c. Foam/vinyl.
d. Polystyrene.

B. Systems Included:
1. Exterior duct wrap insulation.
2. Refrigerant piping insulation.
3. Cooling condensate drain insulation.

1.2 SUBMITTALS

A. Product Data: Submit for each type of insulation to be used.

1.3 QUALITY ASSURANCE

A. Perform installation in accordance with MICA, Commercial and Industrial Insulation Standards.

B. Follow manufacturer’s directions on adhesive application, fastener spacing, etc.

C. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Flexible fiberglass exterior duct wrap equal to FRK-25.

1. K-Factor no greater than 0.3.
2. ¾ pound density.
3. Foil reinforced kraft (FRK) vapor barrier.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that applies to insulation.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.

C. Install insulation with longitudinal seams at top and bottom of horizontal runs.

D. Install multiple layers of insulation with longitudinal and end seams staggered.

E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

F. Keep insulation materials dry during application and finishing.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

L. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

M. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

N. For above ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

O. Provide aluminum sheet metal over insulation exposed outdoors above grade. Use rivets and seal joints watertight.

P. Ducts 18” upstream and 30” downstream of electric resistance and fuel-burning heaters located within duct system will be wrapped externally with fiberglass duct wrap.

Q. All supply and return air duct systems installed in any unconditioned space shall be insulated with a minimum of 2” thickness, ¾ lb. density wrap.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.4 INSULATION SCHEDULE

A. Refer to the drawings.

END OF SECTION 230700

SECTION 231123 - FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Manual gas shutoff valves.
5. Pressure regulators.
6. Dielectric unions.

1.2 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.3 QUALITY ASSURANCE

A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:

1. Piping and Valves: **100 psig** minimum unless otherwise indicated.
2. Service Regulators: **100 psig** minimum unless otherwise indicated.

B. Natural-Gas System Pressure within Buildings: **0.5 psig**.

2.2 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.

3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
4. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.

    a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

2.3 PIPING SPECIALTIES

A. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
3. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
4. Corrugated stainless-steel tubing with polymer coating.
5. Operating-Pressure Rating: 0.5 psig.
6. End Fittings: Zinc-coated steel.
7. Threaded Ends: Comply with ASME B1.20.1.

B. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller.
3. Strainer Screen: **40**-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.

2.4 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for natural gas.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.5 MANUAL GAS SHUTOFF VALVES

A. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.

1. CWP Rating: **125 psig**.
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
6. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.

2.6 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 and smaller.

2.7 DIELECTRIC UNIONS

A. Dielectric Unions:
1. Description:

a. Standard: ASSE 1079.
b. Pressure Rating: **125 psig**.
c. End Connections: Solder-joint copper alloy and threaded ferrous.

2.8 LABELING AND IDENTIFYING

A. Detectable Warning Tape: Acid- and alkali-resistant, PE 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 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 yellow.

PART 3 - EXECUTION

3.1 OUTDOOR PIPING INSTALLATION

A. Comply with **NFPA 54 and the International Fuel Gas Code** for installation and purging of natural-gas piping.

B. Install underground, natural-gas piping buried at least **36 inches** below finished grade.

C. Install underground, PE, natural-gas piping according to ASTM D 2774.

D. Steel Piping with Protective Coating:

1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
3. Replace pipe having damaged PE coating with new pipe.

E. Install fittings for changes in direction and branch connections.

3.2 INDOOR PIPING INSTALLATION

A. Comply with **NFPA 54** and **the International Fuel Gas Code** for installation and purging of natural-gas piping.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Locate valves for easy access.

H. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and branch connections.

K. Verify final equipment locations for roughing-in.

L. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

M. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches (75 mm) long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

N. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.

O. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.

P. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

Q. Connect branch piping from top or side of horizontal piping.

R. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment.

S. Do not use natural-gas piping as grounding electrode.

T. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

3.3 VALVE INSTALLATION

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing or copper connector.

B. Install underground valves with valve boxes.

C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

D. Install anode for metallic valves in underground PE piping.

3.4 CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.

C. Install piping adjacent to appliances to allow service and maintenance of appliances.

D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.5 FIELD QUALITY CONTROL

A. Test, inspect, and purge natural gas according to **NFPA 54** and authorities having jurisdiction.

B. Natural-gas piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 231123

SECTION 233113 – METAL DUCTWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes metal, rectangular ducts and fittings for supply, return, outside, and exhaust air-distribution systems in pressure classes from minus 2- to plus 10-inch wg.

1.2 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal ducts.

1. Penetrations through fire-rated and other partitions.
2. Duct accessories, including access doors and panels.

1.3 QUALITY ASSURANCE

A. NFPA Compliance:

1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 SEALANT MATERIALS

A. Joint and Seam Tape: 2 inches wide; glass-fiber-reinforced fabric.

B. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

2.3 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

B. Hanger Materials: Galvanized sheet steel or threaded steel rod.

1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Galvanized-steel shapes and plates complying with ASTM A 36/A 36M.

E. Gripple Cable Hanger System for Air Distribution.

2.4 RECTANGULAR DUCT FABRICATION

A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.

1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.

C. Formed-On Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.

D. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of nonbraced panel area unless ducts are lined.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.

B. Install ducts with fewest possible joints.

C. Install fabricated fittings for changes in directions, size, and shape and for connections.

D. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches, with a minimum of 3 screws in each coupling.

E. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.

F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

H. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.

I. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

J. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.

K. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.

L. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches.

M. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and firestopping sealant. Fire and smoke dampers are specified in Division 23 Section "Duct Accessories."

N. Protect duct interiors from the elements and foreign materials until building is enclosed.

3.2 SEAM AND JOINT SEALING

A. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated.

B. Seal ducts before external insulation is applied.

3.3 HANGING AND SUPPORTING

A. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.

B. Support vertical ducts at maximum intervals of 16 feet and at each floor.

C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

D. Install concrete inserts before placing concrete.

E. Install powder-actuated concrete fasteners after concrete is placed and completely cured.

1. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

3.4 CONNECTIONS

A. Make connections to equipment with flexible connectors.

B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

END OF SECTION 233113

SECTION 233300 - DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Backdraft and Volume dampers.
2. Fire dampers (including ceiling fire dampers).
3. Turning vanes.
4. Duct-mounting access doors.
5. Flexible connectors.
6. Flexible ducts.
7. Duct accessory hardware.

1.2 SUBMITTALS

A. Product Data: For the following:

1. Backdraft and Volume dampers.
2. Fire dampers.
3. Turning vanes.
4. Duct-mounting access doors.
5. Flexible connectors.
6. Flexible ducts.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, required clearances, method of assembly, components, and location and size of each field connection.

1. Special fittings.
2. Manual-volume damper installations.
3. Fire-damper installations, including sleeves and duct-mounting access doors.
4. Wiring Diagrams: Power, signal, and control wiring.

1.3 QUALITY ASSURANCE

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 BACKDRAFT DAMPERS

A. Description: Multiple-blade, parallel action gravity balanced, with center-pivoted blades of maximum 6-inch width, with sealed edges, assembled in rattle-free manner with 90-degree stop, steel ball bearings, and axles; adjustment device to permit setting for varying differential static pressure.

2.3 VOLUME DAMPERS

A. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

B. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream and suitable for horizontal or vertical applications.

1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
2. Roll-Formed Steel Blades: 0.064-inch- thick, galvanized sheet steel.
3. Blade Axles: Galvanized steel.
4. Bearings: Molded synthetic.
5. Tie Bars and Brackets: Galvanized steel.

C. Jackshaft: 1-inch-diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.

1. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.

D. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.4 FIRE DAMPERS

A. Manufacturers:
1. Ruskin Company.
2. Nailor Industries.
3. United Enertech.

B. Fire dampers shall be labeled according to UL 555.

C. Fire Rating: 1-1/2 hours.

D. Frame: Curtain type with blades inside airstream; fabricated with roll-formed, 0.034-inch-thick galvanized steel; with mitered and interlocking corners.

E. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.

1. Minimum Thickness: 0.052 or 0.138 inch thick as indicated and of length to suit application.
2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.

F. Mounting Orientation: Vertical or horizontal as indicated.

G. Blades: Roll-formed, interlocking, 0.034-inch-thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch-thick, galvanized-steel blade connectors.

H. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

I. Fusible Links: Replaceable, 165 deg F rated.

2.5 TURNING VANES

A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.

B. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

2.6 DUCT-MOUNTING ACCESS DOORS

A. General Description: Fabricate doors airtight and suitable for duct pressure class.

B. Door: Double wall, duct mounting, and rectangular; fabricated of galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.

1. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.

C. Door: Double wall, duct mounting, and round; fabricated of galvanized sheet metal with insulation fill and 1-inch thickness. Include cam latches.

1. Frame: Galvanized sheet steel, with spin-in notched frame.

D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.

E. Insulation: 1-inch- thick, fibrous-glass or polystyrene-foam board.

2.7 FLEXIBLE CONNECTORS

A. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

B. Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd.
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

2.8 FLEXIBLE DUCTS

A. Noninsulated-Duct Connectors: UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound, spring-steel wire.

1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 20 to plus 210 deg F.

B. Insulated-Duct Connectors: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor barrier film.

1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 10 to plus 160 deg F.

C. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 through 18 inches to suit duct size.

2.9 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts.

B. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install backdraft dampers on exhaust fans or nearest to outside and where indicated.

D. Install volume dampers in ducts with liner; avoid damage to and erosion of duct liner.

E. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts as required for air balancing. Install at a minimum of two duct widths from branch takeoff.

F. Install fire dampers, with fusible links, according to manufacturer's UL-approved written instructions.

G. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:

1. On both sides of duct coils.
2. Downstream from volume dampers and equipment.
3. Adjacent to fire or smoke dampers, providing access to reset or reinstall fusible links.
4. On sides of ducts where adequate clearance is available.

H. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.

I. For fans developing static pressures of 5-inch wg and higher, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

J. Connect terminal units to supply ducts with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.

K. Connect diffusers or light troffer boots to low pressure ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place.

L. Connect flexible ducts to metal ducts with adhesive.

3.2 ADJUSTING

A. Adjust duct accessories for proper settings.

B. Adjust fire and smoke dampers for proper action.

C. Final positioning of manual-volume dampers is specified in Division 23 Section "Testing, Adjusting, and Balancing."

END OF SECTION 233300

SECTION 233713 - AIR DIFFUSERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Round ceiling diffusers.
2. Rectangular and square ceiling diffusers.
3. Perforated diffusers.
4. Linear bar and linear slot diffusers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 REFER TO AIR DEVICE SCHEDULE ON DRAWINGS

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install diffusers level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.2 ADJUSTING

A. After installation, adjust diffusers to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713

SECTION 260500 – GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceways and cables.
2. Sleeve seals.
3. Grout.
4. General electrical installation requirements.

1.2 PRE-CONSTRUCTION SUBMITTALS

A. Submit for approval Manufacturer's technical data sheets including performance specifications for all equipment, major materials and other manufactured items. Obtain approval on product manufacturers not specifically names prior to making submittals.

B. Bind submittals in durable covers with contents conveniently organized and properly indexed.

C. Make submittals on all work in Division 26 at one time, except by special permission.

1.3 INTENT

A. It is intended that the contractor provide a complete and operating electrical system including all incidental items and conditions necessary for proper operation or customarily included even though each and every item may not be indicated.

B. The drawings indicate the general layout requirements for equipment, fixtures, conduit, devices, etc. Final layout will be governed by actual field conditions with all measurements verified at the site.

C. Conduit and wiring shown on the drawings is diagrammatic unless otherwise noted, and is intended to indicate switching and branch circuit arrangements, phase balance, and general wiring connection requirements.

D. It is intended that the electrical installation be safe, reliable, energy efficient and easily maintained with adequate provisions for access to equipment.

E. It is intended that the electrical system operate with noise levels below the criteria recommended by NEMA. Provide corrective action to reduce objectionable hum or vibration.

F. Isolated ground circuits as well as circuits serving non-linear loads and those serving ground fault circuit breakers must have their own neutral or isolated ground.

1.4 TEMPORARY LIGHTING AND POWER

A. Provide general and task lighting for construction activity as required for adequate illumination. Provide 5 foot candles minimum for general illumination. Protect lamps with wire guards or tempered glass enclosures. Provide exterior type fixtures where exposed to weather or moisture.

