PROJECT MANUAL

Ohio Valley Educational Cooperative
Head Start Program: Interior Renovation and Addition

7304 Dixie Hwy.
Louisville KY 40258
ska# 2019-52.06

Bid Date: **30 March 2021**

Time of Opening: **2:00 p.m.**

Location: **Ohio Valley Educational Cooperative**
100 Alpine Rd.
Shelbyville KY 40065
TEL **502.647.3533**

ARCHITECT:
Studio Kremer Architects
1231 South Shelby Street
Louisville KY 40205
502.499.1100

MEP CONSULTANT:
Pharis Engineering
7110 Austinwood Rd.
Louisville KY 40214

STRUCTURAL ENGINEER:
Structural Services, Inc.
5948 Timber Ridge Dr., Suite 201
Prospect KY 40059

CIVIL ENGINEER
Land Design & Development, Inc.
503 Washburn Ave., Suite 101
Louisville KY 40222

INDEX TO SPECIFICATIONS

Ohio Valley Educational Cooperative
Head Start Program: Interior Renovation and Addition
7304 Dixie Highway
Louisville KY

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Invitation to Bid

Ohio Valley Educational Cooperative ("OVEC") has invited any and all interested General Contractors to submit bids for the interior renovation and addition to the existing building located at 7304 Dixie Highway in Jefferson County, Kentucky. This project will include interior renovation work to include new partition walls, new doors, new ceilings and floors, new lighting and electrical devices, new and additional plumbing fixtures and a new HVAC system. The addition to this building will include daycare classrooms, restrooms and a utility room with similar scopes of finishes to the renovated areas.

Bids are subject to the terms and conditions of this Invitation to Bid and the Contract Documents.

All General Contractors are required to schedule and attend a **mandatory** Pre-Bid Meeting on Wednesday, March 24th at one of the pre-arranged meeting times listed below. These will be scheduled on a first-come, first-served basis. Please contact Ben McClure with Studio Kremer Architects to schedule your meeting time. Occupancy during the walk throughs will be limited and wearing of masks will be required for all contractors on site at all times. ***Only those who are in attendance will be included on future correspondence, including any addenda and bid information.***

Thursday	March 18th	Documents available at Don Meredith at 12:00 pm
Wednesday	March 24th	9-9:30a; 10-10:30a; 11-11:30a; 1-1:30p; 2-2:30p
Friday	March 26th	Last day for bidder questions by 3:30 pm
Tuesday	March 30th	Bids Due by 2:00 pm

All bidder questions should be directed to Ben McClure with Studio Kremer Architects, *telephone* 502.499.1100 ext. 2589, *e-mail* benm@studiokremer.com

Sealed bids shall be submitted to Ohio Valley Educational Cooperative, 100 Alpine Drive, Shelbyville, Kentucky, 40065, attention Dr. Leon Mooneyhan prior to 2:00 pm on Tuesday, March 30, 2021. Bids will be opened and read aloud at that time. An apparent low bidder will be announced and OVEC will review the bids to identify the lowest evaluated bid price based on total price, estimated time of completion, compliance with materials list and experience with similar projects. Apparent low bidder will be requested to remain after bids are open for a short discussion with the owner.

Facsimile bids are not acceptable. Envelopes containing bids must be clearly marked on the outside of the envelope that a bid is enclosed and the title of the bid/job. Bids mailed or delivered by courier shall be inserted into two envelopes, with the inner envelope containing the bid.

Each bid shall be accompanied by a certified check, cash or bidders bond, executed by the Bidder and Surety Company, in the sum of not less than FIVE PERCENT (5%) of the amount of the base bid. The bid security is required as a guarantee that if the Proposal is accepted, a Contract will be immediately entered into and the performance of it properly secured. The Bid Guaranty shall be issued by a Surety Company that has an AM Best Company rating of 'A-' or better. Upon award of Contract, a Performance and Payment Bond for 100% of the Bid amount shall be provided to the Owner. Bids may not be withdrawn for a period of 45 days after the designated time for receipt of bids.

Copies of the bid documents will be available at Don Meredith Company, located at 2432 Crittenden Drive, Louisville, KY 40217 by 12:00pm on Thursday, March 18th at cost to the contractor. This fee is non-refundable. A set of the construction documents will be available for review during each contractor's respective pre-bid meeting time.

OVEC reserves the right to accept any bid, to reject any or all bids, to waive any informalities in bids received where such acceptance, rejection, or waiver is considered to be in its best interest, and to reject any bid where evidence or information submitted by the bidder does not satisfy OVEC that the bidder is qualified to carry out the details of the contract documents.

END OF INVITATION TO BID

BID FORM – Submit three copies in sealed envelope.

1.1 SCOPE OF WORK:
The scope of the Work is as specified or indicated in the Contract Documents.

1.2 DOCUMENTS & PLANS/SPECIFICATIONS:
The interior renovation work and building addition for Ohio Valley Education Cooperative ("OVEC") at 7304 Dixie Highway in Louisville, Kentucky shall be constructed in accordance with the Invitation to Bid and the Contract Documents. As listed in the INVITATION TO BID, General Contractors may obtain plans at Don Meredith Company, 2432 Crittenden Dr, Louisville, KY 40217 for a non-refundable payment. No digital files will be provided unless provided directly by Don Meredith.

1.3 CONTRACT TIME:
The Contractor proposes the contract period as _____ calendar days from the Notice to Proceed in order to complete the work.

A Notice to Proceed shall be mailed to the Contractor after OVEC has approved the contract bid. The Contractor shall provide all insurance documents prior to commencing work. Contractor proposes to mobilize no later than _____ days from the issuance of a Notice to Proceed.

1.4 PROJECT SCHEDULE/PAYMENT PROCEDURES:
The CONTRACTOR shall submit a proposed schedule of work and Schedule of Values on which payments will be based. Schedules shall be submitted within two weeks of Notice to Proceed.

Payment for work completed will be made once per month. Invoices for work completed less ten (10%) percent retainage shall be submitted to the Owner for approval no later then the Twentieth (20^{th}) of each month. Approved payment shall be made by OVEC to the Contractor by the Tenth (10^{th}) day of the month.

1.5 BONDS:
A Performance Bond, and a Labor & Material Payment Bond shall be required of the contractor by the OWNER prior to contract award. The bid bond shall be equal to 5% of the bid amount and shall be submitted with the Contractor's bid proposal. The Performance Bond, and Labor & Material Bond will be required within two weeks of the Notice to Proceed. Failure to provide these documents shall be justification for Contract termination at no cost to the Owner.

1.6 INDEMNIFICATION/INSURANCE:
The Contractor shall purchase and maintain at the Contractor's expense for the full contract period such insurance as in the following amounts:

Workman's Compensation:	Statutory
Employer's Compensation:	$1,000,000
Comprehensive General Liability	
Bodily Injury Liability:	$1,000,000 for each occurrence
Personal Injury Damage Liability:	$1,000,000 for each occurrence
Property Damage Liability:	$1,000,000 for each occurrence
Comprehensive Automobile Liability	
Bodily Injury Liability:	$1,000,000 for each person
	$1,000,000 for each occurrence
Property Damage Liability:	$1,000,000 for each occurrence

The insurance shall cover claims which may arise from the Work performed with this contract which includes Claim under Worker's Compensation, disability benefits and

claims for damages because of bodily injury, sickness or disease, or death of any the CONTRACTOR's Employees or for any persons other than the CONTRACTOR's Employees who may be hurt/killed as a result of the Contractor's Work on this contract.

1.7 BID FORM:

For the interior renovation and building addition work for Ohio Valley Education Cooperative at 7304 Dixie Highway, Louisville, Kentucky, 40258,

I, (name)_____The duly authorized representative of the

CONTRACTOR, (name)_____ of (address)

_____, (phone)_____

do/does hereby propose to provide all labor, equipment, material and supplies necessary to perform the renovation and addition work in accordance with the Invitation to Bid and Contract Documents for the following amount:

$_____ . _____

Having carefully examined the Instructions to Bidders, Contract Agreement, General Conditions, Specifications, and Drawings, on the above referenced project, the undersigned bidder proposes to finish all labor materials, equipment, tools, supplies, and temporary devices required to complete the work in accordance with the contract documents and any addenda listed below for the price stated herein.

Addendum No._____, Dated_____
Addendum No._____, Dated_____
Addendum No._____, Dated_____

The bid proposal shall be good for forty-five (45) calendar days from bid opening date.

The Owner reserves the right to accept any bid, to reject any or all bids, to waive any informalities in bids received where such acceptance, rejection, or waiver is considered to be in the best interest of the Owner, and to reject any bid where evidence or information submitted by the bidder does not satisfy the Owner that the bidder is qualified to carry out the details of the contract documents.

UNIT PRICES

Indicate on the lines below those unit prices to determine any adjustment to the contract price due to changes in work or extra work performed under this contract. The unit prices shall include the furnishing of all labor and materials, cost of all items, and overhead and profit for the Contractor, as well as any subcontractor involved.

WORK	PRICE	UNIT
Painting of walls per specification	$_____	/ S.F.
Trenching for utility connections (up to 6' deep)	$_____	/ L.F.
Sanitary Sewer Line Installation	$_____	/ L.F.
Domestic Water Line Installation	$_____	/ L.F.

(Provide attachment for additional unit prices)

NOTE: The bidder shall submit the above list of unit prices with the bid.

LIST OF PROPOSED SUBCONTRACTORS

List on the lines below each major branch of work and major material category for this project and the subcontractor or supplier involved with that portion of work. If the branch of work is to be done by the Contractor, so indicate.

The listing of more than one subcontractor in a work category shall invalidate the bid.

The listing of the bidder as the subcontractor for a work category certifies that the bidder has in current employment, skilled staff and necessary equipment to complete that category. The architect/engineer will evaluate the ability of all listed subcontractors to complete the work and notify the owner. Listing of the bidder as the subcontractor may invalidate the bid should the architect's review indicate bidder does not have skilled staff and equipment to complete the work category at the time the bid was submitted.

	BRANCH OF WORK/MATERIAL CATEGORY	SUBCONTRACTOR/SUPPLIER
1.	Concrete	_____
2.	Masonry	_____
3.	Wall Framing and Drywall	_____
4.	Flooring	_____
5.	Ceiling	_____
6.	Roofing	_____
7.	Door Hardware	_____
8.	Painting	_____
9.	HVAC/Plumbing	_____
10.	Electrical	_____

NOTE: The bidder shall submit the above list of Sub Contractors/Suppliers with the bid.

LIST OF MATERIALS/MANUFACTURERS

	MATERIAL DESCRIPTION BY SPECIFICATION DIVISION AND CATEGORY	MANUFACTURER
1.	Roofing	
2.	HVAC	
3.	Gypsum Board / Ceilings	
4.		
5.		

(Provide attachment for additional material/manufacturers.)

NOTE: The bidder shall submit the above list of materials with the bid.

TIME LIMIT FOR EXECUTION OF CONTRACT DOCUMENTS

In the event that a bidder's proposal is accepted by the Owner and such bidder should fail to execute the contract within ten (10) consecutive days from the date of notification of the awarding of the contract, the Owner, at its option, may determine that the awardee has abandoned the contract. The bidder's proposal shall then become null and void.

The bidder hereby agrees that failure to submit herein above all required information and/or prices can cause disqualification of this proposal.

Submitted by:

NAME OF CONTRACTOR: _____

AUTHORIZED REPRESENTATIVE: _____
Signature Date

NAME (typed or printed): _____

TITLE: _____

This form shall not be modified. Attach supplemental form of proposal information pages for project specific requirements as needed.

END OF BID FORM

REV 03/21

Public Protection Cabinet
Department of Housing, Buildings and Construction
Division of Building Code Enforcement
500 Mero Street, First Floor
Frankfort, Kentucky 40601-1987

Case Number: _____
Project Name: _____
City/County: _____

AFFIDAVIT OF ASSURANCES
PURSUANT OF KRS 198B.060(10)

Comes the Applicant, (Please Print Name) _____ and states pursuant to KRS 198B.060(10), that all contractors and subcontractors employed or that will be employed on any activity under the above referenced project shall be in compliance with the Commonwealth of Kentucky requirements for Workers' Compensation Insurance (according to KRS Chapter 342) and Unemployment Insurance (according to KRS Chapter 341).

This the _____ day of _____, 20____.

_____
CONTRACTOR, OWNER OR OWNER'S AGENT

The foregoing Affidavit of Assurance was acknowledged and sworn to before me by

_____, Applicant, on this the _____ day of _____, 20____.

_____
NOTARY PUBLIC
KENTUCKY STATE AT LARGE

MY COMMISSION EXPIRES _____, 20__.

Note: This Affidavit of Assurances shall be submitted for any project under State jurisdiction and where there is no local building official. Persons claiming exemption to the Workers' Compensation Laws should file a Waiver with the Kentucky Department of Workers' Claims, Division of Security & Compliance, 500 Mero Street, 3rd Floor, Frankfort, Kentucky 40601. (1-800-554-8601).

KENTUCKY LABOR CABINET
PREVAILING WAGE DETERMINATION
CURRENT REVISION
LOCALITY NO. 035

JEFFERSON COUNTY

Determination No. CR 1-035 2016

Date of Determination: August 1, 2016

Project No.

Type: ____Bldg _____HH

This schedule of the prevailing rate of wages for Jefferson County has been determined in accordance with the provisions of KRS 337.505 to 337.550. This determination shall be referred to as Prevailing Wage Determination No. CR 1-035 2016

Apprentices shall be permitted to work as such subject to Administrative Regulations 803 KAR 1:010. Copies of these regulations will be furnished upon request to any interested person.

Overtime is to be computed at not less than one and one-half (1 1/2) times the indicated BASE RATE for all hours worked in excess of eight (8) per day, and/or in excess of forty (40) per week. However, KRS 337.540 permits an employee and employer to agree, in writing, that the employee will be compensated at a straight time base rate for hours worked in excess of eight (8) hours in any one calendar day, but not more than ten (10) hours worked in any one calendar day, if such written agreement is prior to the over eight (8) hours in a calendar day actually being worked, or where provided for in a collective bargaining agreement. The fringe benefit rate is to be paid for each hour worked at a straight time rate for all hours worked. Fringe benefit amounts are applicable for all hours worked except when otherwise noted.

Welders will receive rate for craft in which welding is incidental.

NOTE: The type of construction shall be determined by applying the following definitions:

BUILDING CONSTRUCTION
Building construction is the construction of sheltered enclosures with walk-in access for the purpose of housing persons, machinery, equipment, or supplies. It includes all construction of such structures, the installation of utilities and the installation of equipment, both above and below grade level, as well as incidental grading, utilities and paving.

HIGHWAY CONSTRUCTION
Highway construction includes the construction, alteration or repair of roads, streets, highways, runways, taxiways, alleys, trails, paths, parking areas, and other similar projects not incidental to building or heavy construction. It includes all incidental construction in conjunction with the highway construction project.

HEAVY CONSTRUCTION
Heavy projects are those projects that are not properly classified as either "building" or "highway". For example, dredging projects, water and sewer line projects, dams, flood control projects, sewage treatment plants and facilities, and water treatment plants and facilities are considered heavy.

Ervin Dimeny, Commissioner
Department of Workplace Standards
Kentucky Labor Cabinet

CLASSIFICATIONS		BASE RATES AND FRINGE BENEFITS	
ASBESTOS/INSULATION WORKERS:			
Asbestos/Insulation Workers: (Including duct (hot/cold), Pipe Insulator & Pipe Wrapping):		BASE RATE	$27.53
		FRINGE BENEFITS	14.79
Hazardous Material Handlers: (Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging & disposing of all insulation materials, whether they contain asbestos or nor, from mechanical systems):		BASE RATE	$19.35
		FRINGE BENEFITS	10.35
BOILERMAKERS:		BASE RATE	$35.80
		FRINGE BENEFITS	24.26
BRICKLAYERS:			
Bricklayer:	BUILDING	BASE RATE	$24.03
		FRINGE BENEFITS	8.03
Caulkers, Cleaners, Pointers & Stone Masons:	BUILDING	BASE RATE	$25.37
		FRINGE BENEFITS	10.50
Layout Man & Saw Man:	BUILDING	BASE RATE	$24.36
		FRINGE BENEFITS	9.97
Brick Refractory Brick Placement Worker:	BUILDING	BASE RATE	$26.06
		FRINGE BENEFITS	10.50
Tile Setters:	BUILDING	BASE RATE	$22.64
		FRINGE BENEFITS	6.10
Tile Finisher:	BUILDING	BASE RATE	$15.42
		FRINGE BENEFITS	5.63
CARPENTERS:			
(Including acoustical ceiling installation, drywall hanging, form work, metal stud installation and soft floor (carpet/vinyl) installation):	BUILDING	BASE RATE	$24.10
		FRINGE BENEFITS	17.16
Carpenters:	HEAVY	BASE RATE	$27.50
		FRINGE BENEFITS	14.96
Piledrivermen:	HEAVY	BASE RATE	$27.75
		FRINGE BENEFITS	14.96
Divers:	HEAVY	BASE RATE	$41.63
		FRINGE BENEFITS	14.96
Form Work Only	HEAVY	BASE RATE	$27.50
		FRINGE BENEFITS	16.06
CEMENT MASONS/CONCRETE FINISHERS:			
	BUILDING	BASE RATE	$20.21
		FRINGE BENEFITS	9.70

CLASSIFICATIONS		BASE RATES AND FRINGE BENEFITS	
ELECTRICIANS:			
Electricians:	BUILDING	BASE RATE	$30.56
(includes low voltage)		FRINGE BENEFITS	16.10
ELECTRICIAN / LINE CONSTRUCTION:			
Equipment Operator:	HEAVY	BASE RATE	$29.41
		FRINGE BENEFITS	10.90
Groundmen:	HEAVY	BASE RATE	$19.53
		FRINGE BENEFITS	8.91
Linemen and Technician:	HEAVY	BASE RATE	$34.54
		FRINGE BENEFITS	13.56
Truck Driver:	HEAVY	BASE	$15.11
		FRINGE BENEFITS	8.74
ELECTRICIAN:	HEAVY	BASE RATE	$30.01
		FRINGE BENEFITS	25.65
CABLE SPLICER:	HEAVY	BASE RATE	$32.68
		FRINGE BENEFITS	18.13
ELEVATOR MECHANICS:		BASE RATE	$41.47
		FRINGE BENEFITS	29.985
GLAZIERS:		BASE RATE	$21.61
		FRINGE BENEFITS	9.84
IRONWORKERS:			
Structural & Reinforcing:		BASE RATE	$27.91
		FRINGE BENEFITS	21.11
Ornamental:		BASE RATE	$26.40
		FRINGE BENEFITS	19.15
LABORERS / BUILDING:			
Common or General, Backfiller, Carpenter Tender, Demolition:			
	BUILDING	BASE RATE	$19.75
		FRINGE BENEFITS	9.73
Grouting Mason Tender-Cement/Concrete, Power Tool Operator, Tamper (hand held/walk behind):			
	BUILDING	BASE RATE	$19.95
		FRINGE BENEFITS	9.73
Air Tool Operator:	BUILDING	BASE RATE	$18.64
		FRINGE BENEFITS	9.48
Vibrating Plate:	BUILDING	BASE RATE	$19.13
		FRINGE BENEFITS	9.64

CLASSIFICATIONS		BASE RATES AND FRINGE BENEFITS	
LABORERS / BUILDING (CONTINUED):			
Pipelayer:	BUILDING	BASE RATE	$20.36
		FRINGE BENEFITS	9.90
Mason Tender-Brick:	BUILDING	BASE RATE	$14.30
		FRINGE BENEFITS	1.13
Concrete Saw-hand held/walk behind:			
	BUILDING	BASE RATE	$19.93
		FRINGE BENEFITS	5.97
LABORERS / HEAVY			
Chipping Guns & Vibrating Plate:			
	HEAVY	BASE RATE	$22.55
		FRINGE BENEFITS	12.46
Form Stripping, Grade Checker:	HEAVY	BASE RATE	$22.30
		FRINGE BENEFITS	12.46
Concrete Saw (hand held/walk behind)			
	HEAVY	BASE RATE	$28.89
		FRINGE BENEFITS	9.85
Flagger:	HEAVY	BASE RATE	$28.72
		FRINGE BENEFITS	9.85
Blaster, Tunnel, Concrete Finishing & Powderman			
	HEAVY	BASE RATE	$24.21
		FRINGE BENEFITS	11.45
Carpenter Tender & Concrete Worker & Signal Man:			
	HEAVY	BASE RATE	$23.31
		FRINGE BENEFITS	11.45
Backfiller:	HEAVY	BASE RATE	$19.64
		FRINGE BENEFITS	10.08
Common or General:	HEAVY	BASE RATE	$19.30
		FRINGE BENEFITS	10.40
Pipelayer:	HEAVY	BASE RATE	$27.87
		FRINGE BENEFITS	0.00
MILLWRIGHTS:		BASE RATE	$26.20
		FRINGE BENEFITS	21.69
OPERATING ENGINEERS / BUILDING:			
Forklift, Crane, Drill:	BUILDING	*BASE RATE	$28.85
		FRINGE BENEFITS	14.40
Backhoe/Excavator/Trackhoe:	BUILDING	*BASE RATE	$22.27
		FRINGE BENEFITS	3.72

OPERATING ENGINEERS/BUILDING CONTINUED:

Loader:	BUILDING	BASE RATE	$29.86
		FRINGE BENEFITS	14.65
Bulldozer:	BUILDING	BASE RATE	$21.49
		FRINGE BENEFITS	3.84
Oiler:	BUILDING	BASE RATE	$26.05
		FRINGE BENEFITS	14.65
COMPACTOR	BUILDING	BASE RATE	$24.53
		FRINGE BENEFITS	0.00
HIGHLIFT	BUILDING	BASE RATE	$25.00
		FRINGE BENEFITS	0.00
Paver, asphalt, aggregate, concrete:	BUILDING	BASE RATE	$22.52
		FRINGE BENEFITS	4.00
Roller:	BUILDING	BASE RATE	$23.60
		FRINGE BENEFITS	12.65

***CRANE WITH BOOM 150 FEET AND OVER INCLUDING JIB SHALL RECEIVE $1.00 ABOVE WAGE RATE**
***CRANE WITH BOOM 250 FEET AND OVER INCLUDING JIB SHALL RECEIVE $1.50 ABOVE WAGE RATE**
ALL CRANES WITH PILING LEADS WILL RECEIVE $1.00 ABOVE THE WAGE RATE REGARDLESS OF BOOM LENGTH.

OPERATING ENGINEERS / HEAVY:

GROUP 1: A-Frame Winch Truck; Auto Patrol; Backfiller; Batcher Plant; Bituminous Paver; Bituminous Transfer Machine; Boom Cat; Bulldozer; Mechanic; Cableway; Carry-all Scoop; Crane; Carry Deck Crane; Central Compressor Plant; Clamshell; Concrete Mixer (21 cu. ft. or Over); Concrete Paver; Truck-Mounted Concrete Pump; Core Drill; Crane; Crusher Plant; Derrick; Derrick Boat; Ditching & Trenching Machine; Dragline; Dredge Operator; Dredge Engineer; Drill, Elevating Grader & Loaders; Grade-All; Gurries; Heavy Equipment Robotics Operator/Mechanic; High Lift; Hoe-Type Machine; Hoist (Two or More Drums); Hoisting Engine (Two or More Drums); Horizontal Directional Drill Operator; Hydrocrane; Hyster; KeCal Loader; LeTourneau; Locomotive; Mechanic; Mechanically Operated Laser Screed; Mechanic Welder; Mucking Machine; Motor Scraper; Orangepeel Bucket; Piledriver; Power Blade; Pumpcrete; Push Dozer; Rock Spreader, attached to equipment; Rotary Drill; Roller (Bituminous); Scarifier; Scoopmobile; Shovel; Side Boom; Subgrader; Tailboom; Telescoping Type Forklift; Tow or Push Boat; Tower Crane (French, German & other types); Tractor Shovel; Truck Crane; Tunnel Mining Machines, including Moles, Shields or similar types of Tunnel Mining Equipment:

	HEAVY	*BASE RATE	$29.95
		FRINGE BENEFITS	14.40

GROUP 2: Air Compressor (Over 900 cu. ft. per min.); Bituminous Mixer; Boom Type Tamping Machine; Bull Float; Concrete Mixer (Under 21 cu. ft); Dredge Engineer; Electric Vibrator; Compactor/Self-Propelled Compactor; Elevator (One Drum or Buck Hoist); Elevator (when used to Hoist Building Material); Finish Machine; Firemen & Hoist (One Drum); Flexplane; Forklift (Regardless of Lift Height); Form Grader; Joint Sealing Machine; Outboard Motor Boat; Power Sweeper (Riding Type); Roller (Rock); Ross Carrier; Skid Mounted or Trailer Mounted Concrete Pump; Switchman or Brakeman; Throttle Valve Person; Tractair & Road Widening Trencher; Tractor (50 HP or Over); Truck Crane Oiler; Tugger; Welding Machine; Well Points; & Whirley Oiler, Bobcat, Skid Steer/Skid Loader, Concrete Pump:

	HEAVY	*BASE RATE	$27.26
		FRINGE BENEFITS	14.40

OPERATING ENGINEERS / HEAVY CONTINUED:

GROUP 3: All Off Road Material Handling Equipment, Including Articulating Dump Truck; Greaser on Grease Facilities servicing Heavy Equipment:

	HEAVY	*BASE RATE	$26.65
		FRINGE BENEFITS	14.15

GROUP 4: Bituminous Distributor; Burlap & Curing Machine; Cement Gun; Concrete Saw; Conveyor; Deckhand Oiler; Grout Pump; Hydraulic Post Driver; Hydro Seeder; Mud Jack; Oiler; Paving Joint Machine; Power Form Handling Equipment; Pump; Roller (Earth); Steersman; Tamping Machine; Tractor (Under 50 HP); & Vibrator:

	HEAVY	*BASE RATE	$26.96
		FRINGE BENEFITS	14.40
Backhoe/Excavator/Trackhoe:	HEAVY	BASE RATE	$26.76
		FRINGE BENEFITS	13.00
Bulldozer:	HEAVY	BASE RATE	$24.60
		FRINGE BENEFITS	15.64
Loader:	HEAVY	BASE RATE	$26.50
		FRINGE BENEFITS	13.00
Mechanic:	HEAVY	BASE RATE	$25.81
		FRINGE BENEFITS	13.00
Roller:	HEAVY	BASE RATE	$23.39
		FRINGE BENEFITS	13.00
Trencher:	HEAVY	BASE RATE	$26.34
		FRINGE BENEFITS	12.58
Forklift:	HEAVY	BASE RATE	$27.38
		FRINGE BENEFITS	14.15

***Cranes with booms 150 ft. & over (including JIB) and where the length of the boom in combination with the length of the piling leads equals or exceeds 150 ft - $1.00 over Group 1 rate.**

***Cranes with booms 250 ft. & over (including JIB) and where the length of the boom in combination with the length of the piling leads equals or exceeds 150 ft - $1.50 over Group 1 rate.**

All crane operators where the length of the boom in combo with the length of piling leads equals or exceeds 150 ft shall receive$1.00 over Group 1 rate.

**Employees assigned to work below ground level are to be paid 10% above basic wage rate.
This does not apply to open cut work.**

PAINTERS:

Spray:	BUILDING	BASE RATE	$22.81
		FRINGE BENEFITS	11.87
Brush, Roller:		BASE RATE	$21.28
		FRINGE BENEFITS	11.94
Sign Painter & Erector:	BUILDING	BASE RATE	$20.23
		FRINGE BENEFITS	3.25

CLASSIFICATIONS		BASE RATES AND FRINGE BENEFITS	
PAINTERS / HEAVY CONTINUED:			
Spray, Sandblast, Power Tools, Waterblast & Steam Cleaning:			
	HEAVY	BASE RATE	$19.00
		FRINGE BENEFITS	12.02
Brush & Roller	HEAVY	BASE RATE	$18.50
		FRINGE BENEFITS	12.02
PLUMBERS:		BASE RATE	$32.00
		FRINGE BENEFITS	19.13
PIPEFITTERS:		BASE RATE	$32.00
(includes HVAC Pipe & Unit Installation)		FRINGE BENEFITS	19.13
ROOFERS		BASE RATE	$22.03
		FRINGE BENEFITS	9.82
SHEETMETAL WORKERS (HVAC duct installation)		BASE RATE	$29.45
		FRINGE BENEFITS	18.70
SPRINKLER FITTERS:		BASE RATE	$31.35
(Fire Sprinklers)		FRINGE BENEFITS	18.02
TRUCK DRIVERS / BUILDING:			
10 Yard Truck:	BUILDING	BASE RATE	$16.27
		FRINGE BENEFITS	1.50
Dump Truck:	BUILDING	BASE RATE	$23.60
		FRINGE BENEFITS	8.03
TRUCK DRIVERS / HEAVY:			
Mobile Batch Truck Tender:	HEAVY	BASE RATE	$16.57
		FRINGE BENEFITS	7.34
Greaser, Tire Changer, & Mechanic Tender:			
	HEAVY	BASE RATE	$16.68
		FRINGE BENEFITS	7.34
Single Axle Dump & Flatbed, Semi-Trailer or Pole Trailer when used to pull building materials & equipment; Tandem Axle Dump; Distributor; Mixer, & Truck Mechanic:			
	HEAVY	BASE RATE	$16.86
		FRINGE BENEFITS	7.34
Euclid, Other Heavy Earthmoving Equipment & Lowboy; Articulator Cat Truck & 5 Axle Vehicle; Winch & A-Frame when used in transporting materials; Ross Carrier; Fork Lift Truck when used to transport building materials; & Drivers on Pavement Breaker:	HEAVY	BASE RATE	$16.96
		FRINGE BENEFITS	7.34
Dump Truck:	HEAVY	BASE RATE	$16.80
		FRINGE BENEFITS	4.06

CLASSIFICATIONS		BASE RATES AND FRINGE BENEFITS	
BRICKLAYER:	HIGHWAY	BASE RATE	$25.96
		FRINGE BENEFITS	10.64
CARPENTER:	HIGHWAY	BASE RATE	$27.50
		FRINGE BENEFITS	16.06
DIVER:	HIGHWAY	BASE RATE	$41.63
		FRINGE BENEFITS	16.06
PILEDRIVER:	HIGHWAY	BASE RATE	$27.75
		FRINGE BENEFITS	16.06
ELECTRICIAN:	HIGHWAY	BASE RATE	$30.56
		FRINGE BENEFITS	16.10
IRONWORKERS	HIGHWAY	BASE RATE	$27.91
		FRINGE BENEFITS	21.11

LABORERS / HIGHWAY:

Group 1: aging and curing of concrete, asbestos abatement worker, asphalt plant, asphalt, batch truck dump, carpenter tender, cement mason tender, cleaning of machines, concrete, demolition, dredging, environmental-nuclear, radiation, toxic & hazardous waste – level D, flagperson, grade checker, hand digging & hand back filling, highway marker placer, landscaping, mesh handler & placer, puddler, railroad, rip-rap & grouter, right of way, sign, guard rail & fence installer, signal person, sound barrier installer, storm & sanitary sewer, swamper, truck spotter & dumper, wrecking of concrete forms, general cleanup.

	HIGHWAY	BASE RATE	$22.71
		FRINGE BENEFITS	11.05

Group 2: batter board man (sanitary & storm sewer), brickmason tender, mortar mixer operator, scaffold builder, Burner & welder, bushammer, chainsaw operator, concrete saw operator, deckhand scow man, dry cement Handler, environmental – nuclear, radiation, toxic & hazardous waste – Level C, forklift operator for masonry, form setter, green concrete cutting, hand operated grouter & grinder machine operator, jackhammer, pavement breaker, paving joint machine, pipelayer, plastic pipe fusion, power driven Georgia Buggy & wheel barrow, power post hole digger, precast manhole setter, walk behind tamper, walk behind trencher, sand blaster, concrete chipper, surface grinder, vibrator operator, wagon driller.

	HIGHWAY	BASE RATE	$22.96
		FRINGE BENEFITS	11.05

Group 3: asphalt lutemen & raker, gunnite nozzleman, gunnite operator & mixer, grout pump operator, side rail setter, rail paved ditches, screw operator, tunnel (free air) water blaster:

	HIGHWAY	BASE RATE	$23.01
		FRINGE BENEFITS	11.05

Group 4: Caisson worker (free air), cement finisher, environmental-nuclear, radiation, toxic & hazardous waste Levels A & B, miner & driller (free air), tunnel blaster & tunnel mucker (free air), directional & horizontal boring, air Track drillers (all types), powderman & blasters, troxler & concrete tester if Laborer is utilized.

	HIGHWAY	BASE RATE	$23.61
		FRINGE BENEFITS	11.05

OPERATING ENGINEERS/ HIGHWAY

GROUP 1 - A-Frame Winch Truck; Auto Patrol; Backfiller; Batcher Plant; Bituminous Paver; Bituminous Transfer Machine; Boom Cat; Bulldozer; Mechanic; Cableway; Carry-All Scoop; Carry Deck Crane; Central Compressor Plant; Cherry Picker; Clamshell; Concrete Mixer (21 cu. ft. or Over); Concrete Paver; Truck-Mounted Concrete Pump; Core Drill; Crane; Crusher Plant; Derrick; Derrick Boat; Ditching & Trenching Machine; Dragline; Dredge Operator; Dredge Engineer; Elevating Grader & Loaders; Grade-All; Gurries; Heavy Equipment Robotics Operator/Mechanic; High Lift; Hoe-Type Machine; Hoist (Two or More Drums); Hoisting Engine (Two or More Drums); Horizontal Directional Drill Operator; Hydrocrane; Hyster; KeCal Loader; LeTourneau; Locomotive; Mechanic; Mechanically Operated Laser Screed; Mechanic Welder; Mucking Machine; Motor Scraper; Orangepeel Bucket; Overhead Crane; Piledriver; Power Blade; Pumpcrete; Push Dozer; Rock Spreader, attached to equipment; Rotary Drill; Roller (Bituminous); Rough Terrain Crane; Scarifier; Scoopmobile; Shovel; Side Boom; Subgrader; Tailboom; Telescoping Type Forklift; Tow or Push Boat; Tower Crane (French, German & other types); Tractor Shovel; Truck Crane; Tunnel Mining Machines, including Moles, Shields or similar types of Tunnel Mining Equipment

HIGHWAY	BASE RATE	$29.95
	FRINGE BENEFITS	14.40

Group 2: Air Compressor (Over 900 cu. ft. per min.); Bituminous Mixer; Boom Type Tamping Machine; Bull Float; Concrete Mixer (Under 21 cu. ft.); Dredge Engineer; Electric Vibrator; Compactor/Self-Propelled Compactor; Elevator (One Drum or Buck Hoist); Elevator (When used to Hoist Building Material); Finish Machine; Firemen & Hoist (One Drum); Flexplane; Forklift (Regardless of Lift Height); Form Grader; Joint Sealing Machine; Outboard Motor Boat; Power Sweeper (Riding Type); Roller (Rock); Ross Carrier; Skid Mounted or Trailer Mounted Conrete Pump; Skid Steer Machine with all Attachments; Switchman or Brakeman; Throttle Valve Person; Tractair & Road Widening Trencher; Tractor (50 H.P. or Over); Truck Crane Oiler; Tugger; Welding Machine; Well Points;& Whirley Oiler

HIGHWAY	BASE RATE	$27.26
	FRINGE BENEFITS	14.40

Group 3: All off road material handling equipment, including articulating dump trucks, greaser on grease facilities servicing heavy equipment:

HIGHWAY	BASE RATE	$27.68
	FRINGE BENEFITS	14.40

Group 4: bituminous distributor, burlap & curing maching, cement gun, concrete saw, conveyor, deckhand oiler, grout pump, hydraulic post driver, hydro seeder, mud jack, oiler, paving joint machine, power form handling equipment, pump, roller (earth), steerman, tamping machine, tractor (under 50 hp) & vibrator:

HIGHWAY	BASE RATE	$26.96
	FRINGE BENEFITS	14.40

Cranes with booms 150 ft & over including JIB and where length of the boom in combination with the length of the piling leads equals or 150 ft - $1.00 over Group 1 rate.

PAINTERS:

Brush & Roller	HIGHWAY	BASE RATE	$18.50
		FRINGE BENEFITS	11.97
Spray, Sandblast, Power tools, Waterblast & Steam Cleaning:			
	HIGHWAY	BASE RATE	$19.50
		FRINGE BENEFITS	11.97

PLUMBERS:	HIGHWAY	BASE RATE	$32.00
		FRINGE BENEFITS	19.13

TRUCK DRIVERS

Group 1: Mobile batch truck tender:

HIGHWAY	BASE RATE	$16.57
	FRINGE BENEFITS	7.34

Group 2: Greaser, tire changer, mechanic tender:

HIGHWAY	BASE RATE	$16.68
	FRINGE BENEFITS	7.34

Group 3: Single axle dump, flatbed, semi trailer or pole trailer when used to pull building materials and equipment, tandem axle dump, distributor, mixer & truck mechanic

HIGHWAY	BASE RATE	$16.86
	FRINGE BENEFITS	7.34

Group 4: Euclid & other heavy earth moving equipment & lowboy, articulator cat, 5-axle vehicle, winch & A frame when used in transporting materials, ross carrier, forklift when used to transport building materials & pavement breaker.

HIGHWAY	BASE RATE	$16.96
	FRINGE BENEFITS	7.34

END OF DOCUMENT
CR 1-035 2016
August 1, 2016

VECTOR ENGINEERS, INC
GEOTECHNICAL · MATERIALS · GEOSCIENCES
A SUBSIDIARY OF CTL ENGINEERING, INC

March 17, 2021

Mr. Mark Elmore
Ohio Valley Educational Co-Op
100 Alpine Drive
Shelbyville, Kentucky 40065

c/o Jeremy Adams, AIA
Architect/ Partner
Studio Kremer Architects
1231 South Shelby Street
Louisville, Kentucky 40203

Subject: Report of Geotechnical Subsurface Characterization
7304 Dixie Highway Addition
Louisville, Kentucky
Vector Project 21050023SHE

Dear Mr. Elmore,

VECTOR Engineers, Inc., has completed the geotechnical subsurface characterization for the proposed addition to the existing building at 7304 Dixie Highway. This exploration was in general accordance with our proposal No. 21050009SHEPPL, dated February 1, 2021, which was accepted by Mr. Leon Mooneyhan with Ohio Valley Educational Co-Op (OVEC). The purpose of this exploration was to obtain subsurface data to develop site preparation and foundation recommendations for the proposed addition. This report describes our understanding of the project, summarizes our findings, discusses the geotechnical concerns, and contains our engineering recommendations.

PROJECT INFORMATION

Project information was provided to us through correspondence with Mr. Jeremy Adams with Studio Kremer Architects. We have been provided with a set of drawings entitled *Addition & Renovation, OVEC Head Start,* 10 pages, prepared by Structural Services, Inc. dated December 3, 2020.

We understand that OVEC plans to renovate the building located at 7304 Dixie Highway on the south side of Louisville, Kentucky. As part of the renovations, an

approximately 1,600 square-foot addition is proposed. The drawings indicate that the new addition will be single-story and wood-framed with a grade supported floor slab to match the existing building. The drawings indicate that the continuous footings have been designed using an allowable soil bearing pressure of 1,500 psf. The drawings do not indicate any spread column footings. Settlement tolerances for the building are assumed to be ¾-inches differential between columns and 1 inch total.

Based on our observations of the site grades, we anticipate that less than 2 feet of cut or fill will be required to achieve a final grade. We understand that cut or fill slopes will be no steeper than 3 horizontal to 1 vertical (3H:1V). There are no retaining walls or below grade structures proposed for the development.

FINDINGS

As part of our geotechnical site characterization, we observed site conditions, reviewed regional geological maps, performed a subsurface exploration, and observed the groundwater conditions. The following sections report our findings.

Site Surface Conditions

Mr. Matt Slusser, PE, with Vector Engineers, observed the surface conditions on March 4, 2021, to aid in interpreting the subsurface data and to detect conditions that could affect the project. The following is a general description of the site.

The OVEC building is in a commercial area along Dixie Highway. The property is bordered by commercial properties to the south, east, and north. The west boundary of the property is formed by a concrete-lined drainage ditch with residential neighborhoods further west. The proposed addition is located on the south side of the building. This area is generally flat with about 2 feet of elevational relief across the addition footprint. The eastern portion of the addition area is grass-covered, while the western portion is covered with trees and brush (Figure 1). Drainage was judged to be good, as the site appeared to drain toward the ditch to the west.

The existing building did not exhibit obvious settlement cracking in the brick veneer (Figure 2). However, abundant stairstep cracking in the brick veneer and

cracking of the foundation walls was observed in the building just south of the proposed addition (Figures 3 through 6). The age of each building is unknown; however, based on historical aerial imagery, both buildings were constructed over 30 years ago.

Figure 1: The proposed addition area is relatively flat with brush and trees on the west side.

Figure 2: The proposed addition will be located along the south wall of the existing building.

Figure 3: Stairstep cracking repairs on the south wall of the building to the south of the addition site. This type of cracking is commonly observed in buildings experiencing differential settlement.

Figure 4: Stairstep cracking repairs on the east wall of the building to the south of the addition site.

Figure 5: Stairstep cracking repairs on the north wall of the building to the south of the addition site.

Figure 6: Cracks in the footing wall of the building to the south of the addition site.

Area Geology

The Geologic Map of the Louisville West and Lanesville Quadrangles, Kentucky, (GQ-1202), published by the U.S. Geological Survey indicates the site is underlain by glacial outwash deposits from the Wisconsinan glaciation. These deposits consist of yellowish brown and gray silt and clay near the surface transitioning to very fine to coarse sand and brownish gray to reddish brown gravel and cobbles at deeper depths. The sand and gravel are mostly less than about 3 to 4 inches in diameter and generally increase in size with depth.

Figure 7: The site is located near the transition between glacial outwash deposits (yellow shading) and alluvium (white shading). However, the addition (red) is reportedly underlain by the outwash deposits.

The Kentucky Geological Survey indicates that the geology at the site is non-Karst. Our borings encountered soil specimens that generally agree with the published geologic information.

Subsurface Exploration

After researching the readily available published geological information, a preliminary subsurface profile is formulated. The soil boring program is a means to substantiate the assumptions made in our preliminary profile and assist us in developing a representative subsurface profile of the site. The subsurface conditions

will vary between borings thereby making the development of a representative and reliable profile dependent upon the number of borings or data points obtained during the field operations. The following discusses our interpretation of the subsurface profile on the site based on the published information and the results of our borings. The individual Boring Logs attached to this report will have specific details at the location of the boring.

Field Exploration and Laboratory Testing Methods

We drilled three borings to explore the subsurface conditions across the site. Mr. Matt Slusser, PE, directed drilling operations. The boring locations were located in the field by measuring distances from landmarks (i.e. – building corners and the edge of pavements) using a cloth tape measure. Boring surface elevations were interpolated from the Kentucky Digital Elevation Model (DEM) LiDAR data. Because of the methods used, the soil boring locations shown on the Boring Location Plan and the elevations are shown on the Boring Logs in the attachments are approximate. The stratification lines shown on the Boring Logs represent the approximate boundaries between soil or rock types. The transitions may be more gradual than shown.

We obtained soil samples using a split-barrel sampler driven by an automatic hammer assembly in general accordance with ASTM D1586. The soil samples were sealed in the field and returned to our laboratory where Mr. Slusser assigned the applicable laboratory tests. The soil samples were visually classified, by Mr. Slusser, the project geotechnical engineer, according to the Unified Soil Classification System (USCS, ASTM D2487). We conducted moisture contents on several soil samples. Atterberg limits tests and a grain size analysis were performed on selected soil samples to determine the engineering properties of the soil. The laboratory data and descriptions of these tests are included in the attachments.

The procedures used by Vector Engineers for field and laboratory sampling and testing are in general accordance with ASTM procedures and established engineering practice. A brief summary of the field and laboratory procedures is included in the attachments.

Subsurface Conditions

Our borings encountered about 6 inches of topsoil at the surface. Below the topsoil, our borings encountered fill soils extending to depths of about 1½ to 3 feet (approximate elevation of 458 feet). These fill soils consisted of silty lean clay with varied amounts of crushed stone, sand, and debris (asphalt, concrete, and brick fragments). Standard penetration (SPT) N-values within the fill ranged from 10 to 17 blows per foot (bpf), indicating stiff to very stiff soil consistency.

Beneath the fill, our borings encountered silty lean clay and clayey silt extending to about 16 feet. SPT N-values within the stratum ranged from 2 to 13 bpf with a median value of 8 bpf. The penetration values indicate generally firm soil consistency. However, soft soils were encountered in the upper 6 feet of Boring B-2 and the upper 9 feet of Boring B-3. Soil plasticity tests (Atterberg limits) performed on two soil samples from our borings indicated liquid limits ranging of 26 and 29 with corresponding plasticity indexes of 9 and 11. Using these laboratory tests and the USCS, we classified soil samples as "CL" (a low plasticity clay).

Below the clay and silt, Boring B-2 encountered sand extending to the termination depth of the boring. The sand was observed to be fine and silty to a depth of about 28 feet. Below 28 feet, the silt content generally decreased with depth as the particle size of the sand generally increased. Based on our visual observation and a sieve analysis on a sample from 30 feet deep, we classified the soils as:

- 16 to 28 feet deep: "SM", a fine, silty sand (more than 12% fines[1])
- 28 to 48 feet deep: "SP-SM", a fine sand with a little silt (between 5 and 12% fines)
- 48 to 60 feet: "SP", a clean sand of uniform size (less than 5% fines)

SPT N-values above 48 feet in the sand ranged from 5 to 12 bpf, indicating loose to firm sand. Below 48 feet, the SPT N-values ranged from 24 to 40 bpf, indicating very firm to dense sand.

[1] Fines refers to clay and silt size particles (material passing a 200 sieve).

Borings B-1 and B-3 were terminated at 15½ feet prior to encountering sand. Boring B-2 was terminated at 60½ feet in dense sand.

Groundwater

Groundwater was encountered in Boring B-2 at a depth of 38 feet (approximate elevation of 423 feet) during drilling. Since drilling mud and water were used to advance the boring through the sand, an accurate water level reading could not be obtained after drilling. Borings B-1 and B-3 did not encounter groundwater prior to termination.

Groundwater levels fluctuate with seasonal and cyclical climatic variations in precipitation and may be either higher or lower at other times. Typically, water conditions affecting construction projects in the site area are related to trapped or perched water which occurs in irregular, discontinuous locations within the soil overburden, or near the soil/rock interface. When these water bearing strata are exposed in excavations, such as cut slopes, utility or footing trenches, they can produce widely varying seepage durations and rates depending on recent rainfall activity and other site specific characteristics of the area. These perched water sources are often not linked to the more continuous relatively stable groundwater table that typically occurs at greater depths.

DISCUSSION

Based on the results of our borings and our understanding of the proposed project, we believe the project site is suitable for the proposed building addition. However, the soft soils at this site represent a significant geotechnical challenge and financial impact to the proposed development. The following subsections provide additional details and discuss other geotechnical concerns.

Soft Soils

Two of our borings (B-2 and B-3) encountered soft soils extending to depths ranging from 6 to 9 feet deep. Poor soils are commonly encountered in the flat low-lying areas along the Ohio River. In this section, we have discussed the impact of soft soils on foundations and floor slab.

Soft Soil Beneath Foundations

The provided drawings indicate that the building will be supported on continuous footings ranging from 2 to 3 foot in width bearing about 2½ feet below existing grade with a stated bearing pressure of 1,500 psf. The soft soils encountered in our borings are not suitable for support of this bearing pressure. Therefore, we recommend undercutting the soft bearing soils and replacing with compacted crushed stone. We also considered underpinning using push piers or helical piers as well as enlarging the foundations based on a revised allowable bearing pressure. However, we believe that these options are not likely to be economical for the small addition.

Soft Unstable Subgrade for Floor Slab Support

Generally, we anticipate the native soils will be stable if constructed during dry weather; however, we anticipate some areas of stabilization may be required. The soils in the low-lying areas appear to have collected water and are damp. These soils will likely need to be stabilized and will not pass a proofroll. On the high ground, we anticipate the soils will be more stable.

When unstable subgrade is encountered, there are several methods available to stabilize the subgrade. Frequently, the construction team must weigh cost with a delay of schedule. If the construction schedule can allow some extra weeks for drying and working the damp soils, then expensive overruns can be avoided.

When unstable subgrade is encountered, Vector Engineers should be contacted to assist the construction team to select the best method for the project needs. Some typical subgrade stabilization methods include:

- *Scarifying and Drying*: In this method, the soil subgrade is plowed up, allowed to dry, and then recompacted.
- *Soil Swap*: Damp soils can be undercut and replaced with other soil from the site that is near the optimum moisture content. The damp soils are stockpiled, allow to dry, and then recompacted in the borrow source location.
- *Undercut and Replace with Granular Fill*: Generally, the fastest but most expensive method is to undercut 18 to 36 inches of soil and replace with granular fill. The granular fill typically consists of crushed limestone with gradation sizes of KYTC No. 2, No. 3, and No. 57.

- *Chemical Stabilization or Modification*: The addition of cement or lime to the soil will create a hard surface resistant to future surface water softening (waterproof). The process requires specialized equipment and typically a specialty contractor. Once implemented, the subgrade will remain stable and resistant to moisture fluctuations but must be protected from repeated heavy construction traffic. The OVEC site is too small for this option.

Previously Placed Fill

Each of our borings on site encountered previously placed fill consisting of lean clay with crushed stone, sand, and construction debris (asphalt, concrete, and brick fragments). Based on the presence of construction debris, we believe that the fill may not have been placed with quality control (uncontrolled fill).

Whenever uncontrolled fill is encountered, there is a risk of differential settlement, which could result in differential settlement of the foundations, cracked floor slabs, or depression/dip in pavements. Uncontrolled fills often contain deleterious or miscellaneous materials that may decay over time, causing subsidence at the surface. Also, uncontrolled fills can contain zones of less compact materials which will settle under their weight or new loading.

The fill encountered on-site contained miscellaneous construction debris. However, our borings did not encounter deleterious materials within the fill. Additionally, our exploration did not encounter the fill below about 3 feet in depth and the SPT N-values obtained within the fill indicate that the fill has a stiff to very stiff consistency, indicating that the fill was likely placed with compactive effort. Based on our observations, we believe the risks associated with the uncontrolled fill are low at this site. However, we recommend thorough proofrolling of the site to identify unsuitable soils prior to construction of foundations or floor slabs. These unsuitable soils should be undercut and replaced with structural fill placed per the recommendations in this report to further reduce the risk associated with the uncontrolled fill.

Site Degradation During Construction

The on-site soils are formed by glacial outwash deposits of silt and fine sand. Our experience and published data suggest that these soils have a high silt content,

often provide poor subgrade support, will deteriorate from repeated passes of construction equipment, are sensitive to moisture content, and are difficult to compact, especially when wet.

During fill placement, it may be necessary to limit fill placement to two lifts per day. The newly placed fill may begin to pump. The site soils will need to rest and regain their strength after which fill placement may continue.

A granular base material may be required on haul roads or staging areas to protect and confine silt subgrade soils in any areas where significant construction traffic is anticipated. If haul roads are not constructed, significant and repeated undercutting of softened and deteriorated subgrade soils may be required.

LIMITATIONS OF RECOMMENDATIONS

This report has been prepared for the exclusive use of OVEC for specific application to the project site. Our recommendations have been prepared using generally accepted standards of geotechnical engineering practice in the Commonwealth of Kentucky. No other warranty is expressed or implied. This company is not responsible for the conclusions, opinions, or recommendations of others based on these data. Additionally, our conclusions and recommendations are based on the information provided to us, the data obtained from our subsurface exploration, and our experience. They do not reflect variations in the subsurface conditions which are likely to exist between borings and in unexplored areas of the site. These variations result from the geologic variability of the subsurface conditions. If conditions are different than those encountered in our exploration, it will be necessary for us to re-evaluate our conclusions and recommendations based upon on-site observation of the conditions. For more information on the use and limitations of this report, please read the GBA document included in the attachments.

If the overall design or location of the project is changed, the recommendations contained in this report must not be considered valid unless our firm reviews the changes and our recommendations are modified. When the design is finalized, we should be allowed to provide the additional service of reviewing the grading plan and

applicable portions of the project specifications. This review will allow us to check whether these documents are consistent with the intent of our recommendations.

We may recommend that a supplementary exploration be performed when significant design changes such as the movement of the project are incorporated into the final design after the geotechnical exploration has been completed. This supplementary exploration may include obtaining additional soil data along the new alignment to provide specific recommendations.

RECOMMENDATIONS

Earthwork

Since a grading plan was not supplied to us at the time of this report preparation, our preliminary grading estimates suggest less than 2 feet of cut or fill will be required to achieve a final grade.

Stripping

Topsoil and debris should be stripped to prepare the site for construction. The site contains undocumented fill will may have pockets of debris which will need to be removed. The stripping should extend 5 feet outside of the pavement and building areas. Abandoned buried utilities and utility trench backfill should also be removed. Vector's representative should observe site stripping as previously unexplored or unknown conditions could become evident during these operations. Vector should be contacted if unusual or unexpected subsurface conditions (i.e. – such as buried underground structures) are encountered during stripping operations.

Subgrade Evaluation (Proofrolling)

After stripping, the subgrade should be evaluated by a geotechnical engineer by observing proofrolling. Proofrolling consists of applying repeated passes on the subgrade with a fully loaded dump truck or similar rubber-tired vehicle. Due to the low plasticity soils, proofrolling should be limited to 2 passes. Repeated passes will cause a temporary loss of soil strength. Any materials judged to deflect excessively under the

wheel loads should be undercut to more stable soils or stabilized in-place before placing fill. In the pervious section entitled *Soft Unstable Subgrade for Floor Slab Support,* we have discussed different methods for stabilizing subgrade soils.

Structural Fill Placement

The following section applies to most soil fill placement including clay, silt, fine sand, clayey or silty sand. It is also applicable to densely graded aggregate (DGA) crushed stone. However, it does not apply to an open-graded stone such as No. 57, No. 23, and shot rock fill.

After subgrade evaluation, fill areas may be brought to the planned subgrade elevations with structural fill. Ideally, the structural fill is defined as inorganic natural soil with maximum particle sizes of 3 inches and a maximum dry density of at least 95 pounds per cubic foot (pcf) when tested by the standard Proctor method (ASTM D698). Limit the fill materials to a Plasticity Index less than 35. The on-site, native soils will meet this criterion.

Structural fill should be placed in relatively thin (6 to 8-inch) layers and compacted to at least 95 percent of the soil's maximum dry density as determined by the standard Proctor compaction test. Additionally, the moisture content of the fill material should be maintained within 2 to 3 percent of its standard Proctor optimum moisture content depending upon the results of the Proctor tests. We anticipate any new fill will come from an off-site borrow source. The fill source should be tested and approved by a geotechnical engineer before it is allowed to be used as fill.

Field Density Testing

In-place density testing must be performed as a check that the previously recommended compaction criteria (density and moisture) have been achieved. This allows our project engineer to monitor the quality of the fill construction and verify that the design criteria are being achieved in the field. The performance of slabs-on-grade will depend directly on the quality of the fill construction. The testing frequency for density tests performed on a full-time basis can be determined by our personnel based on the area to be tested, the grading equipment used, and the construction schedule.

Tests should be performed at vertical intervals of at least one-foot as the fill is being placed. We recommend that an engineering technician working under the direction of our project geotechnical engineer perform the density tests.

Foundations

The exterior and interior foundations should be designed with a minimum 30-inch embedment to protect against frost heave. Traditionally, interior foundations may be embedded less; however, the additional embedment is required at this site to enhance the bearing capacity. We also recommend foundations have a minimum footing width of 18 inches to lessen the risk of differential settlement and to reduce the risk of punching failure. This footing width also allows for entry into the excavation to remove loose debris and for placement of the reinforcing steel. The drawings currently show footing widths ranging from 2 to 3 feet, which meets this criterion. Reinforcing steel should be clean and dry prior to concrete placement.

Soft Bearing Soils beneath Foundations

Two borings encountered soft soils on-site that are not suitable for the required 1,500 psf allowable bearing pressure that the footings have been designed for. Therefore, the soft bearing soils must be undercut and backfilled with crushed stone as discussed below. Vector may be able to reduce the extents and/or depths of the undercuts at the time of construction by performing foundation observations and testing of the foundation bearing materials. A manually operated dynamic cone penetrometer (DCP) should be used and the soils should be tested to a minimum depth equal to the 1.5 times the footing width. Where soft soils are encountered, DCP test may need to be deeper. We anticipate that up to 75 percent of the foundation bearing soils will not be suitable for the recommended bearing pressure depending on the bearing elevations.

Where unsuitable (soft) soils are encountered, we recommend a soil improvement consisting of limited undercutting beneath the foundations, replacement with a crushed stone, and bearing the foundations on the crushed stone. Figure 8 illustrates our recommendations. The following guidelines are provided for creating the stone pad. In our illustration and discussion, we use the term “B” to refer to the foundation width

dimension. The continuous strip footings on site are shown to be 2 to 3 feet wide in the provided drawings.

- Foundation bearing shall be at least 30 inches below the exterior grade (i.e. foundation embedment).
- From the foundation bearing elevation, undercut to a depth of 1.5B (1.5 x the footing width) but not less than 2 feet (unless recommended by Vector's geotechnical engineer).
- The width of the undercut shall be 2B but not less than 2 feet wider than the footing (i.e. For a 3-foot wide footing, the excavation would be 6 feet wide)
- Line the excavation with a KYTC Type 2, non-woven geotextile fabric.
- Backfill the undercut with KYTC No. 57 crushed stone up to the bearing elevation. Place the granular fill in 8 to 10-inch lifts and compact with hand compactor (i.e. plate compactor)
- Form the footing such that the foundation will be centered on the granular pad.

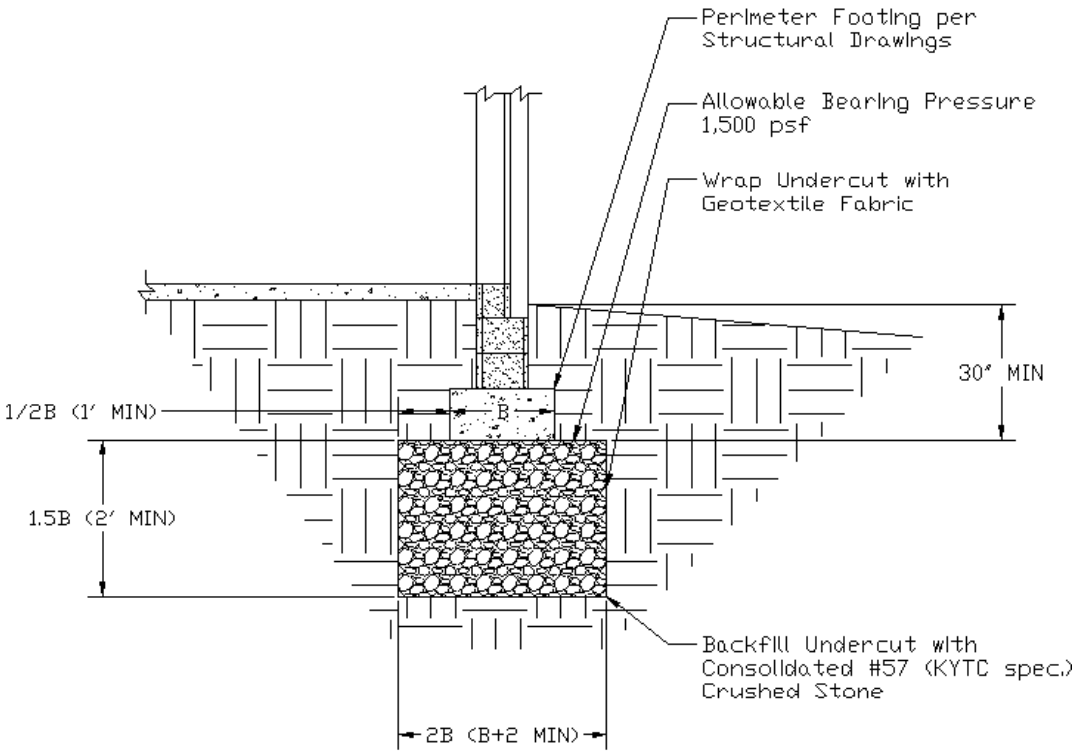


Figure 8: Typical section showing undercut/backfill recommendation.

Floor Slab

We anticipate the existing fill soil will be supporting the slab-on-grade floor slab. Provided the site is proofrolled and unsuitable soils are undercut and replaced with structural fill per the recommendations above, we recommend a k-value (modulus of subgrade reaction) of 60 pounds per cubic inch (pci) be used in determining the slab thickness.

We recommend control joints be placed in the slab around columns and along footing supported walls so these elements may move independently. We recommend a 6-inch thick (minimum) layer of compacted, well-graded crushed stone directly beneath the slab to enhance support and provide a working base for the construction of the floor slab. The crushed stone should be moist, but not wet, as the concrete is placed to reduce curling of the slab as the concrete cures.

Between completion of grading and slab construction, floor slab subgrades are often disturbed by weather, footing, and utility line installation, and other construction activities. For this reason, the subgrade should be evaluated by a geotechnical engineer immediately before constructing the slab. During this evaluation, the subgrade should be proofrolled with relatively heavy rubber-tired equipment. Areas judged by the geotechnical engineer to perform unacceptably under the moving load should be undercut and replaced with dense graded crushed stone compacted to at least 95 percent of its standard Proctor maximum dry density.

Seismic Site Classification

The seismic design procedures outlined in the NEHRP (National Earthquake Hazard Reduction Program) guidelines mandate structural design loads be based on the seismic accelerations of the site. Based on the results of our exploration and the geology of the area, we assigned a site seismic classification of "D". Using the OSHPD[2] application as recommended by U.S. Geologic Survey (USGS) and the site coordinates,

[2] California Office of Statewide Health Planning and Development

the seismic design values from the 2010 ASCE-7 Standard were determined and are listed in the attachment.

Valediction

Vector Engineers, Inc. appreciates the opportunity to provide you with these geotechnical services. Should you have questions or require any additional information, please contact us.

Respectfully submitted,
VECTOR ENGINEERS, INC.

Matthew J. Slusser, PE
Geotechnical Group Manager
Licensed Kentucky 32059

STATE OF KENTUCKY
MATTHEW JONATHAN SLUSSER
32059
LICENSED PROFESSIONAL ENGINEER

W. Robert Folsom, PE
Chief Engineer

Attachments:

- GBA - Important Information about This Geotechnical-Engineering Report
- Site Location Map
- Aerial Photograph
- Boring Location Plan
- Boring Logs
- Field Testing Procedures
- Laboratory Data Summary
- Atterberg Limits
- Grain Size Distribution Report
- Laboratory Testing Procedures
- OSHPD Seismic Design Parameters

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.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in 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.

Geotechnical-Engineering 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 given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives 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 this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- 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. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be,* and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include 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.

Geoenvironmental Concerns Are Not Covered

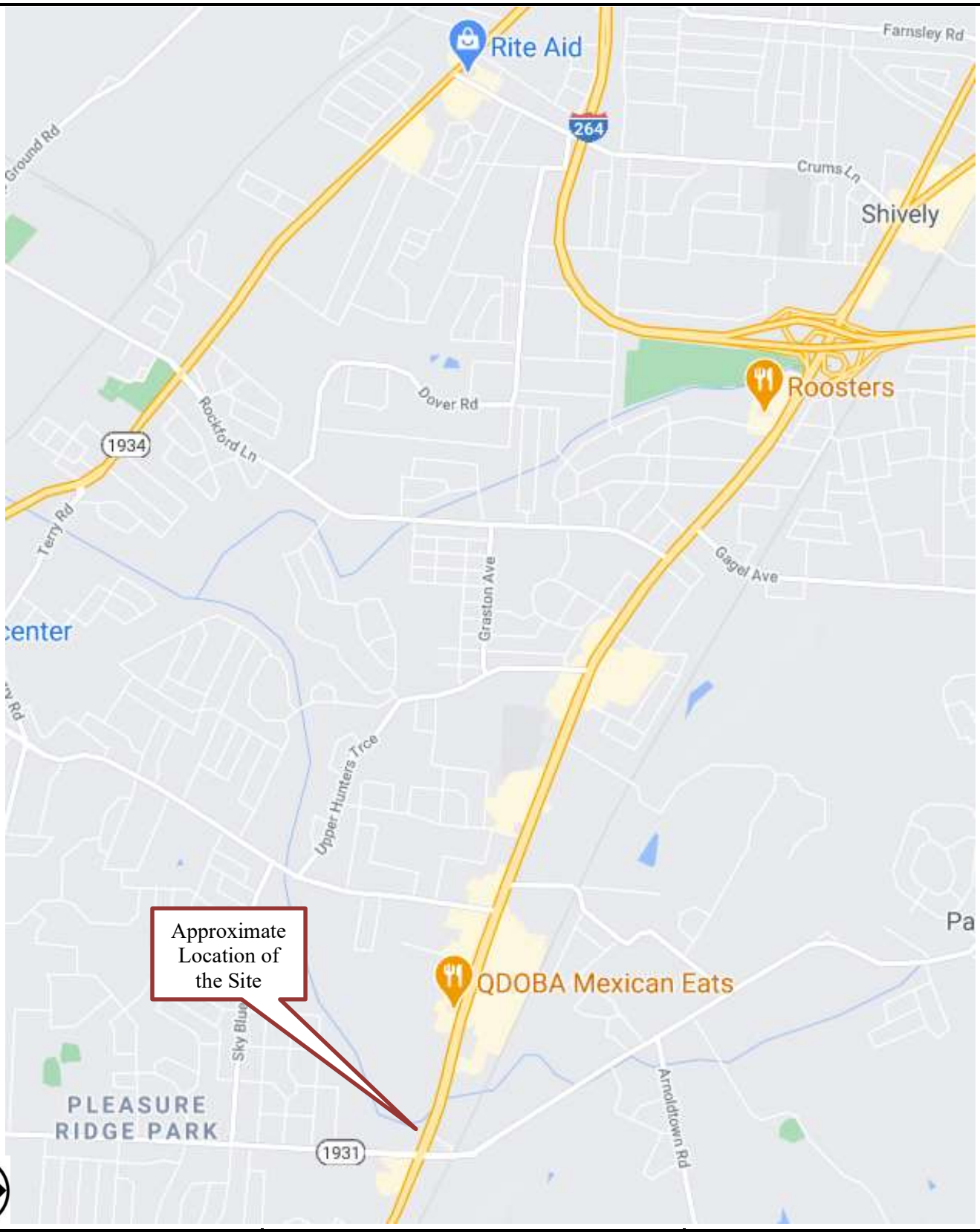
The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org



Ohio Valley Educational Co-op (OVEC)	VECTOR ENGINEERS, INC GEOTECHNICAL · MATERIALS · GEOSCIENCES A SUBSIDIARY OF CTL ENGINEERING, INC	**Site Location Map** **7304 Dixie Highway Addition** Louisville, Kentucky Project 21050023SHE

Ohio Valley Educational Co-op (OVEC)

VECTOR ENGINEERS, INC
GEOTECHNICAL · MATERIALS · GEOSCIENCES
A SUBSIDIARY OF CTL ENGINEERING, INC

Aerial Photograph
7304 Dixie Highway Addition
Louisville, Kentucky
Project 21050023SHE

Ohio Valley Educational Co-op (OVEC)

VECTOR ENGINEERS, INC
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A SUBSIDIARY OF CTL ENGINEERING, INC

Boring Location Plan
7304 Dixie Highway Addition
Louisville, Kentucky
Project 21050023SHE

VECTOR ENGINEERS, INC
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Boring Log

Approximate Elevation: 460 feet

Boring: B-1

Project: 21050023SHE 7304 Dixie Highway Addition — Louisville, Kentucky

Method: H.S.A.	**Date:** 3/4/2021	**Location:**	SW corner of addition
Diameter: 3¼ inches (inside diameter)	**Rig Type:** CME-55	**Hammer Type:**	Automatic
Groundwater: Dry upon completion		**Weather:**	Sunny, 50's
Engineer: Matt Slusser, PE **Driller:** Dale Underwood	**Notes:**		

From (ft)	To (ft)	Material Description	Symbol	Sample Depth (ft)	Sample Type	Blows per 6-inch increment	Recovery (in)	SPT-N value	Rock Quality (RQD, %)	Atterberg Limits (LL, PI)	Moisture Content (%)	% Fines (clay & silt)	Unconfined Compressive Strength (ksf)
0.0	0.5	TOPSOIL (6 inches)											
0.5	1.5	FILL -- VERY STIFF, dark gray silty LEAN CLAY (CL) with asphalt, crushed stone, and brick, moist		1	SS	3, 11, 6	14	17					
1.5		STIFF, gray and brown, silty LEAN CLAY (CL), moist		2 1/2	SS	5, 5, 5	14	10		29, 11	21%		
				5	SS	3, 5, 6	13	11					
				7 1/2	SS	4, 6, 7	18	13			22%		
	10.0												
10.0		FIRM, gray and brown, silty LEAN CLAY (CL), moist to damp (sand lenses below 13 feet)		10	SS	1, 3, 2	18	5					
	15.5			15	SS	3, 3, 5	18	8					
15.5		**Boring terminated at 15.5 feet without refusal**											

VECTOR ENGINEERS, INC
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Boring Log

Approximate
Elevation: 461 feet

Boring: B-2

Project: 21050023SHE 7304 Dixie Highway Addition — Louisville, Kentucky

Method: H.S.A.	**Date:** 3/4/2021	**Location:**	Middle of addition
Diameter: 3¼ inches (inside diameter)	**Rig Type:** CME-55	**Hammer Type:**	Automatic
Groundwater: 38 feet on drilling tools		**Weather:**	Sunny, 40's
Engineer: Matt Slusser, PE **Driller:** Dale Underwood	**Notes:**		

From (ft)	To (ft)	Material Description	Symbol	Sample Depth (ft)	Sample Type	Blows per 6-inch increment	Recovery (in)	SPT-N value	Rock Quality (RQD,%)	Atterberg Limits (LL, PI)	Moisture Content (%)	% Fines (clay & silt)	Unconfined Compressive Strength (ksf)
0.0	0.5	TOPSOIL (6 inches)											
0.5	3.0	FILL -- STIFF, brown and gray, silty LEAN CLAY (CL) with crushed stone and concrete, moist to damp		1	SS	3, 4, 6	16	10					
				2 1/2	SS	7, 6, 5	10	11					
3.0	6.0	SOFT, gray, sandy SILT (ML), damp		5	SS	1, 1, 2	18	3					
6.0	8.0	STIFF, gray and brown mottled SILT (ML), moist		7 1/2	SS	2, 4, 5	10	9					
8.0	16.0	FIRM, brown and gray mottled, silty LEAN CLAY (CL) with a little sand, moist		10	SS	3, 4, 4	18	8			23%		
				15	SS	3, 2, 3	18	5					
16.0	28.0	LOOSE, brown, fine SILTY SAND (SM), moist		20	SS	2, 2, 3	13	5			24%		
				25	SS	2, 4, 6	13	10					
28.0	30.0	FIRM, grayish brown, fine to medium SAND (SP-SM) with a little silt and trace gravel, damp		30	SS	4, 5, 6	12	11			13%	10%	
30.0		**Continued**											

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Boring Log

Approximate
Elevation: 461 feet

Boring: B-2

Project: 21050023SHE 7304 Dixie Highway Addition — Louisville, Kentucky

Method: H.S.A.	**Date:** 3/4/2021	**Location:**	Middle of addition
Diameter: 3¼ inches (inside diameter)	**Rig Type:** CME-55	**Hammer Type:**	Automatic
Groundwater: 38 feet on drilling tools		**Weather:**	Sunny, 40's
Engineer: Matt Slusser, PE **Driller:** Dale Underwood	**Notes:**		

From (ft)	To (ft)	Material Description	Symbol	Sample Depth (ft)	Sample Type	Blows per 6-inch increment	Recovery (in)	SPT-N value	Rock Quality (RQD,%)	Atterberg Limits (LL, PI)	Moisture Content (%)	% Fines (clay & silt)	Unconfined Compressive Strength (ksf)
30.0		LOOSE to FIRM, grayish brown, fine to medium SAND (SP-SM) with a little silt and trace gravel, damp											
		(gray and wet below 35 feet)		35	SS	3, 3, 6	15	9					
				40	SS	2, 3, 3	11	6					
				45	SS	8, 7, 5	18	12					
	48.0												
48.0		VERY FIRM, gray, fine to medium SAND (SP) with gravel, wet		50	SS	6, 12, 13	13	25					
				55	SS	4, 7, 15	12	22					
	57.0												
57.0		DENSE, gray, fine to coarse SAND (SP) with abundant gravel, wet											
	60.5			60	SS	16, 26, 14	14	40					
60.5		**Boring terminated at 60.5 feet without refusal**											

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Boring Log

Approximate
Elevation: 461 feet

Boring: B-3

Project: 21050023SHE 7304 Dixie Highway Addition — Louisville, Kentucky

Method: H.S.A.	**Date:** 3/4/2021	**Location:**	SE corner of addition
Diameter: 3¼ inches (inside diameter)	**Rig Type:** CME-55	**Hammer Type:**	Automatic
Groundwater: Dry upon completion		**Weather:**	Sunny, 50's
Engineer: Matt Slusser, PE **Driller:** Dale Underwood	**Notes:** Possible perched water encountered at about 8 to 9 feet. Bottom inch of final sample was silty fine sand		

From (ft)	To (ft)	Material Description	Symbol	Sample Depth (ft)	Sample Type	Blows per 6-inch increment	Recovery (in)	SPT-N value	Rock Quality (RQD,%)	Atterberg Limits (LL, PI)	Moisture Content (%)	% Fines (clay & silt)	Unconfined Compressive Strength (ksf)
0.0	0.5	TOPSOIL (6 inches)											
0.5	3.0	FILL -- VERY STIFF, graish brown, silty LEAN CLAY (CL) with crushed stone and some sand, moist		1	SS	2, 4, 13	16	17					
				2 1/2	SS	6, 7, 10	9	17					
3.0	6.0	VERY SOFT, gray and brown mottled, silty LEAN CLAY (CL), mosit		5	SS	1, 1, 1	9	2					
6.0	9.0	VERY SOFT gray, silty LEAN CLAY (CL) with sand, damp Lenses of silty sand in upper 18 inches		7 1/2	SS	1, 1, 1	18	2		26, 9	25%		
9.0	15.5	STIFF to FIRM, brown and gray mottled, silty LEAN CLAY (CL) with a little sand, moist		10	SS	2, 6, 6	18	12					
				15	SS	2, 3, 4	18	7					
15.5		**Boring terminated at 15.5 feet without refusal**											

FIELD TESTING PROCEDURES

Vector Engineers performs field tests in general accordance with the American Society for Testing and Materials (ASTM). These procedures are generally recognized as the basis for uniformity and consistency of test results in the geotechnical engineering profession. All work is initiated and supervised by qualified geotechnical professionals.

Subsequent portions of this attachment briefly describe our field testing procedures. Where applicable, we have referenced these procedures to ASTM standards which contain specific descriptions of apparatus, procedures, reporting, etc.

SOIL TEST BORING, ASTM D-1586

The borings were made with a hollow-stem auger powered by a drill rig. At regular intervals, soil samples were obtained through the hollow augers with a standard 1.4-inch I.D., 2.0-inch O.D. split-tube sampler.

The sampler was initially seated 6 inches to penetrate any loose cuttings; then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot was recorded and is designated as the *standard penetration resistance (SPT N-value)*. Penetration resistance, when properly evaluated, is an index to soil consistency and strength.

In the field, our geotechnical professional logged and described the samples as they were obtained. Representative portions of each soil sample were labeled and sealed, then transported to our laboratory. The samples were examined by a graduate geotechnical engineer or geologist to visually check the field descriptions. Boring data, including sample intervals, penetration resistances, soil descriptions, and groundwater levels are shown on the attached Test Boring Records.

CORRELATION
OF
STANDARD
PENETRATION RESISTANCE
WITH
RELATIVE COMPACTNESS AND CONSISTENCY

Sand and Gravel

Standard Penetration Resistance Blows/Foot	Relative Compactness
0-4	Very Loose
5-10	Loose
11-20	Firm
21-30	Very Firm
31-50	Dense
Over 50	Very Dense

Silt and Clay

Standard Penetration Resistance Blows/Foot	Consistency
0-2	Very Soft
3-4	Soft
5-8	Firm
9-15	Stiff
16-30	Very Stiff
31-50	Hard
Over 50	Very Hard

Laboratory Data Summary

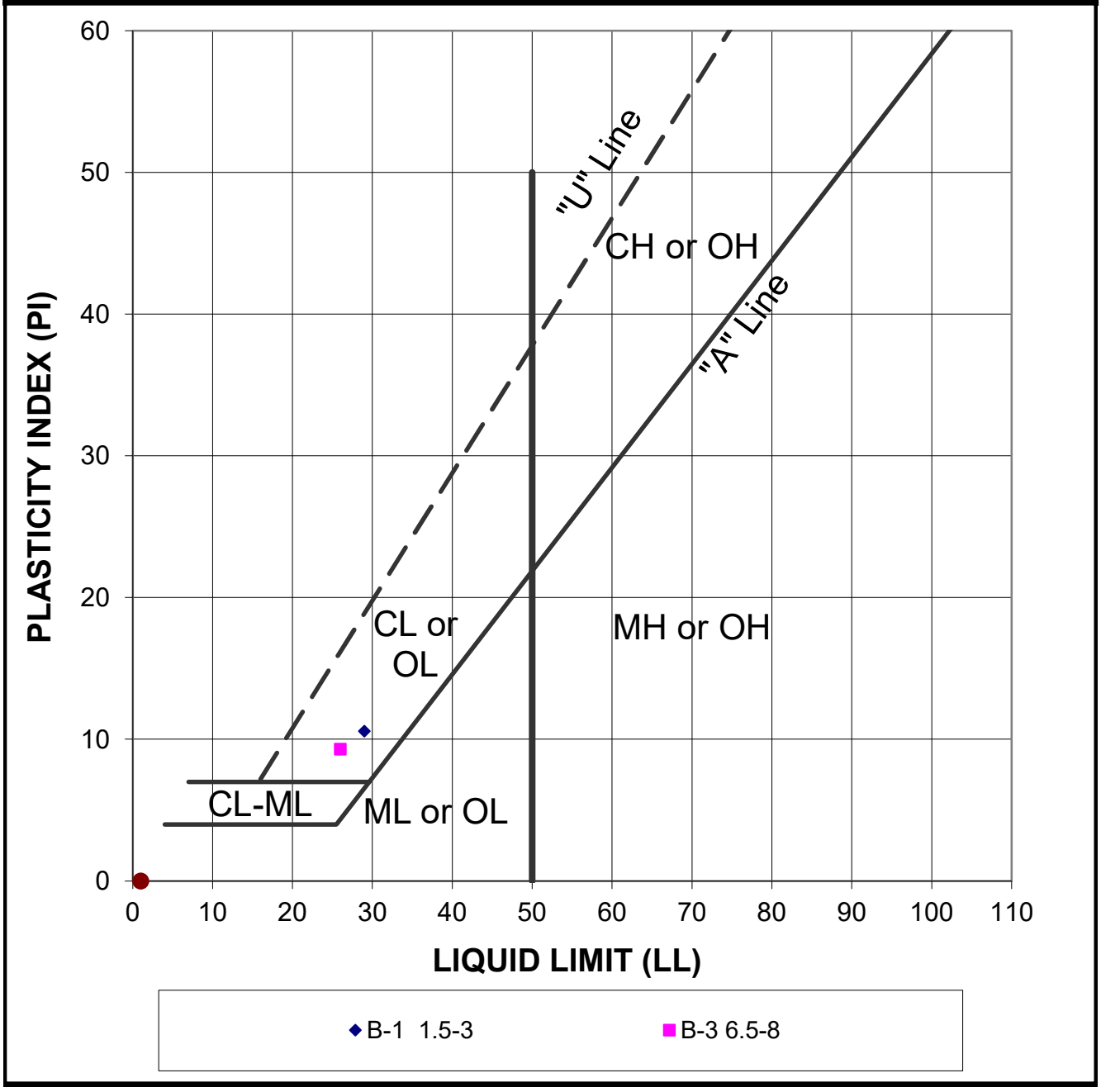
PROJECT NAME: *7304 Dixie Highway Addition* **PROJECT NUMBER:** *21050023SHE*

BORING NO.	SAMPLE DEPTH, FT.	SAMPLE TYPE*	USCS	NATURAL MOISTURE CONTENT, %	ATTERBERG LIMITS			MAX. DRY DENSITY PCF /OPTIMUM MOISTURE %	UNIT WEIGHT, PCF		UNCONFINED COMPRESSIVE STRENGTH, PSF	MATERIAL FINER THAN NO. 200, %	ORGANIC CONTENT, %	CBR, %
					L.L.	P.L.	P.I.		WET	DRY				
B-1	1.5-3	SS	CL	20.6	29	18	11							
B-1	6.5-8	SS		22.3										
B-2	9-10.5	SS		23.2										
B-2	19-20.5	SS		24.1										
B-2	29-30.5	SS	SP-SM	13.2								10.0		
B-3	6.5-8	SS	CL	24.6	26	17	9							

Atterberg Limits
(ASTM D4318)

PROJECT NAME:	*7304 Dixie Highway Addition*	**PROJECT NO.:**	*21050023SHE*
SAMPLE RECEIVED:	*03/05/21*	**TECHNICIAN:**	*MH*
TEST DATE:	*03/08/21*	**REVIEWED BY:**	*MS*
METHOD:	*Multipoint*	**REPORT DATE:**	*03/10/21*

Sample ID / Location	Depth	LL	PL	PI	Moist, %	Est. % retained on No. 40 sieve	Classification - Description
B-1	1.5-3	29	18	11	20.6	-	Gray, lean clay (CL) - 1
B-3	6.5-8	26	17	9	23.2	-	Gray, lean clay (CL) - 2

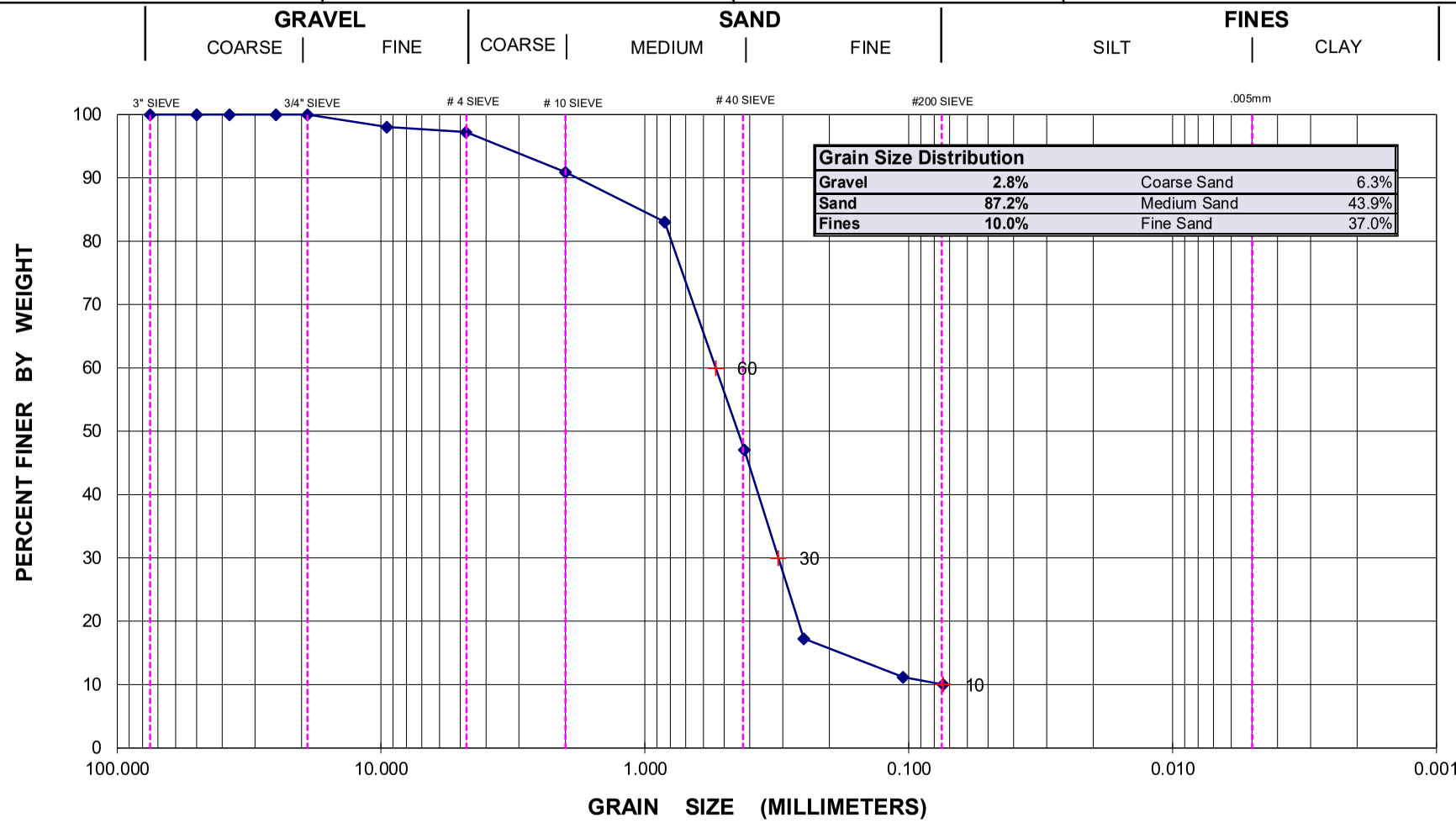


VECTOR ENGINEERS, INC

GRAIN SIZE DISTRIBUTION TEST REPORT

(ASTM D422)

JOB NAME :	*7304 Dixie Highway Addition*						
JOB NO. :	*21050023SHE*	**REPORT NO. :**	-	**DATE :**	3/9/2021	**REVIEWED BY :**	M. Slusser
BORING / PIT NO. :	*B-2*	**DEPTH / ELEV. :**	*29-30.5*	**SAMPLE NO. :**		**SAMPLE TYPE :**	*SS*
SAMPLE LOCATION :	Middle of addition						
SOIL DESCRIPTION :	*Gray, medium sand*					**SP. GRAVITY, Gs :**	-
LIQUID LIMIT, % :	-	**PLASTICITY INDEX , % :**	-	**MOISTURE:**	11.7%	**FINES:**	*10.0%*
D10 , MM :	0.07	**D30 , MM :**	0.31	**D60 , MM :**	0.54	**COEFF OF UNIFORMITY:**	*7.3*
CLASSIFICATION		**UNIFIED :**	*SP-SM*	**AASHTO :**	-	**COEFF OF CURVATURE:**	*2.4*



LABORATORY TESTING PROCEDURES

The laboratory tests are performed in general accordance with the American Society for Testing and Materials (ASTM). These procedures are generally recognized as the basis for uniformity and consistency of test results in the geotechnical engineering profession. The tests are performed by skilled technicians trained in ASTM procedures. The laboratory equipment is well maintained and calibrated at least yearly.

Subsequent portions of this attachment briefly describe our testing procedures. Where applicable, we have referenced these procedures to ASTM standards which contain specific descriptions of apparatus, procedures, reporting, etc.

GRAIN SIZE TEST, ASTM D-422

The grain size distribution of soil particles in a specimen is an indicator of physical properties among which are permeability, compaction characteristics, consolidation, shrinkage and swell parameters, and liquefaction characteristics. The soil specimen is prepared and tested to determine the percentages of particles of various sizes. The cumulative percentages by weight for each size are depicted on a graph showing the distribution of gradations. The distribution of particles larger than 75 microns (retained on No. 200 sieve) is determined by sieving.

The soil specimen is prepared by either drying or using a wet method. The wet method is used when the soil specimen is clay or silt with properties that change if the sample is prepared dry.

After preparation, the coarse material (material retained on the No. 200 sieve) is dried and then passed through a series of nested sieves. The portion retained on each sieve is weighed, and the percent by weight retained on each sieve is computed and plotted on Grain Size Distribution Sheets.

DETERMINATION OF SOILS FINER THAN NO. 200 SIEVE

The clay and silt content of granular soils affects their physical properties such as strength, compressibility, and permeability. Selected granular soil (sand or gravel) samples were tested to determine the percent, by weight, of soil particles finer than the No. 200 sieve (silt and clay size particles). Soil particles finer than 75 microns were flushed through a No. 200 sieve using water. The coarse materials retained on the No. 200 sieve were dried to obtain their dry weight. The dry weight of materials retained on the No. 200 sieve was compared to the dry weight of the total test specimen. The difference in weight, expressed as a percentage of the pre-wash weight, is designated as the percentage of "fines" (silt and clay size particles).

LABORATORY TESTING PROCEDURES

MOISTURE CONTENT DETERMINATION, ASTM D-2216

The moisture content of soils is an indicator of various physical properties, including strength and compressibility. Selected samples obtained during exploratory drilling were taken from their sealed containers. Each sample was weighed and then placed in an oven heated to 110ºC $\pm$ 5º. The sample remained in the oven until the free moisture had evaporated. The dried sample was removed from the oven, allowed to cool, and re-weighed. The moisture content was computed by dividing the weight of evaporated water by the weight of the dry sample. The results are expressed as a percent.

ATTERBERG LIMITS DETERMINATION, ASTM D-4318

Representative samples were subjected to Atterberg limits testing to determine the soil's plasticity characteristics. The plasticity index (PI) is the range of moisture content through which the soil deforms as a plastic material. It is bracketed by the liquid limit (LL) and the plastic limit (PL). The liquid limit is the moisture content at which the soil becomes wet enough to flow as a viscous fluid. To determine the liquid limit, a soil specimen is first washed through a No. 40 sieve. The materials finer than the No. 40 sieve are retained and dried until the soil is in a viscous fluid state. A portion of this soil is then placed in a brass cup of standardized dimensions. A groove is cut through the middle of the soil specimen with a grooving tool of standard dimensions. The cup is attached to a cam that lifts the cup 10 mm and then allows the cup to fall onto a hard rubber base. The cam is rotated at about 2 cps until the two halves of the soil specimen come in contact at the bottom of the groove for a distance of 1/2 inch. The number of blows required to achieve this 1/2 inch contact is recorded, and part of the specimen is subjected to a moisture content determination. The remainder of the specimen is allowed to air dry for a short time, and the grooving process and cam action are repeated. This testing sequence is repeated until more than 25 blows are required to achieve the required groove contact. After the number of blows vs. moisture content for the various test points are plotted on arithmetic graph paper, the moisture content corresponding to 25 blows is designated the liquid limit.

The plastic limit (PL) is the lowest moisture content at which the soil is sufficiently plastic to be manually rolled into threads 1/8" in diameter. The plastic limit is determined by taking a part of soil remaining from the liquid limit test, and repeatedly rolling, kneading, and air drying it until the soil breaks into threads about 1/8 inches in diameter and 3/8 inches long. The moisture content of these soil threads is then determined and is designated the plastic limit.

UNCONFINED COMPRESSION TEST
(SPLIT-BARREL SOIL SAMPLE)

An unconfined compression test was performed to determine the approximate soil shear strength (cohesion) parameter "C". An intact soil sample obtained with a split-barrel sampler was selected for testing. The sample was trimmed to 3 inches long and then placed in a compression testing machine. The sample was compressed at a constant rate of strain, and load measurements were made as the sample failed in undrained shear. The maximum load on the specimen was recorded, and the resultant stress was calculated. This calculated stress is known as the unconfined compressive strength (qu) and is divided by 2 to obtain "C", the shear strength or apparent cohesion.

7304 Dixie Highway

7304 Dixie Hwy, Louisville, KY 40258, USA

Latitude, Longitude: 38.14468, -85.8394655

Date	3/17/2021, 3:56:02 PM
Design Code Reference Document	ASCE7-10
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	0.215	MCE_R ground motion. (for 0.2 second period)
S_1	0.109	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.345	Site-modified spectral acceleration value
S_{M1}	0.258	Site-modified spectral acceleration value
S_{DS}	0.23	Numeric seismic design value at 0.2 second SA
S_{D1}	0.172	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	C	Seismic design category
F_a	1.6	Site amplification factor at 0.2 second
F_v	2.363	Site amplification factor at 1.0 second
PGA	0.101	MCE_G peak ground acceleration
F_{PGA}	1.599	Site amplification factor at PGA
PGA_M	0.161	Site modified peak ground acceleration
T_L	12	Long-period transition period in seconds
SsRT	0.215	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	0.241	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.109	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.128	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.893	Mapped value of the risk coefficient at short periods
C_{R1}	0.853	Mapped value of the risk coefficient at a period of 1 s

SECTION 01 01 00 – SUMMARY OF THE WORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification sections, apply to work of this section.

B. Contractor shall provide all items, articles, materials, operations, or methods listed, mentioned, or scheduled on Drawings and/or herein, including all labor, materials, equipment and incidentals necessary and required for their completion.

1.02 PROJECT / WORK IDENTIFICATION

A. General: Project name is “Ohio Valley Educational Cooperative, Building Addition and Renovation for 7304 Dixie Highway", as shown on Contract Documents prepared by Studio Kremer Architects and their consultants.

B. Work Included: Work under this Contract shall include all materials, labor and equipment necessary for the construction of the new Building Addition and Renovation, a daycare facility on Dixie Highway for OVEC, indicated or hereinafter specified.

C. Contract Documents indicate the work of the Contract and related requirements and conditions that have an impact on the Project. Related requirements and conditions that are indicated on the Contract Documents include, but are not necessarily limited to the following:

1. Existing building conditions.
2. Work which may be performed concurrently by separate Contractors.
3. Work to be performed subsequent to Work under this Contract, by others.

D. Summary by References: Work of the Contract can be summarized by references to the Contract, General Conditions, Supplementary Conditions, Specifications Sections, Drawings, addenda and modifications to the Contract Documents issued subsequent to the initial printing of this project manual and including but not necessarily limited to printed material referenced by any of these. It is recognized that work of the Contract is also unavoidably affected or influenced by governing regulations, natural phenomenon including weather conditions and other forces outside the Contract Documents.

E. Abbreviated Written Summary: Briefly and without force and effect upon the Contract Documents, the Work of the Contract can be summarized as follows:
1. Project involves the construction of a new addition to and renovation of an existing structure at 7304 Dixie Highway to accommodate a new daycare facility, owned, occupied and operated by Ohio Valley Educational Cooperative. Primary construction is wood wall and roof framing. The building is one level on a concrete slab on grade, both existing and addition.

2. Roof construction is 25-year warranty dimensional shingles on wood sheathing over pre-fabricated wood trusses.
4. Work involves HVAC systems, electrical systems (including lighting), fire alarm, plumbing and communications.
5. Finishes include drywall, resilient flooring, carpet, painting and acoustical/grid ceilings.
6. Minimal site work required with a playground area to be completed by the owner under a separate contract.

See specifications index for all elements of work included in project.

1.04 PLANS AND SPECIFICATIONS

A. Drawings provided show areas of work and details of construction. Do not scale drawings for measurements.

B. Contractor shall be responsible for obtaining all field measurements and verification of on-site conditions which may affect the Work. Should the Contractor discover any error or discrepancy between drawings and actual on-site conditions, he shall notify the Architect immediately for clarification.

C. Contractor is responsible for purchasing all sets of documents needed to construct job, including extra set required to be kept as on-site as-built notation set. This set will be turned over to Architect at end of project. See Division 01 Section “Project Record Documents”.

1.04 COORDINATION

A. The Work of this Contract includes coordination of the entire work of the project, including preparation of general coordination drawings, diagrams and schedules, and control of site utilization, from beginning of construction activity through project close-out and warranty periods.

B. Contractors and Subcontractors shall coordinate their work with adjacent work and cooperate with other trades so as to facilitate general progress of the Work. Each trade shall afford other trades every reasonable opportunity for installation of their work and for storage of their materials.

C. Coordinate scheduling, submittals and work of the various Specification Sections to ensure efficient and orderly sequence of installation of interdependent construction elements.

D. Work will be performed by a separate contractor for the installation of Instruction Technology and other equipment components. Work shall be coordinated with this project for a simultaneous completion date.

E. Coordinate work with other trades. All Contractors are required to coordinate and have mutual responsibilities for installing, connecting to, and placing in service, such equipment.

F. Coordinate space requirements and installation of mechanical and electrical work, which are indicated diagrammatically on the Drawings. Follow routing shown for pipes, ducts and conduit, as closely as practicable place runs parallel with lines of the building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance and for repairs, by holding all installation as high as possible. Each Contractor shall coordinate their work with all other trades, existing and anticipated conditions, as necessary to maximize the use of the space. If in doubt about the acceptability of a proposed installation, contact the Architect / Engineer for instructions.

G. In finished areas, except as otherwise indicated, conceal pipes, ducts and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

H. Coordinate completion and clean-up of work requirements of all Specification Sections in preparation for Substantial Completion.

I. After Owner occupancy of the premises, coordinate access to site for correction of defective work and work not in accordance with the Contract Documents, to minimize disruption of Owner's activities.

J. Coordinate parking, material storage, work schedules with the Owner.

K. Contractor shall maintain a Superintendent on-site during all construction activities. The individual in charge shall be responsible for coordination and act as the liaison with the district administration.

L. All subcontractors shall communicate any questions or requests through the General Contractor.

M. Contractor shall not modify, add or delete any scope of work requested by school personnel. Changes to the Contract must be properly authorized by the project Architect.

1.05 PERMITS AND APPROVALS

A. The State plan review fee will be paid by the Owner. The Contractor shall be responsible for obtaining and paying for any other required permits, local plan review fees, or approvals that may be required by any city, county, or state agency, any utility company, or any other agency which may have authority over any aspect of the Work being done.
   1. Contractor is required to submit plans to local Fire Department and County Building Department and pay all required fees.
   2. Contractor to be responsible for producing, submitting and paying any associated fees for delegated designs including, but not limited to, fire alarm, fire sprinkler systems, etc. when called for in the contract documents.

1.06 CONTRACTOR USE OF PREMISES

A. General: The Contractor shall have access to the full property at the discretion of the Owner. Owner should be notified if the extents of construction activity, parking or material staging changes over the duration of the project.

B. Use of the Site: Confine operations to the Area of Work.

1. Refer to Division 01 section “Temporary Facilities” for construction fencing requirements.
2. Refer to Division 01 section “Temporary Facilities” for other allowable use of the site.
3. Do not load structure with weight that will endanger structure.
4. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.

    a. Protect, do not damage portion of areas that are to remain and are outside the project area. Restoration of damaged areas will be required.

5. Keep required means of egress open, accessible and free from construction debris.
6. Keep existing driveways and entrances serving areas outside the areas of work clear and available to the Owner at all times, unless specifically identified as available for Contractor use. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
7. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas agreed with Owner / Architect. If additional storage is necessary, obtain and pay for such storage off site.
8. Assume full responsibility for protection and safekeeping of products stored on site.

    a. It is the responsibility of the General Contractor to protect the following items during all construction activities by wrapping (and securing) plastic wrap around them. If required, the Contractor shall move the said items to install new work and then move or reinstall in the designated location.

        1) Miscellaneous Casework
        2) Miscellaneous Equipment

9. Any equipment used shall be electrically or propane powered. Provide necessary ventilation needed to meet OSHA requirements.
10. Lock automotive type vehicles, such as passenger cars and trucks and other mechanized or motorized construction equipment, when parked and unattended, so as to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place.

1.07 OWNER OCCUPANCY AND COORDINATION OF ANY REQUIRED OUTAGES

A. Full Owner Occupancy:
1. Obtain a Certificate of Occupancy from local building officials prior to Owner occupancy.
2. Prior to Owner occupancy, mechanical and electrical systems shall be fully functional. Required inspections and tests shall have been successfully completed. Upon occupancy,

the Owner will provide operation and maintenance of mechanical and electrical systems in occupied portions of the building.

B. No power outage for the site shall occur when the outside air temperature will be below 40-degrees F, within 24-hours of the beginning of the outage.

C. Any and all outages site-wide that are necessary for performance of the Work shall be accomplished at the Owner's convenience, exclusively. Provide for any premium time anticipated in the Lump Sum Bid. Extras to the Contract will not be considered for premium time.

1.08 PROTECTION OF PROPERTY

A. The Contractor shall protect all property at the site and adjacent thereto, including landscaping, lawns, walks, structures, roof, utilities, and equipment where not included in the scope of this Work.

B. The Contractor shall clean, repair, or replace all damaged parts of the Work as required bringing them to their original condition.

C. The Contractor shall take all necessary steps to protect the work of others and their own work during the process of construction.

D. Construction materials and equipment are to be maintained in a safe and secure manner when the Contractor is not on site.

1.09 MAINTENANCE AND WORKMANSHIP

A. The Contractor shall maintain the Work and repair same where necessary until the Work has been finally accepted.

B. Work shall be performed by mechanics skilled in their respective trades and present an appearance typical of best trade practice. Work not installed in this manner shall be repaired, removed and replaced or otherwise remedied as directed by the Architect. Contractor should ensure that the Work is done correctly the first time so as not to get the opportunity to do the Work over again.

1.10 CLEANING

A. The Contractor shall proceed to complete their Work in a neat and orderly fashion, and keep the building and site free from undue amounts of debris and miscellaneous material that will cause the area to become unsightly. Contractor is responsible for the removal from the site and legal disposal of all removed materials and debris.

B. Upon completion of the Work and before acceptance and final payment will be made; the Contractor shall remove and dispose of legally from the site all machinery, equipment, surplus and discarded materials, rubbish and temporary facilities.

C. The Contractor shall perform final cleaning, as specified in Division 01 section “Cleaning”.

D. The building shall be left in a clean, neat and presentable condition acceptable to the Owner.

1.11 ACCEPTANCE OF WORK

A. Contractor shall comply with all conditions as stated per the Contract Documents. Upon the completion of their Work, clean the applicable area, remove all debris, tools, equipment, etc., from the site and shall leave the Work site in a first class condition, suitable for immediate use by the Owner.

B. Contractor shall notify the Architect of their Substantial Completion, whereupon the Architect and Owner will make an inspection of the Work.

C. Contractor shall correct any and all deficiencies in the Work (as covered in these Specifications) and upon correction of the deficiencies notify the Architect for re-inspection. Payment shall be made upon Architect’s and Owner’s satisfaction of the Work in accordance with these Specifications.

1.12 PROJECT CLOSEOUT

A. Provide all written guarantees and certificates required by these Specifications, in accordance with the General Conditions and Division 01 Sections.