B. Provide general purpose outlets and special outlets for construction activities. Provide circuits of proper sizes and ratings for each use required. Install wiring where least exposed to damage. Provide rigid steel conduit to protect wiring on grade, floors or decks.

C. Provide 20 amp, 4-gang receptacle outlets, equipped with ground fault circuit interrupters, reset button and pilot light, spaced so that a 100 foot extension cord can reach each area of work.

D. Provide warning signs at outlets that are other than 20 amp, 120 volt.

1.5 COORDINATION

A. The contractor is cautioned to examine all drawings and specifications relating to other trades of work, and he shall make proper provisions to review all other work.

B. The architectural, structural and civil plans and specifications, including the General Conditions and all supplements issued thereto, information to bidders, and other pertinent documents issued by the Engineer, are a part of these specifications and the accompanying electrical plans, and shall be complied with in every respect. All of the above is included herewith, and shall be examined by all bidders. Failure to comply shall not relieve the contractor of responsibility or be used as a basis for additional compensation due to omission of architectural, structural or civil details from the electrical drawings.

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS

A. All materials and equipment used in carrying out these specifications to be American made unless approved otherwise by the Engineer and to be new and have UL listing, or listing by other recognized testing laboratory when such listings are available. Specifications and drawings indicate name, type, or catalog numbers of materials and equipment to be used as standards. Proposals shall be based on these standards. Contractor may use materials and equipment equivalent to those specified, subject to Engineer approval.

B. Furnish only new standard products of a manufacturer regularly engaged in the production of said products.

C. Support all products by service organizations with spare parts inventory and personnel located reasonably close to the site.

D. Where multiple units of the same type or class are required, provide all units of the same manufacturer.

2.2 PRODUCT HANDLING

A. Store products in their original containers and shelter in a suitable environment.

B. Make products readily available for inspections and inventory.

2.3 SUBSTITUTIONS

A. For products specified by generic reference, select any product meeting such standard.

B. For products specified by naming one or more products or manufacturers, select any named. Submit request in writing for substitution of any manufacturer not specifically named and obtain approval at least 5 days prior to bidding.

C. Provide all information required to support claim of equality of product proposed for substitution. Substitutions will be considered only if equivalent in quality, efficiency, performance, size, weight, reliability, appearance and ease of maintenance to specified product.

D. Where approved substitutions alter the design, space requirements, electrical requirements, connections, cooling loads, etc. include all work necessary to provide a complete installation of quality equal to or better than that obtained with product or manufacturer specified.

2.4 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.5 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
2. Pressure Plates: Plastic. Include two for each sealing element.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.6 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors 2 inches above finished floor level.

G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry

1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.

J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials.

K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly.

3.5 MANUFACTURER'S DIRECTIONS

A. Handle, install, connect, test and operate all products and systems in accordance with manufacturer's recommendations. In case of conflicting requirements between manufacturer's directions and contract documents, obtain instructions before proceeding with work.

3.6 INSPECTIONS

A. Arrange with administrative authority for inspections of all work and obtain approval prior to concealing or proceeding. Give adequate notice before concealing any work for inspections by Owner's representatives.

3.7 CLEANING

A. Keep premises free and clean of dirt, debris, etc. Upon completion of work clean and polish all fixtures, equipment, etc.

3.8 WORKMANSHIP

A. No person shall perform electrical work without possessing a Master or Journeyman License from the state electrical examiner's board. All electrical work and apprentices shall be supervised by a Master or Journeyman electrician.

B. Carefully perform all cutting, drilling, digging, etc. and patch or refinish disturbed area to the condition of adjoining or similar surfaces. Do not cut any structural members.

C. Conceal conduit in chases, furrings, or above ceilings unless otherwise noted. Flush mount equipment in finished walls wherever possible.

3.9 FLAME AND SMOKE CONSIDERATIONS

A. In enclosures or plenums used for transporting environmental air, use only products conforming to NFPA and UL classifications not exceeding 25 for flame spread and 50 for smoke developed ratings, or install in conduit. This requirement applies to all materials.

B. Completely seal all penetrations through fire and/or smoke rated walls, ceilings, floors or other barriers with UL listed material to preserve the rating of the barrier.

3.10 COORDINATION

A. Coordinate the electrical work with the work of all other trades. Piping or equipment requiring slope or specific mounting height will have right of way over conduit and other products whose elevation can be changed.

3.11 EQUIPMENT CONNECTIONS

A. Make all required electrical connections to each item of equipment shown or specified including equipment furnished by Owner, and make operational.

3.12 PROTECTION REQUIREMENTS

A. Locate existing utility lines and identify and protect during excavation and installation.

B. Protect all work including building finishes against damage due to dirt, water, chemicals, handling, theft, etc. Close all openings in conduit and equipment during installation.

C. Provide warning devices around all exposed “live” parts or high temperature surfaces.

3.13 PAINTING

A. Paint conduit, equipment, etc. exposed in finished areas to match adjacent surfaces. Touch up scratches in factory finished surfaces with a paint to match.

B. All exposed exterior conduit and equipment shall be painted for a uniform appearance. If exposed through grilles or other openings, paint conduit flat black.

C. Paint plywood backboards used for mounting equipment.

3.14 TESTING AND ADJUSTING

A. Test the completed electrical system and prove free of short circuits, poor connections, and improper grounding. Test all systems to assure safe operation.

B. Verify proper taps on motors and transformers for rated performance.

3.15 POST CONSTRUCTION SUBMITTALS

A. Submit project record documents indicating all changes to contract documents made during construction.

B. Submit certificates of final inspection from administrative authority or manufacturer.

C. Deliver all special tools and spare parts necessary for proper operation and maintenance and as called for in other electrical sections.

D. Submit operations and maintenance (O&M) manuals covering all phases of equipment and systems provided. Include complete spare parts data and copy of manufacturing data sheets and shop drawings required in pre-construction submittals.

E. Submit extended warranties required in excess of one year.

F. Assemble all closeout documents for electrical system in 3-ring binders with divider tabs labeled and properly indexed. Submit the number of sets as required by the Architect.

3.16 INSTRUCTIONS TO OWNER

A. Provide competent instruction to the Owner's personnel covering operation and maintenance of all electrical systems. Provide specialized instruction by manufacturer's technical representative when required.

3.17 USE OF EQUIPMENT

A. The contractor shall not use the permanent electrical system for construction activity except by special permission. If permitted, the contractor's use of any equipment shall not reduce the warranty time specified for any equipment.

3.18 GENERAL WARRANTY

A. Warrant the electrical installation against defects for a period of one year from the date of substantial completion in accordance with Architect's specifications. Provide all labor, replacement parts, services, transportation and incidental costs necessary for proper operation of electrical systems during the warranty period. Make good any damage to the building or grounds or other equipment resulting from defects in products and/or workmanship during the warranty period.

END OF SECTION 260500

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Metal-clad cable, Type MC, rated 600 V or less is not allowed except for 6-foot whips to light fixtures.
3. Connectors, splices, and terminations rated 600 V and less.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with **ASTM B 8** for stranded conductors.

D. Conductor Insulation:

1. Type NM: Comply with UL 83 and UL 719.
2. **Type THHN and Type THWN-2**: Comply with UL 83.
3. **Type THW and Type THW-2**: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
4. Type XHHW-2: Comply with UL 44.

2.2 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Limited to 6-foot lengths at final connection to light fixtures.

2.3 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Feeders: Copper for feeders No. 4 AWG and larger. Retain one of two "Branch Circuits" paragraphs below.

C. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

3.3 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Wiring at Outlets: Install conductor at each outlet, with at least **6 inches** of slack.

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.5 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes grounding and bonding systems and equipment.

1.2 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.3 QUALITY ASSURANCE

A. Testing Agency Qualifications: Certified by NETA.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 CONDUCTORS

A. Insulated Conductors: **Copper** wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.

2.3 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless **compression**-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

D. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.

E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

F. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.

G. Conduit Hubs: Mechanical type, terminal with threaded hub.

H. Ground Rod Clamps: Mechanical type, copper or copper alloy.

I. Water Pipe Clamps:

1. Mechanical type, two pieces with **zinc-plated or stainless-steel** bolts.
   a. Listed for direct burial.

2. U-bolt type with malleable-iron clamp and **copper ground connector rated for direct burial**.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; **3/4 inch by 10 feet**.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for **No. 8** AWG and smaller, and stranded conductors for **No. 6** AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare copper conductor, **No. 2/0** AWG minimum.

1. Bury at least 24 inches below grade.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING SEPARATELY DERIVED SYSTEMS

A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.4 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches from the foundation.

3.5 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.

C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

D. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

E. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.6 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

E. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

3.7 FIELD QUALITY CONTROL

A. Tests and Inspections:
1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

END OF SECTION 260526

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Surface raceways.
6. Boxes and enclosures.

B. Related Requirements:

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Metal Conduit:
1. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. GRC: Comply with ANSI C80.1 and UL 6.
3. IMC: Comply with ANSI C80.6 and UL 1242.
4. PVC-Coated Steel Conduit.
    a. Comply with NEMA RN 1.
    b. Coating Thickness: 0.040 inch, minimum.
5. EMT: Comply with ANSI C80.3 and UL 797.
6. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings: Comply with NEMA FB 1 and UL 514B.
1. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Fittings, General: Listed and labeled for type of conduit, location, and use.
3. Fittings for EMT:
    a. Material: **Steel**.
    b. Type: **Setscrew or compression**.
4. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
5. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

2.2 NONMETALLIC CONDUITS AND FITTINGS

A. Nonmetallic Conduit:

B. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1. ENT: Comply with NEMA TC 13 and UL 1653.
2. LFNC: Comply with UL 1660.

C. Nonmetallic Fittings:
1. Fittings, General: Listed and labeled for type of conduit, location, and use.
2. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
3. Fittings for LFNC: Comply with UL 514B.
4. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Description: Sheet metal, complying with UL 870 and NEMA 250, **Type 1** unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.4 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

A. Listing and Labeling: Nonmetallic wireways and auxiliary gutters shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Description: PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.

C. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.

D. Solvents and Adhesives: As recommended by conduit manufacturer.

2.5 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

D. Metal Floor Boxes:

1. Material: **Cast metal**.

2. Type: **Fully adjustable**.
3. Shape: Rectangular.
4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. Nonmetallic Floor Boxes: Nonadjustable, **round or rectangular**.

1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

G. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb.

1. Listing and labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

H. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: **GRC** or **RNC, Type EPC-40-PVC**.
2. Concealed Conduit, Aboveground: **GRC, IMC**, or **RNC, Type EPC-40-PVC**.
3. Underground Conduit: RNC, **Type EPC-40-PVC**.
4. Boxes and Enclosures, Aboveground: NEMA 250, **Type 3R**.

B. Indoors: Apply raceway products as specified below unless otherwise indicated.

1. Exposed, Not Subject to Physical Damage: **EMT**.
2. Exposed, Not Subject to Severe Physical Damage: **EMT**.
3. Exposed and Subject to Severe Physical Damage: **GRC**. Raceway locations include the following:

    a. Loading dock.
    b. Mechanical rooms.
    c. Gymnasiums.

4. Concealed in Ceilings and Interior Walls and Partitions: **EMT**.
5. Damp or Wet Locations: **GRC**.

C. Minimum Raceway Size: **3/4-inch** trade size.

D. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

E. Install surface raceways only where indicated on Drawings.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Do not fasten conduits onto the bottom side of a metal deck roof.

C. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

D. Arrange stub-ups so curved portions of bends are not visible above finished slab.

E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

F. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inches of enclosures to which attached.

I. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of **2 inches** of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.

J. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

L. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

M. Locate boxes so that cover or plate will not span different building finishes.

N. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

O. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

P. Set metal floor boxes level and flush with finished floor surface.

Q. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit.
2. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction.

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.5 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

3.6 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.

1.2 DEFINITIONS

A. MCCB: Molded-case circuit breaker.

B. SPD: Surge protective device.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.

1.4 INFORMATIONAL SUBMITTALS

A. Panelboard schedules for installation in panelboards.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 FIELD CONDITIONS

A. Service Conditions: NEMA PB 1, usual service conditions.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

1. Panelboard Warranty Period: **18** months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS COMMON REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA PB 1.