1.13 CORRECTION PERIOD

A. The Contractor shall repair or replace any material and/or Work installed under this Contract found to be defective for a period of one year from the date of Substantial Completion, unless other sections of the specifications require greater than one year. Any defects developing during that time period shall be remedied by the Contractor at no additional cost to the Owner, in accordance with the General Conditions of the Contract. The one year correction period shall not be construed to establish a period of limitation per Article 12.2 of the General Conditions.

1.14 SECURITY AND PROTECTION

A. Provide all necessary barricades, warning signs, lights, roadway traffic plates, and fencing required to protect the health, safety and welfare of the public. Building shall be secured at the end of each work day.

1.15 CONDUCT OF WORKERS

A. The Contractor shall be responsible for the conduct of all workers under their supervision. Misconduct on the part of any worker to the extent of creating a safety hazard, endangering the lives and/or property of others, shall result in the prompt removal of the worker. The consumption of alcoholic beverages, narcotics or any debilitating drugs, where the worker's judgment is impaired is **strictly forbidden** on the Project Site.

B. Firearms are **prohibited** on the property including vehicles parked on the property.

C. Smoking is **prohibited** on the property. No smoking devices are to be used, including vapor devices.

D. Appropriate language shall be used at all times.

E. Proper attire, including shoes, shirts, pants and necessary safety equipment shall be worn at all times.

F. No worker on the project site shall be a registered sex offender. The Contractor is required to verify through The National Sex Offender (NSOPW.gov) web site that none of the workers on the site are registered sex offenders. Provide the Owner a list of names of the workers to be on site and verification of their status.

1.16 BUILDING TECHNOLOGY

A. While some building technology and communications elements are in the project, the Owner will have a separate contract for furnishings and equipment and a separate contract for instructional technology. It is the responsibility of the General Contractor to coordinate ongoing construction work with the work of these separate contractors, assuring sequencing is conducive to the successful installation of the Work of all contracts.

END OF SECTION 01 01 00

SECTION 01 02 50 – MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Basic Requirements for Applications for Payment and Change Orders: GENERAL CONDITIONS.

PART 2 SCHEDULE OF VALUES

2.01 GENERAL

A. Submit to the Architect the Schedule of Values for review, at least 10 days prior to submitting the first Application for Payment.

B. Upon request by the Architect, support values given with data that will substantiate their correctness.

C. Submit quantities of designated materials.

D. Use the Schedule of Values only as a basis for Contractor's Application for Payment.

E. Prepare separate summary of materials to be purchased through the Direct Purchase Order process. Reflect values of all materials included in Purchase Orders.

2.02 FORM OF SUBMITTAL

A. Submit the Schedule of Values prepared on AIA Document G702 and G703.

B. Use the Index of these Specifications as a basis for format for listing cost codes of work for each Section.

2.03 PREPARING SCHEDULE OF VALUES

A. Itemize separate line item cost for each of the following general cost items:

1. Performance and Payment Bonds
2. Field Supervision and layout
3. Construction Facilities and Temporary Controls
4. General Conditions (i.e. Supervision, Shop Drawings, etc.)
5. Close-Out Documents

B. Itemize separate line item cost for work required by each section of this Specification.

C. Break down installed costs into:

1. Materials costs, including delivery, with taxes paid.
2. Labor cost, with overhead and profit.

D. For each line item which has installed value of more than $1,000.00, break down costs to list major products or operation under each item.

E. Round off figures to the nearest dollar.

F. Make sum of total costs of all items listed in schedule equal to the total Contract Sum.

G. Architect will review submitted Schedule of Values and provide any comments for modifications prior to acceptance. Contractor may use Schedule of Values as basis for Application for Payment after approval by Architect.

PART 3 PAYMENTS

3.01 APPLICATIONS FOR PROGRESS PAYMENTS

A. At a time consistent with the requirements of this section, the GENERAL CONDITIONS, and the Owner - Contractor Agreement, and for each calendar month during the progress of the Work, submit three (3) copies of a properly notarized, itemized Application for Payment prepared in a manner consistent with the Schedule of Values.

B. The amount shown on the Application for Payment shall be established by the value of the Work completed in accordance with the Contract Documents, and that all amounts have been paid by the Contractor for work for which previous payments were issued by the Owner.

C. Payments made on account of materials not incorporated in the Work may be made as a convenience to the Contractor. However, until incorporated in the Work, such stored materials are the responsibility of the Contractor, and they shall carry suitable insurance to cover their loss in the event of theft, fire or other damage. When application for payment includes material or equipment off-site, the application shall be accompanied with a statement giving description of item and location of storage, and certifying that item is covered by all contractual requirements, including liability and fire insurance, and that item or any part thereof will not be installed in any construction other than Work under this Contract. Provide photographic evidence and Certificate of Insurance for the off-site stored material amounts being requested for payment.

D. The form of application for payment shall be based on the 1992 edition of AIA Document G702, "Application and Certificate of Payment", supported by AIA Document G703, Continuation Sheet, 1992 edition.

E. Provide following itemized data on Continuation Sheet:

1. Format, schedules, line items, and values shall be from the schedule of values accepted by Architect. Indicate materials and labor separately.
2. Include names, trades and amounts for Subcontractors.

F. Preparation of Application for each Progress Payment:

1. Application Form:

a. Fill in required information, including that for Change Orders executed prior to the date of submittal application.
b. Fill in summary of dollar values to agree with the respective totals indicated on the continuation sheet.
c. Execute certification with the signature of a responsible officer of the Contractor's firm.

2. Continuation Sheets:

a. Fill in total list of all scheduled component items of Work, with item number and the scheduled dollar value for each item. Break down each item, indicating values for labor and material separately.
b. Fill in the dollar value in each column for each scheduled line item when Work has been performed or products stored. Round off valued to nearest dollar, or as specified for the Schedule of Values.
c. List each Change Order executed prior to the date of submission, at the end of the continuation sheets. List by the Change Order number, description, and breakdown of costs as per original component item of Work.

G. Substantiating Data for Progress Payments:

1. When substantiating data is requested submit suitable information as necessary to substantiate payment request accuracy. Include a cover letter identifying:

a. Project.
b. Application number and date.
c. Detailed list of enclosures.
d. For stored products: Item number and identification as shown on application, and description of specific material.

2. Submit one copy of data and cover letter for each copy of application.

H. Applications for Payment shall be accompanied by cost breakdowns from Subcontractors and Sub-subcontractors, and shall also be accompanied by the previous billing month's waivers of lien from Subcontractors, Sub-subcontractors and material suppliers, as applicable.

I. Application of Payment requesting reduction in retainage before final payment shall be accompanied by a properly executed "Consent of Surety to Reduction in or Partial Release of Retainage", AIA Document G707A, 1994 edition.

J. When the Architect finds the application properly completed and correct, it will be transmitted to the Owner.

3.02 PROGRESS PAYMENTS

A. The stipulated rates of payment and retainage will be in effect in accordance with Article 5 of the Agreement between Owner and Contractor.

B. The full contract retainage may be reinstated if the manner of completion of the Work and its progress do not remain satisfactory to the Owner, or if the Surety withholds consent, or for other good and sufficient reasons.

C. Following a Subcontractor's satisfactory completion of his portion of the Work, and the Contractor including same in an Application for Payment, accompanied by applicable release of liens and written consent of surety, and the Architect's issuance of the Certificate of Payment, the Owner may elect to add a progress payment to amount equal to that required for the Contractor to make final payment, including full retainage, to such Subcontractor.

3.03 APPLICATION FOR FINAL PAYMENTS

A. Submit final Application for Payment using AIA Documents and following the procedures specified above for progress payments.

B. Before submitting final Application for Payment, forward to the Architect, for the Owner, the bonds (if required), written warranties and guarantees, Record "As-Built" Drawings, Record and Maintenance Manuals and other documents required by the Contract Documents, and place properly, in approved storage at the site, the extra stock and spare parts specified.

C. Properly executed releases or waivers of lien in duplicate on AIA Document, Form G706, "Contractor's Affidavit of Payment of Debts and Claims", 1994 edition, and Form G706A "Contractor's Affidavit of Release of Liens", 1994 edition, shall be submitted to Architect in triplicate, prior to final payment.

D. Application for Final Payment shall be accompanied, four (4) copies, by a properly executed "Consent of Surety Company to Final Payment: AIA Document G707, 1994 edition".

E. Contractor shall submit, with the close-out documents, a statement on company letterhead verifying that no materials used in this project contained asbestos.

F. Refer to Division 01 Section "Contract Closeout" for further information.

3.04 FINAL PAYMENT

A. Final payment will be made in accordance with the Agreement after final satisfactory completion of the Work as certified by the Architect and receipt of all close-out documents by the Owner.

PART 4 CHANGE ORDERS

4.01 GENERAL

A. Regardless of method used to determine value of changes, the estimated or actual cost shall be submitted in detailed breakdown form, giving quantity and unit costs by each trade of each item, labor cost with hourly rates, allowable overhead and profit. No additional amount will be paid for submittal in this form or for resubmittal should the breakdown be considered inadequate by the Architect. Back-up data submitted with applications for payment may be used as basis for approving or reflecting costs submitted in Change Orders.

B. In Change Orders involving both increases and decreases and resulting in a net increase, the overhead, profit, and commission added shall be required only on the net increases.

C. In Change Orders involving both increases and decreases and resulting in a net decrease, the overhead, profit, and commission refund shall be required only on the net decrease.

D. In cases of rearrangements, quantities of materials omitted shall be deducted from quantities added. Labor computations shall be made in the same manner.

E. Estimates for materials shall be based on reasonable current prices at which materials are available to the Contractor and Subcontractor. Upon request, submit satisfactory evidence of such costs.

F. The Contractor shall maintain an accurate account of labor and material involved in each change. Such time and material records are subject to verification. Notify Architect when work on each change is to start and when it has been completed. To receive full recognition, labor assigned to Contract changes must, insofar as possible, work continuously on the change, rather than interchanging between Contract Work and the change.

   1. Unit of measurement in calculating areas, quantities, volumes shall be understood to mean **actual in place measurements of materials or volumes.**

G. In order that proposed changes in Work, if they should occur, can be processed without undue delay, indicate in each separate proposal requesting a change in the Contract supporting information in detailed breakdown form, including the exact location of the change requested, the reason for the change, and the square feet, square yards, cubic yards, linear measure or any other unit of measure applicable to the Work involved, together with the unit cost of labor by trades and materials. Labor unit costs shall include associated insurance. Other types of protection are assumed to be covered by overall job insurance with no additional charges assigned to unit costs.

PART 5 UNIT PRICES

5.01 GENERAL

A. A unit price is the amount stated in the agreement or subsequently agreed upon by the Owner and the Contractor as a price per unit of in place measurement for addition or deduction of materials or services as described in the Contract Documents. Unit prices shall include costs of labor, materials, services, overhead and profit, bonds, insurance, and other costs to cover the completed work. Additions or deductions in the work authorized to be carried out and paid for or deducted from payment and omitted from the work shall be executed in accordance with the applicable sections of the Specifications.

END OF SECTION 01 02 50

SECTION 01 04 00 – PROJECT COORDINATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
   1. Coordination.
   2. Administrative and supervisory personnel.
   3. General installation provisions.

B. Use of Project Management/Information Software is described in “Summary of the Work”.

C. Field Engineering is included in Division 01 Section, “Field Engineering”.

D. Progress meetings, coordination meeting and pre-installation conferences are included in Division 01 Section "Project Meetings."

E. Requirements for the Contractor's Construction Schedule are included in Division 01 Section “Submittals”.

F. Requirements for Cleaning are included in Division 01 Section “Cleaning”.

1.03 COORDINATION

A. Coordination: Coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection and operation.

   1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.

      a. While some building technology and communications elements are in the project, the Owner will have a separate contract for furnishings and equipment and a separate contract for instructional technology. It is the responsibility of the General Contractor to coordinate ongoing construction work with the work of these separate contractors, assuring sequencing is conducive to the successful installation of the Work of all contracts.

2. The General Contractor or subcontractors are expected to field verify in-place work as it relates to the installation of new work, including during the shop drawing phase.
3. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
4. Make adequate provisions to accommodate items scheduled for later installation.
7. Each Contractor shall develop their own fabrication installation drawings for their elements of the Project. Prior to purchase/shipment of the ductwork, manufacturer shall provide, as a part of the submittal process, scaled, field coordinated AutoCAD drawings of the complete system to be furnished. Drawings will indicate all system components including fittings, ductwork and manifolds. Drawings shall be available in an electronic format. The Engineer will not be approving the Contractor-prepared drawings and will review for general intent only.
8. The Contractor shall finally coordinate the fabrication and installation of the mechanical services with the limitations of the building structure. **Change Orders shall not be considered for any differences due to lack of field investigation and coordination.**

B. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports and attendance at meetings.
   1. Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

   1. Preparation of schedules.
   2. Installation and removal of temporary facilities.
   3. Delivery and processing of submittals.
   4. Progress meetings.
   5. Project Close-out activities.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water and materials.

   1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work.

1.04 SUBMITTALS

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

1. Show the interrelationship of components shown on separate Shop Drawings.
2. Indicate required installation sequences.
3. Comply with requirements contained in Division 01 Section "Submittals."
4. Refer to Division 20 Sections for specific coordination requirements for mechanical installations.
5. Refer to Division 26 Sections for specific coordination requirements for electrical installations.

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

1. Post copies of the list in the Project meeting room, the temporary field office, and each temporary telephone.

PART 2 PRODUCTS (not applicable)

PART 3 EXECUTION

3.01 GENERAL INSTALLATION PROVISIONS

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

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

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

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

E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.

F. Recheck measurements and dimensions before starting each installation.

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

H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

I. Mounting Heights: Where mounting heights are not indicated and common requirements are not available (e.g., ADA), refer mounting height decision to the Architect.

END OF SECTION 01 04 00

SECTION 01 05 00 – FIELD ENGINEERING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SCOPE OF WORK

A. Provide field engineering work as shown, specified, or both shown and specified, and as required to complete the Work.

PART 2 PRODUCTS (not applicable)

PART 3 EXECUTION

3.01 GENERAL FIELD ENGINEERING REQUIREMENTS

A. Employ licensed civil engineers and / or surveyors to perform field engineering services required, including:

1. Layout building as indicated, informing Architect of any discrepancies. **The licensed engineer / surveyor shall layout all new building foundations and columns lines.**

2. Review and verify locations and figures shown before undertaking construction. General Contractor is responsible for accuracy of finished work.

3. Before beginning work, locate general reference points and bench marks, and take action to preserve or replace them and prevent their destruction. Record the location and elevation of each bench mark and make no changes in locations without the written approval of the Owner.
   a. Verify that same benchmarks are used across all disciplines, i.e. site development contractor is using same starting points as concrete contractor, etc.

4. Locate and lay-out site work, utility slopes and inverts, using surveying instrument and techniques.

5. Plumb, level and align concrete forms and structural elements.

6. Set stakes for grading, fill, backfill and paving.

7. Locate and level screeds. Lay-out formwork.

8. Measure and record changes or variations from Contract Documents throughout construction for transfer to permanent Record Drawings.

B. Establish vertical and horizontal control points remote from the Work, before starting excavation, or trenching. Control points shall be, or shall be related to, benchmarks or other indices that are sufficiently secure and removed from the Work that construction operations and traffic do not affect reliability. Take readings of benchmarks, control points and reference points, and record them. Make a copy of this initial record for the Owner.

C. All new underground utilities (primary and secondary) installed will be surveyed by a licensed Kentucky Surveyor, i.e. water lines, waste lines, electrical lines, telephone service, etc., any line / pipe installed below grade outside of the building footprint. The Owner will employ Surveyor to document underground utilities as described in Division 01 Section “Quality Control”. The Contractor is responsible for coordinating when surveyor is needed on site. Surveyor shall be contacted 48-hours in advance of backfilling underground utilities / piping / conduits, etc.

D. Expose tracer wires at ends, valves, junction boxes, etc., for Owner’s future use. Contractor shall verify / prove to Owner that all tracer wires are installed and continuous without breaks, utilizing tracer equipment at the end of the project.

END OF SECTION 01 05 00

SECTION 01 17 00 – STORAGE, PROTECTION, & SAFETY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Comply with the requirements of the Conditions of the Contract relating to protection of persons and property and with the requirements specified herein.

B. Protect products scheduled for use in the Work by means including, but not necessarily limited to, those described in the Section.

C. Related Work:
   1. Documents affecting work in the Section, include, but are not necessarily limited to, the General Conditions, Supplementary General Conditions, General Notes to Contractor, Contractor Safety, and Division 01 Sections of this Project Manual.
   2. Additional procedures also may be described in other Sections of this Project Manual.

1.03 QUALITY ASSURANCE

A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.

1.04 MANUFACTURER'S RECOMMENDATIONS

A. Except as otherwise approved by the Architect, determine and comply with manufacturer's recommendation on product handling, storage and protection.

1.05 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 for 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 Architect as to manufacturer, grade, quality and other pertinent information. In addition, the Architect may reject any materials or products damaged due to inadequate packaging.

1.06 STORAGE

A. Store materials in a manner acceptable to manufacturer so as to not damage the materials prior to installation. Provide coverings, pallets, dunnage and / or storage facilities necessary to protect stored materials.

1.07 REPAIRS AND REPLACEMENTS

A. In the event of damage, promptly make replacements and repairs to the approval of the Architect, with 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 the extension of the Contract Time of Completion.

1.08 FIRE PROTECTION

A. Maintain good housekeeping practices at all times to reduce the risk of fire damage. All scrap materials, rubbish and trash shall be removed daily from the site and shall not be permitted to be scattered on adjacent property. Use of the Owner's dumpsters shall not be permitted.

B. Comply with all applicable fire protection requirements of the local fire district.

1.09 SPECIAL NOTICE CONCERNING UTILITIES

A. Contractor shall, before starting any work, locate all underground lines / piping including electrical power and lighting, telephone, gas, water, sewers, or other as necessary, to ascertain if there are any underground installations that could be damaged due to this contract work. Contractor shall take every precaution necessary so as not to damage any of these underground services. Contractor will be held entirely responsible for any damage whatsoever to these underground installations and shall pay for remedial work as required at no cost to the Owner.

B. All utilities shown on the Drawings are approximate. Individual service lines are not shown. The General Contractor, or subcontractor, shall notify the Kentucky Dig Safely toll-free hotline (1.800.752.6077, or 811) 48-hours in advance of any construction on this Project. This number was established to provide accurate location of existing below ground utilizes (i.e. cables, electric wires, gas and water lines). The General Contractor shall be responsible for becoming familiar with all utility requirements set forth in the Contract Documents and make any necessary provisions. The General Contractor shall employ the services of a qualified underground utility locator to identify and mark any underground utilities that may be encountered in the work area not specifically located by the utility services locator (i.e. secondary houses lines etc.).

1.10 PROTECTION OF THE WORK

A. It shall be the Contractor's responsibility to prevent uplift and movement of structures in any direction, until receipt of written acceptance of completed work of this contract. Ground water surrounding the structure shall be maintained at safe levels.

B. Take all necessary measure to protect the Work from damage by moisture, freezing and other causes, both before and after installation, until receipt of written acceptance of the completed work.

1.11 SAFEGUARDS

A. Provide barricades and temporary signage for the protection of persons and property and the control of vehicular and pedestrian traffic as required by the governing agency.

B. Secure the building at the end of each day. All exterior doors, windows and openings shall be locked or secured to prevent unauthorized entry into the building. Building alarm system, if in place, shall be activated.

C. Adhere to OSHA 1926 construction manual for work in confined spaces.

1.12 PROTECTION OF PERSONS AND PROPERTY

A. Comply with applicable laws, ordinances, rules, regulations and orders of public authorities having jurisdiction for the safety of persons and property to protect them from damage, injury, or loss.

B. Throughout the Owner's property, protect permanent improvements to remain, curbs, pavements, fences, planting, buildings, and other improvements subject to damage due to Contractor's operations.

C. Erect and maintain, as required by conditions and progress of the work, necessary safeguards, for safety and protection, including temporary fences, guards, railings, barricades, canopies, lighting, shoring, directional and danger signs, signals and other warnings against hazards.

D. Protect and secure the site, materials and equipment from theft and damage, by whatever reasonable means are effective. Methods such as the following may be employed, singularly or together: Locks, fences, signs, patrols, radio, alarms, locked storage on-site and off- site warehousing.

E. Do not permit trenches to remain open, without adequate board or fencing, barricade, or other means of identifying an open trench.

F. Repair and restore all damaged items to the condition existing at the beginning of construction, or better. Existing site improvements; such as pavements, curbs, buildings, fences, lawns,

plantings and lighting which are not to be removed under this Contract, but are damaged or defaced by Contractor's operations, they be repaired or replaced.

G. Fire Extinguishers: Provide types, sizes, numbers and locations as would be reasonably effective in extinguishing fires during early stages of construction, by personnel at the Project Site. Provide Type A extinguishers at locations of low potential for either electrical or grease-oil-flammable liquid fires; provide ABC dry chemical extinguishers at other locations; comply with recommendations of NFPA No.10. Post warning and quick instructions at each extinguisher location and instruct personnel at the Project Site, at time of their first arrival, on proper use of extinguishers and other available facilities at the Project Site. Post local fire department call number on each telephone instrument at the Project Site.

    1. Permanent Fire Protection: Complete each fire protection facility at earliest reasonable date and make ready for emergency use, and instruct personnel at site on availability and proper use.

H. Building Enclosure and Lockup: Secure building against unauthorized entrance at times when personnel are not working. Provide secure temporary enclosures at ground floor and other locations of possible entry, with locked entrances.

I. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

    1. Excessive static or dynamic loading
    2. Excessive internal or external pressures
    3. Excessively high or low temperatures
    4. Thermal shock
    5. Excessively high or low humidity
    6. Air contamination or pollution
    7. Water or ice
    8. Solvents
    9. Chemicals
    10. Light
    11. Radiation
    12. Puncture
    13. Abrasion
    14. Heavy traffic
    15. Soiling, staining and corrosion
    16. Bacteria
    17. Rodent and insect infestation
    18. Combustion
    19. Electrical current
    20. High speed operation
    21. Improper lubrication

22. Unusual wear or other misuse
23. Contact between incompatible materials
24. Destructive testing
25. Misalignment
26. Excessive weathering
27. Unprotected storage
28. Improper shipping or handling
29. Theft
30. Vandalism

J. Fire and Windstorm Protection: Take the following precautions to protect the Project against fire and windstorm damage during construction.

1. Set up an effective fire brigade and arrange for response to the building site by the community fire department in the event of an emergency.
2. Provide adequate portable fire extinguisher equipment for all areas of storage, constriction, temporary enclosures and constriction offices.
3. All temporary contractor's offices, storage sheds, workmen's shanties, etc., shall be located outside of, and well detached from, the building under construction.
4. The installation of water supplies, sprinklers, standpipes and fire hose shall closely follow completion of floors and areas.
5. Storage of combustible and flammable materials shall be maintained outside of, and well detached from the building under construction. Storage of combustibles shall not be located inside the building under construction.
6. Only flame-proofed tarpaulins shall be used.
7. The supply of flammable paints, solvents, oils, gas cylinders, etc., inside the building under construction shall be limited to that required for one day's use.
8. Cutting and welding operations present a severe hazard, and such work should be done outside of the building under construction whenever possible.
9. Insulation materials required for the curing of concrete shall be non-combustible.
10. Temporary electric wiring should be kept to a minimum. Flood lights are preferable to individual unprotected lamps. All temporary electric circuits should be properly installed to prevent physical damage, and they should be provided with overload protection as specified in the National Electric Code.
11. All roofing kettles (or any similar equipment) shall be located outside the building under construction, with as much detachment as possible.
12. Smoking is **NOT PERMITTED** within the building, or adjacent doors or windows at the exterior of the building. Definite control should be maintained in the storage areas and areas involving flammable liquids.
13. All combustible waste and scrap materials shall be removed from the building under construction on a daily basis. No on-site incineration shall be permitted without arrangements being made with Owner on a per-event basis.
14. Ready access for the public fire department shall be maintained to all areas at all times.
15. All structural steel shall be properly secured and braced at the end of each working day.

16. All masonry walls should follow the erection of the permanent structural members, so that adequate lateral stability is improved. Brace wall as required until permanent lateral bracing is installed.
17. All concrete forms shall be adequately fastened in place.
18. All roof decking shall be permanently secured as it is laid in place.
19. All vapor barriers, insulation and roofing materials shall be permanently fastened to the roof deck as it is applied.
20. All construction materials shall be adequately protected against wind damage during storage.
21. All tarpaulins or any other temporary enclosure materials shall be securely fastened.

K. Temporary Interruption of Fire Protection System: Once the fire protection system is in place and operational, the Contractor shall be responsible for implementing emergency measures that will maintain the integrity of the fire protection during periods of impairment to such systems.

1. Notify the Owner, the local fire department and Owner's insurance carrier that protection will be impaired. The information should include what systems will be out of service, for how long and what areas will be affected.
2. Temporary emergency measures that shall be implemented include continuous roaming fire watches; discontinue any work involving cutting or welding, laying out and charging fire hoses that can be put into operation immediately.
3. Protection that is impaired should be restored as soon as possible; but should not be allowed to continue overnight or over a weekend or holiday period. Once the work is started to correct the impairment it should be continued until the work is complete and the system is restored to service.
4. Advise all previously notified parties of the restoration of service at the first opportunity.

L. Protect installed work and provide special protection where specified in individual specification sections.

1. Protect finished surfaces, including walls, projections, jambs, sills and soffits of openings used as passageways, through which equipment and materials are handled.
2. Protect finished floors and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects by protecting with durable sheet materials.

    a. Lay Down / Work Areas: The Contractor shall protect any floors where tool boxes, pipe bending, gang boxes, etc. are placed. Provide 3/4" plywood with plastic sheeting. Contractor is responsible for repairing / replacing any damaged floors.

3. Maintain finished surfaces clean, unmarred and suitably protected until accepted by the Owner.
4. Protect all roof surfaces from traffic or storage. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
5. Prohibit traffic from landscaped areas.

1.13 SAFETY MEETINGS

A. The Contractor shall conduct meetings to discuss safe working methods with all employees under his control on a regularly scheduled basis, but not less than weekly.

B. Contractor shall be held entirely responsible for safety regulations, procedures and policies.

PART 2 PRODUCTS (not applicable)

PART 3 EXECUTION (not applicable)

END OF SECTION 01 17 00

SECTION 01 20 00 – PROJECT MEETINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION

A. Attend pre-construction conference and progress meetings as specified.

1.03 PRE-CONSTRUCTION CONFERENCE

A. As soon as possible after issuance of Notice to Proceed and prior to start of construction, Architect will arrange an on-site meeting with the Contractor. The meeting agenda will include the following:

1. Correspondence procedures;
2. Designation of responsible personnel;
3. Changes;
4. Payments to Contractor;
5. Subcontractors;
6. Construction Schedule;
7. Submittals;
8. Restrictions on access to and use of site;
9. Security;
10. Review of existing mechanical, electrical, communication, or other systems in the areas for new Work. The method to document the existing conditions of these systems will be reviewed and scheduled with the Owner.

1.04 PROGRESS MEETINGS

A. Attend progress meetings every two (2) weeks at the site during the construction period, at a time suitable to Owner and Architect. Also organize other site meetings as requested by Owner or Architect.

1. Agenda:

a. Review of work progress to date and work to be completed in the time frame before the next progress meeting.
b. Review of field observations, problems and decisions.
c. Identification of problems which may impede planned progress.
d. Corrective measures to regain projected schedules.
e. Effect of proposed changes on progress schedule and coordination.

f. Other business relating to work.

B. Each interested Subcontractor shall be present at meetings to report the condition of their work and to receive instructions.

C. Architect shall record the minutes of each meeting, including names of principal participants, significant proceedings and decisions, and distribute copies of minutes within seven (7) days after meetings.

D. Progress of work shall be reported, in writing, in detail with reference to construction schedule and submit copies to Owner and Architect at each progress meeting.

E. When attendance is requested, attendance shall be mandatory.

1.06 FOCUS MEETINGS

A. Prior to the start of any major activities (i.e. masonry, roofing, paving) a focus / coordination meeting shall be held to ensure the Work is properly coordinated and performed as specified.

PART 2 PRODUCTS (not applicable)

PART 3 EXECUTION (not applicable)

END OF SECTION 01 20 00

SECTION 01 22 00 – UNIT PRICES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

B. Related Requirements:
   1. Division 01 Section "Quality Control" for general testing and inspecting requirements

1.03 DEFINITIONS

A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.04 PROCEDURES

A. Indicate unit prices to determine any adjustment to the contract price due to changes in work or extra work performed under this contract. The unit prices shall include the furnishing of all necessary labor and materials, plus cost for delivery, installation, insurance, bonds, applicable taxes, overhead and profit for the Contractor, as well as any Subcontractor involved. These unit prices shall be listed in units of work.

B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections, or in the description of the Unit Price itself.
   1. Unit of measurement in calculating areas, quantities, volumes shall be understood to mean actual in place measurements of materials or volumes.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

PART 2 PRODUCTS (not applicable)

PART 3 EXECUTION

3.01 LIST OF UNIT PRICES

A. Refer to the Form of Proposal provided herein for General Contractor's use in bidding for a schedule of Unit Prices to be included.

END OF SECTION 01 22 00

SECTION 01 30 00 - SUBMITTALS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for Submittals required for performance of the Work, including:
   1. Contractor's Construction Schedule
   2. Submittal Schedule
   3. Daily Construction Reports

B. Administrative Submittals: Refer to other Division 01 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:
   1. Permits
   2. List of Subcontractors

C. The Schedule of Values, included on Division 01 Section "Measurement and Payment".

D. Inspection and test reports, included in Division 01 Section "Quality Control".

E. Shop Drawings, product submittals, and other technical information is described in Section 01 34 00 – "Shop Drawings, Product Data & Samples".

1.03 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittal with performance of construction activities. Transmit each submittal in advance of performance of related construction activities to avoid delay.

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

1.04 CONTRACTORS CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Prepare a fully developed, horizontal, bar-chart type Contractor's schedule. Submit within (15) days of the date of the Notice to Proceed.
   1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values".
   2. Within each time bar, indicate estimated completion percentage in 10% increments. As the Work progresses, place a contrasting mark in each bar to indicate Actual Completion.
   3. Prepare the schedule on a sheet, or series of sheets, on reproducible media, and sufficient width to show data for the entire construction period.

4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically all sequences necessary for completion of related portions of the Work.
5. Coordinate the Contractor's construction schedule with the Schedule of Values, list of subcontracts, submittal schedule, progress reports, payment requests and other schedules.
6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Architect's procedures necessary for Certification of Substantial Completion.

B. Work Stages: Indicate important stages in construction for each major portion of the Work, including testing and installation.

C. Distribution: Following response to the initial submittal, print and distribute copies to the Architect, Owner, Subcontractors and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.
   1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

D. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

PART 2 PRODUCTS (not applicable)

PART 3 EXECUTION (not applicable)

END OF SECTION 01 30 00

SECTION 01 34 00 – SHOP DRAWINGS, PRODUCT DATA, & SAMPLES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 GENERAL

A. Submit, with such promptness as to cause no delay in construction, shop drawings, product data and samples required by Specifications Sections. The completion time of the Project will NOT be extended for delays caused by tardiness of delivery.

1.03 SHOP DRAWINGS

A. Original drawings, prepared by the Contractor, Subcontractor, supplier or distributor, which illustrates some portion of the Work; showing fabrication, layout, setting or erection details.

B. Prepared by qualified detailer.

1.04 PRODUCT DATA

A. Manufacturer's standard schematic drawings:
   1. Modify drawings to delete information which is not applicable to the Project.
   2. Supplement standard information to provide additional information applicable to the Project.

B. Manufacturer's catalog sheets, brochures, diagrams, schedule, performance charts, illustrations and other standard descriptive data:
   1. Clearly mark each copy to identify pertinent materials, products or models.
   2. Shop dimensions and clearance required.
   3. Shop performance characteristics and capacities.
   4. Show wiring diagrams and controls.

1.05 SAMPLES

A. Physical examples to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged.

B. Office Samples of sufficient size and quality to clearly illustrate:
   1. Functional characteristics of product or material, with integrally related parts and attachment devices.
   2. The definition of full range is ALL available colors, regardless of price range.

1.06 CONTRACTOR RESPONSIBILITIES

A. Review Shop Drawings, Product Data and Samples prior to submission. Indicate on each submittal and sign showing review and date.

B. Verify:
   1. Field measurements.
   2. Field construction criteria.
   3. Catalog numbers and similar data.
   4. Quantities.

C. Coordinate each submittal with requirements of the Work and of the Contract Documents.

D. Contractor's responsibility for errors and omissions in submittal is not relieved by Architect / Engineer's review of submittals.

E. Contractor's responsibility for deviations in submittals from requirement of Contract Documents is not relieved by Architect / Engineer's review of submittals, unless Architect / Engineer gives written acceptance of specific deviations.

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 stamp and initials or signature indicating review.

H. After Architect / Engineer's review, distribute copies.

1.07 SUBMISSION REQUIREMENTS

A. All Shop Drawings and Product Data shall be reviewed and stamped by the General Contractor.
   1. Submission of shop drawings and products shall be as follows:

      a. **OWNER:** Owner does not need to receive shop drawings and product data prior to review and approval by the design team. Owner will receive a digital copy of the submittal response from the Architect. Contractor to maintain a file of all finalized shop drawings and product data with consultants' stamps and comments and submit on CD-ROM with closeout documents.
      b. **CIVIL:** All shop drawings and product data *(with transmittal)* to be sent digitally. Send directly to the Civil Engineer and copy the Architect.
      c. **STRUCTURAL:** Shop drawings and product data *(with transmittal)* to be sent digitally. Send directly to the Structural Engineer and copy the Architect.
      d. **ARCHITECTURAL:** All shop drawings and product data *(with transmittal)* to be sent digitally.

e. **MEP:** All shop drawings and product data *(with transmittal)* to be sent digitally. Send directly to the MEP Engineer and copy the Architect.

2. On all transmittals to the Architect / Engineer, include the indication of delivery to Owner Provide separate transmittal for each submittal indicated with Specification Section.
3. If any digital submittal is determined to be insufficient to communicate the details or requirements of the project, Architect may ask to receive hard copies.
4. Email addresses / contacts will be provided at the Pre-Construction Meeting.

B. Samples: Submit as indicated in the Specification of the product.

C. After development and acceptance of the Contractor's construction schedule, prepare and submit a complete schedule of submittals.
1. Coordinate submittal schedule with the subcontractors, Schedule of Values, and the list of products as well as the Contractor's construction schedule.
2. Provide the following information:

a. Related Specification Section number.
b. Name of Subcontractor.
c. Description of the Work covered.

1.08 ARCHITECT / ENGINEER DUTIES

A. Review submittals with reasonable promptness.

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 and initials or signature certifying review of submittal.

E. Return submittals to Contractor for distribution.

PART 2 PRODUCTS (not applicable)

PART 3 EXECUTION (not applicable)

END OF SECTION 01 34 00

SECTION 01 40 00 – QUALITY CONTROL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SCOPE OF WORK

A. This section includes requirements for testing and special inspection services and for published standards and specifications.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Types and Quantities of Field Tests required are identified in the Technical Specifications Sections.

B. Tests Required of Manufacturer in Factory or Plant for Quality Assurance are identified in the Technical Specifications sections.

C. Refer to S0.2 for Structural Special Inspection requirements.

1.04 TESTING AND INSPECTION SERVICES

A. The Owner will employ and pay for the following testing and inspection services:

1. Soils / Geotechnical Services
2. Underground utility survey for new work and found existing utilities
3. Concrete
4. Reinforcement placement
5. Mortar and grout
6. Masonry inspections
7. Welding quality control
8. Structural Steel, including connections
9. Metal deck fastening / attachment.

B. Except where specifically specified above, Contractor shall employ testing and inspection laboratories or agencies to perform inspecting and testing required by the various Specification Sections and pay all costs for such services. Contractor shall coordinate with Owner's testing agency to arrange required inspections at appropriate times.

C. Testing or inspection of the Work or both shall not relieve the Contractor of their responsibility for conforming to the requirements of the Contract Documents.

D. Certification that Work conforms to the requirements of the Contract Documents remains the responsibility of the Contractor.

1.05 PROCEDURE FOR TESTING LABORATORY AND INSPECTION SERVICES

A. Testing laboratory and inspection services, including such services as sample taking, sample curing and preparation, testing, and reporting, shall be performed by an agency or agencies, referred to hereafter as the Inspection Agency or Testing Laboratory, approved by the Owner and Architect.

B. The Contractor shall provide access and incidental equipment and shall schedule operations in such a way that inspections may be made freely by the Testing Agency or Inspection Agency or, when requested, make arrangements with manufacturers for inspection of materials and equipment during manufacture.

C Reports of tests shall be submitted by the Agency or Laboratory, by email, directly to the Architect and Owner for interpretation at the same time forwarded to the Contractor, for their distribution. The Architect will transmit copies to their consultants.

D. Retest Responsibility: Where results of required inspections, tests or similar services are unsatisfactory (not in compliance with the Contract Documents), retesting will be the responsibility of the Contractor at their expense.

E. Notify the Owner's testing agencies a minimum of 24-hours in advance of work requiring their on-site presence. It is the General Contractor's responsibility to coordinate with the Owner's testing service. Contractor will be back charged for the time expended by the testing company due to the lack of notification for cancellation of work regarding testing.

PART 2 PUBLISHED STANDARDS AND SPECIFICATIONS

2.01 USE OF PUBLISHED STANDARDS AND SPECIFICATION STANDARDS

A. Work specified by reference to the published standard or specifications of a government agency, technical associations, trade association, professional society, testing agency, or other organization shall comply with or exceed the minimum standards of quality for materials and workmanship established by the listed standard or specifications. References used in the project specifications are to be the latest edition adopted and published prior to the publication date of these specifications unless the specific date of the standard is listed in the project specification.

B. In case of conflict between the referenced standard or specification and the Building Code or other legal requirement having jurisdiction, comply with the one establishing the more stringent requirements.

C. In case of conflict between the referenced standard or specification and the project specifications, the project specifications shall govern.

D. In case of conflict between the referenced standards or specifications when more than one standard or specification is cited, the priority of interpretation shall be as follows:

1. First priority: UL, NFPA, or FML.
2. Second priority: ASTM or ANSI Standard or Federal Specifications.
3. Third priority: Other listed standard or specification.

2.02 ABBREVIATIONS FOR PUBLISHED STANDARDS AND SPECIFICATIONS

A. Following is a list of organizations publishing specifications and standards to which references may be made in the project specifications, with abbreviations used. The addresses from which published standards can be obtained will be furnished by the Architect upon request.

AA	Aluminum Association
AAMA	Architectural Aluminum Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ABPA	Acoustical and Board Products Association
ACI	American Concrete Institute
AGA	American Gas Association
AI	Asphalt Institute
AIA	American Institute of Architects
AInA	American Insurance Association (formerly NBFU)
AISC	American Institute of Steel Construction
AITC	American Institute of Timber Construction
ANA	American Nurseryman's Association
ANSI	American National Standards Institute, Inc.
APA	American Plywood Association
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPB	American Wood Preservers Bureau
AWSAWS	American Welding Society
BIA	Brick Institute of America (formerly SCPI)
CRA	California Redwood Association
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standards of the U. S. Department of Commerce
FGMA	Flat Glass Marketing Association
FED. Spec.	Federal Specifications
FML	Factory Mutual Laboratories
FTI	Facing Tile Institute

GA	Gypsum Association
IEEE	Institute of Electrical and Electronic Engineers
MFMA	Maple Flooring Manufacturer's Association
MIA	Marble Institute of America
MLSFA	Metal Lath/Steel Framing Association
MIL	Military Specifications
NAAMM	National Association of Architectural Metal Manufacturers
NBGQA	National Building Granite Quarries Association
NBS	National Bureau of Standards of the U. S. Department of Commerce
NCMA	National Concrete Masonry Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NOFMA	National Oak Flooring Manufacturer's Association
NSF	National Sanitation Foundation
NTMA	National Terrazzo and Mosaic Association, Inc.
PCA	Portland Cement Association
PEI	Porcelain Enamel Institute
PI	Perlite Institute, Inc.
PS	Product Standard, National Bureau of Standards
RTI	Resilient Tile Institute
SDI	Steel Deck Institute
SDI	Steel Door Institute
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc.
SFPA	Southern Forest Products Association
SSPC	Steel Structures Painting Council
TCA	Tile Council of America
UL or U.L.I.	Underwriters' Laboratories, Inc.
WWPA	Western Wood Products Association

Part 3 **Execution** (not applicable)

END OF SECTION 01 40 00

17SECTION 01 50 00 – TEMPORARY FACILITIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 GENERAL

A. Contractor shall provide and maintain temporary facilities as specified and as required for the progress and completion of the Work under contract.

B. Contractor shall be responsible for coordinating and scheduling among all trades and subcontractors the furnishing and use of all temporary facilities required for the Work.

1.03 REQUIREMENT OF REGULATORY AGENCIES

A. Contractor shall provide and maintain all temporary facilities in compliance with governing rules, regulations, codes, ordinances and laws of agencies and utility companies having jurisdiction over wok involved in project.

B. Contractor shall be responsible for all temporary work provided, and obtain any necessary permits and inspections for such work.

C. Do not interfere with normal use of streets in vicinity of project site except as indicated on the Drawings and/or as absolutely necessary to execute required work, and then only after proper arrangements have been made with applicable authorities, including traffic control as applicable.

1.04 TEMPORARY FIELD OFFICES

A. Contractor shall provide a field office in a suitable temporary, waterproof, heated and cooled, structure at the site and provide the following:

1. Copies of the Drawings, Specifications, shop drawings, samples and other data pertinent to the work shall be kept on-site at all times for reference.
2. Space is to be complete with construction plans, reference table and chairs (for approximately 10-people) and file cabinet, as necessary to conduct on-site meetings during construction.
3. Construction Superintendent shall be in possession of a portable cellular phone, and the number shall be provided to Owner and Architect.
4. Provide and maintain computer station with email for construction correspondence with the Construction Superintendent.

5. Provide and maintain a copy machine for use by Contractor and persons connected with the Work.

B. Pay cost of providing and maintaining any temporary office facilities.

C. Location of temporary office shall be coordinated with the Owner.

1.05 WATER FOR CONSTRUCTION

A. Contractor may use without charge water from the site's existing water services if used without waste. The Contractor must provide and pay for all temporary water service during construction if not provided from existing building's water service. All effort must be used to conserve these services.

1. Any temporary extension of utilities or services required for the completion of the Work under this contract shall be borne by the Contractor.

B. Contractor to provide sufficient branch lines and suitable fixtures at termination of line of adequate size to serve the needs of all trades. Locate water supply at convenient locations on site.

C. Provide insulated housings for temporary service lines to protect against freezing when applicable.

D. Remove temporary water lines and fixtures upon completion of work.

1.06 TEMPORARY ELECTRICAL ENERGY AND LIGHT

A. Contractor may use without charge the site's existing electrical service if used without waste. The Contractor must provide and pay for all temporary electrical service during construction if not provided from existing electrical service, or for service needed but not available from the existing electrical service. Do not overload circuits. All effort must be used to conserve these services.

1. The Contractor is responsible for providing (and paying for) temporary electrical generation for either power not available at the site that is necessary for the Project at their expense or during power outages necessary during the course of the Project (i.e. electrical service change over).
2. Any temporary extension of utilities or services required for the completion of the Work under this contract shall be borne by the Contractor.

B. If Owner's service is interrupted for any reason, Owner is not responsible for temporary power. Contractor shall provide source of power as necessary to complete the Work.

1. If temporary service is necessary, provide main service disconnect and overcurrent protection at convenient location.

2. Provide temporary electrical service lines at start of project and as work progresses.
3. Provide portable electrical energy source if necessary.

C. Provide adequate power source at convenient central locations required, with each source terminating in suitable load centers with circuit breakers or fuses. Provide distribution of all electrical power outlets to accommodate all trades and proper execution of work.

1. Permanent convenience receptacles may be utilized during construction. If these devices are damaged or marred, they shall be replaced.

D. Provide all temporary lights and wiring, including lamps, as required for adequate illumination to perform work and for safety of persons.

E. Contractor to be responsible for a safe and satisfactory installation. Keep circuits properly fused at all times, and remove temporary provisions when permanent system is ready for use. No temporary wiring, devices, etc., shall be incorporated into permanent construction.

1. All temporary wiring and lighting shall comply with the requirements of the National Electric Code.

F. Remove temporary wiring and equipment upon completion of the Work.

1.07 TEMPORARY HEAT AND VENTILATION

A. Provide and pay for necessary temporary covering, enclosures, ventilation and / or heating to protect workers and work under contract against injury or damage by weather elements.

1. Provide and pay for heat devices and heat as required to maintain specified conditions for construction operations.

B. Use safe effective means of heating, ventilation and / or other protection required at all times. Maintain temperatures and ventilation required for proper installation and completion of work by all trades.

C. If the permanent heating and / or ventilation equipment is used for temporary service during construction period, it is understood that this use in no way affects the required guarantees which become effective the same time of acceptance of building by Owner. Also, if permanent equipment is used, have all used filters replaced at the end of construction period. Refer to Division 23 Sections for further direction regarding filters and use of permanent HVAC equipment.

D. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

E. Maintain minimum ambient temperature of 50-degrees F in areas where construction is in progress.

F. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors or gases.

1.08 HEALTH AND SANITATION

A. The operations of the Contractor shall be in full conformity with all the rules and regulations of boards and bodies having jurisdiction with respect to health and sanitation. Supply safe and sufficient drinking water and toilet facilities to all employees, obey and enforce all sanitary and health regulations and orders, and take precautions against the spread of infectious diseases.

B. Provide and pay for temporary toilet facilities of type acceptable to public health authorities, in quantity to meet the needs of all workmen and agents present on the project site. Locate in convenient locations and relocate as necessary as work progresses.

1. Provide temporary facilities necessary due to project conditions as required.
2. Facilities shall be kept clean by the Contractor.
3. Remove temporary sanitary facilities upon completion of the Work.

1.09 TEMPORARY STORAGE

A. Provide suitable storage facilities for materials delivered to site and protect materials from weather and damage.

B. Any temporary storage of materials at site shall not interfere with or damage work of any contractor at work or the property of the Owner. If necessary, or as directed by Architect, stored materials shall be relocated or removed.

C. Use of a public way for storage of materials shall be permitted only if the Contractor receives approval from the applicable governing authorities.

1.10 VEHICLE ACCESS

A. Provide and maintain temporary access into contract work areas as necessary for vehicles and equipment of all trades requiring such access. Repair any damage to in-place / existing pavements or other construction when damage results from operations under this contract.

1. Owner and Contractor shall survey existing campus paving for damage.
2. Contractor to repair any damage caused during construction.

B. Contractor shall be responsible for all traffic control at streets adjacent to project site as required when vehicles enter and leave the site. Comply with all governing City / State regulations for traffic control and access.

C. Roads and Paved Areas: Maintain existing roads and paved areas during construction operations. Repair roads and paved areas within construction limits that become damaged from construction operations.

1. Grass areas shall not be used for parking. Damaged areas shall be returned to its original condition once construction is complete.

D. Paved driveways on Owner's property and public streets and thoroughfares shall be kept clean, by cleaning daily or more often if necessary, of earth and debris spillage from trucking involved in all construction operations. Provide heavy metal plates to cover utility trenches in driving areas as necessary.

E. Owner's dumpsters shall NOT be used by the General Contractor or any subcontractor.

F. Keep mud and dirt off of surrounding roadways. Provide sweepers and water trucks as necessary to keep roadways clean.

G. Keep dust knocked down by watering as necessary.

H. Sweep all paved areas and run magnetic catcher to eliminate nails, screws or other metal items that can puncture tires, daily if necessary.

1.11 TEMPORARY PARKING

A. Temporary parking facilities for construction personnel and equipment shall be confined to areas designated by the Owner. Do not park on play fields or grass areas.

B. Parking of vehicles and equipment which may be necessary outside Owner's site shall be legally provided by Contractor. Owner assumes no responsibility for temporary parking.

1.12 SIGNS

A. Allow no signs to be erected on the Project site or on the building structure by any subcontractor, fabricator or material supplier, except for contract identification signs as specified and those which are required for safety, traffic control, and protection of persons and property during construction.

1.13 CONSTRUCTION FENCING AND GATES

A. Provide temporary construction fencing to prevent public entry to the project site or contractor's storage area during construction and to protect existing facilities and adjacent properties from damage, and the general public from injury, by construction operations.

1.14 SCAFFOLDING, LADDERS AND HOISTING FACILITIES

A. Contractor is responsible to provide all temporary scaffolding, ladders and hoists required during construction.

B. Remove ladders each day located on the exterior of the building to prevent access to elevated areas.

1.15 RESPONSIBILITIES OF CONTRACTOR

A. The General Contractor shall be responsible for and shall include all costs attendant to, the provision of the following temporary facilities:

1. Contractors Office.
2. Sanitary facilities.
3. Warning Signs (as indicated in Article 1.13 above).
4. Normal use of hoisting equipment by Mechanical and Electrical Contractors. Use of hoisting equipment shall be at General Construction Contractor's discretion and subject to his approval and regulation.
5. Construction fence and walkways.

B. The Mechanical Contractor shall be responsible for, and shall include all costs attendant to, the provision of the following temporary facilities:

1. Temporary office and storage for their exclusive use. (Locate as directed by General Contractor and approved by the Owner.) At the end of construction, all Contractors' equipment and debris will be removed and area will be restored to its original condition.
2. Temporary water service and distribution system and maintenance thereof.
3. Operation and maintenance of permanent heating system if used for temporary heat.
4. Hoisting equipment for special lifts which cannot be accommodated by General Contractor's on-site equipment.

C. The Electrical Contractor shall be responsible for, and shall include all costs attendant to, the provision of the following temporary facilities:

1. Temporary office and storage for their exclusive use. (Locate as directed by General Contractor and approved by the Owner.) At the end of construction, all Contractors' equipment and debris will be removed and area will be restored to its original condition.
2. Temporary electrical service, lighting and distribution system and maintenance thereof. The General Contractor shall pay for the cost of any temporary electrical service (either by the electric utility or portable generator).
3. Hoisting equipment for special lifts which cannot be accommodated by General Contractor's on-site equipment.

D. All Contractors shall be mutually responsible for, and shall include all costs attendant to, the provision of temporary facilities specified but not specifically assigned hereinabove.

1.16 WINTER CONSTRUCTION AND WEATHER PROTECTION

A. Protect interior of building from water entering and seal all holes or gaps in the building envelope that will allow air to enter. Provide temporary heating / cooling units where needed to keep the occupied building at required temperature.

B. Take special precautions against damage to materials stored and work installed in freezing weather.

C. The use of anti-freeze compounds in concrete and in masonry mortars is prohibited.

D. Throughout the progress of work maintain a daily weather record at job site, recording temperatures and precipitation.

1.17 EXTERIOR ENCLOSURES

A. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual Specification Sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.18 DEBRIS CONTROL

A. Provide means of removing rubbish from all parts of the site and other contract areas as work progresses. Remove rubbish from site at frequent intervals to avoid large accumulation and dispose of in a legal manner.

B. Do not burn or bury rubbish on site.

C. Excess material, including demolished materials, excavated rock and excess building materials shall be removed from site and disposed of legally.

1.19 WATER CONTROL

A. Grade site to drain. Maintain excavations free of water. Provide, operate and maintain pumping equipment as required.

B. Protect site from puddling or running water. Control all runoff and pollution in accordance with prevailing codes or regulations.

C. Interior and exterior drains shall be kept free of clogs caused by debris from construction and shall be swept free of leaves, dirt, trash, etc., on a daily basis during construction.

1.20 MOWING

A. The Owner will mow and maintain all lawn areas that are accessible outside of the construction fence (around the building).

B. The Contractor is responsible for mowing adjacent to the building and the remaining areas not covered in Paragraph A above. Grass / weeds shall not exceed 6” in height at any time. Contractor shall do final mowing / trimming prior to Substantial Completion.

1.21 RECYCLING

A. All Contractors on-site are required to recycle the following materials:

1. Cardboard (boxes are to be broken down, stacked and banded on a pallet for pickup).
2. Pallets.
3. Metal items.
4. Concrete and masonry materials.

PART 2 PRODUCTS (not applicable)

PART 3 EXECUTION

3.01 PROJECT COMPLETION

A. Contractor shall remove all temporary facilities complete upon completion of the Work.

END OF SECTION 01 50 00

SECTION 01 63 00 – SUBSTITUTIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for handling requests for substitutions made before the award of the Contract.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section "Quality Control" specifies the applicability of industry standards to products specified.
2. Division 01 Section "Shop Drawings, Product Data, and Samples" specifies requirements for submitting the Contractor's Construction Schedule and the Submittal Schedule.

1.03 DEFINITIONS

A. Definitions in this Article do not change or modify the meaning of other terms used in the Contract Documents.

B. Substitutions: Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor before award of the Contract are considered to be requests for substitutions.

1. The following are not considered to be requests for substitutions:

a. Substitutions requested after award of the Contract, unless products, materials, or equipment are no longer available. Upon notice that availability is an issue, the Architect will provide direction.
b. Revisions to the Contract Documents requested by the Owner or Architect.
c. Specified options of products and construction methods included in the Contract Documents.
d. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.04 SUBMITTALS

A. Substitution Request Submittal: Substitutions are only allowed during the bidding process.

1. Submit (3) copies of each request for substitution for consideration.

2. Identify the product, the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.
3. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:

    a. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate contractors that will be necessary to accommodate the proposed substitution.
    b. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.
    c. Product Data, including Drawings and descriptions of products and fabrication and installation procedures.
    d. Samples, where applicable or requested.
    e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
    f. Cost information, including a proposal of the net change, if any in the Contract Sum.
    g. The Contractor's certification that the proposed substitution conforms to requirements in the Contract Documents in every respect and is appropriate for the applications indicated.
    h. The Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.

4. Architect's Action: If necessary, the Architect will request additional information or documentation for evaluation within one week of receipt of a request for substitution. The Architect will notify the Bidders of acceptance of the substitution via addendum.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Conditions: The Architect will receive and consider the Contractor's request for substitution when one or more of the following conditions are satisfied, as determined by the Architect. If the following conditions are not satisfied, the Architect will return the requests without action except to record noncompliance with these requirements.

1. Extensive revisions to the Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of the Contract Documents.
3. The request is timely, fully documented, and properly submitted.
4. The specified product or method of construction cannot be provided within the Contract Time. The Architect will not consider the request if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
5. The request is directly related to an "or equal" clause or similar language in the Contract Documents.

6. The requested substitution offers the Owner a substantial advantage, in cost, time, energy conservation, or other considerations, after deducting additional responsibilities the Owner must assume. The Owner's additional responsibilities may include compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner, and similar considerations.
7. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials and where the Contractor certifies that the substitution will overcome the incompatibility.
9. The specified product or method of construction cannot be coordinated with other materials and where the Contractor certifies that the proposed substitution can be coordinated.
10. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provides the required warranty.
11. Where a proposed substitution involves more than one prime contractor, each contractor shall cooperate with the other contractors involved to coordinate the Work, provide uniformity and consistency, and assure compatibility of products.

B. The Contractor's submittal and the Architect's acceptance of Shop Drawings, Product Data, or Samples for construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

PART 3 EXECUTION (not applicable)

END OF SECTION 01 63 00

SECTION 01 70 00 – CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Work included:

1. Provide an orderly and efficient transfer of the completed Work to the Owner.

B. Related work:

1. Documents affecting the work of this Section include, but are not necessarily limited to the, General Conditions, Article 9 of the Supplementary Conditions (Section 00 80 00) and Division 01 Sections of this Project Manual.
3. Activities relative to Contract Closeout are described in, but not necessarily limited to, Paragraph 9.8, 9.9 and 9.10 of the General Conditions.
4. "Substantial Completion" is defined in Paragraph 9.8.1 of the General Conditions.

1.03 GUARANTEE – WARRANTY

A. The Contractor and each Subcontractor, in accepting a Contract for the construction of their respective portion of the construction covered by these Drawings and Specifications, do hereby agree to replace and make good, without any expense to the Owner, any work or material which may be found to be defective. Deterioration due to ordinary use and wear will be excluded from this guarantee.

B. Such guarantees shall not relieve the Contractor from any obligation assumed under any other provision of the Contract.

C. Refer to Article 12 of the General Conditions, Uncovering and Correction of Work, and other Specification Sections requiring longer / extended warranty requirements.

1.04 QUALITY ASSURANCE

A. Prior to requesting inspection by the Architect, use adequate means to assure that the Work is completed in accordance with the specified requirements and is ready for the requested inspection.

1.05 PROCEDURES

A. Substantial Completion:

1. Prepare and submit a punch list.
2. Within a reasonable time after receipt of the list, the Architect will inspect to determine the status of completion.
3. Should the Architect determine that the Work is not substantially complete:

    a. The Architect will promptly notify the Contractor, in writing, giving the reasons therefore.
    b. The Contractor shall remedy the deficiencies and notify the Architect when ready for re-inspection.
    c. The Architect will re-inspect the Work.

4. Certificate of Occupancy shall be obtained from the Building Official prior to request of Substantial Completion.

5. When the Architect concurs that the Work is Substantially Complete:

    a. The Architect will prepare a “Certificate of Substantial Completion” on AIA Form G704, accompanied by the Contractor’s list of items to be completed or corrected, as verified by the Architect.
    b. The Architect will submit the Certificate to the Owner and to the Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.

B. Final Completion:

1. Prepare and submit a notice of Final Completion
2. Verify that the Work is complete.
3. Certify that:

    a. Contract Documents have been reviewed.
    b. Work has been inspected for compliance with the Contract Documents.
    c. Work has been completed in accordance with the Contract Documents.
    d. Equipment and systems have been tested as required, and are operational.
    e. Work is completed and ready for final inspection.

4. The Architect will make an inspection to verify status of completion.
5. Should the Architect determine that the Work is incomplete or defective:

    a. The Architect promptly will notify the Contractor, in writing, listing the incomplete or defective work.
    b. The Contractor shall remedy the deficiencies and notify the Architect when ready for re-inspection.

6. When the Architect determines that the Work is acceptable under the Contract Documents, request will be made to the Contractor to make closeout submittals.

C. Closeout submittals include, but are not necessarily limited to the following (refer to Article 9 of Section 00 80 00 for retainage to be held for closeout documents):

1. Project Record Documents described in Division 01 Section “Project Record Documents”.
2. Operation and Maintenance data for items so listed in pertinent other Sections of this Project Manual, and for other items when so directed by the Architect.
3. Warranties and Bonds.
   (Note: All warranty dates are to begin on Date of Substantial Completion regardless of the shipment, or start-up, date of the material).
4. Keys.
5. Spare parts and extra stock material. Contractor shall deliver all spare parts to the Project Site, with a receipt to be signed by an authorized Owner’s representative.
6. Evidence of compliance with requirements of governmental agencies having jurisdiction including, but not necessarily limited to:

   a. Certificates of Inspection.
   b. Certificates of Occupancy.

7. Certificates of Insurance for products and completed operations.
8. AIA Form G706, Contractor’s Affidavit of Payment of Debts and Claims (in triplicate).
9. AIA Form G706A, Contractor’s Affidavit of Release of Liens (in triplicate).
10. AIA Form G707, Consent of Surety to Final Payment (in triplicate).
11. List of Subcontractors, service organizations, and principal vendors, including names, addresses and telephone numbers where they can be reached for emergency service at all times, including nights, weekends and holidays.
12. Letter stating no asbestos was used in the construction.

D. Final adjustment of accounts:

1. Submit a final Application and Certificate for Payment to the Architect, showing all adjustment to the Contract Sum,
2. If so required, the Architect will prepare a final Change order showing adjustments to the Contract Sum which were not previously made by Change Orders.

1.06 OPERATION AND MAINTENANCE DATA

A. Submit (1) copy of complete volumes in final form 15-days prior to final inspection. This copy will be returned after final inspection, with Architect / Engineer comments. Revise content of documents as required prior to final submittal.

B. Submit (3) sets prior to final inspection, bound in 8-1/2 x 11-inch format pages, three D side ring capacity expansion binders with durable plastic covers.

C. Prepare binder covers with printed title “OPERATION AND MAINTENANCE INSTRUCTIONS,” title of project and subject matter of binder when multiple binders are required.

D. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

E. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, type on 24-pound white paper.

F. Part 1: Directory, listing names, addresses and telephone numbers of Architect / Engineer, Contractor, Subcontractors and major equipment suppliers.

G. Part 2: Operation and maintenance instructions arrange by system and subdivided by Specification Section. For each category, identify names, addresses and telephone numbers of Subcontractors and suppliers. Identify the following:

1. Significant design criteria.
2. List of equipment.
3. Parts list for each component, including exploded drawings or diagrams that indicate all parts.
4. Operating instructions.
5. Maintenance instructions for equipment and systems.
6. Maintenance instruction for finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.

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

1. Shop drawings and product data.
2. Air and balance reports.
3. Certificates.
4. Photocopies of warranties.

1.07 INSTRUCTION

A. Instruct the Owner's personnel for proper operation and maintenance of systems, equipment and similar items which were provided as part of the Work.

1.08 PUNCH LIST AND FINAL INSPECTION

A. The Contractor and each Subcontractor shall carefully and regularly check their Work for conformance as the Work is underway. Unsatisfactory work shall be corrected as the work progresses and not be permitted to remain and become a part of the Punch List.

B. If, after Substantial Completion of the Work, final completion is delayed for more than 90 days, through no fault of the Owner or Architect, the Contractor shall be responsible for the Owner's costs for additional architectural services. During the 90 day period, the Architect will make only (2) inspections to verify completion of re-inspection of Punch List items. Any additional inspections required and related administrative services will be considered additional

architectural services. The Owner's costs for additional architectural services will be charged to the Contractor through an appropriate deductive Change Order.

PART 2 PRODUCTS (not applicable)

PART 3 EXECUTION (not applicable)

END OF SECTION 01 70 00

SECTION 01 71 00 – CLEANING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK

A. Special cleaning for specific units of work is specified in other Sections of the Project Manual. General cleaning during progress of work is specified in General Conditions and as temporary services in Division 01 Section, "Temporary Facilities". Provide final cleaning of the Work, consisting of cleaning each surface or unit of work to normal "clean" condition expected for a first-class building cleaning and maintenance program. Comply with manufacturer's instruction for cleaning operations. The following are examples, but not by way of limitation, of cleaning levels required.

1. Remove labels which are not required as permanent labels.
2. Clean transparent materials, including mirrors and window/door glass (both interior sides and exterior sides of window and door glass), to a polished condition, removing substances which are noticeable as vision-obscuring materials. Replace broken glass and damaged transparent materials.
3. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of dust, stains, films and similar noticeable distracting substances. Except as otherwise indicated, avoid disturbance of natural weathering of exterior surfaces. Restore reflective surfaces to original reflective condition.
4. Wipe surfaces of mechanical and electrical equipment clean; remove excess lubrication and other substances.
5. Remove debris and surface dust from limited-access spaces including roofs, plenums, shafts, trenches, equipment vaults, manholes and similar spaces.
6. Clean concrete floors in non-occupied spaces, broom / vacuum clean, then mop.
7. Vacuum clean carpeted surfaces and similar soft surfaces.
8. Clean plumbing fixtures to a sanitary condition, free of stains including those resulting from water exposure.
9. Clean light fixtures and lamps so as to function with full efficiency.
10. Clean project site (yard and grounds), including landscape development areas, of litter and foreign substances. Sweep paved areas to a broom-clean condition; remove stains, petrochemical spills and other foreign deposits. Rake grounds which are neither planted nor paved, to a smooth, even-textured surface.
11. Refer to manufacturer’s recommendations for final cleaning of all resilient tile or epoxy floor coating materials.
12. Cleaning Products:

    a. All-purpose Cleaner (for floor cleaning and spray applications):

1) To be used with manual and / or machine cleaning methods. To be a low sud, easy rinse detergent. Product to be biodegradable and make a clear, soluble solution which leaves no film or residue and not stain or discolor when used at recommended proportions and must dilute in hard or soft water. Chemical composition: Concentrated liquid blend of organic detergents, solvents, water conditioners and alkaline builders with pleasant scent. Approximate pH: 9.8 +/-.3 in solution. Must be portion-packed in easy to handle packaging.

13. Multipurpose Degreaser (for degreasing and spray applications):

a. To be used for heavy-duty cleaning, degreasing of floors and other difficult-to-clean surfaces. Product to be biodegradable and must dilate in hard or soft water. Chemical composition: Blend of mixed liquid quaternary ammonium chlorides; approximate pH 7.2 +/-.3 in solution. Must be portion-packed in easy to handle packaging.

1.03 PEST CONTROL

A. Engage an experienced exterminator to make a final inspection of the Project and to rid project of rodents, insects and other pests.

PART 2 PRODUCTS

2.01 GENERAL

A. Use non-staining, non-abrasive cleaning materials and accessories.

B. Consult with manufacturer and / or installer to determine acceptable cleaning materials and methods for various materials.

PART 3 EXECUTION

3.01 GENERAL

A. For cleaning, employ only experienced firms or individuals specializing in building cleaning and maintenance.

B. Comply with safety standards and governing regulations for cleaning operations. Do not burn waste materials at site or bury debris or excess materials on Owner's property or discharge volatile or other harmful or dangerous materials into drainage systems; remove waste materials from site and dispose of in a lawful manner.

3.02 REMOVAL OF PROTECTION

A. Except as otherwise indicated or requested by Architect / Engineer, remove temporary protection devices and facilities which were installed during course of the Work to protect previously complete work during remainder of construction period.

3.03 CLEANING AND PROTECTION

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

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

C. Maintain all areas free of waste materials, debris and rubbish. Maintain site in a clean and orderly condition.

1. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
2. Broom and vacuum clean interior areas prior to start of surface finishing and continue consistent cleaning to eliminate dust.
3. Remove waste materials, debris, and rubbish from the site periodically as needed and dispose off-site.

END OF SECTION 01 71 00

SECTION 01 73 29 – CUTTING & PATCHING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

A. Each Contractor, or appropriate Subcontractor, is responsible for cutting, fitting and patching required to complete the Work, or to:

1. Make its several parts fit together properly.
2. Uncover portions of the work already in place to provide for installation of ill-timed work.
3. Remove and replace defective work.
4. Remove and replace work not conforming to requirements of the Contract Documents.
5. Remove samples of installed work as specified for testing.
6. Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.

B. Each Specification Section shall include cutting, patching, and digging, for that trade Section, unless otherwise specified, as required for proper accommodation of work of other trade. This does not relive Contractor from responsibility stated in Article 3.14 of the "General Conditions". Execute work with competent workmen skilled in trade required by restoration.

C. Submit written request to the Architect / Engineer well in advance of executing cutting or alteration which affects:

1. Work of the Owner or separate Contractor.
2. Structural value or integrity of any element of the Project.
3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
4. Efficiency, operational life, maintenance or safety or operational elements.
5. Visual qualities of sight-exposed elements.

D. Request pursuant to 01 73 29, paragraph C above, shall include:

1. Identification of the Project.
2. Description of the affected work.
3. Necessity for cutting, alteration, or excavation.
4. Effect on work of the Owner or any separate Contractor, or on the structural or weather-proof integrity of the Project.
5. Description of proposed work:

    a. Scope of cutting, patching, alteration or excavation.

b. Trades who will execute work.
c. Products proposed.
d. Extent of re-finishing.

6. Alternatives to cutting and patching.
7. Cost proposal, when applicable.
8. Written permission of affected separate contractors.

E. Submit written notice to Architect / Engineer designating date and time work will be uncovered.

F. Comply with specifications and standards for each specific product involved.

G. Inspect in-place conditions of the Project, including elements subject to damage or to movement during cutting and patching.

H. After uncovering work, inspect conditions affecting installation of products, or performance of work.

I. Report unsatisfactory or questionable conditions to the Architect / Engineer in writing. Do not proceed with work until the Architect / Engineer has provided further instructions.

J. Provide adequate temporary support as necessary to assure the structural value or integrity of the affected portion of the work.

K. Provide devices and methods to protect other portions of the Work from damage.

L. Provide protection from the elements for that portion of the Project which may be exposed by cutting and patching work and maintain free from water or air infiltration.

M. Execute cutting and demolition by methods which will prevent damage to other work, and will provide proper surfaces to review installation of repairs.

N. Execute excavating and backfilling by methods which will prevent settlement or damage to other work.

O. Employ the original installer or fabricator to perform cutting and patching for:

1. Weather-exposed or moisture-resistant elements.
2. Sight-exposed finished surfaces.

P. Execute fitting and adjustment of products to provide finished installation to comply with specified products, functions, tolerances, and finishes.

Q. Restore work which has been cut or removed; install new products to provide completed work in accordance with requirements of the Contract Documents.

R. Fit work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces or structural elements.

S. Refinish entire surface as necessary to provide an even finish to match adjacent finishes:
   1. For continuous surfaces, refinish to nearest intersection.
   2. For an assembly, refinish the entire unit.

1.03 ALTERATION PROCEDURES

A. Use materials as specified in product sections of this Project Manual; match in-place products and work for patching and extending work.

B. Close openings in exterior surfaces to protect in-place work from weather, extreme temperatures and humidity.

C. Remove, cut and patch work in a manner to minimize damage and to provide a means of restoring products and finishes to original condition.

D. Where new work abuts or aligns with work in place, perform a smooth and even transition. Patched work shall match in-place adjacent work in texture and appearance.

E. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate in-place surfaces along a straight line at a natural line on division.

PART 2 PRODUCTS (not applicable)

PART 3 EXECUTION (not applicable)

END OF SECTION 01 73 29

SECTION 01 78 00 – PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Documents affecting the work of this Section include, but are not necessarily limited to the, General Conditions, Supplementary Conditions and Division 01 Sections of this Project Manual.

B. Other requirements affecting the Project Record Documents may appear in other pertinent Section of this Project Manual.

1.03 WORK INCLUDED

A. Throughout progress of the Work, maintain an accurate record of changes in the Contract Documents, as described in Article 3.01 below.

B. Upon completion of the Work, transfer the recorded changes to a set of Record Documents, as described in Article 3.02 below.

1.04 QUALITY ASSURANCE

A. Delegate the responsibility for maintenance of the Record Documents to one person on the Contractor's staff, as approved by the Architect.

B. Accuracy of Records:

1. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries in each page of the Specifications and each sheet of the Drawings and other Documents where such entry is required to show the change properly.
2. Accuracy of records shall be such that future search for items shown in the Contract Documents may reasonably rely on information obtained from the approved Project Record Documents.

C. Make entries within 24-hours after receipt of information the change has occurred.

1.05 SUBMITTALS

A. Comply with pertinent provisions of Division 01 Section "Shop Drawings, Product Data & Samples".
   1. Contractor to maintain a file of all finalized shop drawings and product data with consultants' stamps and comments and submit on CD-ROM with closeout documents for Owner's records and use.

B. Prior to submitting request for final payment, submit the final Project Record Documents to the Architect and secure approval.

1.06 RECORD DOCUMENTS

A. Job Set: Promptly following the receipt of the Owner's Notice to Proceed, secure (1) complete set of the Contract Documents to be used as a log of all changes throughout the project period.

PART 2 PRODUCTS (not applicable)

PART 3 EXECUTION

3.01 MAINTENANCE OF JOB SET

A. Immediately upon receipt of the Job Set described in Article 1.06 above, identify each of the Documents with the title "**RECORD DOCUMENTS - JOB SET**".

B. Preservation:

1. Do not use the Job Set for any purpose except for entry of new data and for review by the Architect.
2. Maintain the Job Set at the Project Site.

C. Making entries on the 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 overlapping changes.

D. Make entries in all other pertinent Documents.

E. Conversion of Schematic layouts:

1. In some cases on the Drawings, arrangement of conduits, circuits, ducts and similar items are shown schematically and are not intended to portray precise physical layout.

    a. Final physical arrangement is determined by the Contractor, subject to the Architect's approval.

        1) 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 Documents, by dimension, accurate within 1", the centerline of each run of said items.

a. Clearly identify the item by accurate note such as “cast iron drain”, “copper water”, and the like.
b. Show, by symbol or note, the vertical location of the item, such as “under slab”, “in ceiling”, “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.

3.02 FINAL PROJECT RECORD DOCUMENTS

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.

1. Clearly indicate at each affected detail and other Drawings a full description of changes made during construction, and actual location of items described in subparagraph 3.01, E, above.
2. Call attention to each entry by drawing a “cloud” around the area or areas affected.
3. Make changes neatly, consistently and with the proper media to assure longevity and clear reproduction.

B. Review and Submittal:

1. Submit the completed set of Project Record Documents to the Architect as described in Article 1.03 above.
2. Participate in review meetings as required.
3. Make required changes and turn hard copies over to the Architect.

3.02 CHANGES SUBSEQUENT TO ACCEPTANCE

A. The 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 01 78 00

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.

B. Related Sections include the following:
1. Divisions 02 through 33 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 SUBMITTALS

A. Instruction Program: Submit **two** copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative experienced in operation and maintenance procedures and training.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:

1. Equipment.
2. Fire-protection systems, including fire alarm and fire-extinguishing systems.
3. HVAC systems, including air-handling equipment, air distribution systems and terminal equipment and devices.
4. HVAC instrumentation and controls.
5. Electrical service and distribution, including transformers, switchboards, panelboards, uninterruptible power supplies and motor controls.
6. Lighting equipment and controls.
7. Communication and technology systems.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

a. System, subsystem, and equipment descriptions.
b. Performance and design criteria if Contractor is delegated design responsibility.
c. Operating standards.
d. Regulatory requirements.
e. Equipment function.
f. Operating characteristics.
g. Limiting conditions.
h. Performance curves.

2. Documentation: Review the following items in detail:

a. Emergency manuals.
b. Operations manuals.
c. Maintenance manuals.
d. Project Record Documents.
e. Identification systems.
f. Warranties and bonds.
g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.
b. Instructions on stopping.
c. Shutdown instructions for each type of emergency.

d. Operating instructions for conditions outside of normal operating limits.
e. Sequences for electric or electronic systems.
f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.

e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner. Duration of training shall be sufficient to impart the instruction required for operation of maintenance of the subject system(s).
   a. Owner to be involved in establishing all appropriate parties to be trained.

2. Trainer/offeror shall get sign-off from those instructed that training was complete and sufficient to provide introductory familiarity with systems and ability to operate.

C. As training is conducted, session shall be videotaped. This documentation shall be provided to Owner as part of Closeout documentation for use in training future new personnel.

END OF SECTION 01 79 00

SECTION 04 20 00 – UNIT MASONRY ASSEMBLIES

PART 1 GENERAL

1.01 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 the Drawings for locations of work to be performed.

1.02 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:

1. Concrete masonry units (CMUs).
2. Face brick.
3. Stone coping.
4. Mortar and grout.
5. Reinforcing steel.
6. Masonry joint reinforcement.
7. Ties and anchors.
8. Embedded flashing.
9. Miscellaneous masonry accessories.
10. Cavity-wall insulation.

B. Requirements of Division 04 Section "Reinforced Unit Masonry" apply to work of this Section, except where different requirements are stated herein.

C. Related Sections include the following:

1. Division 07 Section "Bituminous Dampproofing" for dampproofing applied to the cavity face of backup wythes of CMU walls.
2. Division 07 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.
3. Division 07 Section "Joint Sealants" for sealing control and expansion joints in unit masonry.

D. Products installed, but not furnished, under this Section include the following:

1. Steel lintels and shelf angles for unit masonry, furnished under Division 05 Section "Metal Fabrications."
2. Manufactured reglets in masonry joints for metal flashing, furnished under Division 07 Section "Sheet Metal Flashing and Trim."

1.03 DEFINITIONS

A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Stone Trim Units (Coping): Show sizes, profiles, and locations of each stone trim unit required.

C. Samples: For each type and color of the following:

1. Face brick, straps of five or more standard (modular) bricks.
2. Accessories embedded in masonry.
3. Limestone trim.

D. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:

1. Masonry units: Include material test reports substantiating compliance with requirements.
2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Pre-blended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Reinforcing bars.
5. Joint reinforcement.
6. Anchors, ties, and metal accessories.
7. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
8. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1 / ASCE 6/TMS 602.

1.05 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality from a single manufacturer for each cementitious component and from one source or producer for each aggregate.

C. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution, as directed by the Architect.

1. Build mockups for typical exterior wall in sizes approximately 48-inches long by 48-inches high by full thickness, including face and backup wythes and accessories.

    a. Architect to provide drawing indicating mock-up configuration.
    b. Include a sealant-filled joint at least 16-inches long in each mockup.
    c. Include through-wall flashing installed for a 24-inch length in corner of exterior wall mockup approximately 16-inches down from top of mockup, but not above window, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
    d. Include flashing, and weep holes in exterior masonry-veneer wall mockup.

2. Clean exposed faces of mockups with masonry cleaner as indicated.
3. Protect accepted mockups from the elements with weather-resistant membrane.
4. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.

    a. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by the Architect in writing.

E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Meetings."

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver pre-blended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store pre-blended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.07 PROJECT CONDITIONS

A. Protection of Masonry exposed to weather: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Weight sheeting and wrap around sides in a way that is sufficient to avoid exposure and keep wind from blowing covering off prior to restart of work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24-inches down both sides and hold cover securely in place.
2. Where (1) wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24-inches down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor, roof or concentrated loads until mortar and grout have reached its design strength. Coordinate with material testing consultant.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of windows and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1 / ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40-degrees F and above and will remain so until masonry has dried, but not less than 7-days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1 / ASCE 6/TMS 602.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include products specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include manufacturers specified.

2.02 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not uses units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

2.03 CONCRETE MASONRY UNITS (CMU)

A. Shapes: Provide shapes indicated and as follows:

1. Provide special shapes for lintels, corners, jambs, sashes, sills at openings, movement joints, headers, bonding, and other special conditions.
2. Provide bullnose units for outside corners.

B. Concrete Masonry Units: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
2. Weight Classification: Lightweight, unless otherwise indicated.
3. Actual Size: Manufactured to dimensions 3/8 inch less than nominal dimensions.
4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.

    a. Size: 8-inches by 16-inches, unless otherwise noted. Refer to Wall Type Legend.

2.04 MASONRY LINTELS

A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout. Provide bullnose at all exposed outside corners. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.05 BRICK

A. General: Provide shapes indicated and as follows:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Application: Use where brick is exposed, unless otherwise indicated. Refer to the Drawings for location of brick type.

B. Face Brick: ASTM C 216, Grade SW, Type FBX.

1. Modular: Basis of Design: Sioux City Brick, Contractor to match existing
   a. (Actual Dimensions): 3-5/8-inches wide by 2-1/4-inches high by 7-5/8-inches long.
   b. Products: To be selected based on the allowance specified in Division 01 Section "Allowances".

C. Available Manufacturers:

1. Sioux City
2. Belden
2. The Bowerston Shale Company
3. Endicott
4. Glen-Gery
5. Watsontown

2.07 STONE TRIM UNITS

A. Limestone: ASTM C 568, Classification II Medium.

1. Variety and Sources: Indiana oolitic limestone quarried in Lawrence, Monroe, or Owen Counties, Indiana.

   a. Grade and Color: Standard, according to grade and color classification established by ILI. Color to match existing limestone at each building for which stone trim is indicated.

B. Finish: Smooth.

C. Provide stone units accurately shaped, with exposed faces dressed true, and with beds and joints at right angles to faces.
1. For limestone, comply with recommendations in ILI's "Indiana Limestone Handbook."

2.08 MORTAR AND GROUT MATERIALS

A. Mortar For Concrete Masonry: Type S

1. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.
2. Hydrated Lime: ASTM C 207, Type S.

3. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 270, Type S.

B. Masonry Cement For Brick: ASTM C 91, Speed Type S, Ohio River Masonry Sand, M

1. Basis-Of-Design Product: Brixment
2. Available Products:
   a. Essroc, Italcementi Group; Brixment
   b. Lafarge North America Inc.; U.S. Cement Masonry Cement.
   c. Lehigh Cement Company; Lehigh Custom Masonry Cement.

3. Mortar Color:

   a. Match Existing Masonry adjacent to new addition.

C. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand.

D. Aggregate for Grout: ASTM C 404.

E. Water: Potable.

F. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

G. Pre-blended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a pre-blended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

H. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type S, (CMU).
2. For above-grade, non-load-bearing walls and parapet walls; and for other applications where another type is not indicated, use Type N, (BRICK).

I. Grout for Unit Masonry: Comply with ASTM C 476.

1. Compressive Strength of 2,500 psi
2. Use grout of type indicated or, if not otherwise indicated, of type (fine or course) that will comply with Table 1.15.1 in ACI 530.1 / ASCE 6/TMS 602 for dimensions of grout spaces and pour height.

3. Provide grout with a slump of 8 to 11-inches as measured according to ASTM C 143 / C 143M.

2.08 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615, Grade 60 with supplementary requirements (SI).

B. Masonry Joint Reinforcement, General: ASTM A 951.

1. Interior Walls: Hot-dip galvanized, carbon steel.
2. Exterior Walls: Hot-dip galvanized, carbon steel.
3. Wire Size for Side Rods: W1.7 or 0.148-inch diameter.
4. Wire Size for Cross Rods: W1.7 or 0.148-inch diameter.
5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16-inches o.c.
6. Provide in lengths of not less than 10-feet, with prefabricated corner and tee units.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Truss type with single pair of side rods.

D. Masonry Joint Reinforcement for Multi-wythe Masonry:

1. Gasket Single Barrel Masonry Fastener with integral Thermal Break

a. Heckmann Thermal Pos-I-tie (Basis of Design) or equivalent by Durawall

1) Spaced 16” o.c. vertically and 32” o.c. horizontally.
2) Masonry Veneer Ties: Provide minimum 2-inches embedment in mortar.
3) Wire 3/16 inch x 3-1/2”
4) Material for Ties in Exterior Walls: Hot-dip galvanized.
5) Material for Ties Exposed to Air in Exterior Walls: Hot-dip galvanized.

2.09 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with eight subparagraphs below, unless otherwise indicated.

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153 / A 153M, Class B-2 coating.
2. Stainless Steel bars: ASTM A 276 or ASTM a 666, Type 304.

B. Adjustable Anchors for Connecting Masonry to Concrete Wall: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Thermal clip with triangular pintle wire tie.

a. Basis-Of-Design Product: Heckmann Pos-I-Tie Thermal Clip
1. thermal break between wire tie and barrel screw

2. flame resistance; UL 94 V-0 rating

C. Stone Anchors: Dowels, cramps, and other stone anchors from stainless steel, similar to Pos-I-Tie StoneAnchors.

2.10 EMBEDDED FLASHING MATERIALS

A. Thru-Wall Flashing: For flashing not exposed to the exterior:

1. Copper-Laminated Flashing: 5-oz. / sq. ft. copper sheet bonded with asphalt between 2 layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.

a. Available Products:

1) Advanced Building Products Inc.; Copper Fabric Flashing.
2) AFCO Products Inc.; Copper Fabric.
3) Hohmann & Barnard, Inc.; H & B C-Fab Flashing.
4) Phoenix Building Products; Type FCC-Fabric Covered Copper.
5) Polytite Manufacturing Corp.; Copper Fabric Flashing.
6) Sandell Manufacturing Co., Inc.; Copper Fabric Flashing.
7) York Manufacturing, Inc.; York Copper Fabric Flashing.

2. Flexible Flashing: Perma-Barrier, by W.R. Grace, to be installed at corners of openings, at top of thru-wall flashing over termination bar at ICF walls and other locations, where a flexible flashing will provide a better installation.

a. Termination Bar: Continuous flat metal bar, 1/8” thick by 1-inch wide, aluminum bar with pre-drilled holes at 8” o.c. Install bar with drive pins at masonry walls and screws at frame walls.

2.11 MISCELLANEOUS MASONRY ACCESSORIES

A. Weep/Vent Products: Use the following, unless otherwise indicated:

1. Vinyl Vent: One-piece, offset, T-shaped units made from flexible, injection-molded PVC, designed to fit into a head joint and consisting of a louvered vertical leg, flexible wings to seal against ends of masonry units, and a top flap to keep mortar out of the head joint; in color approved by Architect to match that of mortar.

a. Available Products:

1) Hohmann & Barnard, Inc.; #343 Louvered Weep Hole.
2) Williams Products, Inc.; Williams-Goodco Brick Vent.
3) Wire-Bond; Louvered Weep holes.

B. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Provide one of the following configurations:

a. Strips, full-depth of cavity and 10-inches wide, with dovetail shaped notches 7-inches deep that prevent mesh from being clogged with mortar droppings.
b. Strips, not less than 1-1/2-inches thick and 10-inches wide, with dimpled surface designed to catch mortar droppings and prevent weep holes from being clogged with mortar.

2. Available Products:

a. Advanced Building Products Inc.; Mortar Break or Mortar Break II.
b. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
c. Mortar Net USA, Ltd.; Mortar Net.

2.12 CAVITY-WALL INSULATION

A. ASTM C578, TYPE IV (25 psi), extruded polystyrene with carbon black technology for increased R-Value (R-5.6 per inch) with ship lap edges:

1. Dow Chemical Styrofoam Cavity Mate Ultra Ship Lap (Basis of Design) or Owens Corning High-R CW Plus Ship Lap.
2. Thermal Performance Warranty: 50-years
3. Water Absorption: .03 max per ASTM 272
4. Vapor Permanence: 1.5 per max at 1” thickness per ASTM E96
5. Flame Spread: 25 max per ASTM E84
6. Smoke Development: 250 per ASTM E84
7. NFPA 285 approval for use in Non-Combustible Construction
8. Thickness: 2-inches
9. Size: 4- by 8-feet minimum.

B. Butyl-rubber self-adhesive membrane at all joints, at all openings and used as penetration sealant at all masonry anchors.

1. Dow Weathermate Plus Flashing or Henry Blue Skin
2. Water Vapor Transmission, ASTM E96, perm <1
3. Application Temperature, °F (°C) min. 30 (-1)
4. UV Resistance, days 120
5. Thickness, ASTM D3767, Method A, mil 20

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

F. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

G. Comply with construction tolerances in ACI 530.1 / ASCE 6/TMS 602 and with the following:
1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10-feet, 1/4-inch in 20-feet, or 1/2-inch maximum.
2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4-inch in 10-feet, or 1/2-inch maximum.
3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8-inch in 10-feet, 1/4-inch in-20 feet, or 1/2-inch-maximum.

4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8-inch, with a maximum thickness limited to 1/2-inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8-inch.
5. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8-inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8-inch.
6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16-inch except due to warpage of masonry units within tolerances specified for warpage of units.
7. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16-inch from one masonry unit to the next.

3.03 LAYING BRICK WALLS

A. Coursing: Lay brick plumb, level and true to line in **full** beds of mortar. Head joints shall be **filled solid** with mortar. Joints in brick work and between brick and other masonry or concrete shall be filled solid (head and bed joints) with mortar as work progresses. Exposed brick shall be laid in running bond pattern unless shown otherwise indicated. Do not install any broken, chipped or cracked bricks.

B. Once laid, do not disturb face brick in any manner which would impair its mortar bed.

C. Cleaning: Clean face brick surfaces as work progresses, Final cleaning is specified hereinafter.

3.04 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Bed hollow metal frame anchors in mortar joints and fill head and jambs of frame solid with mortar.

G. Fill first vertical cell of masonry units adjacent to framed openings full with specified grout fill.

H. When building in electric outlet boxes, pipe sleeves and other similar items, make cuts so face texture will not be damaged beyond face of the cover place or escutcheon; exposed patching will not be accepted.

I. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.

J. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

K. Fill cores in hollow concrete masonry units with grout 24-inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

L. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with requirements of "The Kentucky Building Code".

M. Tuckpoint joints of CMU walls to eliminate voids prior to applying the bituminous dampproofing.

3.05 MORTAR BEDDING AND JOINTING

A. Lay hollow concrete masonry units as follows:

1. With face shells fully bedded in mortar and with **full** head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings. Fill / grout cores solid in starting course.

B. Make uniform, nominal 3/8” wide joints, unless otherwise shown. Tool joints smooth and dense with round, non-staining type jointed to provide slightly concave joints. Tool joints behind lockers, casework, markerboards, tackboards and other equipment.

C. Lay solid masonry units with **completely filled bed and head joints**; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

D. Make joints in brickwork uniform and not more than 3/8” wide and as follows:

1. After becoming “thumb-print” hard, tool joints of exterior facing brick with jointed that is slightly larger than the width of the mortar joint. Close cracks and crevasses.
2. All joints above and below grade: tool concave.

E. Set stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Wet joint surfaces thoroughly before applying mortar.

3.06 CAVITY WALLS

A. Bond wythes of cavity walls together using the following method:

1. Individual Metal Ties: Provide masonry veneer ties as specified, hooked to fastener in backup wythe; spaced typically at 32-inches o.c. horizontally and 16-inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12-inches of openings and space not more than 16-inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24-inches o.c. vertically.

2. Masonry Veneer Anchors: Comply with requirements for anchoring masonry veneers.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

C. Coat cavity face of backup wythe to comply with Division 07 Section "Bituminous Dampproofing."

D. Installing Cavity-Wall Insulation: Place small dabs of adhesive, spaced approximately 12-inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

1. Fill cracks and open gaps in insulation and **tape all joints.**

3.07 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8-inch on exterior side of walls, 1/2-inch elsewhere. Lap reinforcement a minimum of 6-inches.

1. Space reinforcement not more than 16-inches o.c. vertically.
2. Provide reinforcement not more than 8-inches above and below wall openings and extending 12-inches beyond openings.

a. Reinforcement above is in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

3.08 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to concrete masonry unit and rigid insulation furring with masonry-veneer anchors to comply with the following requirements:

1. Fasten anchors to the steel z-furring and to CMU back-up walls with two galvanized or stainless steel fasteners.
2. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
3. Space anchors at 16-inches o.c. vertically and 32-inches o.c. horizontally with not less than (1) anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12-inches of openings and at intervals, not exceeding 16-inches, around perimeter.

3.09 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry as follows:

1. Install foam-plastic filler in head joints.

C. Form expansion joints in brick made from clay or shale as follows:

1. Form open joint full depth of brick wythe and of width indicated, but not less than 1/2-inch for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."

3.10 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and where openings of more than 8-inches for brick-size units and 16-inches for block-size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8-inches at each jamb, unless otherwise indicated.

3.11 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows, unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Lap joints at least 6” and seal both horizontal and vertical surfaces of flashing. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At multi-wythe masonry walls, including cavity walls, extend flashing through outer Wythe to 1/4-inch beyond the exterior face, turned up a minimum of 8-inches, and 1-1/2-inches into the inner Wythe. Form 1/4-inch hook in edge of flashing embedded in inner wythe.
3. At masonry veneer with concrete back-up; extend flashing through veneer, across air space behind veneer, and up face of insulated concrete form work at least 8-inches; with upper edge secured by a galvanized termination bar with sealant along top of bar.
4. At lintels and shelf angles, extend flashing a minimum of 8-inches into masonry at each end. At heads and sills, extend flashing 8-inches at ends and turn up not less than 2-inches to form end dams.
5. Provide end dams at each end of stepped through wall flashings or at ends of a run of flashing.
6. Seal all laps and end dams with mastic for a waterproof installation.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

E. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Miscellaneous Masonry Accessories" Article.

F. Install vents in head joints in exterior wythes at 32-inches o.c. Use specified weep/vent products to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:

1. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.
2. Place grout only after inspectors have verified compliance of grout spaces and grades, sizes, and locations of reinforcement.
3. Payment for these services will be made by the Owner.

4. Retesting of materials failing to comply with specified requirements shall be done at Contractor's expense.

B. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019.

3.13 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
4. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces. Do not use acid.
5. Clean and remove all stains and foreign substances from **all new brick**.
6. Clean stone trim to comply with stone supplier's written instructions.

E. Masonry Cleaning Materials see individual section for related cleaning instructions.

1. Commercial product manufactured for masonry cleaning.
2. “Sure Klean 600” by Prosoco, Inc. or “Thoro-Clean” by Standard Dry Wall Products, Inc.
3. Verify compatibility with selected masonry units.

3.14 SALVAGEABLE MATERIALS

A. Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

END OF SECTION 04 20 00

SECTION 06 10 00 – ROUGH CARPENTRY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:

1. Wood blocking and nailers.
2. Wood nailers and cant strips associated with roofing assemblies.
2. Plywood backing panels.
3. Preservative treatment, borate type.

1.03 DEFINITIONS

A. Dimension Lumber: Lumber that is cut to certain pre-determined sizes, that is sawn, planed and smooth, ready for building applications.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. SPIB: The Southern Pine Inspection Bureau.
4. WWPA: Western Wood Products Association.

1.04 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

a. Manufacturer's Certificate: Certify that Products conform to specified requirements.

2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
   1. Wood-preservative-treated wood.
   2. Power-driven fasteners.
   3. Expansion anchors.
   4. Metal framing anchors.

1.05 QUALITY ASSURANCE

A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

B. Source Quality: Obtain each type of treated wood from a single manufacturer.

   1. Surface Burning Characteristics: ASTM E84.

      a. Flame Spread Index: 25, maximum.
      b. Smoke Developed Index: 450, maximum.

   2. Moisture Content after Treatment:

      a. Lumber: Maximum 19-percent.
      b. Structural Panels: Maximum 15-percent.

C. Apply label from agency approved by authority having jurisdiction to identify each fire retardant treated material. Include the following identification:

   1. Inspection agency.
   2. Standard to which the material was treated.
   3. Treating facility.
   4. Treatment material and retention.
   5. End use for which the product is suitable.
   6. Kiln dried after treatment.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

2.02 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1, using preservative chemicals acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19-percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
3. Within 18-inches of grade.

E. Note that, since 2004-2005, treated wood materials cannot be installed in direct contact with some metals without danger of corrosion.

1. Fasteners shall be hot-dipped galvanized or stainless steel. Follow wood and metal suppliers' recommendations in selection of fasteners.
2. Follow wood and metal suppliers' recommendations to isolate treated lumber from metal materials (flashings, fittings, etc.) where necessary.

2.03 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Furring.
4. Hanging strips.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19-percent maximum moisture content of any species.

C. For concealed boards, provide lumber with 19-percent maximum moisture content and any of the following species and grades:
   1. Mixed southern pine, No. 2 grade; SPIB.
   2. Eastern softwoods, No. 2 Common grade; NeLMA.
   3. Northern species, No. 2 Common grade; NLGA.
   4. Western woods, Standard or No. 2 Common grade; WCLIB or WWPA.

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 2 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For blocking, nailers, and furring used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.04 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness. Paint panel according to Division 09 Section "Painting" **before installing equipment**.

2.05 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

   1. Where rough carpentry is exposed to weather, in ground contact, in pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A-153 / A-153M, or stainless steel fasteners.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening wood blocking or nailers to Metal Roof Deck: Steel drill screws, in type and length recommended by screw manufacturer for thickness of material to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117. Countersink fastener flush with surface of furring.

F. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

2.06 PLYWOOD

A. Trademark: Identify each plywood panel with appropriate APA trademark.

B. Concealed Performance-Rated Plywood: Where plywood panels will be used for concealed types of applications, provide APA performance-rated panels complying with requirements indicated for grade designation, span rating, exposure durability classification, edge detail (where applicable) and thickness.

1. Wall and Roof Exterior Sheathing: APA Rated Sheathing

a. Exposure durability classification: Exterior
b. Span rating: As required to suit structure/support spacing indicated.
c. Basis of Design: 3/4” CDX, unless noted otherwise.

2.08 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Mineral fiber or other non-glass-fiber insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32-inch; selected from manufacturer's standard widths to suit width of sill members indicated.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, grounds, furring, and similar supports to comply with requirements for attaching other construction.
B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Do not splice structural members between supports, unless otherwise indicated.

D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

E. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

F. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

G. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in Kentucky Building Code.

H. Use common wire nails, unless otherwise indicated (as in case of treated lumber applications). Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

3.03 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.04 FIELD TREATMENT

A. Treat cuts and bored holes in pressure treated lumber and plywood with field treatment materials in accordance with wood treatment manufacturer’s instructions.

3.05 PROTECTION

A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 00

SECTION 07 20 00 – BUILDING INSULATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK

A. Extent of building insulation work is shown of the Drawings and indicated by the provisions of this Section.

B. Applications of building insulation specified in this Section include the following:

1. Foundation perimeter insulation (supporting backfill).
2. Polyisocyanurate rigid insulation board.
2. Glass fiber blanket insulation.
3. Mineral wool sound barrier around openings thru walls.
5. Spray foam insulation, for small voids.

C. Insulation for masonry cavity walls is specified under Division 04 Section “Unit Masonry Assemblies”.

D. Modified roofing insulation is specified under Division 07 Section “Modified Bituminous Sheet Roofing (SBS)”.

E. Sound attenuation, blankets shall be specified under Division 09 Section “Gypsum Board Assemblies”.

F. Low expansion spray foam around windows and doors is specified in their respective Specification Sections.

1.03 QUALITY ASSURANCE

A. Thermal Conductivity: Thickness indicated are for thermal conductivity (k-value at 75-degrees F) specified for each material. Provide adjusted thickness as directed for equivalent use of material having a different thermal conductivity. Where insulation is identified by “R” value, provide thickness required to achieve indicated value.

B. Fire and Insurance Ratings: Comply with fire-resistance flammability and insurance ratings indicated, and comply with regulations as interpreted by governing authorities.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's product specifications and installation instructions for each type of insulating and vapor barrier material required.

1.05 PRODUCT HANDLING

A. General Protection: Protect insulations for physical damage and from becoming wet, soiled, or covered with ice or snow.

B. Protection for Plastic Insulation:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project Site ahead of installation time. Complete installation and concealment of insulation materials as rapidly as possible in each area of the Work.
3. Cover stored insulation on pallets with canvas tarps.

PART 2 PRODUCTS

2.01 MATERIALS

A. Extruded Polystyrene Board Insulation (Perimeter Insulation):

1. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

a. The Dow Chemical Company
b. Owens Corning
c. Pactiv Building Products Division

2. Rigid, closed-cell, extruded, polystyrene insulation board with integral high-density skin.

a. Comply with ASTM C-578, Type IV
b. min. 20 psi compressive strength
c. k-value of 0.20
d. .3% maximum water absorption
e. 1.1 perm-inch max. water vapor transmission
f. Manufacturer's standard length and widths
g. Provide minimum thickness of 2" unless otherwise indicated.

B. Rigid Insulation Board:

1. Polyisocyanurate rigid, closed cell, foam insulation.: ASTM C591-15, of type and density indicated below, Class 1 flame spread and smoke development requirements per ASTM E84, respectively:

a. Available Manufacturers:
   1. Dow Chemical Company.
   2. Owens Corning.
   3. Dyplast.

b. R-Value: R-5 to R-6 per inch thickness.

C. Glass-Fiber Blanket Insulation

1. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

   a. CertainTeed Corporation.
   b. Owens Corning
   c. Guardian Fiberglass, Inc.
   d. Johns Manville.
   e. Knauf Fiber Glass.

2. Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on 1 face.

3. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with thermal resistances indicated:

   a. 3-1/2 inches thick with a thermal resistance of 11 deg F x h x sq. ft./Btu at 75 deg F.
   b. 5-1/2 inches thick with a thermal resistance of 21 deg F x h x sq. ft./Btu at 75 deg F.

D . Spray foam insulation for filling small voids / holes:

1. Manufacturers:

   a. Handi-Form Spray Foam as manufactured by Fomo Products.
   b. Great Stuff Pro by Dow Chemical or equivalent by Hilti
   c. Froth Pak Foam Insulation by Dow Chemical or equivalent by Hilti

2. Flame Spread: 25 max per ASTM E84
3. Smoke Development: 350 max per ASTM E84

D. Miscellaneous Materials:

1. Mineral wool sound / fire barrier (at top of fire-rated walls)

   a) Equal to Thermafiber SAFB, Standard Fiber.

2. Adhesive for Bonding Insulation: Type recommended by insulation manufacturer, and complying with fire-resistance requirements.
3. Mechanical Anchors: Type and size shown or, if not shown, as recommended by insulation manufacturer for type of application and condition of substrate.
4. Provide UL rated sealant system over insulation at top of fire-rated walls.

PART 3 EXECUTION

3.01 INSPECTION AND PREPARATION

A. Installer must examine substrates and conditions under which insulation work is to be performed, and must notify Contractor in writing of unsatisfactory conditions. Do not proceed with insulation work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.02 INSTALLATION

A. General:

1. Comply with manufacturer's instruction for particular conditions of installation in each case. If printed instructions are not available or do not apply to the Project conditions, consult with manufacturer's technical representative for specific recommendations before proceeding with work.
2. Extend insulation full thickness shown over entire area to be insulated. Cut and fit tightly around obstructions and fill all voids with insulation. Remove projections which interfere with placement.
3. Apply single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

B. Perimeter and Under-Slab Insulation:

1. On vertical surfaces, set units in adhesive applied in accordance with manufacturer's instructions. Use type adhesive recommended by manufacturer of insulation.

C. General Building Insulation:

1. Apply insulation units to substrate by method indicated, complying with manufacturer's recommendations. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
2. Seal joints between closed-cell non-breathing insulation units by applying mastic or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with mastic or sealant.

D. Spray Foam Insulation:

1. Filling of small voids and holes around structural bearing areas.

3.03 PROTECTION

A. General: Protect installed insulation from harmful weather exposures and from possible physical abuses, where possible by non-delayed installation of concealing work or, where that is not possible, by temporary covering or enclosure. Installed shall advise Contractor of exposure hazards, including possible sources of deterioration and fire hazards.

END OF SECTION 07 20 00

SECTION 07 92 00 – JOINT SEALANTS

PART 1 GENERAL

1.01 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 the Drawings for locations of work to be performed.

1.02 SUMMARY

A. This Section includes joint sealants for the following applications, including those specified by reference to this Section:

1. Exterior joints in vertical surfaces and horizontal non-traffic surfaces.
2. Exterior joints in horizontal traffic surfaces, including joints between slabs and building walls.
3. Interior joints in vertical surfaces and horizontal non-traffic surfaces.
4. Interior joints in horizontal traffic surfaces.
5. Perimeter insulation at window and door openings.

B. See Division 09 Section “Pre-Finished Metal Siding” for sealant to be used in conjunction with metal siding.

C. See Division 08 Section "Glazing" for glazing sealants.

D. See Division 32 Section "Concrete Paving" for sealing joints in pavements, walkways, and curbing.

1.03 WORK INCLUDED

A. Furnish labor and materials to complete caulking work indicated, as specified herein, or both, including but not limited to:

1. Clean out and caulk exterior and interior joints around door frames, entrances, louvers, windows and other wall openings with urethane base caulking.
2. Clean out and caulk control and expansion joints in masonry with urethane base caulking.
3. Caulk cabinets at top and bottom of splash, all joints at walls, other cabinets and beneath inset sinks with silicone caulk.
4. Caulk edges of gypsum board where its meets dissimilar material with urethane base caulking.
5. Caulk joints between dissimilar materials.