C. Comply with NFPA 70.

D. Enclosures: **Flush and Surface**-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, **Type 1**.
b. Outdoor Locations: NEMA 250, **Type 3R**.
c. Other Wet or Damp Indoor Locations: NEMA 250, **Type 4**.

2. Height: 84 inches maximum.
3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.

E. NRTL Label: Panelboards shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.

F. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

2.2 POWER PANELBOARDS

A. Panelboards: NEMA PB 1, distribution type.

B. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than **36 inches** high, provide two latches, keyed alike.

C. Mains: **Circuit breaker or Lugs only, see drawings**.

D. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

B. Mains: **Circuit breaker or lugs only**.

C. Branch Overcurrent Protective Devices: **Bolt-on** circuit breakers, replaceable without disturbing adjacent units.

D. Contactors in Main Bus: NEMA ICS 2, Class A, **mechanically** held, general-purpose controller, with same short-circuit interrupting rating as panelboard.

1. External Control-Power Source: **120-V branch circuit**.

E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

F. Column-Type Panelboards: Single row of overcurrent devices with narrow gutter extension and overhead junction box equipped with ground and neutral terminal buses.

2.4 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Directory card inside panelboard door, mounted in **transparent card holder**.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install panelboards and accessories according to **NECA 407**.

C. Mount top of trim **90 inches** above finished floor unless otherwise indicated.

D. Mount panelboard cabinet plumb and rigid without distortion of box.

E. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

F. Install overcurrent protective devices and controllers not already factory installed.

G. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

H. Install filler plates in unused spaces.

I. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.

J. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.2 IDENTIFICATION

A. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

B. Panelboard Nameplates: Label each panelboard with a nameplate.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standard-grade receptacles, 125 V, **20** A.
2. GFCI receptacles, 125 V, 20 A.
3. Toggle switches, 120/277 V, **20** A.
4. Decorator-style devices, **20** A.
5. Occupancy sensors.
6. Wall-box dimmers.
7. Wall plates.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Comply with NFPA 70.

C. RoHS compliant.

D. Comply with NEMA WD 1.

E. Device Color:

1. Wiring Devices Connected to Normal Power System: **White** unless otherwise indicated or required by NFPA 70 or device listing.

F. Wall Plate Color: For plastic covers, match device color.

G. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STANDARD-GRADE RECEPTACLES, 125 V, 20 A

A. Duplex Receptacles, 125 V, 20 A:

1. Description: Two pole, three wire, and self-grounding.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498 and FS W-C-596.

B. Tamper-Resistant Duplex Receptacles, 125 V, 20 A:
1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498 and FS W-C-596.

C. Weather-Resistant Duplex Receptacle, 125 V, 20 A:
1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498.

2.3 GFCI RECEPTACLES, 125 V, 20 A

A. Duplex GFCI Receptacles, 125 V, 20 A:
1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Type: **Feed** through.
4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

2.4 TOGGLE SWITCHES, 120/277 V, 20 A

A. Single-Pole Switches, 120/277 V, 20 A:
1. Standards: Comply with UL 20 and FS W-S-896.

B. Two-Pole Switches, 120/277 V, 20 A:
1. Comply with UL 20 and FS W-S-896.

C. Three-Way Switches, 120/277 V, 20 A:
1. Comply with UL 20 and FS W-S-896.

D. Four-Way Switches, 120/277 V, 20 A:
1. Standards: Comply with UL 20 and FS W-S-896.

E. Lighted Single-Pole Switches, 120/277 V, 20 A:
1. Description: Handle illuminated when switch is **off**.
2. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.

2.5 DECORATOR-STYLE DEVICES, 20 A

A. Decorator Duplex Receptacles, 125 V, 20 A:
1. Description: Two pole, three wire, and self-grounding. Square face.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498.

B. Decorator Single-Pole Switches, 120/277 V, 20 A:
1. Comply with UL 20.

2.6 OCCUPANCY SENSORS

A. Wall Switch Sensor Light Switch, Dual Technology:
1. Description: Switchbox-mounted, combination lighting-control sensor and conventional switch lighting-control unit using dual (ultrasonic and passive infrared) technology.
2. Standards: Comply with UL 20.
3. Adjustable time delay of **20** minutes.
4. Able to be locked to **Manual**-On mode.
5. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc.

2.7 DIMMERS

A. Wall-Box Dimmers:
1. Description: Modular, full-wave, solid-state dimmer switch with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
2. LED Lamp Dimmer Switches: Modular; compatible with LED lamps; trim potentiometer to adjust low-end dimming; capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.8 WALL PLATES

A. Single Source: Obtain wall plates from same manufacturer of wiring devices.

B. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
2. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
3. Install wiring devices after all wall preparation, including painting, is complete.

C. Device Installation:

1. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
2. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

D. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles **up**.

E. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan-speed control are listed for that application.

F. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

END OF SECTION 262726

SECTION 265119 - LED INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Refer to drawings for exact fixture types.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Provide luminaires from a single manufacturer for each luminaire type.

B. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

1.5 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: **Five** year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Ambient Temperature: **41 to 104 deg F**.

B. Altitude: Sea level to **1000 feet**.

2.2 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:

a. "USE ONLY" and include specific lamp type.
b. Lamp diameter, shape, size, wattage, and coating.
c. CCT and CRI.

C. Recessed luminaires shall comply with NEMA LE 4.

2.3 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Steel:

1. ASTM A 36/A 36M for carbon structural steel.
2. ASTM A 568/A 568M for sheet steel.

C. Stainless Steel:

1. 1. Manufacturer's standard grade.
2. 2. Manufacturer's standard type, ASTM A 240/240 M.

D. Galvanized Steel: ASTM A 653/A 653M.

E. Aluminum: ASTM B 209.

2.4 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

END OF SECTION 265119

SECTION 284621 - ADDRESSABLE FIRE-ALARM SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-alarm control unit.
2. Manual fire-alarm boxes.
3. System smoke detectors.
4. Heat detectors.
5. Notification appliances.
6. Magnetic door holders.
7. Remote annunciator.
8. Addressable interface device.
9. Digital alarm communicator transmitter.

1.2 ACTION SUBMITTALS

A. General Submittal Requirements:

1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
2. Shop Drawings shall be prepared by persons with the following qualifications:

a. Trained and certified by manufacturer in fire-alarm system design.
b. NICET-certified, fire-alarm technician; **Level III** minimum.
c. Licensed or certified by authorities having jurisdiction.

B. Product Data: For each type of product, including furnished options and accessories.

C. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, details, and attachments to other work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Detail assembly and support requirements.
5. Include voltage drop calculations for notification-appliance circuits.
6. Include battery-size calculations.
7. Include input/output matrix.
8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
9. Include performance parameters and installation details for each detector.
10. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
11. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.

a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
b. Show field wiring required for HVAC unit shutdown on alarm.
c. Locate detectors according to manufacturer's written recommendations.

12. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. Include the following:

a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
c. Complete wiring diagrams showing connections between all devices and equipment.
d. Riser diagram.
e. Record copy of site-specific software.
f. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:

1) Equipment tested.
2) Frequency of testing of installed components.
3) Frequency of inspection of installed components.
4) Requirements and recommendations related to results of maintenance.
5) Manufacturer's user training manuals.

g. Manufacturer's required maintenance related to system warranty requirements.
h. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On magnetic media or compact disk, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.

1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
2. Warranty Period: **Five** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. This fire alarm system shall be an extension of an existing fire alarm system in the high school (Honeywell Model 6808). Noncoded, **UL-certified, FM Global-placarded** addressable system, with multiplexed signal transmission and horn/strobe evacuation.

B. Automatic sensitivity control of certain smoke detectors.

C. All components provided shall be listed for use with the selected system.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire-alarm signal initiation shall be by one or more of the following devices:

1. Manual stations.
2. Heat detectors.
3. Smoke detectors.
4. Duct smoke detectors.
5. Automatic sprinkler system water flow.

B. Fire-alarm signal shall initiate the following actions:

1. Continuously operate alarm notification appliances.
2. Identify alarm and specific initiating device at fire-alarm control unit **and remote annunciators**.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Unlock electric door locks in designated egress paths.
5. Release fire and smoke doors held open by magnetic door holders.
6. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
7. Record events in the system memory.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch.
2. Loss of communication with any panel on the network.

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of communication with any addressable sensor, input module, relay, control module, or remote annunciator.
4. Loss of primary power at fire-alarm control unit.
5. Ground or a single break in internal circuits of fire-alarm control unit.
6. Abnormal ac voltage at fire-alarm control unit.
7. Break in standby battery circuitry.

8. Failure of battery charging.
9. Abnormal position of any switch at fire-alarm control unit or annunciator.

E. System Supervisory Signal Actions:

1. Initiate notification appliances.
2. Identify specific device initiating the event at fire-alarm control unit **and remote annunciators**.
3. After a time delay of **200 seconds**, transmit a trouble or supervisory signal to the remote alarm receiving station.

2.3 FIRE-ALARM CONTROL UNIT (IF REQUIRED)

A. General Requirements for Fire-Alarm Control Unit:

1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.
2. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
3. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.

B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: Liquid-crystal type, **80** characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

C. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:

1. Pathway Class Designations: NFPA 72, **Class B**.
2. Pathway Survivability: **Level 0**.

D. Notification-Appliance Circuit:

1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
2. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.
3. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.

E. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.

F. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, **supervisory signals and digital alarm communicator transmitters** shall be powered by 24-V dc source.

1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

G. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.

2.4 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38.

1. Single-action mechanism, **breaking-glass or plastic-rod or pull-lever** type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
2. Station Reset: Key- or wrench-operated switch.

2.5 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24-V dc, nominal.
2. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
4. Integral Visual-Indicating Light: LED type, indicating detector has operated[**and power-on status**].

B. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts.
4. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.6 HEAT DETECTORS

A. General Requirements for Heat Detectors: Comply with UL 521.

1. Temperature sensors shall test for and communicate the sensitivity range of the device.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature or a rate of rise.

1. Mounting: **Adapter plate for outlet box mounting**.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature.

1. Mounting: **Adapter plate for outlet box mounting**.

2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.7 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

B. Chimes: Vibrating type.

C. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464.

D. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch-high letters on the lens.

1. Mounting: Wall mounted unless otherwise indicated.
2. Flashing shall be in a temporal pattern, synchronized with other units.
3. Strobe Leads: Factory connected to screw terminals.
4. Mounting Faceplate: Factory finished, [**red**] [**white**].

2.8 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.

1. Electromagnets: Require no more than 3 W to develop 25-lbf holding force.
2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
3. Rating: 24-V ac or dc.

B. Material and Finish: Match door hardware.

2.9 REMOTE ANNUNCIATOR

A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.

1. Mounting: **Flush** cabinet, NEMA 250, Type 1.

B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.10 ADDRESSABLE INTERFACE DEVICE

A. General:

1. Include address-setting means on the module.
2. Store an internal identifying code for control panel use to identify the module type.
3. Listed for controlling HVAC fan motor controllers.

B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.

C. Control Module:

1. Operate notification devices.
2. Operate solenoids for use in sprinkler service.

2.11 DIGITAL ALARM COMMUNICATOR TRANSMITTER (IF REQUIRED)

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632.

B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture **one** telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

C. Local functions and display at the digital alarm communicator transmitter shall include the following:

1. Verification that both telephone lines are available.
2. Programming device.
3. LED display.
4. Manual test report function and manual transmission clear indication.
5. Communications failure with the central station or fire-alarm control unit.

D. Digital data transmission shall include the following:

1. Address of the alarm-initiating device.
2. Address of the supervisory signal.
3. Address of the trouble-initiating device.
4. Loss of ac supply.
5. Loss of power.
6. Low battery.
7. Abnormal test signal.
8. Communication bus failure.

E. Secondary Power: Integral rechargeable battery and automatic charger.

F. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

B. Install wall-mounted equipment, with tops of cabinets not more than 78 inches above the finished floor.

C. Manual Fire-Alarm Boxes:

1. Install manual fire-alarm box in the normal path of egress within 60 inches of the exit doorway.
2. Mount manual fire-alarm box on a background of a contrasting color.
3. The operable part of manual fire-alarm box shall be between 42 inches and 48 inches above floor level. All devices shall be mounted at the same height unless otherwise indicated.