1.04 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

C. Install sealants when temperature is within the range recommended by the manufacturer. Do not proceed with sealants in unfavorable weather conditions.

1.05 SUBMITTALS

A. Product Data: For each joint sealant product indicated.

B. Samples: For each type and color of joint sealant required.

1. Color: As selected by Architect from manufacturer's full range.
2. Install 12-inch long sample of selected colors for approval prior to proceeding with caulking work.

C. Preconstruction field test reports.

D. Compatibility and adhesion test reports.

E. Product certificates and test reports.

1.06 QUALITY ASSURANCE

A. Preconstruction Compatibility and Adhesion Testing: Submit samples of materials that will contact or affect joint sealants to joint sealant manufacturers for testing according to manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

B. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates according to the method in ASTM C 1193 that is appropriate for the types of Project joints.

C. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:

1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.

2. Install 12” long sample (min. of 3-colors) of selected colors for approval prior to proceeding with caulking work.

D. Single Source: Joint sealants within each type to be one product from a single manufacturer.

1.07 DELIVERY AND STORAGE

A. Deliver, store, and handle materials to prevent inclusion of foreign materials, damage of materials by water and breakage. Deliver and store packaged materials in original packages until ready for use. Do not use packages or materials showing evidence of water or other damage.

1.08 GUARANTEE

A. Guarantee that specified work will be free from defects of materials, workmanship for one year from date of Substantial Completion.

B. Repair and replace such defective work and other work damaged thereby, which becomes defective during guarantee term, without extra cost to the Owner.

C. The following types of failures are considered defective work: leakage, hardening, cracking, crumbling, melting, shrinking or running of caulking; or staining of adjacent work joint sealant.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

C. Acrylic caulking materials are not acceptable.

2.02 MATERIALS

A. Bond Breaker Tape:

1. 3M’s 470 or 481 tape, as applicable.

B. Joint Sealant Backing:

1. General:

a. Backer Rod: Resilient closed cell polyethylene foam backer rod designed for use with cold applied joint sealants.
b. Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

2. Available Products:

a. Sonneborn Building Products: Sonofoam Backer Rod
b. Dow Chemical Company: Ethafoam
c. Tremco

3. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bi-cellular material with a surface skin), or any of the preceding types, as approved in writing by joint sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
4. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

C. Urethane Base Caulking (typical at interior and exterior joints):

1. One-component urethane non-sag grade sealant, including perimeter of gypsum board / hard surfaced ceilings.
2. Available Products:

a. Sonneborn Building Products: Sonolastic NP-1
b. Sika Corporation: Sikaflex 1A
c. Tremco, Inc.: Vulkem 921 or 931

3. Type: S (single component)
4. Grade: NS (nonsag)
5. Class: 25
6. Use Related to Exposure: NT (non-traffic)
7. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.

D. Silicone Base Caulking (typical at perimeter of countertops):

1. Available Products:

a. Pecora 860 Clear Architectural Silicone Sealant, or equal manufactured by:

1) General Electric

2) Dow Corning

3. Type: S (single component)
4. Grade: NS (nonsag)
5. Class: 25
6. Use Related to Exposure: NT (non-traffic)
7. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

E. Self-Leveling, Traffic Grade Sealant (typical at exterior concrete joints):

1. Polyurethane, slope grade, traffic grade, urethane sealant.
2. Available Products:
   a. Pecora Corporation: Dynatrol II-SG
   b. Sonneborn Building Products: SL 2
   c. Sika Corporation, Inc.: Sikaflex-2c SL

3. Type: M (multi-component)
4. Grade: P (pourable / self-leveling)
5 Class: 25
6. Uses Related to Exposure: T (traffic) and NT (non-traffic)
7. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.

F. Insulating Foam for window and door openings.
1. For full perimeter of all window and door openings at exterior building envelope.
2. Minimal-expanding polyurethane foam with low pressure build that forms a durable, airtight and water-resistant seal between a window or door frame and its rough opening.
3. Available Products:
   a. Great Stuff Window and Door Insulating Foam Sealant
   b. OSI Quad Foam
   c. Dupont

G. Primers: As required and recommended by sealant manufacturer.

H. Sand: To match mortar for joints in brick work.

2.04 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

D. Masonry Sand for control joints in brick masonry.

PART 3 EXECUTION

3.01 PREPARATION

A. Preparation of surfaces, joint packing and application shall be by workers trained in preparation and application of materials proposed for use.

B. Examine joints and areas to be sealed. Do not proceed until unsatisfactory conditions are corrected. Masonry, mortar joints and concrete shall be dry and fully cured in areas to be sealed.

C. Surfaces to be sealed shall be clean, dry and dust free. Surface and air temperature shall be greater than 30-degrees F and less than-100 degrees F.

D. Pack deep joints with back-up material specified. Shallow joints shall use non-bonding tape at bottom of joint. Joint shall be approximately 1/2 depth to width when ready for caulking. Generally, minimum depth shall be 1/4" and maximum depth 1/2", unless otherwise indicated.

E. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant.

    a. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.

2. Remove laitance and form-release agents from concrete.

    a. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

F. Joint Priming: Prime joint substrates, where recommended in writing by joint sealant manufacturer, based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

G. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.02 APPLICATION

A. Prime surfaces and install materials in strict accordance with manufacturer's written directions. Backer rods shall be compression fit.

B. Compound shall not adhere to back of joints.

C. Gun sealant from bottom of joint to prevent air bubbles from forming below surface.

3.03 INSTALLATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. **Tooling of Nonsag Sealants:** Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.

2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

G. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.04 JOINTS

A. Neatly point finish of caulking joints on flush surfaces with tool; remove excess material. Leave joints uniform and slightly concave.

B. Neatly point finish of caulking joints in internal corners with coving tool; remove excess material.

C. Install insulating foam at full perimeter of all window and door openings in the exterior envelope, including entrances, clerestories, and translucent panel installations.

D. Caulking where exposed: Free of wrinkles and uniformly smooth. Make caulk joints watertight.

E. While still sticky, apply sand to exterior control joints to match mortar joints in brick work.

3.05 CLEANING

A. Immediately clean adjacent materials which have been soiled; leave work in neat, clean condition.

END OF SECTION 07 92 00

SECTION 08 11 00 – STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:

1. Standard hollow metal doors, frames and view windows.
2. Metal Lite Openings for wood doors.

B. Related Sections

1. Division 04 Section "Unit Masonry Assemblies" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Section "Door Hardware" for door hardware for hollow metal doors.
3. Division 08 Section "Glazing" for glazing for hollow metal doors and hollow metal windows.
4. Division 08 Section “Fire-Rated Aluminum Curtain Walls” for assembly at fire separation.
5. Division 09 Section "Painting" for field painting hollow metal doors, frames and windows.

1.03 DEFINITIONS

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A. Minimum Thickness: Minimum thickness of base metal without coatings.
B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating and finishes.

B. 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 each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Fire ratings for fire doors.

C. Samples for Verification:

1. For the following items, prepared on Samples about 12 by 12-inches to demonstrate compliance with requirements for quality of materials and construction:

a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow metal panels and glazing if applicable.

D. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Provide doors and frames complying with Steel Door Institute “Recommended Specifications: Standard Steel Doors and Frames” (SDI-100) and as herein specified.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished units.

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.

1.07 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.08 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:

1. Amweld Building Products, LLC.
2. Ceco Door Products; an Assa Abloy Group company.
3. Curries Company; an Assa Abloy Group company.
4. Fleming Door Products Ltd.; an Assa Abloy Group company.
5. Metal Products, Inc.
6. Steelcraft; an Ingersoll-Rand company.
7. Republic

2.02 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A-1008 / A-1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A-1011 / A-1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Galvanized Steel Sheets: Zinc coated carbon steel sheets of commercial quality, complying with ASTM A-526, with ASTM A-525, G 60 zinc coating, mill phosphatized.

D. Frame Anchors: ASTM A-591 / A-591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A-1008 / A-1008M (cold-rolled) or ASTM A-1011 / A-1011M (hot-rolled), and hot-dip galvanized according to ASTM A-153 / A-153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A-153 / A-153M.

F. Glazing: Comply with requirements in Division 08 Section "Glazing."

G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

H. Finish Hardware Preparation:

1. Prepare doors and frames to receive mortised and concealed finish hardware in accordance with final Builders Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A 115 series specification for door and frame preparation for hardware.
2. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at Project Site.
3. Locate finish hardware as shown on final shop drawings or, if not shown, in accordance with “Recommended Locations for Builder’s Hardware,” published by Door and Hardware Institute.
4. All interior and exterior door frames shall be prepared to receive butts, closers and locksets.
5. **Doors and frames shall be prepared to receive all electrified hardware as specified.**

2.03 STANDARD HOLLOW METAL DOORS

A. General: Provide 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.

1. Tolerances: Comply with SDI 100, "Manufacturing Tolerances for Standard Steel Doors and Frames."
2. Design: Flush panel, with openings as indicated on the Drawings.
3. Vertical Edges for Single-Acting Doors: Beveled edge, seamless and fully welded.

    a. Beveled Edge: 1/8-inch in 2-inches.

4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch thick, end closures or channels of same material as face sheets.

5. Exterior Doors: SDI-100, Level 4, maximum duty, Model 2, minimum **14-gauge**, vertical steel stiffeners. Form panels and doors from galvanized sheet steel. Close top and bottom edges of exterior doors as an integral part of door construction; top closures to be metal. Doors to have continuous welded seamless vertical edges, dressed smooth.

    a. Exterior Core Construction: Manufacturer's standard polystyrene, polyurethane or polyisocyanurate core.
    b. Thermal-Rated (Insulated) Exterior Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 4.0 degrees F x h x sq. ft. / Btu when tested according to ASTM C-1363.

6. Interior Doors: SDI-100, Level 3, extra heavy duty, Model 1, minimum **16-gauge** faces. Doors to have continuous welded seamless vertical edges, dressed smooth.

    a. Interior Core Construction: Manufacturer's honeycomb core.

7. Rated Doors: Comply with UL labeling requirements.
8. Coordinate undercut at each door with floor finish and threshold conditions. Undercut may vary depending on location and conditions. Exterior doors shall contact threshold seal to prevent air infiltration.

B. Hardware Reinforcement: Fabricate according to ANSI / SDI A250.6 with reinforcing plates from same material as door face sheets.

C. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.04 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI / SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from hot-dip galvanized steel sheet.

1. Fabricate frames with mitered, continuously welded corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Level 3 Steel Doors: **14-gauge** thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as face welded unless otherwise indicated.
3. Frames for Level 2 Steel Doors: **16-gauge** thick steel sheet.
4. Frames for Wood Doors: 16-gauge thick steel sheet.
5. Frames for View Windows: 16-gauge thick steel sheet.

D. Hardware Reinforcement: Fabricate according to ANSI / SDI A250.6 with reinforcement plates from same material as frames.

E. Pre-drill glass stops to correspond with the appropriate glass thickness. Install glass stops on the secure side of the frame.

2.05 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, 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, welded to back of frames; not less than 0.042-inch thick.

B. Floor Anchors: Formed from same material as frames, not less than 0.042-inch thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.06 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 16-gauge thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8-inch high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 16-gauge thick, fabricated from same material as frames in which they are installed.

D. Metal Lite Openings: Install metal frames with through-bolted sex bolts. Face sheet of door may not be used as a window / glass stop. The head of the fastener shall be on the secure side of the door.

2.07 ACCESSORIES

A. Grout Guards: Formed from same material as frames, not less than 26-gauge thick.

2.08 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. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 100.

C. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.

D. Hollow Metal Frames: 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.

1. Welded Frames: Weld joints as noted in paragraph 2.04; grind, fill, dress, and make smooth, flush, and invisible.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
5. 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) Three anchors per jamb from 60 to 90-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) Four anchors per jamb from 60 to 90-inches high.

6. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated 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-templated, 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.

G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
3. Provide loose stops and moldings on inside of hollow metal work.
4. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.09 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

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; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16-inch, measured at door rabbet on a line 90-degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16-inch, measured at jambs on a horizontal line parallel to plane of wall.

3. Twist: Plus or minus 1/16-inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16-inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Placing Frames:

1. Comply with provisions of SDI-105 “Recommended Erection Instructions For Steel Frames”, unless otherwise indicated.
2. Except for frames located at in-place concrete or masonry and at drywall installations, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
3. In masonry construction, locate (3) wall anchors per jamb at hinge and strike levels. Building-in of anchors and grouting of frames is specified in Division 04 Sections.
4. At in-place concrete or masonry construction, set frames and secure to adjacent construction with machine screws and masonry anchorage devices. Grout all frames solid.

C. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI / SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
b. Install frames with removable glazing stops located on secure side of opening.
c. Install door silencers in frames before grouting.
d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
e. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
f. Field apply bituminous coating to backs of frames that are filled with grout containing anti-freezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.

    a. Floor anchors may be set with powder-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16-inch, measured at door rabbet on a line 90- degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16-inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16-inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16-inch, measured at jambs at floor.

D. 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.

E. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9-inches o.c. and not more than 2-inches o.c. from each corner.

3.04 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating finish 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 Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Galvanized Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 11 00

SECTION 08 14 16 – WOOD DOORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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.

B. Related Sections:

1. Division 08 Section "Glazing" for glass view panels in flush wood doors.
2. Division 08 Section "Steel Doors and Frames" for metal lite openings.
3. Division 07 Section "Painting" for requirements of refinishing existing wood doors.
4. Division 06 Section "Finish Carpentry" for barn-style sliding doors fabricated to complement standard wood doors described in this section.

1.03 SUBMITTALS

A. Product Data: For each type of door indicated. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and/or holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate requirements for veneer matching.
4. Indicate doors to be factory finished and finish requirements.
5. Indicate fire-protection ratings for fire-rated doors.

C. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 4 by 4-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. Metal frames for lite openings are specified in Division 08 Section “Standard Steel Doors and Frames” and installed in this Section.

D. Warranty: Sample of special warranty

1.04 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors from single manufacturer.

B. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."

1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, 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.

1.07 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.

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 face veneers exceeding 0.01-inch in a 3-inch span.

2. Warranty shall also include 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

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:

1. Algoma Hardwoods, Inc.
2. Eggers Industries.
3. Graham
4. Marshfield Door Systems, Inc.
5. Mohawk Flush Doors, Inc.; a Masonite company.
6. Ohio Valley Doors
7. Oshkosh Architectural Door Company.

2.02 DOOR CONSTRUCTION, GENERAL

A. WDMA I.S.1-A Performance Grade:

1. Heavy Duty unless otherwise indicated.
2. Extra Heavy Duty: Classrooms, assembly spaces and where indicated.

B. General: Provide wood doors complying with applicable requirements of referenced standards for kinds and types of doors indicated and as specified.

1. Face Panels: Manufacturer's standard 2-ply hot pressed face panels, unless otherwise indicated.
2. Exposed Surfaces: Provide kind shown or scheduled and as further specified. Provide same exposed surface materials on both faces of each door, unless otherwise indicated.

C. Structural Composite Lumber Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.

a. Screw Withdrawal, Face: 700 lbf .
b. Screw Withdrawal, Edge: 400 lbf.
c. 5-inch top-rail blocking.
d. 5-inch bottom-rail blocking, in doors indicated to have protection plates.
e. 2-1/2" side rail blocking (minimum), both sides.

2. Edge Construction: At edge stiles, provide minimum 1/4" solid wood construction (to match face veneer) with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

D. Fire-Protection-Rated Doors: Provide core specified as needed to provide fire-protection rating indicated.

1. Edge Construction: Provide Category "A" (positive pressure) edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges and require no additional installation of intumescent strips.

2.03 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Premium, with Grade A faces.
2. Species: Red Oak
3. Cut: Plain Sliced
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Balance match.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Exposed Vertical Edges: Same species as faces or a compatible species.
8. Core: Structural Composite Lumber.
9. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.

2.05 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Field measure locations where new doors are installed in existing frames for correct hardware placement.

C. Openings: Cut and trim openings through doors in factory.

1. Metal Lite Openings: Cut openings with the profile indicated.
2. Glazing: Field install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."

2.06 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 but top and bottom edges must be sealed.

B. Finish doors at factory.

1. Stain color of new doors to be #375 “Hazel”. Selection to be provided once sample refinished doors are review and approved.

PART 3 EXECUTION

3.01 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.

3.02 INSTALLATION

A. Hardware: For installation, see Division 08 Section "Door Hardware."

B. Installation Instructions: Install doors 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. Clearance: For non-rated doors, provide clearances of 1/8” at jambs and heads; 1/8” at meeting stiles for pairs of doors; and 1/2” from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide clearance from bottom of door to top of threshold.

1. For rated doors, comply with NFPA requirements.

3.03 ADJUSTING

A. Operation: Re-hang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or 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 08 14 16

SECTION 08 41 13 – ALUMINUM FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:

1. Exterior aluminum-framed storefronts.
    a. Glazing is retained mechanically with gaskets on four sides.

2. Exterior and interior manual-swing aluminum doors.
3. Flashing of storefront framing.

B. Related Sections include the following:

1. Division 07 Section "Joint Sealants".
2. Division 07 Section "Sheet Metal Flashing and Trim".
3. Division 08 Section "Door Hardware".
4. Division 08 Section "Glazing".

1.03 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:

1. Structural loads.
2. Thermal movements.
3. Movements of supporting structure indicated on Drawings including, but not limited to, deflection from uniformly distributed and concentrated live loads.
4. Dimensional tolerances of building frame and other adjacent construction.

5. Failure includes the following:

    a. Deflection exceeding specified limits.
    b. Thermal stresses transferred to building structure.
    c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
    d. Noise or vibration created by wind and thermal and structural movements.
    e. Loosening or weakening of fasteners, attachments, and other components.
    f. Sealant failure.

g. Failure of operating units to function properly.

B. Structural Loads:

1. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33-feet above grade, Importance Factor, and Exposure Category indicated on Drawings; according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure" and “The Kentucky Building Code”; based on mean roof heights above grade.
2. Seismic Loads: As required by “The Kentucky Building Code”.

C. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13-feet, 6-inches and to 1/240 of clear span plus 1/4-inch for spans greater than 13-feet, 6-inches or an amount that restricts edge deflection of individual glazing lites to 3/4-inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75-percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components directly below to less than 1/8-inch and clearance between members and operable units directly below to less than 1/16-inch.

D. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
2. When tested at 150-percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2-percent of span.
3. Test Durations: As required by design wind velocity but not less than 10-seconds.

E. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120-degrees F, ambient; 180-degrees F, material surfaces.
2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

a. Test High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180-degrees F.
b. Test Low Exterior Ambient-Air Temperature: 0-degrees F.
c. Test Interior Ambient-Air Temperature: 75-degrees F.

F. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft.

G. Water Penetration Under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20- percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.

H. Average Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having average U-factor of not more than 0.63 Btu/sq. ft. x h x degrees F when tested according to AAMA 1503.

1.04 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, installation data / requirements, and finishes for each type of product indicated.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Include details of provisions for system expansion and contraction and for draining moisture occurring within the system to the exterior.
3. Include flashing details.
4. For entrances, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

E. Fabrication Sample: Of each vertical-to-horizontal intersection of systems, made from 12-inch lengths of full-size components and showing details of the following:

1. Joinery.
2. Anchorage.
3. Expansion provisions.
4. Glazing.
5. Flashing and drainage.

F. Welding certificates.

G. Qualification Data: For Installer.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems.

I. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

J. Warranties: Special warranties specified in this Section.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.

1. Engineering Responsibility: Preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.

B. Source Quality Control: Provide aluminum framing specified herein from a single source.

1. Fabrication Tolerances: Fabricate aluminum framing in accordance with framing manufacturer's prescribed tolerances.

C. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Accessible Entrances: Comply with FED-STD-795, "Uniform Federal Accessibility Standards."

E. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code--Aluminum."

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.
1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating aluminum-framed systems without

field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.07 WARRANTY

A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration caused by thermal movements.
c. Deterioration of metals, metal finishes, flashing, and other materials beyond normal weathering.
d. Adhesive or cohesive sealant failures.
e. Water leakage through fixed glazing, framing, and flashing areas.
f. Failure of operating components to function properly.

2. Warranty Period: Five years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

1. EFCO Corporation.
2. Kawneer.
3. Tubelite Inc.
4. Vistawall Architectural Products.

2.02 MATERIALS

A. Aluminum: 6063 T6 alloy and temper.

1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
3. Extruded Structural Pipe and Tubes: ASTM B 429.

4. Structural Profiles: ASTM B 308/B 308M.
5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.03 FRAMING SYSTEMS

A. Basis-of-Design Product:

1. Exterior Storefront System: Kawneer North America, Trifab VG 451T (center glazed from inside).

B. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

C. Thermal Barrier (Trifab VG 451T):

1. Kawneer IsoLock Thermal Break with a 1/4" separation consisting of a two-part chemically curing, high-density polyurethane which is mechanically and adhesively joined to aluminum storefront sections.
2. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.

D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.

E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.

1. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

F. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

G. Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.

H. Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer for joint type.

2.04 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section "Glazing."

B. Gaskets: Glazing gaskets shall be extruded EPDM rubber.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric types.

2.05 DOORS

A. Basis-of-Design Product: The design for aluminum doors is based on Kawneer Company, Inc.; Series 500 Wide Stile.

B. Doors: Manufacturer's standard glazed doors, for manual swing operation.

1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie rods.
2. Stile Width: 6-inches nominal.
3. Center Bar: Install 8-inch horizontal center cross rail, separating door into two lites, as indicated on the Drawings. Center of cross rail to be aligned with center of exit devices.
4. Bottom rail shall be 12-inches.
5. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
   a. Provide non-removable glazing stops on outside of door.

C. Door Hardware: As specified in Division 08 Section "Door Hardware."

1. Coordinate hardware that is to be supplied by aluminum door manufacturer.
2. Hinges, closers, panic bars and cylinders by the Hardware Supplier.
3. **Provide stainless steel reinforcement plates, to be installed in storefront framing at hinges.**
4. Provide all necessary cut-outs and rough-ins required for electronic hardware.

2.06 ACCESSORY MATERIALS

A. Insulating Materials: As specified in Division 07 Section "Building Insulation."
B. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."

C. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

D. Snap-On Covers: Snap-on covers applied to exterior frame glazing legs to show a sharp, uninterrupted exterior profile between expansion joints. To match material and finish of frame system.

E. Low expansion spray foam insulation for filling perimeter of storefront system and aluminum door frames:

1. Great Stuff Window & Door by Dow Chemical or approved equal.
2. Low-pressure foam designed not to bow or bend window and door frames.

2.07 FABRICATION

A. Form aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by de-scaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from interior.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Door Frames: Reinforce as required to support loads imposed by door operation and for installing hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.

E. Doors: Reinforce doors as required for installing hardware.

1. At exterior doors, provide weather sweeps applied to door bottoms.

F. Hardware Installation: Factory install hardware to the greatest extent possible. Cut, drill, and tap for factory-installed hardware before applying finishes.

G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.08 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Clear Anodized:

1. Finish all exposed areas of aluminum windows and components with electrolytically deposited color in accordance with Aluminum Association Designation AA-M10-C22.

2.09 ACCESSORIES

A. Fasteners and perimeter anchors shall be stainless steel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. Proceed with installation only after unsatisfactory conditions have been corrected.
2. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

3.02 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure non-movement joints.

5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight, unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, without warp or rack.

F. Install such that joints are tight, with no visible opening between components. Open joints will not be accepted.

G Install glazing as specified in Division 08 Section "Glazing."

H. Entrances: Install to produce smooth operation and tight fit at contact points.

1. Exterior Entrances: Install to produce tight fit at weather stripping and weathertight closure.
2. Field-Installed Hardware: Install surface-mounted hardware according to hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

I. Install low expansion spray foam in accordance with manufacturer’s recommendations in gaps between aluminum frames and substrate.

J. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" and to produce weathertight installation.

K. Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8-inch in 12-feet; 1/4-inch over total length.
2. Alignment:

a. Where surfaces abut in line, limit offset from true alignment to 1/16-inch.
b. Where surfaces meet at corners, limit offset from true alignment to 1/32-inch.

3. Diagonal Measurements: Limit difference between diagonal measurement to 1/8-inch.

3.03 FIELD QUALITY CONTROL

A. Testing: At the Owner's option, Owner shall retain a qualified independent testing agency to perform field tests. The Architect shall select storefront units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount. Testing Standard shall be per AAMA 503 and the following:

1. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft2, whichever is greater.
2. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 6.24 psf.

B. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

3.04 PROTECTION AND CLEANING

A. Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum storefront system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance.

3.05 ADJUSTING

A. Entrances: Adjust operating hardware for smooth operation according to hardware manufacturers' written instructions.

1. For doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3-inches from the latch measured to the leading door edge.

END OF SECTION 08 41 13

08 80 00 – GLAZING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors.
3. Glass for storefront systems.

1.03 DEFINITIONS

A. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

B. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

C. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.04 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness

designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

    a. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33-feet above grade, Importance Factor, and Exposure Category indicated on the Drawings; according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure" and The Kentucky Building Code; based on mean roof heights above grade.
    b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15-degrees off vertical and under wind action.

        1) Load Duration: 3-seconds.

    c. Minimum glass thickness; refer to Glazing Schedule at end of specification.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120-degrees F, ambient; 180-degrees F, material surfaces.

1.05 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available for the following:

C. Samples for Verification:

1. Glass: For each type of glass product indicated, other than monolithic clear float glass, in the form of 12-inch square Samples for glass and of 12-inch long Samples for sealants. Install sealant Samples between two strips of material representative in color of the adjoining framing system.

.

D. Glazing Schedule: Use same designations indicated on Drawings.

E. Product Test Reports: For each of the following types of glazing products:

1. Insulating glass.
2. Glazing sealants.
3. Glazing tapes.
4. Glazing gaskets.

F. Warranties: Special warranties specified in this Section.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

1. Engage an experienced glazier who has completed glazing similar in material, design, and extent to that indicated for Project with a record of successful in-service performance.

B. Single-Source Responsibility for Glass: Obtain glass from one source for each product indicated below:

1. Primary glass of each (ASTM C 1036) type and class indicated.
2. Heat-treated glass of each (ASTM C 1048) condition indicated.
3. Insulating glass of each construction indicated.

C. Single-Source Responsibility for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

D. Safety Glass: Products complying with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.

1. Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.

E. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."

F. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the Insulating Glass Certification Council.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials to comply with manufacturer's directions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.08 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing materials manufacturer or when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Install liquid sealants at ambient and substrate temperatures above 40 deg F.

1.09 WARRANTY

A. General: Warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

B. Manufacturer's Warranty on Laminated Glass: Submit written warranty signed by laminated glass manufacturer agreeing to furnish replacements for those laminated glass units that deteriorate as defined in the "Definitions" article, f.o.b. point of manufacture, freight allowed Project site, within specified warranty period indicated below. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to glass manufacturer's published instructions.

1. Warranty Period: Manufacturer's standard but not less than 10 years after date of Substantial Completion.

C. Manufacturer's Warranty on Insulating Glass: Submit written warranty signed by manufacturer of insulating glass agreeing to furnish replacements for insulating glass units that deteriorate as defined in "Definitions" article, f.o.b. point of manufacture, freight allowed Project site, within specified warranty period indicated below. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, protecting, and maintaining practices contrary to glass manufacturer's published instructions.

1. Warranty Period: Manufacturer's standard but not less than 10 years after date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include products specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include:

a. Vitro (formerly PPG Industries)
b. Oldcastle Glass
c. Pilkington Glass
d. Guardian
e. LOF

2.02 PRIMARY FLOAT GLASS

A. Annealed Float Glass: ASTM C 1036, Type I (transparent glass, flat), Class 1 (clear) unless otherwise indicated and Quality q3 (glazing select).

B. Refer to Primary Clear Float Glass Product Data Sheet for Class 1 uncoated tinted glass for monolithic glazing.

C. Refer to requirements for sealed insulating glass units for performance characteristics of assembled units composed of tinted glass, coated or uncoated, relative to visible light transmittance, U-values, shading coefficient, and visible reflectance.

2.03 HEAT-TREATED FLOAT GLASS

A. Fabrication Process: By vertical (tong-held) or horizontal (roller-hearth) process, at manufacturer's option, except provide horizontal process where indicated as tongless or free of tong marks.

B. Uncoated, Clear, Heat-Treated Float Glass: ASTM C 1048, Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select).

2.04 INSULATING GLASS

A. Sealed Insulating Glass Units: Preassembled units consisting of organically sealed lites of glass separated by dehydrated air spaces complying with ASTM E 774 and with other requirements indicated, including those in Insulating Glass Product Data Sheet at the end of this Section.

1. For properties of individual glass lites making up units, refer to requirements specified elsewhere in this Section applicable to types, classes, kinds, and conditions of glass products comprising lites of insulating glass units Heat strengthened where specified to comply with system performance requirements specified and fully tempered where safety glass is designated or required.
2. Performance characteristics designated for coated insulating glass are nominal values based on manufacturer's published test data for units with lites 6 mm thick and nominal 1/2-inch dehydrated space between lites, unless otherwise indicated.
3. U-values are expressed as Btu/hr x sq. ft. x deg F.

2.05 ELASTOMERIC GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
2. Suitability: Comply with sealant and glass manufacturer's recommendations for selecting glazing sealants and tapes that are suitable for applications indicated and conditions existing at time of installation.
3. Colors: Provide color of exposed joint sealants to comply with the following:

    a. Match colors indicated by reference to manufacturer's standard designations.
    b. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

B. Elastomeric Glazing Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with ASTM C 920, including those referencing ASTM classifications for Type, Grade, Class and Uses.

2.06 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent, nonstaining and nonmigrating in contact with nonporous surfaces, with or without spacer rod as recommended by tape and glass manufacturers for application indicated, packaged on rolls with a release paper backing, and complying with AAMA 800.

B. Expanded Cellular Glazing Tape: Closed-cell, polyvinyl chloride foam tape, factory coated with adhesive on both surfaces, packaged on rolls with release liner protecting adhesive, and complying with AAMA 800 for product 810.5.

C. Available Products: Subject to compliance with requirements, glazing tape that may be incorporated in the Work include the following:

1. Back-Bedding Mastic Glazing Tape without Spacer Rod:

    a. PTI 303 Glazing Tape (shimless), Protective Treatments, Inc.
    b. S-M 5700 Poly-Glaze Tape Sealant, Schnee-Morehead, Inc.
    c. Tremco 440 Tape, Tremco Inc.
    d. Extru-Seal, Pecora Corp.
    e. PTI 606 Architectural Sealant Tape, Protective Treatments, Inc.
    f. Dyna-Seal, Pecora Corp.
    g. PTI 626 Architectural Sealant Tape, Protective Treatments, Inc.
    h. S-M 5710 H.P Poly-Glaze Tape Sealant, Schnee-Morehead, Inc.
    i. SST-800 Tape, Tremco, Inc.

2. Back-Bedding Mastic Glazing Tape With Spacer Rod:

    a. PTI 303 Glazing Tape (with shim), Protective Treatments, Inc.
    b. Pre-shimmed Tremco 440 Tape, Tremco, Inc.
    c. PTI 606 Architectural Sealant Tape, Protective Treatments, Inc.

3. Expanded Cellular Glazing Tape:

    a. Norseal V-980 Closed-Cell Glazing Tape, Norton Company.

2.07 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:

    1. Neoprene, ASTM C 864.
    2. EPDM, ASTM C 864.
    3. Silicone, ASTM C 1115.
    4. Thermoplastic polyolefin rubber, ASTM C 1115.
    5. Any material indicated above.

B. Soft Compression Gaskets: Extruded or molded closed-cell, integral-skinned gaskets of material indicated below, complying with ASTM C 509, Type II, black, and of profile and hardness required to maintain watertight seal:

    1. Neoprene.
    2. EPDM.
    3. Silicone.
    4. Thermoplastic polyolefin rubber.
    5. Any material indicated above.

C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include the following companies.

    1. Preformed Gaskets:

        a. Advanced Elastomer Systems, L.P.
        b. Schnee-Morehead, Inc.
        c. Tremco, Inc.

2.08 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonextruding, nonoutgassing, strips of closed-cell plastic foam of density, size, and shape to control sealant depth and otherwise contribute to produce optimum sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistive rating.

2.09 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine glass framing, with glazier present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the film installation under the project conditions.

3.03 GLAZING, GENERAL

A. Comply with combined recommendations of manufacturers of glass, sealants, gaskets, and other glazing materials, except where more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions as indicated on Drawings provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass from edge damage during handling and installation as follows:

1. Use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass lites with flares or bevels on bottom horizontal edges so edges are located at top of opening, unless otherwise indicated by manufacturer's label.
2. Remove damaged glass from Project site and legally dispose of off site. Damaged glass is glass with edge damage or other imperfections that, when installed, weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

E. Install elastomeric setting blocks in sill rabbets, sized and located to comply with referenced glazing standard, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass sizes larger than 50 united inches (length plus height) as follows:

1. Locate spacers inside, outside, and directly opposite each other. Install correct size and spacing to preserve required face clearances, except where gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking to comply with requirements of referenced glazing publications, unless otherwise required by glass manufacturer.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.04 TAPE GLAZING

A. Position tapes on fixed stops so that when compressed by glass their exposed edges are flush with or protrude slightly above sightline of stops.
B. Install tapes continuously but not in one continuous length. Do not stretch tapes to make them fit opening.

C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each lite is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

I. Trim excess tape glazing to be flush with stop.

3.05 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.

B. Secure compression gaskets in place with joints located at corners to compress gaskets producing a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

C. Install gaskets so they protrude past face of glazing stops.

3.06 SEALANT GLAZING (WET)

A. Install continuous spacers between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel weep systems until sealants cure. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass. Install pressurized gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

3.08 PROTECTION AND CLEANING

A. Protect glass from breakage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkali deposits, or stains, and remove as recommended by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents and vandalism, during construction period.

E. Wash glass on both faces in each area of Project not more than 4 days prior to date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

F. For cleaning of applied film, follow manufacturer’s recommendations.

PRODUCT DATA SHEET 1 - PRIMARY CLEAR FLOAT:

A. Primary Clear Float Glass Designation, where indicated.

B. Nominal Performance Characteristics are as indicated below:

1. Visible Light Transmittance: 90% Minimum

PRODUCT DATA SHEET 2 - INSULATING GLASS (SECURITY GLAZING):

A. Insulating Glass Unit Designation: As noted on drawings.

B. Classification of Units: Class CBA per ASTM E 774.

C. Air Space Width: Nominal 1/4 inch, measured perpendicularly from surfaces of glass lites at unit's edge.

D. Gas Filling: Fill air space with argon.

E. Sealing System: Dual seal, primary and secondary sealants: manufacturer's standard sealants.

F. Spacer Specifications: Aluminum with mill or clear-anodized finish.

1. Desiccant: Either molecular sieve or silica gel or blend of both.
2. Corner Construction: Manufacturer's standard corner construction.

G. Glass Specifications: Comply with the following requirements (designated from exterior face to interior face):

1. Surface One: 1/4" thick heat-strengthened glass.
2. Clear .060 PVB layer.
3. Surface Two: 1/4" thick heat-strengthened glass, with Solarban 70XL Clear coating as manufactured by PPG.
4. Air space.
5. Surface Three: 1/8" thick heat-strengthened glass, Class 1 (clear) float glass, complying with requirements specified for laminated glass products.
6. Clear .030 PVB interlayer.
7. Surface Four: 1/8" thick heat-strengthened glass, Class 1 (clear) float glass, complying with requirements specified for laminated glass products.
8. Nominal Performance Characteristics of Solarban 70XL are as indicated below:

a. Visible Light Transmittance: 64%
b. Ultraviolet 6%
c. Total Solar Energy 25%
d. Summer Daytime U-Value: .26
e. Winter Nighttime U-Value: .28
f. Shading Coefficient: .32
g. Visible Light Percentage: 12%

PRODUCT DATA SHEET 3 - INSULATING GLASS (STANDARD):

A. Passive Solar Low-E Insulating-Glass Units:

1. Overall Unit Thickness: 1" for windows and 3/4" for exterior doors
2. Thickness of Each Lite: 1/4"
3. Interspace Content: Argon gas

4. Outdoor Lite: Clear glass with Low-E coating on second surface.

    a. Annealed, Kind HS (heat strengthened), or Kind FT (fully tempered); as required.

5. NFRC U-Factor when insulated with Solarban 70 XL: 0.26 - 0.28
6. NFRC SHGC when insulated with Solarban 70 XL: 0.19 – 0.27
7. Indoor Lite: Class 1 (clear) float glass.

    a. Annealed, Kind HS (heat strengthened), or Kind FT (fully tempered); as required.

8. Nominal Performance Characteristics of Solarban 70XL are as indicated below:

    a. Visible Light Transmittance: 64%
    b. Ultraviolet 6%
    c. Total Solar Energy 25%
    d. Summer Daytime U-Value: .26
    e. Winter Nighttime U-Value: .28
    f. Shading Coefficient: .32
    g. Visible Light Percentage: 12%

END OF SECTION 08 80 00

SECTION 09 29 00 – GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 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 the Drawings for locations of work to be performed.

1.02 SUMMARY

A. Section includes:

1. Wood stud wall framing.
2. Metal soffit and bulkhead framing.
3. Suspended hard surfaced ceilings.
4. Gypsum board and joint treatment.
5. Acoustic insulation.

1.03 PERFORMANCE REQUIREMENTS

A. Stud Selection: Wood studs as indicated in Structural and Architectural Drawings.

B. Acoustic Attenuation for above restroom ceilings.

1.04 SUBMITTALS

A. Shop Drawings:

1. Indicate details associated with suspended ceilings.

B. Product Data:

1. Submit data on metal framing, gypsum board, joint tape; and acoustic accessories.
2. Indicate maximum unbraced height permitted for each stud gauge and yield strength.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with the following Gypsum Association reference standards:

1. GA-214 - Recommended Specification: Levels of Gypsum Board Finish.
2. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board.
3. GA-600 - Fire Resistance Design Manual.

B. Fire Rated Construction: Rating as indicated on Drawings.
   1. Tested Rating: Determined in accordance with ASTM E-119.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

C. Design partitions and ceilings under direct supervision of professional engineer experienced in design of this Work and licensed at Project location.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Available Gypsum Board and Joint Treatment Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

   1. Georgia Pacific
   2. Lafarge North America
   3. National Gypsum
   4. United States Gypsum Company

B. Acoustic Insulation Manufacturers:

   1. CertainTeed; Thermafiber Sound Attenuation Fire Blankets (SAFB) or CertaPro AcoustaTherm Batts.
   2. Johns Manville; MinWool-1200 Sound Attention Fire Batts or Sound Control Batts.
   3. Owens Corning; Sound Attenuation Batts (Mineral Wool) or Sound Attenuation Batts.
   4. Thermafiber; Thermafiber Sound Attenuation Fire Blankets (SAFB).

2.02 INTERIOR GYPSUM BOARD

A. Comply with ASTM C-36 / C-36M or ASTM C-1396 / C-1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

B. Low-impact application: **Typical throughout**

   1. Type X
   2. Thickness: 5/8-inch.
   3. Long Edges: Tapered and featured (rounded or beveled) for pre-filling.

C. Ceiling application: Manufactured to have more sag resistance than regular-type gypsum board.

1. Thickness: 5/8-inch.
2. Long Edges: Tapered.
3. Classification: Type X

2.03 ACCESSORIES

A. Acoustic Insulation: ASTM C-665, Type I, unfaced semi rigid mineral fiber or fiberglass batt type, thickness indicated on Drawings, friction fit, with maximum flame/smoke properties of 25/450 in accordance with ASTM E-84.

B. Metal Trim: ASTM C-1047; hot-dipped galvanized steel; with or without paper facing.

1. Corner beads.
2. Edge Beads: Profile to suit application.
3. Expansion joints.

C. Joint Materials:

1. Gypsum Board: ASTM C-475 / C-475M; reinforcing tape, joint compound, and water.

D. Fasteners for Gypsum Board:

1. Metal Framing 33-mils Thick and Less: ASTM C-1002, Type S.
2. Metal Framing Greater than 33-mils Thick: ASTM C-954.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that site conditions are ready to receive work and opening dimensions are as indicated on Drawings.

3.02 INSTALLATION

A. Wood Stud Framing Installation:

1. Framing Spacing: 16”o.c.
2. Extend studs minimum 6-inches above ceilings, unless otherwise specified or otherwise indicated on Drawings.

a. Laterally brace studs within 3-inches of top plate.

3. Door Opening Framing: Jack stud to support opening header, attached to king stud to run continuous to top plate.

D. Acoustic Accessories Installation:

1. Comply with ASTM C-919 and manufacturer's instructions to achieve STC ratings indicated on Drawings.
2. Place acoustic insulation in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions.
3. Close off sound flanking paths around or through gypsum board assemblies including sealing partitions above acoustic ceilings.

E. Gypsum Board Installation:

1. Install gypsum board in accordance with GA-216 and GA-600.
2. Erect single layer gypsum board vertically, with edges occurring over firm bearing.
3. Double Layer Applications:

    a. Secure second layer to first with fasteners.
    b. Place second layer parallel to first layer. Offset joints of second layer from joints of first layer.

4. Use screws when fastening gypsum board to metal furring or framing.

5. Place control joints consistent with lines of building spaces as indicated and at the following spacing when not indicated:

    a. Maximum Length Between Control Joints: 30- feet.
    b. Maximum Ceiling Area Contained Between Control Joints: 900 sf.
    c. At corners of door heads.

7. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials and locations as indicated.

F. Joint Treatment:

1. Finish in accordance with the following GA-214 Levels:

    a. Level 1: None.
    b. Level 2: Wall surfaces above finished ceilings, concealed from view.
    c. Level 3: None.
    d. Level 4: Wall and ceiling surfaces exposed to view.
    e. Level 5: None.

2. Joints Exposed to View: Feather coats on to adjoining surfaces so that camber is maximum 1/32-inch.

3.03 ERECTION TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8-inch in 10-feet in any direction.

END OF SECTION 09 29 00

SECTION 09 51 13 - ACOUSTICAL LAY-IN CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes acoustical and other panel ceiling materials and exposed suspension systems for ceilings.

1.2 RELATED

A. See Section 09 29 00 – Gypsum Board for gypsum ceiling edge trim/fascia.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Coordination Drawings: Drawn to scale and coordinating acoustical panel ceiling installation with hanger attachment to building structure and ceiling mounted items:

C. Samples: For each exposed finish.

D. Product test reports.

E. Research/evaluation reports.

F. Maintenance data.

1.4 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory or an NVLAP-accredited laboratory.

B. Fire-Test-Response Characteristics:

1. Surface-Burning Characteristics: Acoustical panels complying with ASTM E 1264 for Class A materials, when tested per ASTM E 84.

a. Smoke-Developed Index: 450 or less.

C. Seismic Standard: Comply with the following:

1. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

1.5 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Full-size panels equal to 2% of quantity installed.
2. Suspension System Components: Quantity of each exposed component equal to 2% of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANEL CEILINGS, GENERAL

A. Acoustical Panel Standard: Comply with ASTM E 1264.

B. Metal Suspension System Standard: Comply with ASTM C 635.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

D. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

1. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.

E. Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

2.2 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING (ACT-1):

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Ultima or a comparable product by one of the following:

1. USG
2. Chicago Metallic Corporation
3. Roxul/Rockfon

B. Classification: Provide panels complying with ASTM E 1264 for type and form as follows:

1. Type and Form: Type IV; Form 2, Pattern E,G.

C. Color: White.

D. LR: Not less than 0.84

E. NRC: Not less than 0.8

F. CAC: Up to 35.

G. Edge/Joint Detail: Square

H. Thickness: 7/8 inch.

I. Modular Size: 24 by 24 inches, as shown.

J. Sag-Resistant Tile.

K. Antimicrobial materials.

L. Washable (ASTM D4828), Soil-resistive

M. Recycled content: 75%

N. Accessories: Provide hold-down clips at tiles in Exercise C121.

2.3 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING (ACT-2): Restroom and Kitchen Use

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Fine Fissured Ceramaguard (Item No 607) or a comparable product by one of the following:
   1. USG
   2. Chicago Metallic Corporation

B. Classification: Provide panels complying with ASTM E 1264 for type and form as follows:
   1. Type and Form: Type XX; Pattern CE; ceramic mineral fiber composite, wet formed.

C. Color: White.
D. LR: Not less than 0.82
E. NRC: Not less than 0.55, Type E-400 mounting per ASTM E 795.
F. CAC: Not less than 35.
G. Edge/Joint Detail: Square
H. Thickness: 5/8 inch or ¾ inch.
I. Modular Size: 24 by 24 inches, as shown.
J. Sag-Resistant Tile.
K. Antimicrobial materials.
L. Washable (ASTM D4828), Soil-resistive, scratch (Hess rake test) and impact resistant (ASTM D1037)
M. Recycled content: 38%

2.4 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Prelude XL 15/16” Grid System or a comparable product by one of the following:

1. USG
2. Chicago Metallic Corporation
3. Roxul/Rockfon

B. Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation, with prefinished 15/16-inch-wide metal caps on flanges.

1. Structural Classification: Intermediate-duty system.
2. End Condition of Cross Runners: Override (stepped) type.
3. Cap Material: Steel cold-rolled sheet.
4. Color: White at Mars Clima Plus, Black at Egg Crate

C. Accessories: Provide outside corner bullnose trim for use at all CMU bullnose conditions.

PART 3 - EXECUTION

3.1 VERIFICATION

A. Verify that ceiling elevation shown is minimum 8” below building structure to maintain clearances for systems. If this clearance is not available, notify Architect before proceeding.

3.2 INSTALLATION

A. Comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders.

1. The majority of tiles along any ceiling edge shall be provided with a minimum panel width of 6”. Where the shape of a space requires that incidental panel widths of less than 6” are required, they will be acceptable.
2. Support wires to be installed at ends of each main tee at a maximum of 6” from wall.
3. Support wires to be installed at either side of each splice, maximum 6” from splice.
4. Support wires to be installed throughout grid at maximum of 4’-0” o.c.

C. Suspend ceiling hangers from building's structural members, plumb and free from contact with insulation or other objects within ceiling plenum. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means. Where width of ducts and other construction within ceiling plenum produces hanger spacings

that interfere with location of hangers, use trapezes or equivalent devices. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.

1. All ceiling support wires to be attached to building structure. Do not hang from roof deck bulb tees or joist bridging. Do not support ceilings directly from permanent metal forms or floor deck; anchor into concrete slabs or from bar joists. Do not attach hangers to steel deck tabs or to steel roof deck.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.

1. Install outside corner bullnose trim at all CMU bullnose conditions.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

G. Install acoustical clouds according to manufacturer's guidelines.

END OF SECTION 09 51 13

SECTION 09 65 00 – RESILIENT FLOORING AND ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: This section includes labor, materials and other services necessary to complete resilient plank flooring and accessories work. Conform with requirements of all Sections of Division 1, General Requirements, as it applies to the work of this Section.

B. Related Sections:
   1. Division 07 - Thermal and Moisture Protection.
   2. Division 20 - Mechanical.

1.02 REFERENCES

A. ASTM D 2047, Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
B. ASTM E 648/NFPA 253, Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
C. ASTM E662, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
D. ASTM F710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
E. ASTM F 970, Standard Test Method for Static Load Limit.
F. ASTM F1482, Standard Guide to Wood Underlayment Products Available for Use Under Resilient Flooring.
G. ASTM F1303, Standard Specification for Sheet Vinyl Floor Covering with Backing.
H. ASTM F2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
I. (RFCI) Resilient Floor Covering Institute
   1. RFCI Standard Slab Moisture Test Method (Calcium Chloride Method)

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's current printed product literature, specifications, installation instructions, and field reports in accordance with Section 01330 - Submittal Procedures.

B. Shop Drawings: Submit shop drawings to indicate materials, details, and accessories in accordance with Section 01330 - Submittal Procedures including but limited to the following:
   1. Submit a cut diagram indicating seam locations and roll direction. Use mitered seam layouts for corners when changing directions 180 degrees (e.g. when running material down corridors which bisect at a right angle), unless approved otherwise.

C. Samples: Submit duplicate 12" x 12" sample pieces of sheet material, 12" long, in accordance with Section 01330 - Submittal Procedures.

D. Closeout Submittals: Submit the following:

1. Operation and maintenance data for installed products in accordance with Division 01 Closeout Submittals Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
   1. Training: Installer who has attended manufacturer's flooring installation training clinic.

B. Regulatory Requirements: Provide sheet vinyl safety flooring in compliance with the following:
   1. Americans with Disabilities Act Architectural Guidelines (ADAAG).
   2. Occupational Safety & Health Administration (OSHA).

C. Pre-installation Meeting: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, manufacturer's warranty requirements, and installer qualifications.

1.05 SITE CONDITIONS

A. Temperature Requirements: If storage temperature is below 65F (18C) or the floor temperature is below 50F (18C), the flooring product must be moved to a warmer place and allowed to reach this temperature before unrolling or installation.

B. Maintain air temperature and structural base temperature at flooring installation area between 68F (20C) and 80F (26C) for 48 hours before, during and 24 hours after installation.

1.06 WARRANTY

A. Warranty period shall be 15 years commencing on date of substantial completion. Refer to conditions of the contract for project warranty provisions.

1.07 BACKING

A. Basis of Design product uses non-woven polyester/cellulose, glass fiber reinforcement.

PART 2 PRODUCTS

2.01 LUXURY VINYL TILE FLOORING

A. LVT Manufacturer: (Basis of Design) Brushed Lines Plank by Interface
   a. Color to be determined from standard color options from manufacturer.

B. Alternative Acceptable Manufacturers:
   1. Johnsonite
   2. Armstrong

2.03 ACCESSORIES

A. Cove former: Acceptable material, sized to suit application: manufacturer's Cove former 20R - 24 mm (1") radius.
C. Gulley edge: Acceptable material, vinyl, sized to suit application: Gulley Edge [GA 35/25] [GE 35RE] [GE 25RE].
D. Cap strip: Acceptable material, sized to suit application, [Vinyl] [stainless steel]: Cap Strip [C4] [C7] [C8] [C11].
E. Subfloor Filler and Leveler: Use only gray Portland cement-based "moisture tolerant" underlayments, and patching compounds. Use for filling cracks, holes or leveling. White gypsum materials are not acceptable.
F. Metal edge strips: Aluminum extruded, smooth, [mill finish] stainless steel with lip to extend over flooring.
G. Adhesives
   1. Ecofix 20- Hard set for heavy rolling loads
   2. Ecofix 25- Acrylic general adhesive

PART 3 EXECUTION

3.01 EXAMINATION

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog, installation instructions.

B. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.02 PREPARATION

A. Safety flooring shall be installed over subfloors conforming to ASTM F710 for concrete and other monolithic floors or ASTM F1482 for wood subfloors.

B. Always conduct moisture tests per ASTM F-2170 on all concrete slabs regardless of age or grade level. ASTM F-2170 Relative Humidity (RH) test results must not exceed 90%.