D. Smoke- or Heat-Detector Spacing: Comply with NFPA 72.

E. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches long shall be supported at both ends.

F. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.

G. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.

H. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.

I. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling. Install all devices at the same height unless otherwise indicated.

J. Device Location-Indicating Lights: Locate in public space near the device they monitor.

3.2 PATHWAYS

A. Pathways above recessed ceilings and in nonaccessible locations may be routed exposed.

1. Exposed pathways located less than 96 inches above the floor shall be installed in EMT.

B. Pathways shall be installed in EMT.

C. Exposed EMT shall be painted red enamel.

3.3 CONNECTIONS

A. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Smoke dampers in air ducts of designated HVAC duct systems.
2. Magnetically held-open doors.
3. Electronically locked doors and access gates.

3.4 IDENTIFICATION

A. Install framed instructions in a location visible from fire-alarm control unit.

3.5 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.6 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.

    a. Inspection shall be based on completed record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter.
    b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

B. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

C. Fire-alarm system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

F. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.7 SOFTWARE SERVICE AGREEMENT

A. Comply with UL 864.

B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for **two** years.

C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within **two** years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.

1. Upgrade Notice: At least **30** days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

3.8 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION 284621

SECTION 31 05 13 - EARTHWORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Excavate, backfill, compact, and grade the site to the elevations shown on the Drawings, as specified herein, and as needed to meet the requirements of the construction shown in the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Use equipment adequate in size, capacity, and numbers to accomplish the work of this Section in a timely manner.

C. In addition to complying with the requirements of the Geotechnical Investigation Report, comply with the directions of the soil engineer.

D. Employ at Contractor's expense, a testing laboratory and geotechnical engineer to perform soil testing and inspection service for quality control testing during earthwork operations as described in these Specifications and the Geotechnical Investigation Reports which follow this Section of these Specifications.

1.3. SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner’s Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer’s specifications and other data needed to prove compliance with the specified requirements;
3. Manufacturer’s recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 64 00.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory soil materials: SC, GC

B. Plasticity Index of 8 min. and 15 max. and liquid limit of 40.

2.2 BACKFILL AND FILL MATERIALS

A. Fill and backfill materials:
1. Provide soil materials free from organic matter and deleterious substances, containing no rocks or lumps over 3" in greatest dimension, and with no more than 15% of the rocks or lumps larger than 2-3/8" in their greatest dimension.
2. Fill material is subject to the approval of the soil engineer, and is that material removed from excavations or imported from off-site borrow areas, predominantly granular, non-expansive soils free from roots and other deleterious matter.
3. Do not permit rocks having a dimension greater than 1" in the upper 12" of fill or embankment.
4. Cohesionless material used for structural backfill: Provide sand free from organic material and other foreign matter, and as approved by the soil engineer.
5. Where drainage fill is called for under building slabs, provide aggregate complying with requirements of this Section of these Specifications.

2.3 TOPSOIL

A. Where noted "Lawn" on the Drawings or otherwise required, provide 6" of compacted topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life, and reasonably free from subsoils, roots, heavy or stiff clay, stones larger than 2" in greatest dimension, noxious weeds, sticks, brush, liter, and other deleterious matter.
All “Lawn” areas shall slope away from the building, 2% minimum.

B. Obtain topsoil from sources within the project limits, or provide imported topsoil obtained from sources outside the project limits, or from both sources.

2.4 BASE COURSE

A. AHTD Aggregate Base Course, Class 7

2.5 DRAINAGE FILL

A. ASTM C33, No. 67 gradation.

2.6 FERTILIZER:

A. 12% Nitrogen, 28% Phosphorous, 12% Potash.

2.7 SOD & SEED

A. Refer to Specification Section 32 91 20 - Landscape Work (Topsoil and Sod)

2.8 OTHER MATERIALS

A. Provide materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

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.

3.3 PROCEDURES

A. Utilities:
1. Unless shown to be removed, protect active utility lines shown on the Drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.
2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utilities at no additional cost to the Owner.
4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Architect and secure his instructions.
5. Do not proceed with permanent relocation of utilities until written instructions are received from the Architect.

B. Protection of persons and property:
1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.

C. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

D. Maintain access to adjacent areas at all times.

3.4 EXCAVATING

A. Perform excavating of every type of material encountered within the limits of the Work to the lines, grades, and elevations indicated and specified herein.

B. Removal of topsoil and asphalt paving:
1. After the areas have been cleared of vegetation, strip the existing topsoil (all organic material) to a minimum of 6".
2. Remove all asphalt paving and base (class 7 material), 6" minimum, from existing parking lot areas as shown on the Drawings.

C. Undercutting: The following additional undercutting shall be performed after top soil and/or existing paving is removed: The recommendations of the Geotechnical Investigation Reports shall be strictly followed.
1. At all Areas of School: Undercut the existing soils to an elevation as described in the Geotechnical Investigation.
2. At new Parking Lot and Drives: Undercut the existing soils to an elevation as described in the Geotechnical Investigation.
3. Undercut includes the building and parking lot areas and five feet (5') beyond all exterior walls and curb lines, but do not cross property lines or **existing building footings/foundations.**
4. After stripping and completing any cuts, and before undercutting and placing any fills, the exposed subgrade

at all locations shall be proofrolled to evaluate its performance. Proofrolling shall consist of overlapping passes with a rubber-tired construction vehicle weighing at least 25 tons, such as a loaded scraper or tandem-axle dump truck. The geotechnical engineer or representative thereof, shall observe subgrade performance during the proofrolling procedure, and instruct undercutting to proceed as stated above, or be modified accordingly.

5. Fill shall be select fill per Geotechnical Report Requirements and placed in loose lifts not exceeding 8 inches in thickness. The fill shall be compacted with a moisture content equal to or slightly above the material's optimum moisture content determined in accordance with the standard Proctor procedure (ASTM D-698). Each lift shall be compacted to at least 95 percent of the material's maximum laboratory dry density (ASTM D-698). The top two feet shall be compacted to 100 percent of standard laboratory density, ASTM D-698.
6. The recommended moisture content shall be maintained in the subgrade and fills, until fills are completed and floor slabs are constructed.
7. All fill shall consist of approved low volume change material having a plasticity index of 18 or less and containing at least 15 percent fines (material passing the No. 200 sieve, based on dry weight).

D. Surplus materials:
   1. Dispose of unsatisfactory excavated material, and surplus satisfactory excavated material, away from the site at disposal areas arranged and paid for by the Contractor.

E. Testing and Geotechnical Engineer observation shall occur as a minimum:
   1. Inspection of existing subgrade prior to placement of any fill.
      a. Compaction Testing Quantity - Building Area Subgrade:
         1. Cut Areas: 1 Test / 2,500 square footage
         2. Fill Areas: 1 Test / 2,500 square footage
      b. Compaction Testing Quantity - Parking and Drives Subgrade:
         1. Cut Areas: 1 Test / 10,000 square footage
         2. Fill Areas: 1 Test / 10,00 square footage for each 8" lift.
   2. Testing of engineered fills during each lift of soil.
   3. Foundation excavations.
   4. Undercutting operations.

F. Testing and Geotechnical Engineer observation shall occur as described in the Geotechnical Investigation Report, but as a minimum:
   1. Inspection of existing subgrade prior to placement of any fill.
   2. Testing of engineered fills during each lift of soil.
   3. Foundation excavations.
   4. Undercutting and fill operations.

G. Excavation of rock:
   1. Where rocks, boulders, granite, or similar material is encountered, and where such material cannot be removed or excavated by conventional earth moving or ripping equipment, take required steps to proceed with the general grading operations of the Work, and remove or excavate such material by means which will neither cause additional cost to the Owner nor endanger buildings or structures whether on or off the site.
   2. Do not use explosives without written permission from the Architect.

H. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.

I. Borrow:
   1. Obtain material required for fill or embankment in excess of that produced within the grading limits of the Work from borrow areas selected and paid for by the Contractor.

J. Ditches and gutter:
   1. Cut accurately to the cross sections, grades, and elevations shown.
   2. Maintain excavations free from detrimental quantities of leaves, sticks, trash, and other debris until completion of the Work.

K. Unauthorized excavation:

1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific instruction from the Architect or the soil engineer.
2. Under footings, foundations, or retaining walls:
   a. Fill unauthorized excavations by extending the indicated bottom, elevation of the footing or base to the excavation bottom, without altering the required top elevation.
   b. When acceptable to the Architect, lean concrete fill may be used to bring the bottom elevation to proper position.
3. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations, unless otherwise directed by the soil engineer.

L. Stability of excavations:
1. Slope sides of excavations to 1:1 or flatter, unless otherwise directed by the soil engineer.
2. Shore and brace where sloping is not possible because of space restrictions or stability of the materials being excavated.
3. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

M. Shoring and bracing:
1. Provide materials for shoring and bracing as may be necessary for safety of personnel, protection of work, and compliance with requirements of governmental agencies having jurisdiction.
2. Maintain shoring and bracing in excavations regardless of the time period excavations will be open.
3. Carry shoring and bracing down as excavation progresses.

N. Excavating for structures:
1. Conform to elevations and dimensions shown within a tolerance of 0.10 ft, and extending a sufficient distance from footings and foundations to permit placing and removing concrete formwork, installation of services, other construction required, and for inspection.
2. In excavating for footings and foundations, take care not to disturb bottom of excavation:
   a. Excavate by hand tools to final grade just before concrete is placed.
   b. Trim bottoms to required lines and grades to leave solid base to receive concrete.
3. Excavate for footings and foundations only after general site excavating, filling, and grading are complete.

O. Excavating for pavements:
1. Cut surface under pavements to comply with cross sections, elevations, and grades.

P. Cold weather protection:
1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.5 FILLING AND BACKFILLING

A. General: Follow all recommendations of the Geotechnical Investigation (Appendix “B”), summarized as follows:
1. For each classification listed below, place acceptable soil material in layers to required subgrade elevations.
2. In excavations:
   a. Use satisfactory borrow material.

3. Under concrete, asphalt and aggregate pavements:
   a. Use select fill materials from lowest elevation (excavation/undercut) up to base course materials as shown on the Drawings.
   b. Use base course materials as described in the Drawings.
4. Under building slabs:
   a. Use select fill materials from lowest elevation (excavation/undercut) up to drainage fill.
   b. Use drainage fill, 4" minimum, directly under building concrete slabs.

B. Backfill excavations as promptly as progress of the Work permits, but not until completion of the following.
1. Acceptance of construction below finish grade including, where applicable, dampproofing and waterproofing.
2. Inspecting, testing, approving, and recording locations of underground utilities.
3. Removing concrete formwork.

4. Removing shoring and bracing, and backfilling of voids with satisfactory materials.
5. Removing trash and debris.
6. Placement of horizontal bracing on horizontally supported walls.

C. Ground surface preparation:
1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious matter from ground surface prior to placement of fills.
2. Plow, strip, or break up sloped surfaces steeper than one vertical to four horizontal so that fill material will bond with existing surface.
3. When existing ground surface has a density less than that specified under "compacting" for the particular area, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.

D. Placing and compacting:
1. Place backfill and fill materials in layers not more than 8" in loose depth.
2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
3. Compact each layer to required percentage of maximum density for area. See paragraph 3.6.
4. Place backfill and fill materials evenly adjacent to structures, to required elevations.
5. Take care to prevent sedging action of backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.

3.6 GRADING

A. General
1. Uniformly grade the areas within limits of construction including adjacent transition areas.
2. Smooth the finished surfaces within specified tolerance.
3. Compact with uniform levels or slopes between points where elevations are shown on the Drawings, or between such points and existing grades.
4. Where a change of slope is indicated on the Drawings, construct a rolled transition section having a minimum radius of approximately 8'-0", unless adjacent construction will not permit such a transition defeats positive control of drainage.

B. Grading outside building lines:
1. Grade areas adjacent to buildings to achieve drainage away from the structures, and to prevent ponding.
2. Finish the surfaces to be free from irregular surface changes, and:
3. Shape the surface of areas scheduled to be under walks to line, grade, and cross-section, with finished surface not more than 0.10 ft. above or below the required subgrade elevation.
4. Shape the surface of areas scheduled to be under pavement to line, grade, and cross-section, with finished surface not more than 0.05 ft above or below the required subgrade elevation.