C. Do not proceed with work until results of moisture condition tests are acceptable.

D. When patching, a *moisture tolerant* patching compound must always be used.

3.03 INSTALLATION

A. Install flooring in accordance with the current posted manufacturer Installation Practices. All Seams shall be heat welded with manufacturer's weld rod product only. Failure to install flooring in accordance with recommended procedures may compromise manufacturer's warranty, in which case installer will need to correct conditions in order for manufacturer to reinstate warranty.

3.04 CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas.
   1. Repair or replace damaged installed products.
   2. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance.
B. Protection:
   1. Sweep or vacuum all construction debris and dust first, then clean the flooring as recommended by manufacturer.

3.05 PROTECTION

A. Cover and protect finished installation from damage from other trades using a non-staining, temporary floor protection system, such as a reusable textured plastic sheeting.
B. Product should be covered and protected from all other trades during construction with a suitable non-staining protective covering without taping to the surface of the flooring.

END OF SECTION 09 65 00

SECTION 09 65 13 - RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Resilient wall base.
2. Molding accessories.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of product indicated.

C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 2” long, of each resilient product color, texture, and pattern required.

1.4 QUALITY ASSURANCE

A. The wall base and trim shall be constructed of first quality materials, properly vulcanized, and shall be smooth and free from imperfections which detract from its appearance. The base shall conform fully to all the requirements of Standard Specification F-1861, Type TS (Thermoset Vulcanized Rubber), Group1 (solid).

B. Installers: Ensure installers of prefabricated flash cove bases have a minimum of 5 years documented experience in installation of prefabricated flash cove bases and are certified by manufacturer as an “approved installer”, having received necessary training from prefabricated flash cove base manufacturer. Submit documentation to Architect prior to commencement of work of this Section.

C. Construct a mock-up of flash cove installation with resilient floor tile for Architect’s review and approval to use as benchmark.
1. Construct mock-up minimum 5’ x 5’ with 1 completed inside corner, in specified material and color.
2. Notify Architect of completion of mock-up and allow minimum 48 hours for review.

3. Where approved by Architect, mock-up may remain as part of the Work. Approved mockup serves as minimum acceptable standard for remainder of installation.
4. Where mock-up is rejected, correct deficiencies or replace mock-up as directed by Architect and request subsequent reviews until approved.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 PROJECT CONDITIONS

A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After post installation period, maintain temperatures within range recommended by manufacturer, but not less than 60 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting and vinyl floor installation, have been completed.

1.7 WARRANTY

A. Manufacturer Warranty: Warrant prefabricated flash cove base for lifetime against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to punctures through aluminum backing at cove radius provided prefabricated flash cove base was installed professionally in accordance with manufacturer’s written specifications.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish no less than two percent (2%) of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to manufacturers specified.

B. Basis of Design Product: The design for the cove base is based on the product specified. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 RESILIENT WALL BASE (Rubber)

A. Type TP (Thermoplastic Rubber), 6” x 1/8” rubber cove base vulcanized and extruded from a synthetic rubber compound conforming with ASTM F 1861. Design with a ribbed back and top-lip for tight fit. Provide smooth, low-gloss satin or matte finish that resists scuffing, gouging and most chemicals.

1. Basis of Design Product: Johnsonite; Traditional Wall Base.

2. Available Manufacturers:

a. Armstrong World Industries, Inc.
b. Azrock Commercial Flooring
c. Burke Mercer Flooring Products
d. Flexco
e. Roppe Corporation;

B. Lengths: Provide product in rolls, not sections.

C. Outside Corners: Job formed.

D. Inside Corners: Mitered, job formed.

E. Color: To be selected from manufacturer’s full range of available colors.

2.3 RESILIENT MOLDING ACCESSORIES

A. Description: Edges and Transitions

1. Basis of Design Product:

a. Underslung Reducer: Flexco #156.
b. Tile/Carpet Joiner: Flexco #168.
c. Tile Reducer: Flexco #192a.

e. Other transitions and reducers as necessary, of same brand and color as those provided above.

2. Available Manufacturers:

a. Armstrong World Industries, Inc.
b. Azrock Commercial Flooring
c. Burke Mercer Flooring Products
d. Johnsonite
e. Roppe Corporation;

B. Material: Rubber. (Vinyl is acceptable for accessories only where rubber is not available.)

C. Color: To be selected from manufacturer's full range of available colors.

2.4 INSTALLATION MATERIALS

A. Sharp utility knife, hand roller, 1/8" notched trowel or wall base cartridge gun, trowelable Leveling and Patching Compounds:

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. For treads: as recommended by tread manufacturer to meet site conditions.

2. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. Cove Base Adhesives: 50 g/L.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.

B. 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.

C. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

D. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

1. Do not install resilient products until they are the same temperature as the space where they are to be installed.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 RESILIENT WALL BASE INSTALLATION

A. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is scheduled.

B. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

C. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

D. Do not stretch wall base during installation.

E. On masonry surfaces or other similar irregular substrates, fill voids along top edge of wall base with manufacturer's recommended adhesive filler material.

F. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.

2. Inside Corners: Use straight pieces of maximum lengths possible. Form by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor coverings that would otherwise be exposed.

B. Prefabricated Flash Cove Base Application:

1. Provide prefabricated flash cove base for integral base indicated in Finish Schedule.

2. Dry-fit prefabricated flash cove base; cut and fit material to required lengths. Miter-cut inside and outside corners.

3. Dry-fit and cut metal cove cap prior to prefabricated flash cove base installation.

4. Scribe glue line on walls and floor at edge of prefabricated flash cove base material.

5. Apply adhesive in full spread (100% coverage on 2 surfaces) for full length of prefabricated flash cove base material. Apply prefabricated flash cove base to wall surface straight and level.

6. Slide metal base cap behind prefabricated flash cove base material.

7. Hand roll prefabricated flash cove base material onto wall and floor surface removing bumps, ripples and fishmouths. Remove excess adhesive.

8. Heat weld seams (vertical and horizontal) in prefabricated flash cove base material.

3.5 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

    a. Do not wash surfaces until after time period recommended by manufacturer.

B. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

END OF SECTION 09 65 13

SECTION 09 68 00 – CARPET

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:

1. Carpet Tile.

B. Related Sections include the following:

1. Division 09 Section “Resilient Flooring and Accessories”.

1.03 SUBMITTALS

A. Product Data: For the following, including installation recommendations for each type of substrate:

1. Carpet tile: For each type indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance.

B. Shop Drawings: Show the following:

1. Columns, doorways, enclosed walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
2. Carpet type and color.
3. Type, color, and location of edge, transition, and other accessory strips.
4. Transition details to other flooring materials.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet: One tile.
2. Exposed Edge, Transition, and other Accessory Stripping: 12-inch long Samples.

D. Qualification Data: For Installer.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency.

F. Maintenance Data: For carpet to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet.

G. Warranties: Special warranties specified in this Section.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104, Section 5, "Storage and Handling."

1.06 PROJECT CONDITIONS

A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."

B. Environmental Limitations: Do not install carpet 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.

C. Do not install carpet over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.

D. Where demountable partitions, library shelving or other items are indicated for installation on top of carpet, install carpet before installing these items.

1.07 WARRANTY

A. Special Warranty for Carpet: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet installation that fails in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.
3. Warranty Period:

a. Carpet Installer's one (1) year warranty against defects in installation.
b. Lifetime Commercial Limited Warranty: warranty that the Owner will be completely satisfied with the performance of the carpet when installed in accordance with manufacturer's installation instructions and when maintained in accordance with current carpet care recommendations, and when such maintenance continues throughout duration of warranty period when owned and operated by original owner.

1.08 EXTRA MATERIALS

A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet tile: Provide three (3) percent overage of calculated yardage for each type of carpet (include carpet needed for complete installation plus waste and usable scraps in calculated yardage).
2. Deliver specified overrun and usable pieces of carpet to Owner's designated storage space, properly packaged (boxed and labeled).

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, and are limited, to manufacturers specified.

B. Basis of Design Product: The design for the carpet tile is based on the product specified. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufactures specified.

2.02 CARPET TILE

A. Available Manufacturers:

1. Mohawk
2. Lees
3. Mannington

B. Product:

1. Minimum performance quality and manufacture based on Basis of Design products scheduled.
    a. Basis of Design products:
        i. Interface, Harmonize, Pewter

2. Size: 25cm x 1m

2.03 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Cementitous latex type (Ardex or approved equal) as recommended by carpet tile manufacturer; compatible with carpet adhesive and curing / sealing compound used on concrete provided and recommended by the manufacturer. Gypsum based products are not acceptable.

B. Releasable Pressure-Sensitive Type Adhesive: Low VOC (no solvents) type releasable carpet tile adhesive as recommended by the carpet manufacturer; permit removal of carpet tile at any time without damage or adhesion to carpet.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Examine carpet for type, color, pattern, and potential defects.

B. Concrete Sub-floors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet manufacturer.
2. Sub floor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving carpet.
3. Sub floors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. General: Comply with CRI 104, Section 7.3, "Site Conditions; Floor Preparation," and with carpet manufacturer's written installation instructions for preparing substrates.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8-inch wide or wider, and protrusions more than 1/32-inch, unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet manufacturer.

D. Broom, vacuum clean and damp mop substrates to be covered immediately before installing carpet. Allow adequate time for the surface to dry after damp mopping.

3.03 INSTALLATION

A. Install carpet tile in accordance with manufacturer's recommended instructions for pattern/layout scheduled.

B. Install carpet under open-bottom obstructions and under removable flanges, library shelving and furnishings, and into alcoves and closets in each space.

C. Provide cutouts where required.

D. Install carpet tight against walls, columns, and cabinets so that the entire floor area is covered with carpet.

E. Install edging guards at openings and doors wherever carpet terminates unless otherwise indicated.

F. Perform cutting in accordance with manufacturer's recommendation using tools designed for carpet being installed.

G. Butt edges with proper pressure to attain the tightest joint possible without distortion.

H. Inspect completed carpet installation, verify that the installation is complete; work is properly done and acceptable.

I. Remove and replace, at no additional cost to the Owner, any work found not to be acceptable.

3.04 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing carpet:

1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet manufacturer.
2. Remove yarns that protrude from carpet surface.
3. Vacuum carpet using commercial machine.

B. Protect installed carpet to comply with CRI 104, Section 16, "Protection of Indoor Installations."

C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer.

END OF SECTION 09 68 00

SECTION 09 90 00 – PAINTING

PART 1 GENERAL

1.01 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 the Drawings for locations of work to be performed.

1.02 WORK INCLUDED

A. Furnish labor and materials to complete painting work indicated, as specified herein, or both.

B. The following specifications cover complete painting; finishing of wood, gypsum wallboard, concrete, concrete masonry, unfinished metal, mechanical and electrical items, other surfaces throughout the exterior and interior of building, except otherwise specified.

C. Furnish tools, ladders, drip cloths, masking, scaffolding and other equipment necessary for complete work.

D. Examine Specifications for various other trades; become familiar with their provisions regarding their painting; paint or finish surfaces that are left unfinished by requirements for other Sections.

E. DO NOT paint or finish copper, bronze, chromium plate, nickel, stainless steel, aluminum, Monel metal, except as otherwise specified.

F. If woodwork, metal or any other surface to be finished cannot be put in proper condition for finishing by customary cleaning, sanding, puttying operations, notify Architect in writing, or assume responsibility for and rectify any unsatisfactory finish resulting.

G. Related Sections include the following:

1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.

1.03 WORK NOT INCLUDED

A. Shop coat specified under other trades.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Samples for Verification: For each type of paint system and in each COLOR and GLOSS of topcoat indicated.

1. Submit Samples on rigid backing, 8-inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.05 TEST PANELS

A. Paint Finish: Contractor is to provide finish as specified on test panels required in Division 09 Section, Gypsum Board Assemblies. Finish only a portion of panel. Stagger coats so each coat is visible. Apply in the same manner as will be used during construction.

B. Stain and Varnish Finish: Contractor is to provide test panels of finish on new wood.

1.06 QUALITY ASSURANCE

A. Applicator Qualifications: A firm with (3) years' experience in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

1.07 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50- and 95-degrees F.

B. Do not apply paints when relative humidity exceeds 85-percent; at temperatures less than 5-degrees F above the dew point; or to damp or wet surfaces.

1.08 STORAGE

A. Store materials used on job in single place. Keep such storage neat and clean; rectify damage thereto or to its surroundings.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45-degrees F.

1. Maintain containers in clean condition, free of foreign materials and residue.

C. Remove oily rags, waste, etc., from building every night; take precautions to avoid danger of fire.

1.09 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional (1) gallon of each material and color applied.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

1. Sherwin Williams **(Basis of Design product)**
2. PPG Paints
3. Benjamin Moore & Co.

2.02 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range of colors, reference drawings.

2.03 MATERIALS

A. Materials Used: Exactly as specified in brand and quality. No claim as to unavailability of any material specified, or unwillingness to use same, or inability to produce first class work with same, will be entertained unless such claims are made in writing and submitted with Proposal. Deliver specified products in original containers, with seals unbroken and labels intact.

B. Use materials only as specified by manufacturer’s direction label on container.

C. Painting materials, such as linseed oil, shellac, turpentine, etc.: pure, highest quality, bear identifying label on container.

D. Base Proposal on use of specific brand and quality. If Contractor desires to use materials other than those specified, submit request in writing for approval; give manufacturer's name, specify name of each product offered as a substitute. Requests for approval must be received by Architect no later than (10) days before date and time set to receive bids and such approval must be obtained in writing before bids are submitted; otherwise, only specified products are to be furnished.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12-percent.
2. Masonry (Clay and CMU): 12-percent.
3. Wood: 15-percent.
4. Gypsum Board: 12-percent.

C. Verify suitability of substrates, including surface conditions and compatibility with other finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.02 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulates.
   1. Remove incompatible primers and re-prime substrate with compatible primers as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical or chemical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

H. Wood Substrates:
   1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
   2. Sand surfaces that will be exposed to view, and dust off.
   3. Prime edges, ends, faces, undersides, and backsides of wood.
   4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried. Re-apply filler if depression exists for a smooth and flush finish.

I. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

J. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.03 APPLICATION

A. Apply paints according to manufacturer's written instructions.

   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment, marker and tackboards or furniture.

3. Paint exposed surfaces of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

D. Prior to second coat of paint, contact Owner and Architect for inspection and approval in order to proceed with the next coat.

E. Where closed-cell spray foam polyurethane has been installed, as noted in the Drawings, any foam that is present on the interior side is to be painted with intumescent paint.

F. All exterior metals are to be painted, unless pre-finished, even if galvanized.

3.04 WORKMANSHIP

A. Workmanship: Very best, spread materials evenly; flow on smoothly without runs, sags or brush marks. Employ skilled mechanics.

B. Clean surfaces that are to be painted, including floors. Surfaces are to be free of loose dirt, tape, staples, adhesive residue and other foreign materials. Dust before painting starts.

C. Prior to first coat, do all necessary puttying of holes, cracks, etc., with putty color that matches finish. Bring putty **flush** with adjoining surfaces in neat, workmanlike manner.

D. Wash metal surfaces with alcohol or deglosser to remove any dirt or grease before applying materials. Where rust or scale is present, use a wire brush or sandpaper to clean before painting. Clean shop coats of paint that become marred and touch-up with specified primer.

E. Clean galvanized metal surfaces with Thinner or Galva Prep per manufacturer's directions for use before applying primer.

F. Cover surfaces to be stained with uniform stain coat, wipe off excess.

G. Tint undercoats of paint and enamel to same or approximate final coat shade.

H. Sand smoothly woodwork to be finished with enamel or varnish; clean before proceeding with first coat application. Use fine sandpaper between coats of enamel or varnish finish applied to wood or metal to product even, smooth finish.

I. See that coats are thoroughly dry before applying succeeding coats.

J. Work where coat of material has been applied, inspected and approved by Owner / Architect before application of succeeding specified coat, otherwise no credit for coat applied will be given. Contractor automatically assumes responsibility to recoat work in question. **Notify Architect when particular coat applied is completed and ready for inspection and approval.**

K. Finish door tops, bottoms, edges the same as balance of doors after they are fitted.

L. Do not perform any exterior painting while surface is damp or during rainy or frosty weather.

M. Protect work at all times. Protect adjacent work and materials with suitable covering or other method during work progress. Upon completion of work, remove paint, varnish spots from floors, glass and all other surfaces. Remove from premises all rubbish and accumulated materials of whatever nature not caused by other trades. Leave work clean, orderly and in acceptable condition.

N. Paint behind all markerboards, tackboards, wall panels, casework, etc. prior to their installation.

O. Paint mechanical, electrical piping and conduit, plumbing, etc. as indicated in Division 20, 21, 22, 23, 25, 26, 27 and 28 Sections.

3.05 EXTERIOR PAINT SCHEDULE

A. Paint Exterior Ferrous Metals (Gloss):

First Coat:	S-W:	Kem Bond HS Primer, DFT: 2.3 mils
Second Coat:	S-W:	Pro Industrial Urethane Alkyd Enamel, DFT: 2.0-3.0 mils per coat
Third Coat:	S-W:	Pro Industrial Urethane Alkyd Enamel

B. Paint Exterior Aluminum (Gloss):

First Coat:	S-W:	DTM Wash Primer
Second Coat:	S-W:	Pro Industrial Urethane Alkyd Enamel, DFT: 2.0-3.0 mils per coat
Third Coat:	S-W:	Pro Industrial Urethane Alkyd Enamel

A. Concrete Block (Semi-Gloss):

First Coat:	S-W:	Heavy Duty Block Filler, DFT: 10.0 mils minimum, may require multiple coats to be PIN-HOLE FREE
Second Coat:	S-W:	Pro Industrial Urethane Alkyd Enamel, DFT: 1.5 mils per coat
Third Coat:	S-W:	Pro Industrial Urethane Alkyd Enamel

B. Paint Exterior Galvanized Metal (Gloss):

First Coat:		Wash coat of 8 oz. copper acetate or copper sulphate in one gallon of water.
Second Coat:	S-W:	Galvite HS

Third Coat: S-W: Pro Industrial Urethane Alkyd Enamel, DFT: 2.0-3.0 mils per coat
Fourth Coat: S-W: Pro Industrial Urethane Alkyd Enamel

C. Paint Exterior Concrete (Semi-Gloss):

First Coat: S-W: Loxon Concrete & Masonry Primer Sealer, DFT: 10.0 mils minimum, may require multiple coats to be PIN-HOLE FREE
Second Coat: S-W: A-100 Exterior Latex Satin, DFT: 1.5 mils per coat
Third Coat: S-W: A-100 Exterior Latex Satin

D. PVC [Roof vents, piping, etc] (Flat):

Primer : n/a – Finish paint is a self-priming product.
Finish Coats (3) PPG: Break-Through! 250 Interior/Exterior Satin Water-Borne Acrylic Series: V50-410, DFT: 2.0-4.0 mils per coat.

3.06 INTERIOR PAINT SYSTEMS

A. Paint Interior Galvanized Metal (Semi-Gloss):

First Coat: Wash coat of 8 oz. copper acetate or copper sulphate in one gallon of water.
Second Coat: S-W: DTM Wash Primer (B71Y1) DFT: 2.3 mils
Third Coat: S-W: Promar Alkyd Semi-Gloss Enamel (34 Series), DFT: 2.0-3.0 mils per coat
Fourth Coat: S-W: Promar Alkyd Semi-Gloss Enamel (34 Series)

B. Paint Interior Ferrous Metals (Semi-Gloss):

First Coat (on unprimed metal):
S-W: DTM Acrylic Primer/Finish (B66W1) , DFT: 2.3 mils
Second Coat: S-W: DTM Acrylic Semi-Gloss Coating (B66-200), DFT: 2.0-3.0 mils per coat
Third Coat: S-W: DTM Acrylic Semi-Gloss Coating (B66-200)

C. Paint Interior GWB (Semi-Gloss):

First Coat: U.S. Gypsum: First Coat, DFT: 1.0-1.4 mils
Second Coat: S-W: DTM Acrylic Semi-Gloss Coating (B66-200), DFT: 1.5 mils per coat
Third Coat: S-W: DTM Acrylic Semi-Gloss Coating (B66-200)

D. Paint Interior CMU (Semi-Gloss):

First Coat: S-W: Prep Rite Masonry Primer, B28W300, DFT: 10.0 mils minimum, may require multiple coats to be PIN-HOLE FREE
Second Coat: S-W: Prop Mar 200 Interior Latex, DFT: 1.5 mils per coat
Third Coat: S-W: Pro Mar 200 Interior Latex

E. Wood – Natural / Stain:

Stain:	Deft Oil Based Wood Stain Series: DFT400
(2) Finish Coats:	Deft Polyurethane Interior Oil Based 350 g/L – Satin Series: DFT129

F. Ceiling and Bulkheads – White (Flat):

First Coat:	U.S. Gypsum: First Coat, DFT: 1.0-1.4 mils	
Second Coat:	S-W:	DTM Acrylic Semi-Gloss Coating (B66-200), DFT: 1.5 mils per coat
Third Coat:	S-W:	DTM Acrylic Semi-Gloss Coating (B66-200)

G. Concrete Floors (Clear Sealer):

Locations: Coordinate with Room Finish Schedule

Clean: Surface to be cleaned of all dirt, debris and any previously applied concrete sealer applied during concrete finish operation

(2) Finish Coats: PPG Paints PERMA-CRETE Plex-Seal WB Interior/Exterior Clear Sealer

3.07 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 09 90 00

SECTION 10 28 00 – RESTROOM ACCESSORIES

PART 1 GENERAL

1.01 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 the Drawings for locations of work to be performed.

1.02 WORK INCLUDED

A. Furnish labor and materials to complete restroom accessories indicated, as specified herein, or both.

B. Accessories: Include anchors, plates, screws, bolts, expansion shields and like required by types of accessories selected and by construction to which they are to be secured.

1. Exposed hardware: Finish to match accessory.

1.03 RELATED SECTIONS

A. Refer to Division 06 Specification Sections, Finish Carpentry for wood blocks for restroom accessory attachment.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

1. Construction details and dimensions.
2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Material and finish descriptions.
4. Features that will be included for Project.
5. Manufacturer's warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated on Drawings.
2. Identify products using designations indicated on Drawings.

C. Maintenance Data: Restroom accessories to include in maintenance manuals.

1.05 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.

1.06 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Individually pack and wrap accessory item, each complete with required trimmings, anchors, fastenings, bolts, screws and like; label each item indicating type of accessory, floor and room or space designation.

C. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.07 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15-years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.

B. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

C. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

D. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

E. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 1/4-inch thick.

F. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.02 RESTROOM ACCESSORIES

A. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. A & J Washroom Accessories, Inc.
2. Bobrick Washroom Equipment, Inc.
3. Bradley Corporation.
4. General Accessory Manufacturing Co. (GAMCO).

B. Toilet Grab Bar:

1. Basis-of-Design Product: Bobrick, B-5806
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05-inch thick; smooth, No.4, satin finish.
4. Outside Diameter: 1-1/4 inches.
5. Configuration and Length: As indicated on Drawings.

C. Mirror Units:

1. Types:

   a. Basis-of-Design Product: Bobrick, B-292, 24-inch x 36-inch with shelf.
   b. Basis-of-Design Product: Bobrick, B-290, 24-inch x 36-inch without shelf.

2. Frame: Stainless-steel welded frame, 0.05-inch thick; smooth, No.4, satin finish.

3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.

   a. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

4. Locations: Mirror WITH integrated shelf shall be installed in restrooms 116 and 119. All other mirror locations shall be WITHOUT shelf.

E. Paper Towel Dispenser:

1. Basis-of-Design Product: Gamco TD-2
3. Location: One dispenser installed at each toilet room sink location, coordinate final locations with owner.

F. Roll Paper Towel Dispenser:

1. Basis-of-Design Product: Bobrick B-253

2. Location: One dispenser provided for each classroom sink and warming kitchen sink. Coordinate final locations with owner.

G. Toilet Paper Dispenser:

1. Basis-of-Design Product: Bobrick B-2746
2. Provide one toilet paper holder for each water closet.

H. Sanitary Napkin Disposal:

1. Basis-of-Design Product: Bobrick B-270
2. Location: Provide sanitary napkin holders in rooms:
a. Restroom 119: (1)
b. Restroom 116: (1)

I. Automatic soap dispenser:

1. Basis-of-Design Product: Bobrick B-2012
2. Provide one automatic soap dispenser for each sink location indicated on the drawings.

J. Coat Hooks:

1. Basis-of-Design Product: Gamco 76827
2. Provide one hook on the interior side of all classroom and office doors and as indicated on the restroom doors.

2.03 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories where indicated, or as directed.

B. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

C. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to method in ASTM F 446.

D. Mount roll paper towel dispenser to bottom of casework.

E. During installation of accessories, until finally installed, accepted, protect items by approved means to maintain accessories in perfect condition. Remove damaged or defective work; replace with perfect work without extra cost to Owner.

3.02 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10 28 00

12 32 00 – CASEWORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Extent of casework is shown on the Drawings and as follows:

1. Plastic laminate casework, rail mounted.
   a. Cabinets with doors and drawers
2. Miscellaneous items.
3. All filler strips.
4. Plastic laminate countertops.
5. Custom cabinetwork.
6. Plumbing items as specified herein.

B. Work includes the fabrication and installation of standard components of plastic laminate base cabinets, sink base cabinets, wall cabinets, door bases and other units as indicated in the Drawings and as scheduled.

C. Related Sections include the following:

1. Division 06 Section “Rough Carpentry”, for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.

D. Wood blocking within metal stud and gypsum board walls and partitions shall be provided by the General Contractor.

E. Cabinets indicated to receive sinks shall be constructed to allow for installation of sinks for sizes indicated. Coordinate with Division 22 for sink sizes, unless specified herein. Cutouts in casework shall be by the casework installer. Sink cutouts shall have 2-coats of sealer applied to any exposed wood / particle board edges.

1.03 DEFINITIONS

A. Plastic laminate casework includes wood furring, shims, and hanging strips, unless concealed within other construction before casework installation.

1.04 SYSTEM DESCRIPTION

A. Casework Accessibility Requirements shall be provided to conform with the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and State and local regulations. These requirements supersede Technical Specifications in the section.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's data and installation instruction for each type of manufactured casework unit.

B. Samples: Submit 6-inch x 6-inch samples of specified finishes, including top material. Samples will be reviewed by Architect for color, texture and pattern only. Compliance with other specified requirements is exclusive responsibility of the Contractor.

1. Submit samples of mechanical and electrical service fixtures when requested by Architect, complete with fittings and accessories with specified finish.

a. Acceptable sample units will be used for comparison, inspections at project. Unless otherwise directed, acceptable sample units may be incorporated in the Work. Notify the Architect of their exact location. If not incorporated in the Work, retain acceptable samples units in building until completion of the Work and remove sample units from premises when directed by the Architect.

C. Shop Drawings: Submit shop drawings for casework, showings plans, elevations, ends, cross-sections, service run spaces, location and type of service fixture with lines thereto. Show details and location of anchorages and fitting to floors, walls and base. Include layout of units with relation to surrounding walls, doors, soffits, windows, and other building components.

1.06 QUALITY ASSURANCE

A. Single Source Responsibility: Provide manufactured casework with tops and other components all manufactured or furnished by same casework company for single responsibility.
1. Manufacturer will show evidence of a minimum of five (5) years' experience in providing manufactured casework systems for similar types of projects, produce evidence of financial stability, and adequate facilities and personnel required to perform this project.

B. Quality Standards: Unless otherwise indicated, comply with the following standards:
1. Work in this Section shall be performed by a firm certified by the Architectural Woodwork Institute (AWI) Quality Certification Program. Work in this section shall comply with the specified grades of work written herein and Sections 400 and 1600 of the 8th Edition of the Architectural Woodwork Institute Quality Standards.
2. Compliance shall be evidenced by the firm through the application of AWI Quality Certification labels on the work according to AWI/QCP labeling guidelines.

1.07 PRODUCT HANDLING

A. Deliver casework only after wet operations in building are complete.

B. Store completed casework in a ventilated place, protected from the weather, with relative humidity therein of 50-degrees or less at 70-degrees F.

C. Protect finished surfaces from soiling and damage during handling and installation. Keep covered with polyethylene film or other protective covering.

1.08 WARRANTY

A. Manufactured laminate-clad casework products, including epoxy tops, to provide a 1-year Guarantee and Warranty to the Owner against defective material and workmanship. This is a warranty of replacement and repair only, whereby manufacturer will correct defects in material and/or workmanship without charge.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers. Subject to compliance with requirements, provide products by one of the following:
   1. Campbell Rhea
   2. TMI Systems Design Corporation
   3. Sheldon
   4. Stevens Industries / LSI
   5. Precision Millwork & Plastics

B. Equal products of other manufacturers will be acceptable of they are pre-qualified by the Architect 10 days prior to the bid date. Such approvals will be incorporated by Addendum.

2.02 PLASTIC LAMINATE CASEWORK

A. Definition of cabinet components by surface visibility. Reference to the following locations will be made in Section 2.03 when describing surface materials:

   1. Exposed Surfaces
      a. Surface visible when drawers and doors are closed.
      b. Portion of cabinets visible when fixed appliances are installed.

   2. Semi-Exposed Surfaces
      a. Surface visible when drawers and doors are open.
      b. Interior surfaces of open units.
      c. Bottoms of cabinets, 30-inches or more above floor.

d. Top of cabinets less than 78-inches above floor or when visible from an upper floor or staircase after installation.

3. Concealed Surfaces
   a. Surfaces not normally visible after installation.
   b. Bottoms of cabinets less than 30-inches above floor.
   c. Top of cabinets more than 78-inches above floor and not visible from above after installation.
   d. Stretchers. Blocking and/or components concealed by drawers.

B. Vertical Exterior Laminate: GP28 vertical surface grade, high pressure laminate for exposed cabinet and table frame surfaces. Color as selected from casework manufacturer's full range of colors from WilsonArt, Formica, Nevamar or Pionite.

1. Basis of Design manufacturer: Formica, Infiniti line.

C. Particleboard: Grade 1-M-3, 45-50 lb. density, 3/4-inch (except for 1-inch shelves).

D. Backing Sheet: White thermofused melamine cabinet liner for casework interior surfaces.

E. Plywood: Seven-ply, 3/4-inch veneer core plywood with cross and face plies bonded with Type II water resistant glue; drawers are nine-ply, 1/2-inch.

F. Glue: Laminating glue – Type II water resistant glue. Assembly glue – Type III glue.

G. Banding: PVC thickness for cabinet body edge to be 3-mm from manufacturer's standard color offering; door and drawer edges to have 3-mm. Edge banding shall be hardwood when wood veneers are selected. T-molding is not acceptable.

H. All casework shall be fabricated with balanced construction.

2.03 CASEWORK FABRICATION

A. General fabrication requirements:

1. Units shall be doweled and glue construction utilizing 8-mm (min.) diameter fluted hardwood dowels spaced at 96-mm o.c., providing rigid, self-supporting unit.
2. Apply edge banding with hot melt adhesive.
3. Unfinished cabinet ends to have balanced surfaces.
4. At all vertical filler strips in casework installed next to walls, provide filler panel at top and bottom of wall cabinets to close off any voids.

B. Base units, floor mounted and suspended:

1. Sub-top Panel / Frame: Full depth, 3/4-inch particleboard, banded front edge, balanced surfaces, fastened to both end panels, or hardwood top frame. None on sink units.

2. Bottom Panel, Floor Mounted Base Unit: 3/4-inch particleboard, banded front edge, balanced surfaces.
3. Bottom Panel, Suspended Base Unit: 1-inch particleboard, banded front edge, balanced surfaces.
4. End Panels: 3/4-inch particleboard, banded exposed edges, balanced surfaces for both exposed and unexposed panels, sufficient number of drilled holes for insertion of shelf clips where required.
5. Back Construction: 1/4-inch hardboard, fused melamine interior surface, captured at sub-top and bottom, one-piece behind cupboard units and two-piece behind drawers. Sink cabinets to have full-height back with removable panel. Suspended unit has 3/4-inch particleboard panel, doweled into ends, balanced surfaces of same color. Also acceptable back construction, 1/2" particleboard, onset design.
6. Drawer: Lock shoulder construction with sub-front, sides and back of 1/2-inch (12 mm) PVC clad particleboard. 6 mm hardboard bottom with white surface, grooved into drawer box and sealed with hot melt glue process around entire drawer bottom perimeter. Also acceptable drawer bottom, 1/2", hardboard, onset drawer bottom with bottom mounted drawer slide.
7. Drawer and Door Fronts: 3/4-inch particleboard core with vertical exterior laminate, 3 mm PVC banding, all edges.
8. Vertical Dividers Between Drawers: 1-1/2-inch panel product, banded front edge.
9. Security Panels (where locks are specified): 3/4-inch particleboard, edge band in front, balanced surfaces, full depth of cabinet.
10. Intermediate Front Rails (not used when security panels are used); 3/4-inch x 5-3/8-inch panel product, edge band in front, balanced surfaces on cabinets. All drawers units are 36-inches or more wide come standard with one intermediate front rail to act as spacer between panes.
11. Toe Base: Separate, veneer core plywood, factory attached (unless otherwise noted).
12. Knee Space Table Frame: 3/4-inch particleboard; 3/4-inch hardwood if drawer cutouts are included.

C. Wall and Upper Cases:

1. End Panels: 3/4-inch particleboard, banded exposed edges, balanced surfaces for both exposed and unexposed panels, sufficient number of drilled holes for insertion of shelf clips where required.
2. Top and Bottom Panel: 3/4-inch particleboard, banded front edge, balanced surfaces.
3. Back Construction: 1/4-inch hardboard, thermofused melamine interior, captured in top, bottom and side panels; 3/4-inch x 3-inch full width mounting cleat at top.

D. Countertops and Accessories:

1. Plastic Laminate Tops:

   a. Core: 1 inch, ANSI A208.1 – 1993, M-2 particleboard.
   b. Surface: HGS high pressure decorative laminate with balanced backer sheeting.
   c. Edges, including applied backsplash: High-pressure decorative laminate.

1. Rounded edges at all classrooms.

d. Provide countertops for base cabinets and counter sections, as shown on the Drawings.

e. Sealants: Fully bed and seal splashes to tops and other splashes with Dow Corning 786 mildew resistant, silicone, clear sealant.

E. Doors:

1. Solid Doors: 3/4-inch particleboard, 3 mm PVC banding all edges; balanced surfaces.

F. Shelves, for Base and Wall Cabinets:

1. Base cabinets are to have thermofused, melamine clad, 3/4-inch thick (unless otherwise noted) particleboard shelf, less than 34-inches wide, to match interior; provide 1-mm PVC banded front edge to match interior color, full depth. Provide 1-inch thick shelf for spans over 34-inches wide.
2. Wall and upper cases to have full depth shelves sized appropriately for the depth of the unit.

2.04 CASEWORK HARDWARE AND ACCESSORIES

A. Provide manufacturer's standard, satin finish (US26D) hardware units, unless otherwise indicated.

B. Hinges: Institutional type, 5-knuckle. Provide (1) pair for doors less than 4-feet high and (1-1/2) pairs for doors over 4-feet.

C. Pulls: Solid metal, 4-1/2-inch long for drawers and swings doors, mounted with (2) screws, fastened from back. Provide (2) pulls for drawers over 24-inches wide.

D. Door Catches: Nylon roller, spring catch. Provide (2) catches on doors over 4-feet high.

E. Metal Drawer Slides: Slides shall be heavy duty, full extension, side mounted type, 75-pound capacity, zinc plated steel, equipped with heavy duty, ball bearing nylon wheel. Provide 100-pound capacity at file drawers.

F. Drawer and Cabinet Door Locks:

1. Provide at <u>all</u> drawers and doors.
2. Locks to be CompX National (or equal), Lock Number M3-3713-301, pin tumbler, box lock.
3. Furnish (2) keys per lock.
4. Key all cabinets within any given room on the same key and each room to be keyed different.
5. Locks to be divided by room and master keyed. Provide (6) master keys to the Owner.

G. Resilient Base: Furnished and installed under Division 09.

H. Adjustable Shelf Supports: BHMA B84072, wrought steel, mortise mounted.

PART 3 EXECUTION

3.01 CASEWORK INSTALLATION

A. Install wall track/lock rail system plumb, level, true and straight with no distortions. Shim as required, using concealed shims.

B. When hanging casework on wall track/lock rail system, adjust as necessary so that installation remains plumb, level, true, and straight with no distortions. Where casework abuts other finished work, scribe and apply filler strips for accurate fit with fasteners concealed where practicable.
   1. A third/intermediate rail will be required on any cabinets taller than 56 inches.

C. Base Cabinets: Set cabinets straight, plumb and level. Adjust sub-tops within 1/16-inch of single plane. Fasten each individual cabinet to wall track/lock rail system. Fasten continuous cabinets together.

   1. Do not attach casework directly to walls.
   2. Where required, assemble units into (1) integral unit with joints flush, tight and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16-inch.

D. Wall Cabinets: Securely fasten to wall track/lock rail system, not to wall. Anchor, adjust and align wall cabinets as necessary and attach together for straight lines.
   1. Do not attach casework directly to walls.

E. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.02 INSTALLATION OF TOPS

A. Field jointing: Where practicable, make in same manner as factory jointing, using dowels, splines, adhesives and fasteners as recommended by manufacturer. Locate field joints as shown on accepted shop drawings, factory prepared so there is no job site processing of top and edge surfaces.

B. Fastenings: Use concealed clamping devices for field joints located within 6-inches of front and at back edges, and at intervals not exceeding 24-inches. Tighten in accordance with manufacturer's instructions to exert a constant, heavy clamping pressure at joints. Secure tops to cabinets with "z"-type fasteners or equivalent, using (2) or more fasteners at each front, end and back.

   1. For epoxy tops, secure to cabinets with epoxy cement applied at each corner and along perimeter edges of not more than 48-inches o.c.
   2. For plastic laminate tops, anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Apply sealant to space between

backsplash and wall or countertop with sealant specified in Division 07 Section “Joint Sealants”.

C. Workmanship: Abut top and edge surfaces in one true plane, with internal supports placed to prevent any deflection. Provide flush hairline joints to top units using clamping devices.

D. After installation, carefully dress joints smooth, remove any surface scratches, clean and polish entire surface.

E. Provide holes and cutouts as required for mechanical and electrical service fixtures.

F. Provide scribe moldings for closures at junctures of top, curb and splash with walls as recommended by manufacturer for material involved. Use chemical resistant, permanently elastic sealing compound where recommended by manufacturer.

3.03 INSTALLATION OF ACCESSORIES

A. Install in a precise manner in accordance with manufacturer’s directions. Turn screws to a flat seat; do not drive. Adjust moving parts to operate freely without excessive bind.

3.04 CLEANING AND PROTECTION

A. Repair or remove and replace defective work as directed upon completion of installation.

B. Clean shop-finished surfaces, touch-up as required and remove or refinish damaged or soiled areas, as acceptable to the Architect. Wipe down all cabinets and drawers inside and out to remove dust, construction debris and layout marks.

C. Protection: Advise Contractor of procedures and precautions for protection of materials and installed casework from damage by work of other trades.

END OF SECTION 12 32 00

OVEC Head Start
7304 Dixie Highway
Louisville, Kentucky

SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS:

A. All requirements under Division One and the General and Supplementary Conditions of these specifications shall be a part of this section. Each contractor shall be responsible to thoroughly familiarize himself with all its contents as to requirements which affect this division or section. The work required under this section includes all material, equipment, appliances, transportation, services, and labor required to complete the entire system as required by the drawings and specifications.

1.2 SCOPE

A. The work included in this division consists of the furnishing of all labor, equipment, transportation, supplies, material, appurtenances and services necessary for the satisfactory installation of the complete and operating Plumbing System(s)/Equipment indicated or specified in the Contract Documents.

B. Any materials, labor, equipment or services not mentioned specifically herein which may be necessary to complete or perfect any part of the Plumbing Systems in a substantial manner, in compliance with the requirements stated, implied or intended in the drawings and,or specifications, shall be included as part of this Contract.

C. It is the intent of this Contract to deliver to the Owners a "like new" project once work is complete. Although plans and specifications are complete to the extent possible, it shall be the responsibility of the Contractors involved to coordinate all new systems with items of construction provided by others, and to relocate items which interfere with new equipment or materials required for the complete installation without additional cost to the Owner.

1.3 DEFINITIONS AND ABBREVIATIONS

A. Contractor - Any Contractor whether proposing or working independently or under the supervision of a General Contractor and,or Construction Manager and who installs any type of mechanical work or, the General Contractor.

B. Engineer - The Consulting Mechanical-Electrical Engineers either consulting to the Owners, Architect, other Engineers, etc.

C. Architect - The Architect of Record for the project.

D. Furnish - Deliver to the site in good condition and turn over to the Contractor who is to install.

E. Provide - Furnish and install complete, tested and ready for operation.

F. Indicated - Shown on the Drawings or Addenda thereto.

G. Typical - Where indicated repeat this work, method or means each time the same or similar condition occurs whether indicated or not.

H. OSHA - Office of Safety and Health Administration.

I. NEC - National Electrical Code.

J. NFPA - National Fire Protection Association.

K. AGA - American Gas Association

L. ASME - American Society of Mechanical Engineers.

M. ANSI - American National Standards Institute.

N. ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers.

O. NEMA - National Electrical Manufacturers Association.

P. UL - Underwriters Laboratories.

1.4 INSPECTION OF THE SITE:

A. The contractor shall personally inspect the site of the proposed work and inform himself fully as to the conditions under which the work is to be done. Failure to do so will not be considered sufficient justification to request or obtain extra compensation over and above the contract price.

1.5 MATERIAL AND WORKMANSHIP:

A. All material and apparatus shall be new and in first class condition. All workmanship shall be of the finest possible by experienced mechanics. All installations shall be made in a manner that will comply with applicable Codes and laws. In general, all materials and equipment shall be of commercial specification grade in quality.

1.6 DRAWINGS AND SPECIFICATIONS

A. The drawings are diagrammatic only and indicate the general arrangement of the systems and are to be followed. If deviations from the layouts are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Engineer for approval before proceeding with the work. The drawings are not intended to show every item that may be necessary to complete the systems. All proposers shall anticipate that additional items may be required and submit their bid accordingly.

B. Each Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. He shall coordinate this work with all other branches of work in such a manner as to cause a minimum of conflict or delay.

C. The Engineer shall reserve the right to make adjustments in location of piping, ductwork, equipment, etc. where such adjustments are in the interest of improving the project.

D. Unless dimensioned, the mechanical drawings only indicate approximate locations of equipment, piping, etc.. Dimensions given in figures on the drawings shall take precedence over scaled dimensions and all dimensions, whether given in figures or scaled, shall be verified in the field to insure no conflict with other work.

1.7 COORDINATION:

A. Coordinate all work with that of other trades so that the various components of the systems will be installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. Any components which are installed without regard to the above shall be relocated at no additional cost to the owner.

B. It is the Contractor's responsibility to provide materials with trim which will fit properly the types of ceiling, wall, or floor finishes actually installed. Model numbers in specifications or shown on drawings are not intended to designate the required trim.

1.8 ORDINANCES AND CODES:

A. Comply with National Fire Protection Association codes, Kentucky Building Code, Kentucky Plumbing Code, and/or all other applicable codes and ordinances. Obtain and pay for all permits. Contractor shall be held responsible for any violation of the law.

B. The Contractor shall give all necessary notices, obtain and pay for all permits, government sales taxes, fees, inspections and other costs, in connection with his work. He shall also file all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments having any jurisdiction, whether indicated or specified or not.

C. The contractor shall also obtain all required certificates of inspection for his work and deliver same to the Engineers before request for acceptance and final payment for the work.

1.9 PROTECTION OF EQUIPMENT:

A. Adequately protect equipment from damage after delivery to job. Cover with heavy polyethylene plastic as required to protect from plaster, dirt, paint, water, or physical damage. Equipment which has been damaged by construction activities will be rejected, and contractor is obligated to furnish new equipment of a like kind.

B. Keep premises broom clean at all times from foreign material created under this contract. All piping, equipment, etc. shall have a neat and clean appearance at the termination of the work.

1.10 EQUIPMENT AND MATERIALS SUBSTITUTIONS OR DEVIATIONS

A. When any Contractor requests approval of materials and/or equipment of different physical size, capacity, function, color, access, it shall be understood that such substitution, if approved, will be made without additional cost to anyone other than the Contractor requesting the change regardless of changes in connections, space requirements, electrical characteristics, etc. from that indicated, electrical service, etc.. In all cases where substitutions affect other trades, the Contractor requesting such substitutions shall advise all such Contractors of the change and shall renumerate them for all necessary changes in their work.

B. NOTE: Any drawings, Specifications, Diagrams, etc., required to describe and coordinate such substitutions or deviations shall be professionally prepared at the responsible Contractor's expense. Review of Shop Drawings by the Engineers does not in any way absolve the Contractor of this responsibility.

C. Notwithstanding any reference in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make or catalog number, such reference shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; any devices, products, materials, fixtures, forms, or types of construction which, in the judgment of the Engineer, are equivalent to those specified are acceptable, provided the provisions of the paragraph immediately preceding are met. Requested substitutions shall be submitted to the Engineer a minimum of five days prior to bids.

1.11 SUPERVISION OF WORK

A. Each Contractor shall personally supervise the work for which he is responsible or have a competent superintendent, approved by the Engineers, on the work at all times during progress with full authority to act for him.

1.12 SHOP DRAWINGS:

A. Submit for approval eight sets of manufacturers shop drawings of all major items of equipment

and all items requiring coordination between contractors. Before submitting shop drawings and material lists, the contractor shall verify that all equipment submitted is mutually compatible and suitable for the intended use, and shall fit the available space and allow ample room for maintenance. The Engineer's checking and subsequent approval of such shop drawings shall not relieve the contractor from responsibility for errors in dimensions, details, size of members, or quantities; or omissions of components or fittings; or for coordinating items with actual building conditions. Provide any needed wiring diagrams.

B. Catalog data must have the item or model number clearly marked and all accessories indicated. Mark out all inapplicable items.

C. NOTE: Any shop drawings received without being reviewed and stamped by the Contractor shall be returned Rejected without review.

1.13 OPERATION AND MAINTENANCE INSTRUCTIONS:

A. Submit to the architect four (4) copies each of material for maintenance and operation instruction manuals, appropriately bound into manual form including approved copies of the following, revised if necessary to show system and equipment as actually installed:

1. Manufacturers Catalog Sheets
2. Wiring Diagrams
3. Maintenance Instructions
4. Recommended Maintenance Schedules and Timelines
5. Operating Instructions
6. Parts Lists
7. Preventative Maintenance Recommendations

B. All binders shall be as per the applicable Division I General Specifications.

1.14 GUARANTEE:

A. Each Contractor shall guarantee all equipment, apparatus, materials, and workmanship entering into this Contract to the best of its respective kind and shall replace all parts at his own expense, which are proven defective for a duration as indicated in the Division I General Conditions and Specifications.

B. Where such duration is not identified, then guarantee shall be for one year from final acceptance of the work by the Engineer/Architect. The effective date of completion of the work shall be the date of the Engineer's (Architect's) Statement of Substantial Completion. Items of equipment which have longer guarantees, as called for in these specifications, shall have warranties and guarantees completed in order, and shall be in effect at the time of final

acceptance of the work by the Engineer. The Contractor shall present the Engineer with such warranties and guarantees at the time of final acceptance of the work. The Engineer shall then submit these warranties, etc. to the Owner. Refer to other sections for any special or extra warranty requirements.

1.15 CONDUCT OF WORKMEN

A. Each Contractor shall be responsible for the conduct of all workmen under his supervision. Misconduct on the part of any workman to the extent of creating a safety hazard, or endangering the lives and property of others, shall result in the prompt relief of that workman. The consumption of alcoholic beverages or other intoxicants, narcotics, barbiturates, hallucinogens or debilitating drugs on the job site is strictly forbidden.

1.16 ROUGH-IN:

A. Coordinate without delay all roughing-in with general construction. All piping, conduit, rough-in shall be concealed except in unfinished areas and where otherwise shown.

1.17 CUTTING AND PATCHING:

A. This contractor shall do all cutting of walls, floors, ceilings, etc. as required to install work under this section. Contractor shall obtain permission of the Architect before doing any cutting. All holes shall be cut as small as possible. Contractor shall patch walls, floors, etc. as required by work under this section. All patching shall be thoroughly first class and shall match the original material and construction.

1.18 ACCESSIBILITY

A. The Contractor shall locate and install all equipment so that it may be serviced, and maintained as recommended by the manufacturer. Allow ready access and removal of the entire unit and,or parts such as valves, filters, fan belts, motors, prime shafts, etc.

1.19 REQUIRED CERTIFICATIONS

A. Upon completion of the project, the Contractor shall deliver all inspection certificates acquired during the course of the project to the Owner for their records, inclusive of the boiler certificate (if applicable).

B. The Contractor shall upon completion of the Final Punch list, deliver to Architect and Engineer a written certification that all systems and work has been completed in compliance with the plans and specifications. The Contractor also shall deliver over to the Owner all required maintenance manuals and phone numbers of the equipment suppliers. The delivery of these documents and certifications will be required prior to final payment and release of retainage.

1.20 INDEMNIFICATION

A. The Contractor(s) shall hold harmless and indemnify the Engineer, employees, officers, agents and consultants from all claims, loss,damage, actions, causes of actions, expense and/or liability resulting from, brought for, or on account of any personal injury or property damage received or sustained by any person, persons, (including third parties), or any property growing out of, occurring, or attributable to any work performed under or related to this contract, resulting in whole or in part from the negligence of the Contractor, any subcontractor, any employee, agent or representative.

PART 2 - PRODUCTS

2.1 NONE

PART 3 - EXECUTION

3.1 NONE

END OF SECTION 220500

OVEC
St. Teresa Convent
Louisville, Kentucky

SECTION 220519 - METERS AND GAGES

PART 1 - **GENERAL**

1.1 DESCRIPTION OF WORK:

A. Extent of gauges and thermometers required by this section is indicated on drawings and/or specified in other Division 22 sections.

1.2 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacturer of pressure gauges and thermometers, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.3 SUBMITTALS:

A. Product Data: Submit catalog cuts, specifications, and installation instructions, for each type of measuring device required. Submit showing Manufacturer's figure number, size, and features for each required device.

PART 2 - PRODUCTS

2.1 TEMPERATURE GAGES:

A. Direct Mount Dial Thermometers:

1. General: Provide direct mount dial thermometers of materials, capacities, and ranges indicated, designed and constructed for use in service indicated.

2. Type: Vapor tension, universal angle.

3. Case: Drawn steel or brass, clear acrylic plastic lens, 4½" diameter.

4. Adjustable Joint: Die cast aluminum, 180° adjustment in vertical plane, 360° adjustment in horizontal plane, with locking device.

5. Thermal Bulb: Copper with phosper bronze bourbon pressure tube, on scale division accuracy.

6. Movement: Brass precision geared.

7. Scale: Progressive, satin faced, non-reflective aluminum, permanently etched markings.

8. Stem: Copper plated steel, or brass, for separable socket, length to suit installation.

9. Range: Conform to the following:

a. Hot & Cold Water: 40° - 240°F (10°-115°C).

10. Available Manufacturers: Subject to compliance with requirements, manufacturers offering direct mount dial thermometers which may be incorporated in the work include, but are not limited to the following:

    a. Marsh Instrument Co., Unit of General Signal.
    b. Trerice (H.O.) Co.
    c. Weiss (Albert A. & Son, Inc.

B. Dial Type Insertion Thermometers:

1. General: Provide dial type insertion thermometers of materials, capacities, and ranges indicated, designed and constructed for use in service indicated.