3.7 COMPACTING

A. Control soil compaction during construction to provide the minimum percentage of density specified for each area as determined in accordance with Standard Proctor Test.
B. Provide not less than the following maximum density of soil material compacted at optimum moisture content of the actual density of each layer of soil material in place, as described in the Geotechnical Investigation Report and as approved by the Geotechnical Engineer.
1. Structures: (Building foundations and slabs)
a. Compact the top two feet of subgrade to 100% standard lab density, ASTM D-698 and each layer of fill material or backfill material below the top two feet at 95% of standard laboratory density (ASTM D-698).
2. Lawn and unpaved areas:
a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 95% of standard lab density, ASTM D-698.
3. Walks: (Concrete, asphalt or other material noted on Drawings.)
a. Compact the top two feet of subgrade to 100% standard lab density, ASTM D-698 and each layer of fill material or backfill material below the top two feet at 95% of standard laboratory density (ASTM D-698).
4. Pavements: (Concrete, asphalt or other material noted on Drawings.)

a. Compact the top two feet of subgrade to 100% standard lab density, ASTM D-698 and each layer of fill material or backfill material below the top two feet at 95% of standard laboratory density (ASTM D-698).

C. Moisture control:
1. Where subgrade or layer of soil material must be moisture-conditioned before compacting, uniformly apply water to surface of subgrade or layer of soil material to prevent free water appearing on surface during or subsequent to compacting operations.
2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.
3. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the soil engineer.

3.8 TOPSOIL, SEEDING, SODDING AND LANDSCAPE WORK

A. In areas indicated on Drawings as "Lawn" and any area left exposed during excavation, and/or disturbed during construction, place and compact a minimum of 6" of topsoil. Finish elevations will be those shown on Drawings or to follow the natural lay of the land. Apply fertilizer at 8 lbs. per 1000 s.f., work fertilizer into top 1" of topsoil.

B. In areas indicated on Drawings as "Lawn" install grass sod materials.

C. Maintain planting (sod) for a period of sixty (60) days from the date of installation. At the end of maintenance period, all materials shall be in a healthy growing condition.

3.9 MAINTENANCE

A. Protection of newly graded areas:
1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds;
2. Repair and reestablish grades in settled, eroded, and rutted areas to the specified tolerances.

B. Where completed and compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction.

3.10 MEASUREMENT & PAYMENT

A. Include within the Contract Sum an amount sufficient to cover all costs for work of this Section in the quantity shown in the Contract Documents.

B. Unit Prices
1. Elevations to the bottom of the concrete footings and/or building slabs and pavement are shown on the Drawings. The extent of undercutting is noted in this Section of the Specifications. The Base Proposal shall be made based on these elevations. If, in order to obtain suitable bearing for the building foundation, building slab, paving or lawn areas, it is necessary to further undercut (or perform less undercutting) an adjustment in the Contract will be made on the basis of unit prices. Any adjustment in the contract will be based on the total cubic yardage of earthwork done compared to that shown in the Contract Documents.
2. Unit Price #1: Bidders shall state in their proposals the amount per cubic yard to be added to or deducted from the Contract Sum on account of an increase or decrease in the Work. Such amounts will include the costs of excavating, filling, compaction, overhead, and profit. Only one price will be accepted and it shall apply to both increases and decreases in total volume. Should this Unit Price be required for the completion of the Work, the cubic yardage to determine any decrease or increase in the Contract amount shall be the removed cubic yardage and not the replaced and compacted cubic yardage.
3. Before any additional undercutting occurs, the Contractor shall provide elevations of existing grades and the proposed undercut grades. Once the additional undercutting is approved by the Owner and the work is performed, the Contractor shall supply the Owner and/or Architect with a complete topographic survey showing all existing grades and the final undercut grades.

END OF SECTION

SECTION 31 10 00 - CLEARING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Clear and grub the site as shown on the Drawings and specified herein.

B. Related work:
1. Documents affecting Work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
2. Section 31 05 13 - Earthwork

2.1 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

PART 2 - PRODUCTS

3.2 MATERIALS

A. Provide materials, not specifically described but required for proper completion of the work of this Section, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

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.

3.3 PROTECTION

A. Protect existing utilities indicated or made known.

B. **PROTECT TREES IF INDICATED TO REMAIN ON THE DRAWINGS, BY PROVIDING A FENCE (ORANGE PLASTIC SAFETY FENCING) AROUND THE TREES OF SUFFICIENT DISTANCE AWAY, BUT NOT LESS THAN THE TREE'S DRIP LINE AWAY, AND OF SUFFICIENT HEIGHT SO TREES WILL NOT BE DAMAGED IN ANY WAY BY PART OF THIS WORK.**

C. Protection of persons and property:
   1. Barricade open depressions and holes occurring as part of this Work, and post warning lights on property adjacent to or with public access.
   2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
   3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by operations under this Section.

D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors and to other work being performed on or near the site.

E. Maintain access to the site at all times.

3.3 CLEARING

A. Clean out roots 1" in diameter and larger to a depth of at least 12" below the existing ground surface or subgrade of new graded surface, whichever is lower. Treat roots remaining in the soil with a weed killer approved by the Architect.

3.4 CONSERVATION OF TOPSOIL

A. After the area has been cleared of vegetation, strip the existing topsoil (all organic materials) to a minimum depth of 6".

B. Stockpile in an area clear of new construction.

C. Maintain the stockpile in a manner which will not obstruct the natural flow of drainage.
   1. Maintain stockpile free from debris and trash.

3.5 DISPOSAL

A. General:
   1. Remove brush, grass, roots, trash, and other material from clearing operations.
   2. Dispose of away from the site in a legal manner.
   3. Do not store or permit debris to accumulate on the job site.

B. Do not burn debris at the site.

3.6 UTILITIES

A. Coordinate with utility companies and agencies as required.

B. Where utility cutting, capping, or plugging is required, perform such work in accordance with requirements of the utility company or governmental agency having jurisdiction.

END OF SECTION

SECTION 31 23 33 - EXCAVATION, TRENCHING & BACKFILLING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section covers the requirements and procedures for excavation and backfill relating to underground conduits.

1.2 QUALITY ASSURANCE

A. Compaction shall be in accordance with Section 31 26 00: Compaction Control and Testing.

B. The Architect shall be the sole and final judge of suitability of all materials.

C. Materials in question, pending test results, shall not be used in the work. The Contractor shall remove all materials that fail to meet the requirements of the specifications, whether in stockpiles or in place.

D. Pipe bedding or trench backfill which does not meet the specification requirements shall be removed or recompacted until the requirements are satisfied.

1.3 PROTECTION

A. Protection of Existing Improvements:
1. Protection shall be provided to prevent damage to existing improvements indicated to remain in place on the Owner's property and adjoining properties.
2. Damaged improvements shall be restored to their original condition, as acceptable to parties having jurisdiction.
3. Land areas outside the limits of permanent work performed under this contract shall be preserved in their present condition. The Contractor shall confine his construction activities to areas defined for work on the Drawings.

B. Protection of Existing Utilities:
1. The Contractor shall verify all existing utility locations either shown or not shown on the Drawings.
2. The Contractor shall immediately notify the Owner and applicable utility company of any damages to existing utilities.
3. Repairs to damaged utilities shall be made in accordance with the requirements of the Owner and applicable utility company at no extra cost to the Owner.
4. The Contractor shall coordinate with the Owner and the applicable utility company for shutoff of or connection to active utilities. Existing utility services shall not be interrupted except as authorized in writing by the Owner.

C. Protection of Open Excavations: Barricades or other type protectors shall be provided in accordance with OSHA regulations.

1.4 JOB CONDITIONS

A. Classification of Excavation:
1. No classification shall be made to differentiate the various surface and subsurface conditions the Contractor may encounter during his performance under this contract.
2. It is the Contractor's sole responsibility to verify the site surface and subsurface conditions.

B. Dewatering:
1. Trenching shall be performed in such manner that the trench and the area immediately surrounding the trench will be continually and effectively drained by gravity or temporary pumps.
2. Water shall not be permitted to accumulate in trenches.

3. Trenches shall be drained by methods which prevent the softening of the pipe bedding.

C. Shoring:
1. Shoring, including sheet piling, shall be furnished and installed as necessary to protect workers, banks, adjacent paving, structures, and utilities. Comply with OSHA regulations.
2. Shoring, bracing, and sheeting shall be removed as trenches are backfilled, in a manner to prevent caving.

D. Blasting shall not be permitted.

PART 2 - PRODUCTS

2.1 BEDDING MATERIAL

A. Fine Aggregate Bedding:
1. Fine aggregate bedding shall meet the quality and grading requirements of AASHTO M29, Grading No. 1.
2. In general, fine aggregate bedding shall consist of natural sand having hard, strong, durable particles free from deleterious substances and meeting the following gradation requirements:

Sieve Designation	Mass Percent Passing
3/8 inch	100
No. 4	95 - 100
No. 8	70 - 100
No. 16	40 - 80
No. 30	20 - 65
No. 50	7 - 40
No. 100	2 - 20
No. 200	0 - 10

B. Coarse Aggregate Bedding:
1. Coarse aggregate bedding shall meet the quality requirements of AASHTO M80, Class C; and the grading requirements of AASHTO M43, Size Number 67.
2. In general, coarse aggregate bedding shall consist of a well-graded crushed stone, crushed stone, crushed gravel, or gravel having hard, strong durable particles free from deleterious substances and meeting the following gradation requirements:

Sieve Designation	Mass Percent Passing
1 inch	100
3/4 inch	90 - 100
3/8 inch	25 - 55
No. 4	0 - 10
No. 8	0 - 5

3. Coarse aggregate bedding used for fiberglass pipe shall meet the above requirements, except that 100% of the material shall pass the 3/4" sieve.

2.2 BACKFILL MATERIAL

A. Select Soil Backfill
1. Select soil backfill shall be soil or soil aggregate free of debris, roots, organic material, and frozen materials.
   a. Initial backfill (to 12" above the top of pipe) shall be free of stones not passing a 1" sieve.
   b. The remainder of the backfill shall be free of stones having a maximum dimension of 3" or more.
   c. Initial backfill for fiberglass pipe shall be free of stones not passing a 3/4" sieve.
2. Otherwise suitable material which is unsuitable due to excess moisture content will not be classified as unsuitable material unless it cannot be dried by manipulation, aeration, or blending with other materials to the

satisfaction of the Owner.

3. Unsuitable materials shall include those materials that are determined by the Owner to be inadequate for providing a stable backfill.
4. Expansive clay soils shall be classified as unsuitable unless treated or mixed in a manner approved by the Owner.

B. Aggregate Subbase Backfill:
1. Aggregate subbase backfill shall meet the quality and grading requirements of AASHTO M147, Grading A, B, C, or D, except that the initial backfill (to 12" above the top of pipe) shall be free of stones not passing a 1" sieve.
2. In general, aggregate subbase backfill shall consist of a dense-graded aggregate having hard, strong, durable particles free from deleterious substances and meeting the following gradation requirements (except in the initial backfill):

Sieve Designation	Grading A	Grading B	Grading C	Grading D
2 inch	100	100	---	---
1 inch	---	75-95	100	100
3/8 inch	0-65	40-75	50-85	60-100
No. 4	25-55	30-60	35-65	50-85
No. 10	15-40	20-45	25-50	40-70
No. 40	8-20	15-30	15-30	25-45
No. 200	2-8	5-20	5-15	5-20

3. Initial backfill for fiberglass pipe shall be free of stones not passing a 3/4" sieve.

C. **Concrete Slurry Backfill:**
1. The slurry backfill shall consist of a mixture of sand, cement and flyash and shall be in a ratio of 3400lb:150lb:100lb. Slurry mixture shall be plant mixed slurry and have a minimum compressive strength of 300 psi at 28 days. The design of slurry mixture may be modified as required by the Architect and/or Engineer.

2.3 SELECTION OF BORROW MATERIAL

A. Borrow material, if required, shall be selected to meet requirements and conditions of the particular backfill for which it is to be used.

B. For borrow material obtained outside the limits of the project site, the Contractor shall obtain the right to procure material and shall pay all royalties and other charges involved.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 TRENCH EXCAVATION

A. Trench excavation, regardless of material encountered, shall be performed to the depths indicated or as otherwise specified.
B. During excavation, material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins.

C. Excavated materials not required or suitable for backfill shall be removed and wasted as specified in Section 31 05 13 - Earthwork.

D. Excavation shall be made by open cut, with as little trench opened at one time as possible.

E. Trench walls shall be vertical from the bottom of the trench to at least one foot above the top of the pipe. The remainder of the trench shall be excavated such that the walls are at a slope flat enough to prevent collapse of the trench. Shoring shall be used as necessary to protect workers, banks, adjacent paving, structures, and utilities. Comply with OSHA regulations.\

F. Trench widths:
1. Trenches shall be wide enough to allow for the proper laying of pipes and conduits. Unless otherwise indicated on the Drawings, the bottom of the trench shall conform to the following (Use horizontal span for arch pipe, elliptical pipe, or other odd-shaped conduits):

Size of Conduit (ID)	Width of Trench (Maximum)	
Internal Diameter or Horizontal Span	Without Sheeting and Shoring	With Sheeting and Shoring
12 inch and smaller	24 inch	36 inch
15-21 inch inc.	ID + 12 inch	ID + 24 inch
24-30 inch inc.	ID + 18 inch	ID + 30 inch

2. Where only a small amount of sheeting and shoring is required, which will not interfere with the work, the maximum trench widths shall be the same as where no sheeting and shoring are required.

G. Excavation for manholes, valves, and other appurtenances shall be sufficient to allow a minimum 12" clearance around the appurtenance. Comply with OSHA regulations.

H. Wet or otherwise unstable materials encountered in the bottom of the trench shall be overexcavated to allow for construction of a stable pipe bedding. The overexcavation shall be backfilled with coarse aggregate bedding.

3.3 DEPTH OF BURY

A. Unless otherwise indicated on the Drawings, trenches shall be excavated to a depth that will provide not less than the following cover over the top of the pipe or conduit from finished grade:
1. Water Lines - 3 feet
2. Roof Drains and Storm Drains - 3 feet
3. Sanitary Sewers - 3 feet
4. Gas Lines (Low Pressure) - 3 feet
5. Electrical Duct Banks - 3 feet
6. Direct Buried Electrical - 3 feet

B. In addition to the above requirements, trenches shall be excavated to a depth that will avoid interference with other utilities.

3.4 PIPE BEDDING AND TRENCH BACKFILL

A. First-Class Bedding
   1. **FIRST-CLASS BEDDING SHALL BE USED FOR NEW AND/OR EXISTING PIPES AND CONDUITS UNDER PAVEMENTS (PARKING LOTS), DRIVEWAYS, CURBS, GUTTERS, STEPS, EQUIPMENT SLABS, BUILDING SLABS ON GRADE, AND SIMILAR USE AREAS.**
   2. Circular Pipes
      a. Bedding: Coarse aggregate bedding shall be placed on the bottom of the trench prior to the installation of the pipe. Fine aggregate bedding shall be used for steel pipe with exterior coating. The bedding shall have a minimum thickness of one-fourth the outside pipe diameter or 6", whichever is greater. Hand or mechanical tamping shall be used to compact the bedding. The surface of the bedding shall be brought to a uniform grade during compaction. Bell holes shall be excavated prior to pipe installation to allow for unobstructed assembly of the joint and to assure that the pipe is fully bedded for its entire length.
      b. Haunching: After the pipe has been installed, coarse aggregate bedding shall be placed to extend up the sides of the pipe to the horizontal centerline. Fine aggregate bedding shall be used for steel pipe with exterior coating. Each lift shall not exceed 6" and shall be compacted by hand. Mechanical tamping may be used except when installing plastic or fiberglass pipe or when use of mechanical tampers is not recommended by the pipe manufacturer. Sufficient material shall be worked under the haunch of the pipe to provide adequate support. Precautions to prevent movement of the pipe during placing of the material under the pipe haunch shall be taken.
   3. Initial Backfill
      a. Aggregate subbase backfill shall be placed from the top of the coarse aggregate bedding to 12" above the top of the pipe or conduit. Fine aggregate bedding material shall be used for initial backfill of steel pipe with exterior coating.
      b. Each lift shall not exceed 6" and shall be compacted by hand. Mechanical tamping may be used except when installing plastic or fiberglass pipe or when use of mechanical tampers is not recommended by the pipe manufacturer.
      c. Initial backfill shall be placed simultaneously on both sides of the pipe to prevent displacement.
   4. **Final Backfill**
      a. Trenches shall not be backfilled until required pressure tests are performed.
      b. Trenches shall be backfilled with concrete slurry from the top of all pipes and brought to the subgrade elevation required for surface course construction.
      c. <u>Concrete Slurry Backfill</u> shall be placed for the full width of the trench and vibrated into place.

B. Ordinary Bedding
   1. Ordinary bedding shall be used for pipes and conduits where first-class bedding is not required.
   2. Circular Pipes
      a. Bedding: Coarse aggregate bedding shall be placed on the bottom of the trench prior to the installation of the pipe. Fine aggregate bedding shall be used for steel pipe with exterior coating. The bedding shall have a minimum thickness of one-eighth the outside pipe diameter or 4", whichever is greater. Hand or mechanical tamping shall be used to compact the bedding. The surface of the bedding shall be brought to a uniform grade during compaction. Bell holes shall be excavated prior to pipe installation to allow for unobstructed assembly of the joint and to assure that the pipe is fully bedded for its entire length.
      b. Haunching: After the pipe has been installed, coarse aggregate bedding shall be placed to extend up the sides of the pipe one-sixth of the outside pipe diameter. Fine aggregate bedding shall be used for steel pipe with exterior coating. Each lift shall not exceed 6" and shall be compacted by hand. Mechanical tamping may be used except when installing plastic or fiberglass pipe or when use of mechanical tampers is not recommended by the pipe manufacturer. Sufficient material shall be worked under the haunch of the pipe to provide adequate side support. Precautions to prevent movement of the pipe during placing of the material under the pipe haunch shall be taken.
   3. Initial Backfill
      a. Select soil backfill shall be placed from the top of the haunching to 6" above the top of the pipe or conduit. Fine aggregate bedding material shall be used for initial backfill for steel pipe with exterior coating.
      b. Each lift shall not exceed 6" and shall be compacted by hand. Mechanical tamping may be used except

when installing plastic or fiberglass pipe or when use of mechanical tampers is not recommended by the pipe manufacturer.

c. Initial backfill shall be placed simultaneously on both sides of the pipe to prevent displacement.

4. Final Backfill
   a. Trenches shall not be backfilled until required pressure tests are performed.
   b. Trenches shall be backfilled with select soil backfill and brought to the subgrade elevation required for surface construction or topsoiling.
   c. Backfill shall be placed in successive horizontal layers of 8" to 12" in loose depth for the full width of the trench and compacted.
   d. Rolling equipment shall not be used until a minimum of 2' of backfill material has been placed over the top of the pipe. If a hydro hammer is used to compact the backfill, a minimum of 3' of cover is required.

C. Backfill Around Structures and Appurtenances
   1. Backfill around manholes, inlets and similar structures shall conform to Section 310513 - Earthwork: (Structure Excavation and Backfill) except that structures located in pavements, driveways, curbs, gutters, steps, equipment slabs, building slabs on grade, and similar use areas shall be backfilled with aggregate subbase backfill.
   2. Backfill around fire hydrants, valves, cleanouts, and similar appurtenances shall conform to trench backfill requirements, except as modified on the Drawings.

3.5 COMPACTION

A. For backfill compaction densities and moisture contents, see Section 31 26 00: Compaction Control and Testing.

END OF SECTION

SECTION 31 26 00 - COMPACTION CONTROL AND TESTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section covers the requirements and procedures for compaction control and testing of soils to be performed and paid for by the Contractor.

1.2 DEFINITIONS

A. Cohesionless Materials:
1. Cohesionless materials shall be clean, free-draining variously graded gravels and sands with little or no fines. The portion passing the No. 200 sieve shall be limited to 12% and have a plasticity index of 0.
2. Cohesionless materials shall be classified according to ASTM D2487 as GW, GP, SW or SP.

B. Cohesive Materials:
1. Cohesive materials shall be classified according to ASTM D2487 as GM, GC, SM, SC, CL or CH.
2. Materials classified according to ASTM D2487 as ML, OL, MH, OH and PT shall be unsatisfactory.

1.3 QUALITY ASSURANCE

A. Test Specifications
1. Laboratory Tests
a. Moisture - Density relations of soils (Proctor test) - AASHTO T99, Method C or D.
b. Liquid limit of soils - AASHTO T89.
c. Plastic limit and plasticity index of soils - AASHTO T90.
d. Particle size analysis of soils (gradation test) - AASHTO T88.
2. Field Tests
a. Density of soil and soil aggregate in-place by nuclear methods - AASHTO T238, Method B (direct transmission).

B. Laboratory Tests Required
1. The following tests shall be performed for each principal type of material or combination of materials encountered or utilized.
a. Proctor test
b. Liquid limit test
c. Plastic limit test (and determination of plasticity index)
d. Gradation test
2. The tests listed above shall be performed on additional samples as directed by the Architect.
3. Results of these tests shall be the basis of control for compaction.

C. Field Tests Required
1. Compaction Test Quantity - Building Area Subgrade:
a. Cut Areas: 1 Test / 2,500 square footage
b. Fill Areas: 1 Test / 2,500 square footage
2. Compaction Test Quantity - Parking and Drives Subgrade:
a. Cut Areas: 1 Test / 5,000 square footage
b. Fill Areas: 1 Test / 5,00 square footage for each 8" lift.
3. Trench Excavation and Backfilling
a. One (1) in-place density test and one (1) in-place moisture test per 100 linear feet of trench per lift under structures and paved areas.
b. One (1) in-place density test and one (1) in-place moisture test per 300 linear feet of trench per lift under grassed or nontraffic areas.
4. Excavation, filling and raw subgrade preparation under grassed or nontraffic areas: One (1) in-place density test and one (1) in-place moisture test per 3,000 square yards per lift.

5. Additional in-place moisture-density tests and relative density tests shall be performed as directed by the Architect.

D. Samples for laboratory and field tests shall be taken at locations designated by the Architect.

PART 2 - PRODUCTS

Not applicable

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 COMPACTION

A. Each lift shall be compacted to not less than the percentage of the maximum density specified below.

Fill embankment, backfill, and trench backfill	Percent Maximum Density (ASTM D-698)	
	Top Two Feet	Below the Top Two Feet
Under equipment slabs, building slabs-on-grade and other structures:	100	95
Under pavement, concrete walks, driveways, curbs, gutters, steps, and similar use areas (including adjacent shoulder areas):	100	95
Under grassed or landscaped areas:	95	95

B. Moisture Content
1. Each lift of fill, embankment, backfill and trench backfill under pavement, driveways, curbs, gutters, steps, sidewalks, grassed or landscaped areas, and similar use areas (including adjacent shoulder areas) shall be compacted at a moisture content 1% below to 4% above optimum moisture.
2. Each lift of fill, embankment, backfill and trench backfill under equipment slabs, building slabs-on-grade, and other structures shall be compacted at a moisture content 1% to 4% above optimum moisture.
3. Subgrades shall be compacted at a moisture content 1% to 4% above optimum moisture.

3.3 COMPACTION DEFICIENCIES

A. The Owner shall be the final judge of suitability of all compaction.

B. Apparent negligence or carelessness during any portion of the earthwork operations will require that additional tests be performed on that portion of the work.

C. Fills, embankments, backfills, trench backfills or subgrades that do not meet the specification requirements shall be removed or recompacted until the requirements are satisfied.

END OF SECTION

SECTION 31 31 16 - TERMITE CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide soil poisoning to control subterranean termites as specified herein and needed for a complete and proper treatment.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 31 05 13 - Earthwork.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Qualifications of subcontractor:
1. Properly licensed to provide such services by governmental agencies having jurisdiction.
2. Not less than five years successful experience in soil treatment for subterranean termites.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 WARRANTY

A. Upon completion of the Work, and as a condition of its acceptance, deliver to the Architect two copies of a Warranty signed by an authorized representative of the installing subcontractor, and co-signed by the Contractor, agreeing:
1. To make an inspection of the Work once each year for a total period of five years following Date of Substantial Completion for the purpose of detecting termite infestation;
2. If termite infestation is found during that five year period, to retreat in accordance with prevailing practices of the trade and within ten calendar days after such infestation is discovered;
3. To repair damage to the Work caused by subterranean termites during that five year period, to a maximum cost of $5,000;
4. To make such inspections, retreatment, and repairs at no additional cost to the Owner.