2. Type: Bi-metal, stainless steel case and stem, 1" diameter dial, dust and leak proof, 1/8" diameter stem with nominal length of 5".

3. Accuracy: 0.5% of dial range.

4. Range: Conform to the following:

    a. Hot & Cold Water: 0°- 220°F (-10°-110°C).

5. Available Manufacturers: Subject to compliance with requirements, manufacturers offering direct mount dial type insertion thermometers which may be incorporated in the work include, but are not limited to the following:

    a. Marsh Instrument Co., Unit of General Signal.
    b. Taylor Instrument Process Control Div., Sybron Corp.
    c. Trerice (H.O.) Co.
    d. Weiss (Albert A.) & Son, Inc.

C. THERMOMETER WELLS:

1. General: Provide thermometer wells constructed of brass or stainless steel, pressure rated to match piping system design pressure. Provide 2" extension for insulated piping.

2.2 PRESSURE GAGES AND FITTINGS:

A. General: Provide pressure gages of materials, capacities and ranges indicated, designed and constructed for use in service indicated.

B. Type: General use, 1% accuracy, ANSI B 40.1 grade A, phosphor bronze bourdon type, bottom connection.

C. Case: Drawn steel or brass, clear acrylic plastic lens, 4½" diameter.

D. Connector: Brass with ¼" male NPT.

E. Scale: White coated aluminum, with permanently etched markings.

F. Range: Conform to the following:

1. HVAC Water and steam: 0 - 100 PSI.

G. Available Manufacturers: Subject to compliance with requirements, manufacturers offering pressure gages which may be incorporated in the work include, but are not limited to the following:

1. Ametek, U.S. Gauge Div.
2. Marsh Instrument Co., Unit of General Signal.
3. Marshalltown, An Eltra Company
4. Trerice (H.O.) Co.
5. Weiss (Albert A.) & Son, Inc.

H. Pressure Gage Cocks:

1. General: Provide pressure gage cocks between pressure gages and gage tees on piping systems. Construct gage cock of brass with ¼" female NPT on each end, and "T" handle brass plug.

I. Snubber: ¼" brass bushing with corrosion resistant porous metal disc, through which pressure fluid is filtered. Select disc material for fluid served and pressure rating.

J. Pressure Gage Connector Plugs:

1. General: Provide pressure gage connector plugs pressure rated for 150 PSI and 200°F. Construct of brass and finish in nickel-plate, equip with ½" NPT fitting, with self-sealing valve core type neoprene gasketed orifice suitable for inserting 1/8" O.D. probe assembly from dial type insertion pressure gage. Equip orifice with gasketed screw cap and chain. Provide extension, length equal to insulation thickness, for insulated piping.

PART 3 - EXECUTION

3.1 INSTALLATION OF TEMPERATURE GAGES:

A. General: Install temperature gages in vertical upright position, and tilted so as to be easily read by observer standing on floor.

B. Locations: Install at the following locations, and elsewhere as indicated:

1. At the supply line from the domestic water heaters

C. Thermometer Wells: Install in piping tee where indicated, in vertical upright position. Fill well with oil or graphite, secure cap.

3.2 INSTALLATION OF PRESSURE GAGES:

A. General: Install pressure gages in piping tee with pressure gage cock, located on pipe at most readable position.

B. Locations: Install in the following locations, and elsewhere as indicated:

1. At discharge of each pressure reducing valve.

END OF SECTION 15170

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7304 Dixie Highway
Louisville, Kentucky

SECTION 220523 - GENERAL DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1. DESCRIPTION OF WORK:

1.1 Extent of valves required by this section is indicated on drawings and/or specified in other Division 22 sections.

A. Types of valves specified in this section include the following:

1. Gate Valves.
2. Globe Valves.
3. Drain Valves.
4. Ball Valves.
5. Swing and Lift Check Valves.

1.2 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacturer of valves, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.3 SUBMITTALS:

A. Product Data: Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valve schedule showing Manufacturer's figure number, size, location, and valve features for each required valve.

PART 2 - PRODUCTS

2.1 VALVES:

A. General: Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by Installer to comply with installation requirements. Provide sizes as indicated, and connections which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.

2.2 GATE VALVES:

A. Packing: Select valves designed for repacking under pressure when fully opened, equipped with packing suitable for intended service. Select valves designed so back seating protects

packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.

1. For Low Pressure Domestic Water Service:

   a. Threaded Ends 2" and Smaller: Class 125, bronze body, union bonnet, rising stem, solid wedge.

   b. Flanged Ends 2½" and Larger: Class 125, iron body bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge.

   c. Soldered Ends 2" and Smaller: Class 125, bronze body, screwed bonnet, non-rising stem, solid wedge.

2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering gate valves which may be incorporated in the work include, but are not limited to the following:

   a. Crane Co., Valve Div.
   b. Fairbanks Co.
   c. Hammond Valve Corp., Div. of Conval Corp.
   d. Jenkins Bros., A Corp.
   e. NIBCO, Inc.
   f. Powell (Wm.) Co.
   g. Stockham Valves and Fittings, Inc.
   h. Walworth Co.

2.3 GLOBE VALVES:

A. Packing: Select valves designed for repacking under pressure when fully opened, equipped with packing suitable for intended service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.

B. Composition Discs: Where required, provide suitable material for intended service. For stem throttling service, fit composition disc valve with throttling nut.

C. Comply with the following standards:

   1. Bronze Valves: MSS SP-80.

D. For Domestic Water Service:

1. Flanged, Threaded or Solder Ends 2½" and Larger: Class 150, bronze body, union bonnet, plug-type, OS&Y, renewable seat and disc, rated for severe throttling.

E. Available Manufacturers: Subject to compliance with requirements, manufacturers offering globe valves which may be incorporated in the work include, but are not limited to, the following:

1. Crane Co., Valve Div.
2. Fairbanks Co.
3. Hammond Valve Corp., Div. of Conval Corp.
4. Jenkins Bros., A Corp.
5. NIBCO, Inc.
6. Powell (Wm.) Co.
7. Stockham Valves and Fittings, Inc.
8. Walworth Co.

2.4 SWING CHECK VALVES:

A. General: Construct pressure containing parts of valves as follows:

1. Bronze Valves, 125 or 150 PSI: ANSI/ASTM B 62.

B. Construct valves of pressure castings free of any impregnating materials.

C. Construct valves of bronze, regrinding, with seating angle 40° to 45°, unless composition disc is specified.

D. Provide stop plug as renewable stop for disc hanger, unless otherwise specified.

E. Construct disc and hanger as separate parts, with disc free to rotate.

F. Support hanger pins on both ends by removable side plugs.

2.5 Available Manufacturers: Subject to compliance with requirements, manufacturers offering swing check valves which may be incorporated in the work include, but are not limited to the following:

1. Crane Co., Valve Div.
2. Fairbanks Co. (The)
3. Hammond Valve Corp., A Condec Co.
4. Jenkins Bros., A Corp.
5. NIBCO, Inc.

6. Powell Co. (The Wm.)
7. Stockham Valves and Fittings, Inc.
8. Walworth Co.

2.6 LIFT CHECK VALVES:

A. General: Provide lift check valves, 2" and smaller, constructed of bronze or forged steel to suit service. Construct bronze valves with basic rating of 125 or 150 PSI with pressure containing parts of materials having at least physical properties of ANSI/ASTM B 62. Conform to ANSI /FCI 74-1 for design, rating, and testing. Construct pressure castings, free of any impregnating materials.

B. Horizontal Lift Check Valves: ¼" to 2", straight pattern threaded or soldered ends, pressure rated for 150 PSI, renewable composition disc, screw-over cap, bronze body.

C. Spring Loaded Horizontal Lift Check Valves: ¼" to 2", straight pattern, threaded or soldered ends, pressure rated for 150 PSI, renewable composition disc, phosphor bronze wire spring, screw over cap, bronze body.

D. Available Manufacturers: Subject to compliance with requirements, manufacturers offering lift check valves which may be incorporated in the work include, but are not limited to the following:

1. Fairbanks Co. (The).
2. Hammond Valve Corp.,A Condec Co.
3. Jenkins Bros., A Corp.
4. Lunkenheimer Co. (The), Div. Conval Corp.
5. Powell Co. (The Wm.).
6. Stockham Valves & Fittings, Inc.

2.7 BALL VALVES:

A. General: Select with port area equal to or greater than connecting pipe area, include seat ring designed to hold sealing material.

B. For Domestic Water Service:

1. Threaded Ends 2" and Smaller: Class 125, bronze 2 piece body, bronze ball, bronze stem.

2. Soldered Ends 2" and Smaller: Class 125, bronze, 2 piece body, bronze ball, bronze stem.

C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering ball valves which may be incorporated in the work include, but are not limited to the following:

1. Conbraco Industries, Inc.
2. Crane Co., Valve Div.
3. Fairbanks Co.
4. Hammond Valve Corp., Div. of Conval Corp.
5. Jamesbury Corp.
6. NIBCO, Inc.
7. Stockham Valves and Fittings, Inc.
8. Walworth Co.

2.8 DRAIN VALVES:

A. For Low Pressure Drainage Service:

1. Threaded Ends 2" and Smaller: Class 125, bronze body, screwed bonnet, rising stem, composition disc, 3/4" hose outlet connection.

2. Soldered Ends 2" and Smaller: Class 125, bronze body, screwed bonnet, rising stem, composition disc, 3/4" hose outlet connection.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering drain valves which may be incorporated in the work include, but are not limited to, the following:

1. Crane Co., Valve Div.
2. Fairbanks Co.
3. Hammond Valve Corp., Div. of Conval Corp.
4. Jenkins Bros., A Corp.
5. NIBCO, Inc.
6. Walworth, Co.

2.9 SWING CHECK VALVES:

A. General: Construct pressure containing parts of valves as follows:

1. Bronze Valves, 125 or 150 PSI: ANSI/ASTM B 62.

2. Metallic Seated Bronze Valves, 200 or 300 PSI: ANSI/ASTM B 61.

3. Iron Body Valves: ANSI/ASTM A 126, Grade B.

B. Comply with MSS SP-71 for design, workmanship, material and testing.

C. Construct valves of pressure castings free of any impregnating materials. Construct valves of bronze, regrinding, with seating angle 40° to 45°, unless composition disc is specified.

D. Provide stop plug as renewable stop for disc hanger, unless otherwise specified.

E. Construct disc and hanger as separate parts, with disc free to rotate.

F. Support hanger pins on both ends by removable side plugs.

G. For Domestic Water Service:

1. Threaded Ends 2" and Smaller: Class 125, bronze body, screwed cap, horizontal swing, bronze disc.

2. Soldered Ends 2" and Smaller: Class 125, bronze body, screwed cap, horizontal swing, bronze disc.

3. Flanged Ends 2½" and Larger: Class 125, iron body bronze mounted, bolted cap, horizontal swing, cast iron disc.

H. Available Manufacturers: Subject to compliance with requirements, manufacturers offering swing check valves which may be incorporated in the work include, but are not limited to the following:

1. Crane Co., Valve Div.
2. Fairbanks Co. (The)
3. Hammond Valve Corp., A Condec Co.
4. Jenkins Bros., A Corp.
5. NIBCO, Inc.
6. Powell Co. (The Wm.)
7. Stockham Valves and Fittings, Inc.
8. Walworth Co.

2.10 VALVE FEATURES:

A. General: Provide valves with features indicated and, where not otherwise indicated, provide proper valve features as determined by Installer for installation requirements. Comply with ANSI B31.1

B. Outside Screw and Yoke: Stem and handwheel designed to rise out of bonnet or yoke as valve is operated from closed to open position.

C. Inside Screw, Non-Rising Stem: Stem and handwheel designed to rotate without rising when valve is operated from closed to open position.

D. Threaded: Valve ends complying with ANSI B2.1.

E. Bonnet: Part of gate or globe valve through which stem passes to valve body, and attached to valve body by screws, bolts, union or welding.

F. Solid Wedge: One piece tapered disc in gate valve, designed for contact on both sides.

G. Outside Screw and Yoke: Stem and handwheel designed to rise out of bonnet or yoke as valve is operated from closed to open position.

H. Inside Screw, Non-Rising Stem: Stem and handwheel designed to rotate without rising when valve is operated from closed to open position.

I. Valve System: Select and install valves with outside screw and yoke stems, except provide inside screw non-rising stem valves where headroom prevents full opening of OS&Y valves.

J. Renewable Seats: Select and install valves with renewable seats, except where otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. General: Except as otherwise indicated, comply with the following requirements:

B. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.

C. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward for horizontal plane unless unavoidable. Install valve drains with hose end adapter for each valve that must be installed with stem below horizontal plane.

D. Insulation: Where insulation is indicated, install extended stem valves, arranged in proper manner to receive insulation.

E. Applications Subject to Shock: Install valves with bodies of metal other than cast iron where

thermal or mechanical shock is indicated or can be expected to occur.

F. Valve System: Select and install valves with outside screw and yoke stems, except provide inside screw non-rising stem valves where headroom prevents full opening of OS&Y valves.

G. Fluid Control: Where throttling is indicated or recognized as principal reason for valve, install globe valves.

H. Installation of Check Valves:

1. Swing Check Valves: Install in horizontal position with hinge pin horizontally perpendicular to center line of pipe. Install for proper direction of flow.

END OF SECTION 220523

OVEC Head Start
7304 Dixie Highway
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SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Extent of supports, anchors and seals required by this section is indicated on drawings and/or specified in other Division 22 sections.

B. Types of supports, anchors, and seals specified in this section include the following:

1. Horizontal-Piping Hangers and Supports.
2. Vertical-Piping Clamps.
3. Hanger-Rod Attachments.
4. Building Attachments.
5. Saddles and Shields.
6. Miscellaneous Materials.
7. Anchors.

C. Supports, anchors, and seals furnished as part of factory-fabricated equipment, are specified as part of the equipment assembly in other Division 22 sections. Also refer to Drawings for notes regarding the post tension slab system.

1.2 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacturer of supports, anchors, and seals, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Select and apply pipe hangers and supports, complying with MSS SP-69. Size hangers and supports to support pipe weight and fluid conveyed.

PART 2 - PRODUCTS

2.1 HORIZONTAL-PIPING HANGERS AND SUPPORTS:

A. General: Except as otherwise indicated, provide factory fabricated horizontal-piping hangers and supports complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and

to exactly fit around piping insulation with saddle or shield for insulated piping.

1. Adjustable Steel Clevises: MSS Type 1.
2. Alloy Steel Pipe Clamps: MSS Type 2.
3. Steel Double Bolt Pipe Clamps: MSS Type 3.
4. Steel Pipe Clamps: MSS Type 4.
5. Pipe Hangers: MSS Type 5.
6. Adjustable Swivel Pipe Rings: MSS Type 6.
7. Adjustable Steel Band Hangers: MSS Type 7.
8. Adjustable Band Hangers: MSS Type 9.
9. Extension Split Pipe Clamps: MSS Type 12.
10. Single Pipe Rolls: MSS Type 41.
11. Pipe Roll Stands: MSS Type 44.
12. Adjustable Roller Hangers: MSS Type 43.
13. Pipe Rolls and Plates: MSS Type 45.

2.2 VERTICAL-PIPING CLAMPS:

A. General: Except as otherwise indicated, provide factory fabricated vertical-piping clamps complying with ANSI/MSS SP-58, of one of the following types listed, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe.

1. Two-Bolt Riser Clamps: MSS Type 8.
2. Four-Bolt Riser Clamps: MSS Type 42.

2.3 HANGER-ROD ATTACHMENTS:

A. General: Except as otherwise indicated, provide factory fabricated hanger-rod attachments complying with ANSI/MSS SP-58. Select size of hanger-rod attachments to suit hanger rods.

1. Steel Clevises: MSS Type 14.
2. Swivel Turnbuckles: MSS Type 15.
3. Steel Weldless Eye Nuts: MSS Type 17.

2.4 BUILDING ATTACHMENTS:

1. General: Except as otherwise indicated, provide factory fabricated building attachments complying with ANSI/MSS SP-58

2.5 SADDLES AND SHIELDS:

1. General: Except as otherwise indicated, provide saddles or shields for piping hangers and

supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.

B. Protection Saddles: MSS Type 39; fill interior voids with segments of insulation matching adjoining insulation.

C. Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation.

2.6 MANUFACTURERS OF HANGERS AND SUPPORTS:

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering hangers and supports which may be incorporated in the work include, but are not limited to the following:

1. Anvil
2. C & S Mfg. Corp.
3. Carpenter and Patterson, Inc.
4. Elcen Metal Products Co.
5. F & S Central Mfg. Corp.
6. Fee & Mason Mfg. Co., Div. of A-T-O, Inc.
7. ITT Grinnel Corp.

PART 3 - EXECUTION

3.1 INSTALLATION OF HANGERS AND SUPPORTS:

A. General: Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69. Install supports with maximum of eight foot spacing. Building attachments and/or hangars systems shall be cast in place into the concrete post tension slab system during concrete placement. Refer to Drawings for additional notes. Do not use wire or perforated metal to support piping, and do not support piping from other piping, ductwork or other supported mechanical or electrical items.

B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.

C. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods.

D. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes.

E. Insulated Piping: Comply with the following installation requirements.

F. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.

G. Saddles: Where insulation without vapor barrier is indicated, install protection saddles.

END OF SECTION 220529

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SECTION 220700 - PLUMBING INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Extent of mechanical insulation required by this section is indicated on drawings, and by requirements of this section.

B. Types of mechanical insulation specified in this section include the following:

1. Piping System Insulation:

a. Domestic Cold Water Lines
b. Hot Water Lines
c. Refrigerant Suction Lines and Hot Gas Lines

1.2 QUALITY ASSURANCE:

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

1. Armaflex
2. Armstrong World Industries, Inc.
3. Babcock & Wilcox Co., Insulating Products Div.
4. Certainteed Corp.
5. Johns-Manville Corp.
6. Keene Corp.
7. Knauf Fiber Glass
8. Owens-Corning Fiberglass Corp.

B. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread rating of 25 or less, and smoke-developed rating of 50 or less, as tested by ANSI/ASTM E 84 (NFPA 255) method.

1.3 INSULATION SHIELDS

A. Metal insulation shields are required at all pipe hangers where the piping is insulated. Metal shields shall be constructed of galvanized steel, formed to a 180 degree arc with lengths equal to at least twice the pipe diameter.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's specifications and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, thickness, and furnished accessories for each mechanical system requiring insulation.

B. Certified Tests: With product data submit certified test reports on performances including burning characteristics and thermal insulating valves.

1.5 DELIVERY, STORAGE AND HANDLING:

A. Deliver insulation, coverings, cements, adhesives, and coatings to site in containers with manufacturer's stamp or label, affixed showing fire hazard ratings of products.

B. Protect insulation against dirt, water, and chemical and mechanical damage. Do not install damaged insulation; remove damaged insulation from project site.

PART 2 - PRODUCTS

2.1 PIPING INSULATION:

A. All domestic cold and hot water piping shall be insulated. The insulation shall be a heavy density, pipe insulation with a K factor .22 at 75°F mean temperature. The insulation shall be wrapped with a vapor barrier jacket with self-sealing lap, equal to Certain-teed, Mansville, Owens-Corning or Armstrong. Cover fittings with Zeston or equal premolded insulating fittings. Insulation shall be installed in a professional, neat appearing manner; poor workmanship shall be corrected at the Contractor's expense.

B. Application thicknesses shall be as follows:

1.	Domestic Cold Water piping:	1/2" thick
2.	Domestic Hot and Recirculating Hot Water Piping	1” thick

C. Insulation may be omitted on concealed water lines in chase walls where feeding water fixtures.

2.2 REFRIGERANT PIPING

A. Refrigerant piping shall be insulated with 1” thick Imcolock flexible polyolefin foam pipe insulation. Insulation shall bear U.L. listing for a 25/50 flame smoke spread. Product shall be stabilized against ultra-violet light degradation. The following piping systems shall be insulated:

1. Variable Refrigerant Flow Heat pumps: Suction lines and hot gas lines

B. As an option, refrigerant piping and piping totally concealed in walls may be an open cell foam insulation product similar to Armaflex, but under no circumstances shall Armaflex, or equal plastic type insulation, be used in an air plenum, unless it bears a 25/50 flame/smoke spread rating. If Armaflex or similar product is used for outdoor service then two (2) coats of the weather-proofing sealant coating shall be applied as per manufacturer's installation instructions.

PART 3 - EXECUTION

3.1 INSTALLATION OF INSULATION:

A. General: Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.

B. Install insulation materials with smooth and even surface. Insulate each continuous run of piping or ductwork with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other.

C. Clean and dry all surfaces prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.

D. Cover valves, fittings and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run. Install factory molded, precut or job fabricated units (at Installer's option) except where specific form or type is indicated.

E. Maintain integrity of vapor-barrier jackets on pipe and ductwork insulation, and protect to prevent puncture or other damage.

F. Extend piping insulating without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.

G. Install protective metal shields and insulated inserts wherever needed to prevent compression of insulation. Pipe Hanger Insulation Inserts: Butt pipe insulation against pipe hanger insulation inserts. For cold piping apply wet coat of vapor barrier lap cement on butt joints and seal joints with 3 inch wide vapor barrier tape or band.

3.2 PROTECTION AND REPLACEMENT:

A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

B. Protection: Insulation Installer shall advise Contractor of required protection for insulation

work during remainder of construction period, to avoid damage and deterioration.

END OF SECTION 220700

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7304 Dixie Highway
Louisville, Kentucky

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Extent of domestic water piping required by this section is indicated on drawings and/or specified in other Division 22 sections or as required to provide a complete system.

1.2 QUALITY ASSURANCE:

A. Plumbing Code Compliance: Comply with Kentucky State Plumbing Code and pertaining to plumbing materials, construction and installation of products. Also comply with all state and local codes having jurisdiction. No work shall begin until the Contractor has approved plumbing plans. The Contractor is responsible for installing the indicated systems in accordance with code, therefore any modifications to the project required by the Division of Plumbing shall be considered as part of this project and shall be made at no increase in contract price.

1.3 DELIVERY STORAGE, AND HANDLING:

A. Where possible, store pipe and tube inside and protected from weather. Where necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping. Maintain end-caps through shipping, storage and handling as required to prevent pipe-end damage and eliminate dirt and moisture from inside of pipe and tube.

B. Protect flange and fittings from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

1.4 SUBMITTALS:

A. Product Data: Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of valve, specialty, etc. Include pressure drop curve or chart for each type and size of equipment.

PART 2 - PRODUCTS

2.1 PLUMBING PIPING MATERIALS:

A. All piping for hot and cold water above the slab, within the building, shall be type "L" hard temper copper tube with wrought copper fittings and soldered connections made up with lead free solder equal in performance to 95/5 solder.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION;

A. Pipe shall be accurately cut from job measurements and shall be neatly aligned, securely connected, and properly supported. Piping shall be thoroughly cleaned before installation. Provide pipe sleeves where piping passes through structure. Threaded and soldered joints shall be made in a workmanlike manner according to good pipe fitting practices.

B. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and permanent-enclosure elements of building; limit clearance to 1/2" where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1.0" clearance outside insulation. Wherever possible in finished and occupied spaces, conceal piping from view, by locating in column enclosures, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated.

C. Electrical Equipment Spaces: Do not run piping through transformer vaults, over panels and other electrical or electronic equipment spaces and enclosures.

D. Braze copper tube-and-fitting joints where indicated, in accordance with ANSI B31.

E. Solder copper tube-and-fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens.

F. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary. Install shut-off valves for each piece of plumbing equipment.

G. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward for horizontal plane unless unavoidable. Install valve drains with hose end adapter for each valve that must be installed with stem below horizontal plane.

H. Ferrous pipe hangers shall be Fee & Mason Figure 215 or equal Unistrut malleable iron split ring hanger; copper pipe hangers shall be Figure 361 cast brass with plated adjuster. No perforated

strap iron hangers will be permitted. Fee & Mason #400 "Auto-Grip" type hangers are an acceptable alternative hanger. Concrete inserts, where required, shall be Unistrut, Midwest, or Truscon. Hangers shall be spaced at ten foot intervals or less, as required to avoid sag, prevent vibration, and allow accurate leveling or grading. Vertical piping shall be supported by Fee & Mason Figure 241 or equal clamp for ferrous piping, and Figure 368 for copper. Provide sheet metal saddles for insulated piping.

I. Do not use wire or perforated metal to support piping, and do not support piping from other piping, ductwork or other supported mechanical or electrical items. Install hangers and supports to provide indicated pipe slopes.

3.2 AIR CHAMBERS AND TRAPS:

A. Wherever water piping terminates at a fixture or valve, furnish and install air chambers of sufficient capacity to prevent water hammer. Length shall be at least 12 times branch pipe diameter. Every fixture shall be separately trapped with a water sealed trap installed as close to the fixture as possible.

3.3 PIPING STERILIZATION:

A. Sterilize the new hot and cold water piping system with solution containing not less than 50 PPM available chlorine. Solution shall remain in the system a minimum of 24 hours, with each valve being operated several times during the period. After completion, flush system with city water until chlorine residual is lowered to incoming city water level.

3.4 TESTING:

A. All water piping shall be tested with 50 PSI hydrostatic pressure; isolate piping from boiler prior to testing. All piping shall be tested before any insulation installed, and shall be subject to the above pressure for an uninterrupted period of not less than 4 hours. All lines, joints, flanges, valve stems, etc., shall be leak tight.

B. General: Provide temporary equipment for testing, including pump and gages. Test piping system before insulation is installed. Remove control devices before testing.

C. Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 5% of test pressure.

D. Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

END OF SECTION 221116

OVEC Head Start
7304 Dixie Highway
Louisville, Kentucky

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Extent of piping specialties required by this section is indicated on drawings and/or specified in other Division 22 sections or as required to provide a complete system.

B. Types of piping specialties specified in this section include the following:

1. Wall Hydrants
2. Backflow Preventer (Double Check Valve Assembly)
3. Pipe Escutcheons
4. Pipeline Strainers.
5. Dielectric Unions.
6. Sleeves.
7. Sleeve Seals.

1.2 QUALITY ASSURANCE:

A. Plumbing Code Compliance: Comply with Kentucky State Plumbing Code and pertaining to plumbing materials, construction and installation of products. Also comply with all state and local codes having jurisdiction. No work shall begin until the Contractor has approved plumbing plans. The Contractor is responsible for installing the indicated systems in accordance with code, therefore any modifications to the project required by the Division of Plumbing shall be considered as part of this project and shall be made at no increase in contract price.

B. Manufacturers: Firms regularly engaged in manufacturer of piping specialties of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.3 SUBMITTALS:

A. Product Data: Submit catalog cuts, specifications, installation instructions, Also submit dimensioned drawings for pipeline strainers. Include pressure drop curve or chart for each type and size of pipeline strainer. Submit schedule showing manufacturer's figure number, size, location and features for each required pipeline strainer.

B. Maintenance Data: Submit maintenance data and spare parts lists for each type of pipeline strainer. Include this data in Maintenance Manual.

PART 2 - PRODUCTS

2.1 MANUFACTURED PIPING SPECIALTIES:

A. General: Provide factory-fabricated piping specialties recommended by manufacturer for use in service indicated. Provide piping specialties of types, pressure ratings, voltage and wattage indicated for each service, or if not indicated, provide proper selections as determined by Engineer to comply with installation requirements. Provide sizes as indicated, and connections, which properly interface with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.

B. Hose Valves: American-Standard #4224.028 with screw-on vacuum breaker and 3/4" hose thread outlet.

C. Wall Hydrants: Wall hydrants shall be Jay R. Smith #5609-PB "non-freeze", cast bronze, polished bronze face, with integral vacuum breaker, ¾" hose connection, removable key handle operator; or equal Josam, Wade, or Zurn. Provide accessible stop valve inside building.

D. Backflow Preventer: This contractor shall furnish and install a double check valve assembly immediately downstream from the water service shut-off valve at the entry. Double check valve assembly shall be Watts #LF719 or approved equal Wilkins, double check valve type with bronze body, trim, and bronze ball valve shut-offs on inlet and outlet. Lead Free.

E. Pipe Escutcheons, General: Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings, and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.

1. Pipe Escutcheons for Moist and Wet Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate provide cast brass or sheet brass escutcheons, solid or split hinged.

2. Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.

F. Low Pressure Y-Type Pipeline Strainers, General: Comply with FCI 73-1. Provide strainers full line size of connecting piping, with ends matching piping system materials. Select strainers for 125 psi working pressure with Type 304 stainless steel screens, with 3/64" performance at 233 per sq. in.

1. Threaded Ends, 2" and Smaller: Cast-iron body, screwed screen retainer with centered blowdown fitted with pipe plug.

2. Threaded Ends, 2½" and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.

3. Flanged Ends, 2½" and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.

4. Available Manufacturers: Subject to compliance with requirements, manufacturers offering low pressure Y-type strainers which may be incorporated in the work include, but are not limited to the following:

   a. American Air Filter, an Allis-Chalmers Co.
   b. Armstrong Machine Works.
   c. Hoffman Specialty, ITT Fluid Handling Div.
   d. Metraflex Co.
   e. Sarco Co., Div. of White Consolidated.
   f. Crane Co.
   g. Trerice (H.O.) Co.
   h. Victaulic Co. of America

G. Dielectric Unions, General: Provide standard products recommended by manufacturer for use in service indicated, which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action, and stop corrosion. Universal Controls or equal

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering dielectric unions which may be incorporated in the work include, but are not limited to the following:

   a. Atlas Products Co.
   b. Capital Mfg. Co., Div. of Harsco Corp.
   c. Eclipse, Inc.
   d. Epco Sales, Inc.
   e. FMC Corp.
   f. McNally, Inc.
   g. PSI Industries.
   h. Stockham Valves and Fittings.
   i. Universal Controls

2.2 FABRICATED PIPING SPECIALTIES:

A. Pipe Sleeves: Provide pipe sleeves of one of the following:

1. Sheet-Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams or welded longitudinal joint. Fabricate from the following

gages: 3" and smaller, 20 gage; 4" to 6", 16 gage; over 6", 14 gage.

a. Steel-Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.

b. Iron-Pipe: Fabricate from cast-iron or ductile-iron pipe, remove burrs.

B. Sleeve Seals: Provide sleeve seals for sleeves located in foundation walls below grade, or in exterior walls, of one of the following:

1. Mechanical Sleeve Seals: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering mechanical sleeve seals which may be incorporated in the work include, but are not limited to the following:

1. Thunderline Corp.

PART 3 - EXECUTION

3.1 INSTALLATION OF MANUFACTURED PIPING SPECIALTIES:

A. Pipe Escutcheons: Install pipe escutcheons on each pipe penetration thru floors, walls, partitions, and ceilings where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole and is flush with adjoining surface

B. Wall Hydrants: Install as indicated on the Drawings in accordance with manufacturer’s recommendations.

C. Backflow preventer: Provide at the water service entrance prior to serving any fixture and before any branch line take-offs. Comply with all manufacturer’s installation instructions.

D. Dielectric Unions: Install at each piping joint between ferrous and non-ferrous piping. Comply with manufacturer's installation instructions.

E. Y-Type Strainers: Install Y-type strainers, full size of pipe line, in accordance with manufacturer's installation instructions. Install pipe nipple and shutoff valve in strainer blow down connection, full size of connection. Where indicated, provide drain line from shutoff valve to plumbing drain, full size of blow down connection.

F. Locate Y-type strainers in supply line ahead of the following equipment, and elsewhere as indicated, if integral strainer is not included in equipment, or if suction diffuser is not indicated.

3.2 INSTALLATION OF FABRICATED PIPING SPECIALTIES:

A. Sleeves: Install pipe sleeves of type indicated where piping passes through walls, floors, ceilings and roofs. Do not install sleeves through structural members of work, except as detailed on drawings, or as reviewed by Architect/Engineer. Install sleeves accurately centered on pipe runs. Size sleeves so that piping and insulation (if any) will have free movement in sleeve, including allowance for thermal expansion; but not less than 2 pipe sizes larger than piping run. Where insulation includes vapor-barrier jacket, provide sleeve with sufficient clearance for installation.

1. Install sheet-metal sleeves at interior partitions and ceilings other than suspended ceilings.

2. Install iron-pipe sleeves at exterior penetrations, both above and below grade.

3. Install steel-pipe or plastic-pipe sleeves except as otherwise indicated.

B. Sleeve Seals: Install in accordance with the following:

1. Mechanical Sleeve Seals: Loosely assemble rubber links around pipe with bolts and pressure plates located under each bolt head and nut. Push into sleeve and center. Tighten bolts until links have expanded to form watertight seal.

3.3 SPARE PARTS:

A. Furnish to Owner, with receipt, one valve key for each key operated hydrant, bibb, or faucet installed.

END OF SECTION 221119

OVEC Head Start
7304 Dixie Highway
Louisville, Kentucky

221123 - NATURAL GAS PIPING SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Extent of natural gas piping required by this section is indicated on drawings and/or specified in other Division 22 sections or as required to provide a complete system.

1.2 QUALITY ASSURANCE:

A. Code Compliance: Comply with NFPA-54, National Fuel Gas Code and pertaining to gas piping system materials, construction and installation of products. Also comply with all state and local codes having jurisdiction.

1.3 DELIVERY STORAGE, AND HANDLING:

A. Where possible, store pipe and tube inside and protected from weather. Where necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping. Maintain end-caps through shipping, storage and handling as required to prevent pipe-end damage and eliminate dirt and moisture from inside of pipe and tube.

B. Protect flange and fittings from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

1.4 SUBMITTALS:

A. Product Data: Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of valve, specialty, etc. Include pressure drop curve or chart for each type and size of equipment.

PART 2 - PRODUCTS

2.1 BASIC IDENTIFICATION:

A. Building Distribution Piping: Plastic pipe markers.

B. Gas Valves: Brass valve tags.

2.2 BASIC PIPE, TUBE AND FITTINGS:

A. Exterior Gas Piping:

1. All Pipe Sizes: Galvanized steel pipe, Schedule 40 with Wrought-steel, threaded fittings.

B. Underground Exterior Gas Service Piping:

1. Pipe Sizes ½" Through 4": Thermoplastic gas pressure pipe, tubing, and fittings complying with ANSI/ASTM D 2513. All joining methods shall be as approved by the International Mechanical Code

and Kentucky State Code Revisions. All underground thermoplastic pipe shall be provided with No. 18 AWG copper tracer wire with yellow insulation.

C. Building Distribution Piping:

1. Pipe Size 2" and Smaller: Black steel pipe, Pipe Weight: Schedule 40 with Malleable iron threaded fittings.

2. Pipe Size 2½" and Larger: Black steel pipe, Schedule 40 with Wrought-steel buttwelded fittings.

2.3 SPECIAL VALVES

A. Gas Cocks 2" and Smaller: 150 PSI non-shock WOG, bronze straightway cock, flat or square head, threaded ends.

B. Gas Cocks 2½" and Larger: 125 PSI non-shock WOG, iron body bronze mounted, straightway cock, square head, flanged ends.

PART 3 - EXECUTION

3.1 INSTALLATION OF NATURAL GAS PIPING:

A. Use sealants on metal gas piping threads which are chemically resistant to natural gas. Use sealants sparingly, and apply to only male threads of metal joints.

B. Remove cutting and threaded burrs before assembling piping.

C. Do not install defective piping or fittings. Do not use pipe with threads which are chipped, stripped or damaged.

D. Plug each gas outlet, including valves, with threaded plug or cap immediately after installation and retain until continuing piping, or equipment connection are completed.

E. Ground gas piping electrically and continuously within project, and bond tightly to grounding connection.

3.2 Install drip-legs in gas piping where indicated, and where required by code or regulation.

A. Install "Tee" fitting with bottom outlet plugged or capped, at bottom of pipe risers.

B. Use dielectric unions where dissimilar metals are joined together.

C. Install piping with 1" drop in 60' pipe run (0.14%) in direction of floor.

3.4 EQUIPMENT CONNECTIONS:

A. General: Connect gas piping to each gas-fired equipment item, with drip leg and shutoff gas cock. Comply with equipment manufacturer's instructions.

3.5 PIPING TESTS:

A. Test natural gas piping in accordance with ANSI B31.2, and local utility requirements.

END OF 221123

OVEC Head Start
7304 Dixie Highway
Louisville, Kentucky

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Extent of sanitary waste and vent piping required by this section is indicated on drawings and/or specified in other Division 22 sections or as required to provide a complete system.

1.2 QUALITY ASSURANCE:

A. Plumbing Code Compliance: Comply with applicable portions of Kentucky State Plumbing Code and pertaining to plumbing materials, construction and installation of products. Also comply with all state and local codes having jurisdiction. No work shall begin until the Contractor has approved plumbing plans. The Contractor is responsible for installing the indicated systems in accordance with code, therefore any modifications to the project required by the Division of Plumbing shall be considered as part of this project and shall be made at no increase in contract price.

PART 2 - PRODUCTS

2.1 PLUMBING PIPING MATERIALS:

A. Soil and waste: All soil and waste piping above ground and inside the building to be Schedule 40 PVC and pipe fittings.

2.2 Plumbing Vents: All vent piping may be Schedule 40 PVC and pipe fittings.

2.3 Condensate Waste: Condensate waste piping from the interior and exterior HVAC units to be Schedule 40 PVC where concealed or in mechanical rooms, and shall be Type M copper where exposed.

2.4 CLEANOUTS

A. All **floor cleanouts** shall be Jay R. Smith #4051 series, coated cast iron, with square Nikaloy top, hub outlet with gasket, of sizes required. It shall be the responsibility of this contractor to determine the type of floor covering to be used at each cleanout location, and to rough-in and install each cleanout flush with the finished floor construction.

B. All **wall cleanouts** shall be Jay R. Smith #4472 series, with round stainless steel access cover, center screw and recessed bronze tapped plug, of sizes required.

C. All **cleanouts for installation exterior to the building** where required by the drawings or code, shall be Jay R. Smith #4237-U, full size of line, cast iron, hub outlet, heavy duty round cast iron

tractor cover with vandal proof screw.

D. Approved equivalent Josam, Zurn, or Wade is acceptable.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION;

A. Pipe shall be accurately cut from job measurements and shall be neatly aligned, securely connected, and properly supported. Piping shall be thoroughly cleaned before installation. Joints shall be made in a workmanlike manner according to good pipe fitting practices.

B. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Locate runs as shown or described by diagrams, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment.

C. Do not use wire or perforated metal to support piping, and do not support piping from other piping, ductwork or other supported mechanical or electrical items. Install hangers and supports to provide indicated pipe slopes.

3.2 CLEANOUTS:

A. Cleanouts shall be installed at points as noted on the drawings, as well as at the foot of each soil, waste or interior downspout stack, minimum every 80 feet in horizontal soil and waste lines, and at other points as required for easy system maintenance. Cleanouts shall be full size of the pipe up to 4", and 4" size for pipe above 4" size. Grease all cleanout plugs.

B. Cleanouts and/or test tees concealed in inaccessible pipe spaces, walls and other locations shall have an eight (8) inch by eight (8) inch (minimum) access panel or cover plates shall be set flush with finished floors and walls and shall be key or screw driver operable.

C. Access panels for cleanouts shall be of the Zurn, 1460 series or equivalent by Josam or Wade. Where they are not to receive paint, they shall be polished bronze unless otherwise indicated where they are to receive paint or other finishes. They may, at the Contractor's option, be Perma-Coated steel, prepared to receive finish.

D. Cleanouts and access panels shall be sized so as to permit the entry of a full sized rodding head capable of one hundred percent circumferential coverage of the line served.

E. Provide a non-hardening mixture of graphite and grease on threads of all screwed cleanouts during installation.

F. Do not install cleanouts against walls, partitions, etc. where rodding will be difficult or impossible. Extend past the obstruction. Hold a minimum of 12" from all walls.

G. In finished walls, floors, etc., insure that cleanouts are installed flush with finished surfaces and, where required, grout or otherwise finish in a neat and workmanlike manner.

3.3 FLOOR DRAINS

A. Provide floor drains at locations indicated and/or as required by Kentucky Building Code. Install in a neat and workmanlike manner. Coordinate locations with appropriate persons or party to insure floor pitch to drain where required.

B. Each floor drain located on floors above the lowest floor shall to provided complete with flashing and clamping collar.

C. Ensure by coordination with the appropriate persons or party that spaces served by a floor drain(s) has a water seal extending at least three (3) inches from the floor of the space served on all floors above the lowest level.

D. The floor drains shall be Zurn, Josam, Wade, Ancon or equivalent, as specified on the Drawings.

3.4 TESTING:

A. All waste piping shall be tested with all stacks filled with water, and any other tests required by the Plumbing Inspector. All lines, joints, flanges, etc., shall be leak tight.

B. Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage.

C. Drain test water from piping systems after testing and repair work has been completed.

END OF SECTION 221316

OVEC Head Start
7304 Dixie Highway
Louisville, Kentucky

SECTION 224000 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Extent of mechanical insulation required by this section is indicated on drawings, and by requirements of this section.

1.2 SUBMITTALS:

A. Product Data: Submit manufacturer's specifications for plumbing fixtures, equipment and trim, including catalog cut of each fixture type and trim item furnished, roughing-in dimensioned drawings, templates for cutting substrates, fixture carriers and installation instructions.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver plumbing fixtures individually wrapped in factory-fabricated containers.

B. Handle plumbing fixtures carefully to prevent breakage, chipping and scoring the fixture finish. Do not install damaged plumbing fixtures; replace and return damaged units to equipment manufacturer.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES:

A. General: Provide factory-fabricated fixtures of type, style and material indicated. For each type fixture, provide fixture manufacturer's standard trim, carrier, seats and valves as indicated by their published product information; either as designed and constructed, or as recommended by the manufacturer, and as required for a complete installation. Where type is not otherwise indicated, provide fixtures complying with governing regulations.

B. Furnish and install fixtures as scheduled, equal to Kohler American-Standard, Stern-Williams or Crane plumbing fixtures. All fixtures shall be of same manufacturer where possible. Fixtures shall be set firm and true, connected to all required piping services ready to use; all fixtures shall be left clean.

2.2 PLUMBING FITTINGS, TRIM AND ACCESSORIES:

A. Water Outlets: At locations where water is supplied (by manual, automatic or remote control), provide commercial quality faucets, valves, or dispensing devices, of type and size indicated, and

as required to operate as indicated. Include manual shutoff valves and connecting stem pipes to permit outlet servicing without shutdown of water supply piping systems.

B. Vacuum Breakers: Provide with flush valves where required by governing regulations, including locations where water outlets are equipped for hose attachment.

C. P-Traps: Include adjustable and removable P-traps where drains are indicated for direct connection to drainage system.

D. Carriers: Provide carriers indicated, or if not indicated, provide cast-iron supports for fixtures of either graphite gray iron, ductile iron, or malleable iron as required.

E. Fixture Bolt Caps: Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.

F. Escutcheons: Where fixture supplies and drains penetrate walls in exposed locations, provide chrome plated cast-brass escutcheons with set screw.

G. All faucets, stops and fittings must be of one manufacturer with interchangeable parts, unless otherwise specified.

2.3 WATER HEATERS:

A. Provide domestic gas-fired water heaters as scheduled on the drawings.

B. Water heaters shall meet ASHRAE 90.1 and 90.1b energy efficiency standards. Heater shall be AGA rated and provided with required safety controls.

C. Water heaters shall be provided with durable glass lining, with insulated water heater jacket. Integral thermostats shall be provided.

D. Tanks shall be provided with three (3) year minimum warranty.

PART 3 - EXECUTION

3.1 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Handle water heaters carefully to prevent damage, breaking, and scoring. Store heaters and equipment in clean dry place. Protect from weather, dirt, fumes, water, construction debris and physical damage.

3.2 INSPECTION AND PREPARATION:

A. Examine roughing-in work of domestic water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping, and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of the Kentucky State and local codes pertaining to installation of plumbing fixtures.

C. Fasten plumbing fixtures securely to indicated supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies behind or within wall construction so as to be rigid, and not subject to pull or push movement.

D. Caulk joint between fixture and wall or floor with elastomeric sealant. Color of sealant to match fixture.

E. Install water heater venting in strict accordance with manufacturer’s instructions. Materials shall be suitable for maintaining manufacturer’s listings, and shall comply with NFPA-54, latest edition. Install gas piping in accordance with NFPA-54, and provide appliance connection with shut-off, 4” long dirt leg, and dielectric union.

3.3 CLEAN AND PROTECT:

A. Clean plumbing fixtures of dirt and debris upon completion of installation. Protect installed fixtures from damage during the remainder of the construction period.

3.4 FIELD QUALITY CONTROL:

A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

B. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Remove cracked or dented units and replace with new units.

END OF SECTION 224000

OVEC Head Start
7304 Dixie Highway
Louisville, Kentucky

SECTION 230500 - COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS:

A. All requirements under Division One and the General and Supplementary Conditions of these specifications shall be a part of this section. Each contractor shall be responsible to thoroughly familiarize himself with all its contents as to requirements which affect this division or section. The work required under this section includes all material, equipment, appliances, transportation, services, and labor required to complete the entire system as required by the drawings and specifications.

1.2 SCOPE

A. The work included in this division consists of the furnishing of all labor, equipment, transportation, supplies, material, appurtenances and services necessary for the satisfactory installation of the complete and operating Mechanical System(s)/Equipment indicated or specified in the Contract Documents.

B. Any materials, labor, equipment or services not mentioned specifically herein which may be necessary to complete or perfect any part of the Mechanical Systems in a substantial manner, in compliance with the requirements stated, implied or intended in the drawings and,or specifications, shall be included as part of this Contract.

C. It is the intent of this Contract to deliver to the Owners a "like new" project once work is complete. Although plans and specifications are complete to the extent possible, it shall be the responsibility of the Contractors involved to coordinate all new systems with items of construction provided by others, and to relocate items which interfere with new equipment or materials required for the complete installation without additional cost to the Owner.

1.3 DEFINITIONS AND ABBREVIATIONS

A. Contractor - Any Contractor whether proposing or working independently or under the supervision of a General Contractor and,or Construction Manager and who installs any type of mechanical work (Controls, Plumbing, HVAC, Boiler Work, Sprinkler, Air Systems, etc.) or, the General Contractor.

B. Engineer - The Consulting Mechanical-Electrical Engineers either consulting to the Owners, Architect, other Engineers, etc.

C. Architect - The Architect of Record for the project.

D. Furnish - Deliver to the site in good condition and turn over to the Contractor who is to install.

E. Provide - Furnish and install complete, tested and ready for operation.

F. Indicated - Shown on the Drawings or Addenda thereto.

G. Typical - Where indicated repeat this work, method or means each time the same or similar condition occurs whether indicated or not.

H. OSHA - Office of Safety and Health Administration.

I. NEC - National Electrical Code.

J. NFPA - National Fire Protection Association.

K. AGA - American Gas Association

L. ASME - American Society of Mechanical Engineers.

M. ANSI - American National Standards Institute.

N. ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers.

O. NEMA - National Electrical Manufacturers Association.

P. UL - Underwriters Laboratories.

1.4 INSPECTION OF THE SITE:

A. The contractor shall personally inspect the site of the proposed work and inform himself fully as to the conditions under which the work is to be done. Failure to do so will not be considered sufficient justification to request or obtain extra compensation over and above the contract price.

1.5 MATERIAL AND WORKMANSHIP:

A. All material and apparatus shall be new and in first class condition. All workmanship shall be of the finest possible by experienced mechanics. All installations shall be made in a manner that will comply with applicable Codes and laws. Any abnormal noise caused by rattling equipment, piping, ducts, air devices, and squeaks in rotating components will not be acceptable. In general, all materials and equipment shall be of commercial specification grade in quality.

1.6 DRAWINGS AND SPECIFICATIONS

A. The drawings are diagrammatic only and indicate the general arrangement of the systems and are to be followed. If deviations from the layouts are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Engineer for approval before proceeding with the work. The drawings are not intended to show every item which may be necessary to complete the systems. All proposers shall anticipate that additional items may be required and submit their bid accordingly.

B. Each Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. He shall coordinate this work with all other branches of work in such a manner as to cause a minimum of conflict or delay.

C. The Engineer shall reserve the right to make adjustments in location of piping, ductwork, equipment, etc. where such adjustments are in the interest of improving the project.

D. Unless dimensioned, the mechanical drawings only indicate approximate locations of equipment, piping, ductwork, etc.. Dimensions given in figures on the drawings shall take precedence over scaled dimensions and all dimensions, whether given in figures or scaled, shall be verified in the field to insure no conflict with other work.

1.7 COORDINATION:

A. Coordinate all work with that of other trades so that the various components of the systems will be installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. Any components which are installed without regard to the above shall be relocated at no additional cost to the owner.

B. It is the Contractor's responsibility to provide materials with trim which will fit properly the types of ceiling, wall, or floor finishes actually installed. Model numbers in specifications or shown on drawings are not intended to designate the required trim.

1.8 ORDINANCES AND CODES:

A. Comply with National Fire Protection Association codes, Kentucky Building Code, International Mechanical Code, and/or all other applicable codes and ordinances. Obtain and pay for all permits. Contractor shall be held responsible for any violation of the law.

B. The Contractor shall give all necessary notices, obtain and pay for all permits, government sales taxes, fees, inspections and other costs, in connection with his work. He shall also file all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments having any jurisdiction, whether indicated or specified or not.

C. The contractor shall also obtain all required certificates of inspection for his work and deliver same to the Engineers before request for acceptance and final payment for the work.

1.9 PROTECTION OF EQUIPMENT:

A. Adequately protect equipment from damage after delivery to job. Cover with heavy polyethylene plastic as required to protect from plaster, dirt, paint, water, or physical damage. Equipment which has been damaged by construction activities will be rejected, and contractor is obligated to furnish new equipment of a like kind.

B. Keep premises broom clean at all times from foreign material created under this contract. All piping, equipment, etc. shall have a neat and clean appearance at the termination of the work.

1.10 EQUIPMENT AND MATERIALS SUBSTITUTIONS OR DEVIATIONS

A. When any Contractor requests approval of materials and/or equipment of different physical size, capacity, function, color, access, it shall be understood that such substitution, if approved, will be made without additional cost to anyone other than the Contractor requesting the change regardless of changes in connections, space requirements, electrical characteristics, etc. from that indicated, electrical service, etc.. In all cases where substitutions affect other trades, the Contractor requesting such substitutions shall advise all such Contractors of the change and shall renumerate them for all necessary changes in their work.

B. NOTE: Any drawings, Specifications, Diagrams, etc., required to describe and coordinate such substitutions or deviations shall be professionally prepared at the responsible Contractor's expense. Review of Shop Drawings by the Engineers does not in any way absolve the Contractor of this responsibility.

C. Notwithstanding any reference in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make or catalog number, such reference shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; any devices, products, materials, fixtures, forms, or types of construction which, in the judgment of the Engineer, are equivalent to those specified are acceptable, provided the provisions of the paragraph immediately preceding are met. Requested substitutions shall be submitted to the Engineer a minimum of five days prior to bids.

1.11 SUPERVISION OF WORK

A. Each Contractor shall personally supervise the work for which he is responsible or have a competent superintendent, approved by the Engineers, on the work at all times during progress with full authority to act for him.

1.12 SHOP DRAWINGS:

A. Submit for approval eight sets of manufacturers shop drawings of all major items of equipment and all items requiring coordination between contractors. Before submitting shop drawings and material lists, the contractor shall verify that all equipment submitted is mutually compatible and suitable for the intended use, and shall fit the available space and allow ample room for maintenance. The Engineer's checking and subsequent approval of such shop drawings shall not relieve the contractor from responsibility for errors in dimensions, details, size of members, or quantities; or omissions of components or fittings; or for coordinating items with actual building conditions. Provide any needed wiring diagrams.