1.5 PRODUCT HANDLING

A. Comply with pertinent provision of Section 01 64 00.

PART 2 - PRODUCTS

2.1 MATERIALS

A. To the extent approved by governmental agencies having jurisdiction, use working solutions containing the following chemical at the listed minimum concentration:
   1. Dragnet SFR Termiticide/Insecticide; active ingredient: Permenthrin. Meeting U>S OSHA Hazard Communication Standard 29 CFR 1910. 1200.
   2. Talstar P Professional Termiticide/Insecticide
   3. Fuse Termiticide/Insecticide

B. If combinations of toxicants are approved by governmental agencies having jurisdiction, provide toxicants having such approval and in the maximum strength so approved, at no additional cost to the Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

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.

3.3 APPLICATION: Apply as per manufacturers's instructions, if in conflict with information stated below.

A. Begin soil poisoning only after all preparation for slab placement is complete.

B. Slabs on grade:
   1. Apply toxicant as an overall treatment at the minimum rate of one gallon of toxicant to each 10 square feet of area under slabs on grade within building lines.

C. Utility entrances:
   1. Apply toxicant at the rate of two gallons of toxicant per five lineal feet at critical locations such as where utilities pass through exterior walls and through floor slabs.
   2. Extend treatment not less than 48" from wall into trench.

D. Walls:
   1. Apply toxicant at the rate of two gallons of toxicant per five lineal feet along both sides of all foundation walls, cross walls, and grade beams, after all nearby excavation has been completed.
   2. Apply toxicant at the rate of one gallon of toxicant per five lineal feet to voids in masonry walls.

E. Miscellaneous: Apply toxicant at the rate of two gallons of toxicant per five lineal feet at the following areas:
   1. Immediately below expansion joints, control joints, and all areas where slab will be penetrated by construction features.
   2. Where exterior facings or veneers extend below grade level along the exterior side of all foundation walls.
   3. Where unit masonry foundation construction is used.

F. If soil is disturbed after treatment, retreat disturbed areas.

END OF SECTION

SECTION 31 80 00 - EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Temporary and permanent erosion control systems.
2. Slope protection systems.
3. Preparation of Stormwater Pollution Preservation Plan.

B. Related Work: Documents affecting Work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.2 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Certificates, SWP^3, or other forms as required by ADEQ.

1.3 PROJECT CONDITIONS OR SITE CONDITIONS

A. Environmental Requirements: Protect adjacent properties and water resources from erosion and sediment damage throughout Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Quick Growing Grasses: Wheat, rye, or oats.

B. Straw Bales: Free of weed seed.

C. Fencing for Siltation Control: Indicated on Drawings.

D. Erosion Control Blankets and/or Erosion Control Geotextiles as indicated on the Drawings.

E. Bale Stakes:
1. Minimum 4 feet length.
2. 2 No. 4 steel reinforcing bars or,
3. 2 steel pickets or,
4. 2 - 2x2 inch hardwood stakes driven 18 inches to 24 inches into ground.

F. Temporary Mulches: Loose straw, netting, wood cellulose, or agricultural silage free of seed.

G. Metal Fence Stakes: Minimum 8 foot length.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

A. The Owner shall prepare and submit, and the Contractor(s) shall maintain the Stormwater Pollution Prevention Plan (SWP3).

B. Notify the Owner and Construction Manager of deficiencies or changes in Stormwater Pollution Prevention Plan (SWP3) required by current site conditions.

3.3 EROSION CONTROL AND SLOPE PROTECTION IMPLEMENTATION

A. The Owner and/or Architect may direct Contractor to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and may direct Contractor to provide immediate permanent or temporary pollution control measures.

B. Provide permanent erosion control measures at earliest practical time to minimize requirement for temporary erosion controls. Permanently seed and mulch cut slopes as excavation proceeds.

C. Maintain temporary erosion control systems, to control siltation, at all times throughout Work, as required by ADEQ and/or the SWP3. Provide maintenance or additional Work directed by ADEQ, the Owner or Architect within 48 hours of notification by ADEQ, the Owner or Architect.

D. Apply erosion control blankets and/or geotextiles or sod slopes, that may be easily eroded, with wheat, rye or oat grasses.

END OF SECTION

SECTION 32 12 16- ASPHALTIC CONCRETE PAVING AND PAVEMENT MARKING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide asphaltic concrete paving where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 31 05 13 - Earthwork and Geotechnical Investigation Reports
3. Section 32 13 13 - Portland Cement Concrete Paving and Pavement Marking

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. All construction is to conform to latest Arkansas State Highway and Transportation Department Standard Specifications for Highway Construction in effect at the time of bidding unless otherwise specified or shown on the Drawings.

C. Supply asphaltic concrete from a mixing plant approved by the Arkansas State Highway Department.

D. Complete all work in compliance with applicable requirements of all governmental agencies having jurisdiction and all other applicable law and codes.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 23.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Certificates, signed by the material producer and the asphalt paving subcontractor, stating that materials meet or exceed the specified requirements.

1.4 PRODUCT HANDLING

A. All materials shall be delivered to the site in full compliance with approved mix designs within time and temperature restrictions as specified.

B. Where materials are delivered to the site in a manner other than that set forth above, such materials shall not be used and shall be replaced at no additional cost to the Owner.

C. Use all means necessary to protect all materials before, during and after installation, and to protect all work and improvements adjacent to this operation.

D. All damage caused by misconduct, improper acts and faulty work shall be immediately repaired or caused to be repaired, by the Contractor at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 BASE COURSE

A. Pavement base material shall conform to Arkansas Highway and Transportation Department Standard Specifications, Section 303 for Crushed Stone Base Course, Class 7.

2.2 ASPHALTIC SURFACING

A. Asphaltic Concrete: Conform to Arkansas Highway and Transportation Department Specifications, Section 407, Type 3.

B. Asphalt content shall range from 4.5 to 7.5 percent for approved mix.

C. Mix design: Conform to Arkansas Highway and Transportation Department Standard Specifications Section 407. Submit design mix to the Architect for approval prior to dispatching materials.

2.3 PRIME COAT

A. Conform with Arkansas Highway and Transportation Department Standard Specifications, Type MC-30 or equivalent.

2.4 JOINT AND CRACK FILLER

A. Hot poured type conforming with ASTM D3405.

2.5 WHEEL STOPS

A. Provide precast concrete wheel stops with precast holes for permanent anchoring, at parking space locations as shown on the Drawings.

2.6 PAVEMENT MARKING PAINT

A. Provide paint specifically formulated for use as pavement marking in automobile parking area, in the color selected by the Architect from standard colors of the approved manufacturer.

B. Acceptable products:
1. “Traffic Paint” manufactured by J.E. Bauer Company.
2. “Traffic Paint” manufactured by Tnemec.
3. “Romark Traffic” manufactured by Glidden-Durkee.
4. “Traffic and Zone Marking Paint” manufactured by PPG.

2.7 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.0 GENERAL

A. Strictly conform to the stated requirements of the Pavement Recommendations of the Geotechnical Investigation Report as a minimum.

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

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.

3.3 LAYOUT OF WORK

A. Lay out the Work based on the dimensions and elevations on the Drawings to such an extent as to assure that conflicts do not exist. Do in advance of the construction of any of the Work under this Section.

B. In the event of discrepancy, immediately notify the Architect.

C. Complete the work so that all pavement, curb and gutter and sidewalk are free from undrained areas.

3.4 EQUIPMENT

A. All equipment for compacting shall be steel-tired power rollers having a minimum weight of ten tons, except that hand-held vibrator-compactors may be used in areas not accessible to rollers when specifically approved in advance by the Architect.

B. All equipment for primer application shall be specifically designed for that purpose and shall be subject to the inspection and approval of the Architect.

C. All equipment for paving shall be spreading self-propelled asphalt paving machines capable of maintaining line, grade and minimum surface course thickness specified.

3.5 PLACEMENT OF ASPHALTIC CONCRETE PAVING

A. Base Course:
1. Prior to distributing Base Course material, the surface upon which the material is placed shall be shaped, finished, and compacted in accordance with the requirements of Arkansas Highway and Transportation Department, Standard Specifications, Section 407. At Parking Lot and Drive Areas: After all existing silty soils are removed/undercut (see 31 05 13 - Earthwork and Geotechnical Investigation Reports). The subgrade area shall be shaped and recompacted to subgrade depth. The compacted subgrade at all areas shall extend at least 18 inches beyond the edge of the proposed pavement. All subgrades shall be compacted to an in-place density of 100% Standard Laboratory Density ASTM D-698. The moisture content of the soil, when compacted, shall be between 2% below and 2% above the optimum moisture determined by this test.
2. The Crushed Stone Base Course shall be distributed, and then it shall be spread evenly over the entire area to be paved in a uniform layer sufficiently thick to provide a compacted thickness of 8 inches minimum in the paving area(s). Spreading shall be done in a manner to prevent segregation of the mixture. The material shall be moistened to optimum water content and rolled and compacted to an in-place density of not less than 100% of maximum density as determined by AASHTO T99, Standard Proctor.

B. Prime Coat:
   1. After the compacted base course has cured to optimum strength, a prime coat shall be evenly applied by approved equipment at a rate of 0.25 gallons per square yard, and shall be allowed to cure prior to placement of wearing surface.

C. Wearing Surface:
   1. Asphaltic concrete for wearing surface shall be mixed, placed and roll compacted as required to conform with the applicable portions of Arkansas Highway Department Standard Specifications, Section 409.
   2. All parking areas and drives shall be paved in two equal lifts to a final compacted thickness of 3 inches.

D. Finish Tolerances: Finish all surfaces to the following tolerances:
   1. Base Course: Plus 0.00 feet to minus 0.10 foot from line and grade shown on the Drawings.
   2. Asphaltic Concrete Surfacing: Plus 0.05 to minus 0.00 feet at any point from line and grade shown on the Drawings.

3.6 TESTING

A. General: The Contractor shall employ, at his own expense, a testing laboratory experienced in testing of asphaltic materials to perform material evaluation tests. Selection of a testing laboratory is subject to the Architect's approval. Provide four copies of all test results, send three copies to the Architect and one copy to the Contractor.

B. Tests Required:
   1. Subgrade and Base Course: Density tests, one per 700 sq. yd. of pavement area, minimum.
   2. Aggregate samples: AASHTO T11, T27 and T30 as applicable.
   3. Extraction tests on bituminous mixtures: AASHTO T164 or Arkansas Highway Department procedure for vacuum extraction, one (1) test per day.
   4. Compacted density and thickness: AASHTO T166, one (1) test per 1000 sq. yd.

C. Water Test:
   1. All asphalt pavement areas shall be flooded with water, with Owner, Architect, and Construction Manager present.
   2. Any areas holding / ponding water shall be removed and replaced at Contractor’s expense.

END OF SECTION

SECTION 31 91 20 - LANDSCAPE WORK (TOPSOIL AND SOD)

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Extent of landscape development work is shown on the Drawings and shall be a part of the Base Bid.

1.2 QUALITY ASSURANCE

A. Subcontract landscape work to a single firm specializing in landscape work.

B. General: Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.

C. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability to Owner, together with proposal for use of equivalent material.

D. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

1.3 SUBMITTALS

A. Certification: Submit certificates of inspection as required by governmental authorities. Submit manufacturer's or vendor's certified analysis for soil amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements.

B. Planting Schedule: Submit proposed planting schedule, indicating dates for each type of landscape work during normal seasons for such work in area of site. Correlate with specified maintenance periods to provide maintenance from date of substantial completion. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.

C. Maintenance Instructions: Submit typewritten instructions recommending procedures to be established by Owner for maintenance of landscape work for one full year. Submit prior to expiration of required maintenance period(s).

1.4 DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

B. Sod: Time delivery so that sod will be placed within 24 hours after stripping. Protect sod against drying and breaking of rolled strips. Cover with plastic sheets when transporting. Store sod at job site in shady location and add moisture as required.

C. Do not remove container grown stock from containers until planting time.

1.5 JOB CONDITIONS

A. Proceed with and complete landscape work as rapidly as portions of site become available, working within seasonal limitations for each kind of landscape work required.

B. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned. Familiarize with sprinkler system lines.

C. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Owner before planting.

D. Planting Time: Plant or install materials during normal planting seasons for each type of landscape work required. Correlate planting with specified maintenance periods to provide maintenance from date of substantial completion.

1.6 SPECIAL PROJECT WARRANTY

A. Warranty lawns for a period of one year after date of final acceptance by the Owner, against defects including death and unsatisfactory growth, except from defects resulting from neglect by Owner, abuse or damaged by others, or unusual phenomena or incidents which are beyond the Contractor's control. The Contractor shall replace dead or unsatisfactory growth at the expense of the Contractor.

B. Remove and replace sod found to be dead or in unhealthy conditions during warranty period. Make replacements during planting season following end of warranty period. Replace trees and shrubs which are in doubtful condition at end of warranty period; unless, in opinion of Owner, it is advisable to extend warranty period for a full growing season.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Provide new topsoil which is fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than 2" in any dimension, and other extraneous or toxic matter harmful to plant growth.
   1. Obtain topsoil from local sources or from areas having similar soil characteristics to that found at project site. Obtain topsoil only from naturally, well-drained sites where topsoil occurs in a depth of not less than 12"; do not obtain from bogs or marshes.

B. All topsoil shall be a part of the Base Bid and is not a part of the Allowance.

2.2 SOIL AMENDMENTS

A. Lime: Natural dolomitic limestone containing not less than 85% of total carbonates with a minimum of 30% magnesium carbonates, ground so that not less than 90% passes a 10-mesh sieve and not less than 50% passes a 100-mesh sieve.

B. Aluminum Sulfate: Commercial grade.

C. Bonemeal: Commercial, raw, finely ground; 4% nitrogen and 20% phosphoric acid.

D. Superphosphate: Soluble mixture of treated minerals; 20% available phosphoric acid.

E. Sand: Clean, washed sand, free of toxic materials.

F. Perlite: Conforming to National Bureau of Standards PS 23.

G. Vermiculite: Horticultural grade, free of toxic substances.

H. Sawdust: Rotted sawdust, free of chips, stones, sticks, soil or toxic substances and with 7.5 lbs. nitrogen uniformly mixed into each cubic yard of sawdust.

I. Manure: Well rotted, unleached stable or cattle manure containing not more than 25% by volume of straw, sawdust or other bedding materials and containing no chemicals or ingredients harmful to plants.

J. Mulch: Organic mulch free from deleterious materials and suitable for top dressing of trees, shrubs or plants and consisting of the following:
   1. Shredded cyprus mulch

K. Commercial Fertilizer: Complete fertilizer of neutral character, with some elements derived from organic sources and containing the following percentages of available plant nutrients:
   1. For trees and shrubs, provide fertilizer with not less than 5% total nitrogen, 10% available phosphoric acid and 5% soluble potash.
   2. For lawns, provide fertilizer with percentage of nitrogen required to provide not less than 1 lb. of actual nitrogen per 100 sq. ft. of lawn area and not less than 4% phosphoric acid and 2% potassium. Provide nitrogen in a form that will be available to lawn during initial period of growth; at least 50% of nitrogen to be organic form.

2.3 GRASS MATERIALS

A. Sod: At “Lawn" areas as noted on the Drawings, provide strongly rooted sod, not less than 2 years old, free of weeds and undesirable native grasses and machine cut to pad thickness of 3/4" (plus or minus 1/4"), excluding top growth and thatch. Provide only sod capable of vigorous growth and development when planted (viable, not dormant).
   1. Provide sod of uniform pad sizes with maximum 5% deviation in either length or width. Broken pads or pads with uneven ends will not be acceptable. Sod pads incapable of supporting their own weight when suspended vertically with a firm grasp on upper 10% of pad will be rejected.
   2. Provide sod composed principally of the following:
      a. Bermuda grass (cynodon dactylon).

PART 3 - EXECUTION

3.1 PREPARATION:

A. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps and other extraneous materials harmful or toxic to plant growth.

B. Mix specified soil amendments and fertilizers with topsoil at rates specified. Delay mixing of fertilizer if planting will not follow placing of planting soil within a few days.

C. For pit and trench type backfill, mix planting soil prior to backfilling, and stockpile at site.

D. For lawns, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.

E. Loosen subgrade of lawn areas to a minimum depth of 4". Remove stones over 1-1/2" in any dimension and sticks, roots, rubbish and other extraneous matter. Limit preparation to areas which will be planted promptly after preparation.
   1. Spread topsoil to minimum depth required to meet lines, grades and elevations shown after light rolling and natural settlement. Add specified soil amendments and mix thoroughly into upper 4" of topsoil.
   2. Place approximately ½ of total amount of topsoil required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil. Add specified soil amendments and mix thoroughly into upper 4" of topsoil.

F. Preparation of Unchanged Grades: Where lawns are to be planted in areas that have not been altered or disturbed by excavating, grading or stripping operations, prepare soil for lawn planting as follows: Till to a depth of not less than 6"; apply soil amendments and initial fertilizers as specified; remove high areas and fill in depressions; till soil to a homogeneous mixture of fine texture, free of lumps, clods, stones, roots and other extraneous matter.

1. Prior to preparation of unchanged areas, remove existing grass.
2. Allow for sod thickness in areas to be sodded.
3. Apply specified commercial fertilizer at rates specified and thoroughly mix into upper 2" of topsoil. Delay application of fertilizer if lawn planting will not follow within a few days.

G. Fine grade lawn areas to smooth, even surface with loose, uniformly fine texture. Roll, rake and drag lawn areas, remove ridges and fill depressions, as required to meet finish grades. Limit fine grading to areas which can be planted immediately after grading.

H. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.

I. Restore lawn areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

3.2 MAINTENANCE

A. Begin maintenance immediately after planting.

B. Maintain lawns for not less than the period stated below, and longer as required to establish an acceptable lawn.
1. Sodded lawns, not less than 60 days after acceptance.

C. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading and replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas.

3.8 CLEANUP AND PROTECTION

A. During landscape work, keep pavements clean and work area in an orderly condition.

B. Protect landscape work and materials from damage due to landscape operations, operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape work as directed.

3.9 INSPECTION AND ACCEPTANCE

A. When landscape maintenance period is complete, the Owner and Contractor will make an inspection to determine final acceptance. This will begin the one (1) year warranty period specified by Paragraph 1.6, SPECIAL PROJECT WARRANTY.

B. When landscape work is completed, the Owner and Contractor will make an inspection to determine acceptability. This will begin the maintenance periods specified by paragraph 3.7, MAINTENANCE.

C. When inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until reinspected by Owner and found to be acceptable. Remove rejected plants and materials promptly from project site.

3.10 SCHEDULE OF PLANTING SOIL MIXTURE REQUIREMENTS:

A. For lawn areas, provide not less than the following quantities of specified materials:
1. 1 part of loose peat humus to 5 parts of topsoil.
2. 40 lbs. of bonemeal per 1000 sq. ft.
3. 40 lbs. of commercial fertilizer per 1000 sq. ft.

B. Add aluminum sulfate (to adjust ph of alkaline soils), sand, perlite, vermiculite, sawdust, manure or other appropriate soil amendments to above schedules depending on local conditions.

END OF SECTION

SECTION 33 40 00 - STORM DRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Site storm sewer drainage piping, fittings and accessories, and bedding.
2. Connection of storm sewer system to municipal storm sewer system.
3. Catch basins, paved area drainage, site surface drainage, and storm water detention facilities.

B. Related Documents: The Contract Documents, as defined in the General Conditions, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

C. Related Sections:
1. Section 31 23 33 - Excavation, Trenching and Backfill
2. Section 03 30 00 - Cast-in-Place Concrete

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM C 76 - Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
2. ASTM C 443 - Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
3. ASTM D 2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
4. ASTM D 3034 - Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings.

B. American Association of State Highway and Transportation Officials
1. AASHTO M 294 Specification for Corrugated Polyethylene Pipe, smooth interior.

1.3 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to start of backfill operations.

1.4 SUBMITTALS

A. Section 01 33 23 - Submittal Procedures: Procedures for submittals.
Within 35 calendar days after the Contractor has received Owner’s Notice to Proceed, submit:
1. Product Data: Data indicating pipe, pipe accessories, and fittings.
2. Assurance/Control Submittals:
a. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.
b. Certificates: Manufacturer's certificate that products meet or exceed specified ASTM requirements.

B. Section 01 78 00 - Project Closeouts: Procedures for closeout submittals.
1. Project Record Documents: Accurately record the following.
a. Actual locations of pipe runs, connections, manholes, catch basins, cleanouts, and invert elevations.
b. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Conform to local Public Works Standard Specifications for materials and installation of the work of this Section.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

A. Reinforced Concrete Pipe (RCP):
1. Pipe: ASTM C 76, Class III unless indicated otherwise on Drawings.
2. Gaskets: ASTM C 443; rubber compression gaskets installed in accordance with manufacturer's published instructions.

B. Polyvinyl Chloride (PVC) Pipe:
1. Pipe: ASTM D 3034, SDR 35 Rated.
a. Continuously mark pipe with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D 3034 classification.
2. Joints: ASTM D 3034, Table 2; integrally molded bell ends with factory supplied elastomeric gaskets and lubricant.

C. Corrugated Polyethylene Pipe (CPEP)
3. Pipe: AASHDO M 294, smooth interior walls.
4. Fittings: CPEP, Fabricated fittings.

2.2 INLETS, CATCH BASINS AND JUNCTION BOXES

A. Lid and Frame: Cast iron heavy duty as indicated on Drawings.

B. Structure: As indicated on Drawings.

C. Grate and Frame: Cast iron, as indicated on Drawings.

D. Concrete: As indicated on Drawings. If not, then 3,500 PSI Compressive strength concrete at 28 days, 5% air entrained.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
1. Verify that survey benchmark and intended elevations for the Work are as indicated on Drawings.
2. Verify that trench cut and excavation is ready to receive Work and excavations, dimensions, and elevations are as indicated on Drawings.

B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.

B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.3 BEDDING

A. Excavate pipe trench as specified in Section 31 23 33. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Place bedding material at trench bottom, level materials in continuous layers not exceeding 6 inches compacted depth, each layer. Place compacted bedding material to elevation of paving subgrade as indicated on Drawings.

C. Maintain optimum moisture content of bedding material to attain required compaction density.

D. Remove excess backfill and excavated material from site.

3.4 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with ASTM C 12, ASTM D 2321 or manufacturer's published instructions, and state or local requirements. Seal joints watertight.

B. Install pipe on minimum 4 inch bedding.

C. Lay pipe to slope gradients indicated on Drawings.

D. Install aggregate at sides and over top of pipe. Provide top cover to minimum compacted thickness equal to paving subgrade indicated on Drawings.

E. Refer to Section 31 23 33 for trenching and backfilling requirements. Do not displace or damage pipe when compacting. All pipe under any and all site paving shall have slurry backfill.

F. Connect to municipal storm sewer systems, manholes, and inlets as indicated on Drawings.

3.5 INSTALLATION - CATCH BASINS, INLETS, AND JUNCTION BOXES

A. Form bottom of excavation clean and smooth to elevation indicated on Drawings.

B. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe to be placed at required elevations.

C. Form and place cast-in-place concrete walls, sleeved at required elevation, to receive storm sewer pipe as indicated on Drawings.

D. Form and place cast-in-place top of structure as indicated on Drawings.

E. Mount grate and frame level, in grout, secured to top section at elevation indicated.

3.6 CONSTRUCTION

A. Interface with Other work: Coordinate the Work with termination of storm sewer connection outside building including connection to municipal storm sewer system.

3.7 FIELD QUALITY CONTROL

A. Site Tests:
   1. Perform inspections prior to and immediately after placing bedding.
   2. Compaction: Specified in Section 31 26 00.
      a. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.
      b. Frequency of Tests: One test for each 50 lineal feet of trench.

END OF SECTION