B. Catalog data must have the item or model number clearly marked and all accessories indicated. Mark out all inapplicable items.

C. NOTE: Any shop drawings received without being reviewed and stamped by the Contractor shall be returned Rejected without review.

1.13 OPERATION AND MAINTENANCE INSTRUCTIONS:

A. Submit to the architect four (4) copies each of material for maintenance and operation instruction manuals, appropriately bound into manual form including approved copies of the following, revised if necessary to show system and equipment as actually installed:

a) Manufacturers Catalog Sheets
b) Wiring Diagrams
c) Maintenance Instructions
d) Recommended Maintenance Schedules and Timelines
e) Operating Instructions
f) Parts Lists
g) Preventative Maintenance Recommendations

B. All maintenance schedules and recommendations shall be developed in full coordination with the Engineer. All binders shall be as per the applicable Division I General Specifications, unless such specifications are not included or are not as stringent as the below requirements.

1.14 GUARANTEE:

A. Each Contractor shall guarantee all equipment, apparatus, materials, and workmanship entering into this Contract to the best of its respective kind and shall replace all parts at his own expense, which are proven defective for a duration as indicated in the Division I General Conditions and Specifications.

B. Where such duration is not identified, then guarantee shall be for one year from final acceptance of

the work by the Engineer/Architect. The effective date of completion of the work shall be the date of the Engineer's (Architect's) Statement of Substantial Completion. Items of equipment which have longer guarantees, as called for in these specifications, shall have warranties and guarantees completed in order, and shall be in effect at the time of final acceptance of the work by the Engineer. The Contractor shall present the Engineer with such warranties and guarantees at the time of final acceptance of the work. The Engineer shall then submit these warranties, etc. to the Owner. Refer to other sections for any special or extra warranty requirements.

1.15 RECORD DRAWINGS

A. Each Contractor shall insure that any deviations from the Design are as they occur recorded in red, erasable pencil on record drawings kept at the jobsite. The Engineer may review the record documents from time to time to insure compliance with this specification. Compliance shall be a contingency of final payment. Pay particular attention to Deviations in the Control Systems. Keep information in a set of drawings set aside at the job site especially for this purpose and deliver to the Engineers the originals and three (3) copies of the record drawings upon completion of the work. Delivery of these documents will be contingent of final payment.

1.16 QUALIFICATIONS OF WORKMEN

A. All mechanical work shall be accomplished by qualified workmen competent in the area of work for which they are responsible. Mechanical contractors shall be licensed as required by Kentucky State Law.

B. All sheet metal, insulation and pipe fitting work shall be installed by workmen normally engaged or employed in these respective trades.

C. All electrical work shall be installed only by competent workmen under direct supervision of a fully qualified Electrician.

1.17 CONDUCT OF WORKMEN

A. Each Contractor shall be responsible for the conduct of all workmen under his supervision. Misconduct on the part of any workman to the extent of creating a safety hazard, or endangering the lives and property of others, shall result in the prompt relief of that workman. The consumption of alcoholic beverages or other intoxicants, narcotics, barbiturates, hallucinogens or debilitating drugs on the job site is strictly forbidden.

1.18 ROUGH-IN:

A. Coordinate without delay all roughing-in with general construction. All piping, conduit, rough-in shall be concealed except in unfinished areas and where otherwise shown.

1.19 CUTTING AND PATCHING:

A. This contractor shall do all cutting of walls, floors, ceilings, etc. as required to install work under this section. Contractor shall obtain permission of the Architect before doing any cutting. All holes shall be cut as small as possible. Contractor shall patch walls, floors, etc. as required by work under this section. All patching shall be thoroughly first class and shall match the original material and construction.

1.20 ACCESSIBILITY

A. The Contractor shall locate and install all equipment so that it may be serviced, and maintained as recommended by the manufacturer. Allow ready access and removal of the entire unit and,or parts such as valves, filters, fan belts, motors, prime shafts, etc.

1.21 ELECTRICAL WIRING:

A. All power conduit and wiring shall be furnished by the electrical contractor. All control and interlock conduit and wiring for mechanical systems is the responsibility of the Mechanical Contractor; however he may choose to hire an electrician to perform this work. All wiring shall be in conduit and in accordance with the National Electric Code.

1.22 REQUIRED CERTIFICATIONS

A. Upon completion of the project, the Contractor shall deliver all inspection certificates acquired during the course of the project to the Owner for their records.

B. The Contractor shall upon completion of the Final Punch list, deliver to Architect and Engineer a written certification that all systems and work has been completed in compliance with the plans and specifications. The Contractor also shall deliver over to the Owner all required maintenance manuals and phone numbers of the equipment suppliers. The delivery of these documents and certifications will be required prior to final payment and release of retainage.

1.23 INDEMNIFICATION

A. The Contractor(s) shall hold harmless and indemnify the Engineer, employees, officers, agents and consultants from all claims, loss,damage, actions, causes of actions, expense and/or liability resulting from, brought for, or on account of any personal injury or property damage received or sustained by any person, persons, (including third parties), or any property growing out of, occurring, or attributable to any work performed under or related to this contract, resulting in whole or in part from the negligence of the Contractor, any subcontractor, any employee, agent or representative.

PART 2 - PRODUCTS

NONE

PART 3 - EXECTUTION

NONE

END OF SECTION 230500

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SECTION 230513 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. This section specifies the basic requirements for electrical components which are an integral part of packaged mechanical equipment. These components include, but are not limited to factory installed motors, starters, and disconnect switches furnished as an integral part of packaged mechanical equipment. NOTE: Refer to other sections of the specifications for additional or superseding requirements for motors and/or starters.

1.2 SUBMITTALS:

A. Product Data: Submit manufacturers data on motor starters.

B. Shop Drawings: Submit dimensioned drawings on motor starters showing accurately scaled equipment layouts and spatial relationship to associated motors, and connections to electrical power panels and feeders.

PART 2 - PRODUCTS

2.1 MOTORS:

A. Provide motors and starting equipment where not furnished with the equipment package. Motors shall have copper windings, class B insulation, and standard squirrel cage with starting torque characteristics suitable for the equipment served. All motors for air handling equipment shall be selected for quiet operation. Each motor shall be checked for proper rotation after electrical connection has been completed.

B. Motors shall have dripproof enclosure for locations protected from weather and not in air stream of fan; and totally enclosed fan cooled enclosure for motors exposed to weather.

C. Motors shall be manufactured by Century, General Electric, Westinghouse, Louis Allis, or approved equal.

D. Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads.

E. Motor sizes shall be large enough so that the driven load will not require the motor to operate in the service factor range.

F. Temperature Rating: Rated for 40 deg. C environment with maximum 50 deg. C temperature rise for continuous duty at full load (Class A Insulation).

G. Service Factory: 1.15 for poly-phase motors and 1.35 for single phase motors.

H. Overload protection: build-in thermal overload protection and, where indicated, internal sensing device suitable for signaling and stopping motor at starter.

I. Noise rating: "Quiet" rating on motors located in occupied spaces of building.

J. Nameplate: Indicate the full identification of manufacturer, ratings, characteristics, construction, special features and similar information.

2.2 MINIMUM NOMINAL FULL LOAD MOTOR EFFICIENCIES (%):

	OPEN MOTORS			***ENCLOSED MOTORS***		
HP	3600 RPM	1800 RPM	1200 RPM	3600 RPM	1800 RPM	1200 RPM
1.0	----	82.5	80.0	75.5	82.5	80.0
1.5	82.5	84.0	85.5	82.5	84.0	84.0
2.0	84.0	84.0	86.5	84.0	84.0	85.5
3.0	84.0	87.5	87.5	85.5	86.0	86.5
5.0	85.5	87.5	87.5	87.5	87.5	87.5
7.5	87.5	89.0	89.5	88.5	88.5	88.5
10.0	88.5	89.5	89.5	89.5	89.5	90.2
15.0	89.5	91.0	90.2	90.2	91.0	90.2
20.0	90.2	91.0	90.2	90.2	91.0	91.0

END OF SECTION 230513

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SECTION 220533 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Extent of mechanical identification work required by this sections indicated on drawings and/or specified in other Division 15 sections. Systems which must be identified are as follows:

1. Exterior Condensing Units

B. Type of identification devices specified in this section include the following:

1. Engraved Plastic-Laminate Signs

1.2 SUBMITTALS

A. Product Data: Submit product specifications and installation instructions for each identification material and device required.

PART 2 - PRODUCTS

2.1 LETTERING AND GRAPHICS:

A. General: Coordinate names, abbreviations and other designations used in mechanical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturer's or as required for proper identification and operation/maintenance of mechanical systems and equipment.

2.2 ENGRAVED PLASTIC-LAMINATE SIGNS:

A. General: Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in the sizes and thicknesses indicated, engraved with engraver's standard letter style of the sizes and wording indicated, black with white core (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate. Thickness: 1/16" for units up to 20 sq. in. or 8" length; 1/8" for larger units. Fasteners: Self-tapping stainless steel screws, expect contact-type permanent adhesive where screws cannot or should not penetrate the substrate.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION:

A. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

3.2 MECHANICAL EQUIPMENT:

A. Mechanical Equipment Identification, General: Install engraved plastic laminate sign on or near each major item of mechanical equipment and each operational device, as specified herein.

1. Exterior condensing units and heat pump units.

END OF SECTION 220533

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SECTION 230548 - VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Extent of vibration isolation work required by this section is indicated on drawings and schedules, and/or specified in other Division 15 sections.

B. Types of vibration isolation products specified in this section include the following:

1. Flexible Duct Connectors.
2. Neoprene Equipment Pads

C. Vibration isolation products furnished as part of factory-fabricated equipment, are specified as part of the equipment assembly in other Division 15 sections.

1.2 QUALITY ASSURANCE:

A. Product Qualification: Provide each type of vibration isolation unit produced by specialized manufacturer, with not less than 5 years' successful experience in production of units similar to those required for project.

PART 2 - PRODUCTS

2.1 ISOLATION MATERIALS AND SUPPORT UNITS:

A. Flexible Duct Connectors: Laminated flexible sheet of cotton duct and sheet elastomer (butyl, neoprene or vinyl), reinforced with steel wire mesh where required for strength to withstand duct pressure indicated. Form connectors with full-faced flanges and accordion bellows to perform as flexible isolators unit, and of manufacturer's standard length for each size unless otherwise indicated. Equip each unit with galvanized steel retaining rings for airtight connection with ductwork.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering vibration isolation products, which may be incorporated in the work include, but are not limited to the following:

1. Peabody Noise Control, Inc.
2. Korfund Dynamics Corp.
3. Mason Industries, Inc.
4. Vibration Eliminator Co., Inc.

2.2 NEOPRENE PADS

A. Neoprene Pads: Oil-resistant neoprene sheets, of manufacturer's standard hardness and cross-ribbed pattern, designed for neoprene-in-shear-type vibration isolation, and in thicknesses required.

PART 3 - EXECUTION

3.1 APPLICATIONS:

A. General: Except as otherwise indicated, apply the following types of vibration isolators at indicated locations or for indicated items of equipment. Selection is Installer's option where more than one type is indicated.

B. Flexible Duct Connectors: Install at the following ductwork connections:

1. At Air Handlers
2. At ERV Units
3. Elsewhere as detailed on Drawings

3.2 INSTALLATION

A. Provide flexible duct connections wherever ductwork connects to vibration isolated equipment or as indicated on the Drawings. Construct flexible connections of neoprene coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment Duro-Dyne, Elgen, Ventfabric or equal. All canvas connections shall have a flame spread of 25 or less and smoke developed rating not higher than 50.

END OF SECTION 230548

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SECTION 230593 - TESTING, ADJUSTING AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of testing, adjusting, and balancing work is indicated by requirements of this section, and also by drawings and schedules, and is defined to include, but is not necessarily limited to, air distribution systems, and associated equipment and apparatus of mechanical work. The work consists of pressure testing, setting speed and volume (flow) adjusting facilities provided for systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to work as required by contract documents.

B. Component types of testing, adjusting, and balancing specified in this section includes the following as applied to mechanical equipment:

1. HVAC Systems
2. Exhaust Fans
3. Grilles, Registers & Diffusers

1.3 QUALITY ASSURANCE:

A. Installer: A firm certified by Associated Air Balance Council (AABC) in those testing and balancing disciplines similar to those required for this project.

B. AABC Compliance: Comply with AABC's Manual MN-1 "AABC National Standards", as applicable to mechanical air and hydronic distribution systems and associated equipment and apparatus.

C. NEBB Compliance: NEBB compliance will be acceptable with approval of the technician's qualifications by the engineer.

D. Industry Standards: Comply with American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE) recommendations pertaining to measurements, instruments and testing, adjusting and balancing, except as otherwise indicated.

1.4 SUBMITTALS:

A. Submit certified test reports signed by Test and Balance Supervisor who performed TAB work.

B. Include identification and types of instruments used and their most recent calibration date with submission of final test report.

C. Maintenance Data: Include in maintenance manuals, copies of certified test reports.

1.5 JOB CONDITIONS:

A. Do not proceed with testing, adjusting, and balancing work until work has been completed and is operable. Ensure that there is no latent residual work still to be completed.

B. Do not proceed until work scheduled for testing, adjusting, and balancing is clean and free from debris, dirt and discharged building materials.

PART 2 - PRODUCTS

2.1 PATCHING MATERIALS:

A. Except as otherwise indicated, use same products as used by original Installer for patching holes in insulation, ductwork and housings which have been cut or drilled for test purposes, including access for test instruments, attaching jigs, and similar purposes.

B. At Tester's option, plastic plugs with retainers may be used to patch drilled holes in ductwork and housings.

2.2 TEST INSTRUMENTS:

A. Utilize test instruments and equipment for TAB work required, of type, precision and capacity as recommended in the following TAB standards: AABC's Manual MN-1 "AABC National Standards".

PART 3 - EXECUTION

3.1 TESTING, ADJUSTING, AND BALANCING:

A. Examine installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned and is operable. Do not proceed with TAB work until satisfactory conditions have been corrected in manner acceptable to Tester.

B. Test, adjust and balance environmental systems and components, as indicated, in accordance with procedures outlined in applicable standards.

C. HVAC Testing, Adjusting and Balancing:

1. All equipment shall be adjusted to operate as intended by the specification. All bearings shall be lined up. Bearings that have dirt or foreign material in them shall be replaced with new bearings without additional cost to the owner. All thermostats and control devices shall be adjusted to operate as intended. Adjust fans for proper and efficient operation. Certify to Engineer that all adjustments have been made and that system is operating satisfactorily. Adjust all supply outlets to supply the amount of air shown on the drawings. Further adjustments shall be made to obtain uniform temperature in all spaces. Calibrate, set, and adjust all automatic temperature controls. Check proper sequencing of all interlock systems, and operation of all safety controls.

2. Contractor shall employ the services of a testing and balancing firm to take test readings on all fans and units, and to adjust fan speeds to deliver specified amounts of air. Testing and balancing report logs shall be made showing all air supply quantities, fan and unit test readings, etc.; (3) three copies of the log shall be submitted to the Engineer before final inspection of the project and is necessary for final payment. Log shall be listed by unit, and shall additionally indicate unit horsepower, motor nameplate amps, and actual amps draw after all adjustments are completed. Also each room shall be listed with total exhaust, supply and return air quantities listed.

3. Patch holes in insulation, ductwork and housings, which have been cut or drilled for test purposes, in manner recommended by original installer.

4. Prepare a report of recommendation for correcting unsatisfactory mechanical performances when system cannot be successfully balanced; including, where necessary, modifications which exceed requirements of contract documents for mechanical work.

5. Retest, adjust and balance systems subsequent to significant system modifications, and resubmit test results.

D. Additional Testing Requirements:

<u>The certified test and balance company shall also perform the following tests in addition to the above test, and shall include the results of these tests with the test and balance report:</u>

1. All HVAC units are to have the cooling capacities test and included in the report. The information shall include the following:
   a. Entering air temperature and humidity
   b. Leaving temperature and humidity
   c. Airflow

d. Exterior outdoor ambient temperature and humidity
e. HVAC unit nameplate voltage/phase/amps
f. HVAC unit measured voltage/phase/amps

END OF SECTION 230593

OVEC Head Start
7304 Dixie Highway
Louisville, Kentucky

SECTION 230700 - HVAC INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Extent of mechanical insulation required by this section is indicated on drawings, and by requirements of this section.

B. Types of mechanical insulation specified in this section include the following:

1. Ductwork Insulation:

a. Supply Air Duct
b. Outside Air ERV Supply Ductwork
c. ERV Exhaust Duct In Attic
d. Flexible duct to diffusers.

2. Piping System Insulation:

a. Refrigerant Suction Piping
b. Refrigerant Hot Gas Piping
c. Condensate Piping

1.2 QUALITY ASSURANCE:

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

1. Babcock & Wilcox Co., Insulating Products Div.
2. Certainteed Corp.
3. Johns-Manville Corp.
4. Keene Corp.
5. Knauf Fiber Glass
6. Owens-Corning Fiberglass Corp.

B. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread rating of 25 or less, and smoke-developed rating of 50 or less, as tested by ANSI/ASTM E 84 (NFPA 255) method.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's specifications and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, thickness, and furnished accessories for each mechanical system requiring insulation.

B. Certified Tests: With product data submit certified test reports on performances including burning characteristics and thermal insulating valves.

1.4 DELIVERY, STORAGE AND HANDLING:

A. Deliver insulation, coverings, cements, adhesives, and coatings to site in containers with manufacturer's stamp or label, affixed showing fire hazard ratings of products.

B. Protect insulation against dirt, water, and chemical and mechanical damage. Do not install damaged insulation; remove damaged insulation from project site.

PART 2 - PRODUCTS

2.1 PIPING INSULATION:

A. All interior condensate piping is to be insulated with ½" thick, pipe insulation with a K factor .22 at 75°F mean temperature. The insulation shall be wrapped with a vapor barrier jacket with self-sealing lap, equal to Certain-teed, Mansville, Owens-Corning. Cover fittings with Zeston or equal premolded insulating fittings. Insulation shall be installed in a professional, neat appearing manner; poor workmanship shall be corrected at the Contractor's expense.

B. Refrigerant piping shall be insulated with 1" thick Imcolock flexible polyolefin foam pipe insulation. Insulation shall bear U.L. listing for a 25/50 flame smoke spread, and shall be rated for duty in return air plenums. Product shall be stabilized against ultra-violet light degradation. The following piping systems shall be insulated:

1. Variable Refrigerant Flow Heat pump: Suction and hot gas lines.

C. As an option, exterior refrigerant piping and piping totally concealed in walls may be an open cell foam insulation product similar to Armaflex, but under no circumstances shall Armaflex, or equal plastic type insulation, be used in an air plenum, unless it bears a 25/50 flame/smoke spread rating. If Armaflex or similar product is used for outdoor service then two (2) coats of the weather-proofing sealant coating shall be applied as per manufacturer's installation instructions.

2.2 INSULATION SHIELDS

A. Metal insulation shields are required at all pipe hangers where the piping is insulated. Metal shields shall be constructed of galvanized steel, formed to a 180 degree arc with lengths equal to at least twice the pipe diameter.

2.3 DUCT INSULATION

A. Flexible Fiberglass Ductwork Insulation (Outside of Attic): FS HH-I-558, Form B, Type I. Insulation to have a density of 1.5 pcf density and shall have a "k" value of 0.28 maximum at 75 deg. F. Provide all-service insulation jacket with vapor barrier.

B. Flexible Fiberglass Ductwork Insulation (In Attic): FS HH-I-558, Form B, Type I. Insulation to have a density of 3.0 pcf density and shall have a "k" value of 0.28 maximum at 75 deg. F. Provide all-service insulation jacket with vapor barrier.

C. Application: Provide thicknesses of insulation on ductwork as follows:

1.	Supply Air Duct:	1.5” thick
2.	Supply Air Duct (where located in attic:	2” thick
3.	Outside Air ERV Supply Ductwork:	2” thick
4.	Exhaust Air ERV Ductwork in Attic:	1.5” thick

D. Ductwork Insulation Accessories: Provide staples, bands, wires, tape, anchors, corner and angles and similar accessories as recommended by insulation manufacturer for applications indicated. Provide cements, adhesives, coatings, sealers, protective finishes and similar compounds as recommended by insulation manufacturer for applications indicated.

E. All insulating materials, adhesives, coatings, etc., shall have a flame spread of 25 or less and smoke developed rating not higher than 50. All containers for mastics and adhesives shall have U.L. Label.

PART 3 - EXECUTION

3.1 INSTALLATION OF INSULATION:

A. General: Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose. All ductwork shall be externally insulated unless otherwise indicated.

B. Install insulation materials with smooth and even surfaces.

C. Clean and dry ductwork prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.

D. Maintain integrity of vapor-barrier on ductwork insulation, and protect it to prevent puncture and other damage.

E. Extend ductwork insulation without interruption through walls, floors and similar ductwork penetrations, except at penetrations through exterior building barriers and where otherwise indicated.

3.2 PROTECTION AND REPLACEMENT:

A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

B. Protection: Insulation Installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

END OF SECTION 230700

OVEC Head Start
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SECTION 232300 - REFRIGERATION PIPING SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Extent of refrigeration piping systems work is indicated on drawings and schedules, and by requirements of this section.

B. Applications for refrigeration piping systems include the following:

1. Refrigerant suction, liquid and hot gas bypass piping between air handlers and their respective condensing units.

1.2 QUALITY ASSURANCE:

A. Installer: A firm with at least 3 years of successful installation experience on projects with refrigeration piping system work similar to that required for project.

B. Brazing: Comply with applicable requirements of ANSI B31.5 and ANSI B31-5a, "Refrigeration Piping", pertaining to brazing of refrigeration piping for shop and project site locations.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's data for refrigeration piping systems materials and products.

B. Brazing Certification: Certify brazing procedures, brazers and operators in accordance with ASME standards (ANSI B31.5).

C. Shop Drawings: Submit scaled layout drawings of installed refrigeration pipe and fittings including, but not necessarily limited to, pipe sizes, locations, elevations and slopes of horizontal runs, wall and floor penetrations, and connections. Show interface and spatial relationship between piping and proximate equipment.

PART 2 - PRODUCTS

2.1 REFRIGERATION PIPING MATERIALS AND PRODUCTS:

A. General: Provide piping materials and factory fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with ANSI B31.5 Code for Refrigeration Piping where applicable, base pressure rating on refrigeration piping system maximum design pressures. Provide sizes and types

matching piping and equipment connections; provide fittings of materials which match pipe materials used in refrigeration piping systems. Where more than 1 type of materials or products are indicated, selection is Installer's option.

2.2 BASIC PIPE, TUBE AND FITTINGS:

A. General: Provide pipe, tube, and fittings in accordance with the following listing:

1. Tube Size 4 1/8" and Smaller: Copper tube.

a. Wall Thickness: Type ACR, hard drawn temper.
b. Fittings: Wrought copper, solder joints. Joints: Soldered, silver lead solder, ANSI/ASTM B32, Grade 96 TS.

2. Tube Size 3/4" and Smaller: Copper tube. Wall Thickness: Type ACR, soft annealed temper.

a. Fittings: Cast copper alloy for flared copper tubes.
b. Joints: Flared.

3. Tube Size 7/8" through 4 1/8": Copper tube.

a. Wall Thickness: Type ACR, soft annealed temper.
b. Fittings: Wrought copper, solder joints.
c. Joints: Soldered, silver lead solder, ANSI/ASTM B32, Grade 96 TS.

2.3 SPECIAL REFRIGERATION VALVES:

A. General: Special valves required for refrigeration piping systems include the following types:

B. Ball and Check Valves:

1. Shutoff Valves: Forged brass, packed, levered ball valves, 300°F (149°C) temperature rating, 500 PSI working pressure.

2. Check Valves: Forged brass, accessible internal parts, soft synthetic seat, fully guided brass piston and stainless steel spring, 250°F (121°C) temperature rating, 500 PSI working pressure.

C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering ball and check valves which may be incorporated in the work include, but are not limited to the following:

1. Henry Valve Co.
2. Parker Hannifin Corp, Refrigeration & Air Conditioning Div.
3. Sporlan Valve Co.

2.4 REFRIGERATION ACCESSORIES:

A. Thermal expansion valves and solenoid valves shall be as provided by the HVAC equipment supplier.

B. Refrigerant Strainers: Brass shell end and connections, brazed joints, monel screen, 100 mesh, UL listed, 350 PSI working pressure.

C. Moisture-Liquid Indicators: Forged brass, single port, removable cap, polished optical glass, solder connections, UL listed, 200°F (93°C) temperature rating, 500 PSI working pressure.

D. Refrigerant Filter-Driers: Steel shell, ceramic fired desiccant core, solder connections, UL listed, 500 PSI working pressure.

E. Available Manufacturers: Subject to compliance with requirements, manufacturers offering refrigeration accessories which may be incorporated in the work include, but are not limited to the following:

1. Alco Controls Div., Emerson Electric Co.
2. Henry Valve Co.
3. Parker-Hannifin Corp., Refrigeration & Air Conditioning Div.
4. Sporlan Valve Co.

PART 3 - EXECUTION

3.1 INSTALLATION OF REFRIGERATION PIPING:

A. Pitch refrigerant piping in direction of oil return to compressor. Provide oil traps and double suction risers where indicated, and where required to provide oil return.

3.2 INSTALLATION OF REFRIGERATION ACCESSORIES:

A. Refrigerant Strainers: Install in refrigerant lines as indicated or required, and in accessible location for service.

B. Moisture-Liquid Indicators: Install as indicated on refrigerant liquid lines or required, in accessible location.

C. Refrigerant Filter-Dryers: Install in refrigerant lines as indicated or required, and in accessible

location for service.

3.3 EQUIPMENT CONNECTIONS:

A. General: Connect refrigerant piping to mechanical equipment in manner shown, and comply with equipment manufacturer's instructions where not otherwise indicated.

3.4 FIELD QUALITY CONTROL:

A. Refrigerant Piping Leak Test: Prior to initial operation, clean and test refrigerant piping in accordance with ANSI B31.5 and ANSI B31.5a, "Refrigeration Piping". Perform initial test with dry nitrogen, using soap solution to test all joints. Perform final test with 27" vacuum, and then 200 PSI using halide torch. System must be entirely leak free.

B. Repair or replace refrigerant piping as required to eliminate leaks, and retest as specified to demonstrate compliance.

END OF SECTION 232300

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SECTION 232500 - MULITI-ZONE HEATING AND AIR CONDITIONING SYSTEM

PART 1 - GENERAL

1.1 QUALITY ASSURANCE:

A. Manufacturers: Daikin, U.S., Corp., or Sanyo

B. ARI Compliance: Test and rate heat recovery system and units in accordance with Air Conditioning and Refrigeration Institute (ARI) Standards for heat pumps.

C. UL or ETL Compliance: Construct and install units in compliance with applicable standards.

1.2 SUBMITTALS:

A. Shop Drawings: Submit assembly type shop drawings showing unit dimensions, construction details, and field connection details. Also include interconnecting wiring for the Daikin control systems, and submit drawing indicating the interconnecting piping for the Daikin system.

B. Maintenance Data: Submit maintenance instructions, including lubrication instructions, filter replacement, motor, and drive replacement, and spare parts lists. Include this data in maintenance manuals.

1.3 GENERAL

A. The specified system is a heat recovery heat pump system capable of serving multiple indoor ductless zone units, each of which can either heat or cool. The system produces liquid, suction, and hot gas piping each of which is controlled volumetrically by “BS” boxes to either heat or cool a zone unit. Capacity control of the unit compressors is variable speed, with oil filtered and retained in the compressor by ultra-high efficient oil separation.

PART 2 - PRODUCTS

2.1 UNITS

A. Unit shall be air cooled, split type multi-system air conditioner consisting of one outdoor unit and plural indoor units, each having capability to cool or heat independently for the requirements of the rooms. Multiple indoor units shall be capable of being connected to one refrigerant circuit and controlled individually.

B. Compressor shall be equipped with inverter controller, and capable of changing the rotating speed to follow variations in cooling and heating load.

C. Both indoor unit outdoor unit are assembled, tested, and charged with refrigerant at the factory.

D. Outdoor Unit
   1. The outdoor unit shall be a factory assembled unit housed in a sturdy weatherproof casing constructed form rust-proofed mild steel panels coated with a baked enamel finish. The outdoor unit shall have two scroll compressors and be able to operate even in case of a compressor failure. Outdoor unit shall operate continuously at the ambient temperature of 23°F in cooling 5°F in heating.

E. Compressor
   1. The compressor shall be of highly efficient hermetic DC scroll type and equipped with inverter control capable of changing the speed in accordance to the cooling or heating load requirement. The outdoor unit shall have the multi-step of capacity control to meet load fluctuation and indoor unit individual control. Refrigerant to be R-410A.

   2. The refrigerant piping shall be extended up to 330ft with 165ft level difference without any oil traps.

F. Heat Exchanger
   1. The heat exchanger (exterior condenser) shall be constructed with copper tubes mechanically bonded to aluminum fins to form a cross fin coil. The aluminum fins shall be covered by anti-corrosion resin film.

G. Refrigerant Circuit
   1. The refrigerant circuit shall include liquid and gas shut off valves and a solenoid valves.
   2. All necessary safety devices shall be provided to ensure the safe operation of the system, to be inclusive of high pressure switch, low pressure switch, overcurrent relay, inverter overload protection, condenser fan overloads, relief plugs, etc.

H. Oil Recovery System
   1. Unit shall be equipped with an oil recovery system to ensure stable operation with long refrigerant piping. Oil recovery efficiency shall be in excess of 98%.

I. Indoor Units
   1. Each indoor unit shall be of the wall or ceiling mounted type and shall have an electronic control valve which controls refrigerant flow rate in respond to load variations of the room. The fan shall be of the multi blade type and statically and dynamically balanced to ensure low noise and vibration free operation. Fans to have individual fusing.

   2. Each indoor unit’s refrigeration shall be controlled by an electronic expansion valve.

   3. Each indoor unit to be provided with wired remote controller to include digital temperature display, LCD display of operating status, time programming, temperature sensor, and heating-cooling changeover functions.

   4. Computerized PID control shall be used to maintain a correct room temperature. Unit shall be equipped with a self-diagnosis for easy and quick maintenance and

service. The LCD (Liquid Crystal Display) remote controller shall memorize the latest malfunction code for easy maintenance.

J. Central Remote Controller

1. A multi-functional centralized controller (central remote controller) shall be also supplied. It shall be able to control up to 64 zones of 64 groups (each group consists of Max. 16 units) of indoor units with the following functions.

    a) Temperature setting for each zone, or group, or indoor unit.
    b) On / off as a zone or individual unit.
    c) Indication of operating condition.
    d) Selection of operation modes for each zone.

2. Central control system shall be compatible for communication to other control systems complying with BACnet communication standards.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install HVAC units as indicated and in accordance with manufacturer's installation instructions.

B. All control wiring, refrigerant piping and installation requirements shall meet those as listed in Daikin's or Sanyo's installation and design engineering guides. Refrigerant piping fittings to be made with the RENET system as developed by Daikin. Pay particular attention to the purge, vacuum, and cleanliness of the piping system required by Daikin (or equivalent manufacturer).

C. Communication wiring shall be installed between units, BS boxes and their remote controllers, and between the temperature remote controllers and the master remote controller for the system. Communications wiring shall also be provided to the exterior units. Ensure all run lengths of communications wiring is within the Daikin published limitations.

D. All control systems for this HVAC system shall be fully enveloped by the Daikin control system or equal manufacturer's system); no other control interface will be required exterior to the VRF units and remote wired thermostat controllers.

E. Uncrate all units and inspect for damage. Verify that nameplate data corresponds with unit designation.

3.2 ADJUSTMENT AND CLEANING OF HVAC UNITS:

A. General: After construction is completed, including painting, clean unit exposed surfaces, vacuum clean terminal coils and inside of cabinets.

B. Retouch any marred or scratched surfaces of factory finished cabinets, using finish materials furnished by manufacturer.

3.3 TRAINING OF OWNER'S PERSONNEL:

A. Provide services for manufacturer's technical representative for (1) 8-hour day to instruct Owner's personnel in operation and maintenance of the Daikin (or Sanyo) systems; a factory or manufacturer's representative shall be on-site to direct the training.

B. Schedule training with Owner, provide at least 14-day notice to Contractor and Engineer of training date.

END OF SECTION

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SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 QUALITY ASSURANCE:

A. SMACNA Compliance: Comply with applicable portions of Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) HVAC duct construction standards, latest edition.

B. Industry Standards: Comply with American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (ASHRAE) recommendations pertaining to construction of duct accessories, except as otherwise indicated.

C. UL Compliance: Construct, test, and label fire dampers in accordance with Underwriters Laboratories (UL) Standard 555 "Fire Dampers and Ceiling Dampers".

D. NFPA Compliance: Comply with applicable provisions of ANSI/NFPA 90A "Air Conditioning and Ventilating Systems", pertaining to installation of duct accessories.

1.2 SUBMITTALS:

A. Product Data: Submit manufacturer's data for each type of duct accessory, including dimensions, capacities, and materials of construction; and installation instructions.

B. Submit assembly-type shop drawings for each type of duct assembly showing interfacing requirements with ductwork, and method of fastening or support.

PART 2 - PRODUCTS

2.1 FILTERS:

A. Two Types of filters shall be used where indicated on the drawings: 1” throwaway, and 2” pleated high efficiency throwaway.

B. All air units shall have filters installed any time they are operated before final acceptance. Provide extra set of filters and install in units just before turning over building to owner. Manufactured by Duststop, Farr, Cambridge, or approved equal.

2.2 DUCTWORK:

A. Furnish and install all galvanized steel ductwork and housings as shown on drawings. All ducts shall be in conformance with current SMACNA Standards relative to gauge, bracing, joints, etc.

Reinforce all housings and all ducts over 30" with 1¼" angles not less than 5'-6" on centers, and closer if required for sufficient rigidity to prevent vibration. Provide airtight joints and blade elbows. Support horizontal runs of duct on not to exceed 8'-0" centers from strap iron hangers.

B. All offsets in ducts of 45 degrees or more shall have turning vanes of same gauge as duct and shall be rigidly fastened with guide strips. Vanes in ducts over 30" deep shall be installed in multiple sections with vanes not over 30" long and shall be rigidly fastened.

C. Provide balancing dampers in all supply runouts, where shown on drawings and wherever necessary for complete control of air flow. Where access to dampers through a suspended ceiling is required, coordinate the proper location of the access doors. Provide "Spin-in" fitting with scoop-type extractor and double bearing volume dampers for all round duct branch takeoffs to individual air devices. Spin-in fittings shall be installed with a minimum of (5-6) five to six sheet metal screws regardless of manufacturer's recommended screw layout.

D. Round or oval duct shall be spiral lockseam sheet metal, Semco, United, or equal, with smooth interior surface, with round duct gauges per the following table:

	Size	Gauge
1.	14" & under	26
2.	15" thru 26"	24
3.	28" thru 36"	22
4.	38" thru 50"	20
5.	52" thru 60"	18

E. Fittings shall be welded prefabricated, 20 gauge for 36" fittings and under, 18 gauge for all larger sizes. All 90 degree tee's shall be conical type. Seal all joints in ductwork as recommended by SMACNA.

2.3 FLEXIBLE DUCT:

A. Flexible duct shall be Class 1, insulation type, polymeric liner with steel wire helix core duct, fiberglass insulation 1½" thick and outer fiberglass vapor barrier jacket. Flexible duct run shall not exceed 10 feet in length, and be installed in as straight a line as possible. Manufactured by Thermaflex "M-KE", Certainteed, Flexmaster.

2.4 COMBINATION FIRE/SMOKE DAMPERS:

A. Fire/Smoke Dampers: Provide combination fire/smoke dampers, of types and sizes indicated. Construct casings of 22 ga. minimum galvanized steel with bonded red acrylic enamel finish. Provide fusible link rated at 160-165°F (71-74°C) unless otherwise indicated. Dampers shall not obstruct the flow of air in the open position.

B. The motor/actuator to be UL listed and to have high torque opening capability with the operation being power open, spring closed. Damper motor to be 24 VAC.

C. Provide dampers where shown on drawings, and as required by Code enforcing authority. Fire/smoke dampers shall conform to NFPA Pamphlet No. 90A and UBC Standard 43-7 with recommended steel sleeves, fusible links, motor, interlocks, spring catches and noncorrosive bearings. Dampers shall be U.L. listed, manufactured by Prefco, Ruskin, Air Balance, or American Warming & Ventilating. Provide access door in duct for inspection and service to fire damper, motor and fusible link.

D. NOTE: Contractor shall be responsible for providing the correct type of fire/smoke dampers throughout the system(s) with respect to the UL listing of the damper. Provide dynamic dampers wherever static dampers do not have the necessary listing.

2.5 FIRE DAMPERS:

A. Fire Dampers: Provide fire dampers, of types and sizes indicated. Construct casings of 22 ga. galvanized steel with bonded red acrylic enamel finish. Provide fusible link rated at 160-165°F (71-74°C) unless otherwise indicated. Provide damper with positive lock in closed position, and with the following additional features. Dampers shall not obstruct the flow of air in the open position.

B. Provide fire dampers where shown on drawings, and as required by Code enforcing authority. Fire dampers shall conform to NFPA Pamphlet No. 90A and UBC Standard 43-7 with recommended steel sleeves, fusible links, spring catches and noncorrosive bearings. Dampers shall be U.L. listed, manufactured by Ruskin, Air Balance, or American Warming & Ventilating. Provide access door in duct for inspection and service to fire damper and fusible link.

C. NOTE: Contractor shall be responsible for providing the correct type of fire dampers throughout the system(s) with respect to the UL listing of the damper. Provide dynamic dampers where ever static dampers do not have the necessary listing.

2.6 DAMPERS:

A. Low Pressure Manual Dampers: Provide dampers of single blade or multiblade type, constructed in accordance with SMACNA "Low Pressure Duct Standards". Volume dampers shall be opposed blade interlocking type, factory made by Ruskin, APC, Air Balance, or approved equal.

2.7 TURNING VANES:

A. Fabricated Turning Vanes: Provide fabricated turning vanes and vane runners, constructed in accordance with SMACNA "Low Pressure Duct Standards".

B. Manufactured Turning Vanes: Provide turning vanes constructed of 1½" wide curved blades set at 1 1/2" o.c., and set into side strips suitable for mounting in ductwork, per SMACNA Standards for low pressure duct.

2.8 DUCT HARDWARE:

A. Quadrant Locks: Provide for each damper, quadrant lock device on one end of shaft; and end bearing plate on other end for damper lengths over 12". Provide extended quadrant locks and end extended bearing plates for externally insulated ductwork.

B. Concealed Damper regulators: For dampers located above inaccessible plaster or gypsum board ceilings, provide Young Regulator Co. Model No. 301 CDS concealed regulators with cover plates. Units shall be flush with finished surface. Key shall operate damper rod. Lock nut and spring washer shall hold damper in fixed position. The Bowden cable damper system is an acceptable substitute for shaft operate damper actuators.

2.9 DUCT ACCESS DOORS:

A. Construction: Construct of same or greater gate as ductwork served, provide insulated doors for insulated ductwork. Provide flush frames for uninsulated ductwork, extended frames for externally insulated duct. Provide one side hinged, other side with 1 handle type latch for doors 12" high and smaller, 2 handle type latches for larger doors.

B. All ductwork fire dampers not accessible from removal the ceiling grille shall be provided with an access door to access the linkage. All slot diffusers with fire dampers in the throat and sidewall grille penetrations shall have the connected ductwork supplied with an access door near the fire damper. All fire damper access doors shall be permanently labeled on the exterior having letters not less than 0.5” in height reading “Fire Damper” in accordance with Code.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install duct accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

B. Support ducts rigidly with suitable ties, braces, hangers, and anchors of type which will hold ducts true to shape and to prevent buckling.

C. Seal ductwork, to seal class recommended, and method prescribed in SMACNA "HVAC Duct Construction Standards" Latest Edition.

D. Complete fabrication of work at project as necessary to match shop fabricated work and accommodate installation requirements.

E. Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations, or if not otherwise indicated, run ductwork in shortest route which does not obstruct unusable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Limit clearances to ½" where furring is shown for enclosure of concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts, hollow wall construction or above suspended ceilings. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

F. Where ducts pass through interior partitions and exterior walls, conceal space between construction opening and duct over duct-plus-insulation with sheet metal flanges of same gage as duct. Overlap opening on 4 sides by at least 1½".

G. Where ducts pass thru block walls, ensure that a lintel sized per the structural specifications is provide above penetration.

H. Install turning vanes in all rectangular supply, return and outside air duct turns 45 deg. or greater.

I. Coordinate duct installations with installation of accessories, dampers, equipment, controls and other associated work of ductwork system.

J. Support ductwork in manner complying with SMACNA "HVAC Duct Construction Standards – Latest Edition".

3.2 CLEANING AND PROTECTION:

A. Clean ductwork internally, unit-by-unit as it is installed, of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration.

3.3 BALANCING:

A. Seal any leaks in ductwork that become apparent in balancing process.

END OF SECTION 233113

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SECTION 237433 - PACKAGED, 100% OUTDOOR, HEATING AND COOLING MAKEUP AIR UNITS

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including general and supplementary conditions of Division 1 and portions of Division 22 (Plumbing), apply to this section.

1.2. SUMMARY

A. This section includes Packaged Air-to-Air Energy Recovery Units with integral heating and cooling for outdoor installation.

B. Integral heat source shall be Indirect Gas-Fired furnace

C. Integral cooling source shall be packaged DX

D. Airflow arrangement shall be Outdoor Air only.

E. Within this document, these units may be referred to as Energy Recovery Unit (ERU) for brevity. Each unit shall be constructed in a horizontal configuration and shall incorporate additional product requirements as listed in Section 2 of this specification.

F. Related Sections include the following:

1. Division 01 General Requirements
2. Division 22 Plumbing
3. Division 23 Heating, Ventilating, and Cooling (HVAC)
4. Division 26 Electrical

1.3. SUBMITTALS

A. Product Data: For each type or model of Packaged Air-to-Air Energy Recovery Unit with Integral heating and cooling, include the following:

1. Complete fan performance curves for both Supply Air and Exhaust Air, with system operating conditions indicated, as tested in an AMCA Certified Chamber.
2. Sound performance data for both Supply Air and Exhaust Air, as tested in an AMCA Certified chamber.
3. Energy wheel performance data for both summer and winter operation.
4. AHRI Certified coil performance ratings with system operating conditions indicated. Ratings shall be in accordance with Standard 410.
5. Motor ratings, electrical characteristics and motor and fan accessories.
6. Combined efficiency data per ARI Guideline V-2003 for each model. Data shall include RER, COP, Unitary Net Cooling, Unitary EER and CEF.

7. Material types and gauges of all component pieces and assemblies.
8. Dimensioned drawings for each type of installation, showing isometric and plan views, to include location of attached ductwork and service clearance requirements.
9. Estimated gross weight of each installed unit.
10. Installation, Operating and Maintenance manual (IOM) for each model.
11. Microprocessor Controller specifications to include available options and operating protocols. Include complete data on all factory-supplied input devices.

1.4. QUALITY ASSURANCE

A. Source Limitations: Obtain Packaged Air-to-Air Energy Recovery Unit with all appurtenant components or accessories from a single manufacturer.

B. Product Options: Drawings must indicate size, profiles and dimensional requirements of Energy Recovery Units and are to be based on the specific system indicated. Refer to Division 1 Section "Product Requirements".

C. Certifications

1. Blowers shall be AMCA Certified for air flow.
2. Entire unit shall be ETL Certified per U.L. 1995 and bear an ETL sticker.
3. Energy Wheel shall be AHRI Certified, per Standard 1060.
4. Coils shall be Recognized Components for ANSI/UL 1995, CAN / CSA C22.2 No 236.05. DX and water coils shall be AHRI Certified per standard 410-2001.

D. Indirect gas-fired furnace shall be ETL Certified as a component of the ERU. Indirect gas-fired furnace shall be an ETL Recognized Component of the ERU per ANSI Z83.8.

1.5. COORDINATION

A. Coordinate size and location of all building penetrations required for installation of each Energy Recovery Unit and associated plumbing and electrical systems.

B. Coordinate location of water system fittings to ensure correct positioning for connection to the water coil and condensate drain pipe.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

A. Available Manufacturers: Subject to compliance with specifications contained within this document, manufacturers offering products that may be incorporated into the work include, but are not limited to:

1. Greenheck Fan Corporation
2. AAON
3. Valent

4. Daikin

2.2. MANUFACTURED UNITS

A. Packaged Air-to-Air Energy Recovery Units shall be fully assembled at the factory and consist of an insulated metal cabinet, downturned outdoor air intake hood, motorized low leakage intake damper, filter assemblies for both intake and exhaust air, energy wheel, airside coil, engineered P trap assembly with P trap, reheat coil, supply air blower assembly, indirect gas-fired furnace, exhaust air blower assembly electrical control unit with all specified components and internal accessories factory installed and tested and prepared for single-point high voltage connection except with electric post heat and exhaust fan only power which have dual point power.

2.3. CABINET

A. Materials: Formed, insulated double wall construction, fabricated to permit access to internal components for maintenance.
   1. Outside casing: 18 gauge, galvanized (G90) steel meeting ASTM A653 for components that do not receive a painted finish. Unit's exterior shall be supplied from the manufacturer using G60 galvaneal steel with pre-painted material.
   2. Internal assemblies: prepainted 20 gauge galvannealed steel except for motor supports which shall be 14 gauge galvanized (G90) steel.

B. Cabinet Insulation: Comply with NFPA 90A and NFPA 90B and erosion requirements of UL 181.
   1. Materials: Fiberglass insulation. If insulation other than fiberglass is used, it must also meet the Fire Hazard Classification shown below.
      a. Thickness: 1 inch (25 mm)
      b. Fire Hazard Classification: Maximum flame spread of 25 and smoke developed of 50, when tested in accordance with ASTM C 411.
      c. Location and application: Full coverage of entire cabinet exterior to include walls and roof of unit. Insulation shall be of semi-rigid type and installed between inner and outer shells of all cabinet exterior components.
   2. Materials: Rigid urethane foam
      a. Thickness: 1 inch (25 mm)
      b. Meets UL94HF-1 flame requirements.
      c. Location and application: Doors and the floor of the unit.

C. Access panels / doors: Unit shall be equipped with insulated, hinged doors or removable access panels to provide easy access to all major components. Doors and access panels shall be fabricated of 18 gauge galvanized G90 steel.

D. Condensate drain pan: Pan shall be formed of welded austenitic stainless steel sheet material and provided with a welded drain connection at the front for connection to a P trap. Drain pan shall be sloped in two directions to provide positive draining.

E. P trap: An engineered P trap (condensate drain) assembly shall be provided for each unit, to include cleanout ports.

F. Energy wheel: Energy wheel shall be of total enthalpy, rotary air-to-air type and shall be an element of a removable energy wheel cassette. The cassette shall consist of a galvanized steel framework (designed to produce laminar air flow through the wheel), an energy wheel as specified and a motor and drive assembly. The cassette shall incorporate a pre-tensioned urethane drive belt with a five year warranty. The wheel media shall be a polymer film matrix in a stainless steel framework and be comprised of individual segments that are removable for servicing. Non-segmented energy wheels are not acceptable. The polymer film material shall be coated with silica gel desiccant and shall be designed and constructed to permit cleaning and servicing. The energy wheel is to have a five year warranty. Performance criteria are to be as specified in AHRI Standard 1060, complying with the Combined Efficiency data in the submittal.

G. Compressed refrigerant coils shall be AHRI Certified and shall be (silver) soldered or brazed into the compressed refrigerant system. Coil shall be constructed of copper tubing, permanently bonded to aluminum fins and enclosed in a galvanized steel frame. If two compressors are used as components of a packaged DX system in the ERU, then the evaporator coil shall be of "interlaced" configuration, permitting independent operation of either compressor without conflict with the other compressor.

H. Supply Air and Exhaust Air blower assemblies: Blower assemblies consist of an electric motor and a belt driven blower. Assembly shall be mounted on heavy gauge galvanized rails and further mounted on 1 inch thick neoprene vibration isolators.

I. Control panel / connections: Energy Recovery Unit shall have an electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply connections. Optional electric post heater shall have a separate electrical control center and separate high voltage power circuit as shown on the plans.

J. Reheat coil with factory installed modulating hot gas reheat valve.

K. Indirect gas furnace shall be ETL Certified as a component of the Energy Recovery Air Unit. Unit shall have an integral exhaust gas blower and be ETL Certified for installation downstream of a cooling coil. Provide fault sensors to provide fault conditions to optional digital controller or building controls.
Provide multi-pass tubular heat exchangers, constructed of type 409 stainless steel. Heat exchanger tubes shall be installed on the vest plate by means of swaged assembly. Heat exchanger tubes shall be supported by a minimum of two fabricated assemblies that support the tubes and also permit expansion and contraction of the tubes.

L. Furnace control shall be 4:1 Modulating. Shall have solid state controls permitting stand-alone operation or control by building controllers.

M. Shall be encased in a weather-tight metal housing with intake air vents. Large, metal lift-off or hinged door shall provide easy access to the enclosed vest plate, control circuitry, gas train, burner assembly and exhaust blower.

N. Packaged DX System: Energy Recovery Air Unit shall have an integral compressor(s) and evaporator coil located within the weather-tight unit housing. Condenser coils and appurtenant condenser fan assemblies shall be factory installed as integral subassemblies of the ERU and mounted on the exterior of the ERU. Condenser fan motors shall be three phase, type 56 frame, Open Air Over and Shaft Up. Each condenser fan motor shall have a vented frame, rated for continuous duty and be equipped with an automatic reset thermal protector. Motors shall be UL Recognized and CSA Certified. The refrigerant compressor(s) shall be hermetic scroll-type and shall be equipped with liquid line filter drier, thermal expansion valve (TXV), manual reset high pressure and low pressure cutouts and all appurtenant sensors, service ports and safety devices. Compressed refrigerant system shall be fully charged with R-410A refrigerant. Each compressor shall be factory-equipped with an electric crankcase heater to boil off liquid refrigerant from the oil. Hot gas bypass shall be provided on the lead circuit to prevent icing of the evaporator coil under low load conditions.

   Packaged DX Control and Diagnostics: The Packaged DX system shall be controlled by an onboard digital controller (DDC) that indicates both owner-supplied settings and fault conditions that may occur. The DDC shall be programmed to indicate the following faults:
   - Global alarm condition (active when there is at least one alarm)
   - Supply Air Proving alarm
   - Dirty Filter Alarm
   - Compressor Trip alarm
   - Compressor Locked Out alarm
   - Supply Air Temperature Low Limit alarm
   - Sensor #1 Out of Range (outside air temperature)
   - Sensor #2 Out of Range (supply air temperature)
   - Sensor #3 Out of Range (cold coil leaving air temperature)

O. Motorized dampers / Intake Air, Motorized dampers of low leakage type shall be factory installed.

2.4. BLOWER SECTION

A. Blower section construction, Supply Air and Exhaust Air: Belt drive motor and blower shall be assembled onto a 14 gauge galvanized steel platform and must have neoprene vibration isolation devices.

B. Blower assemblies: Shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.

C. Centrifugal blower housing: Formed and reinforced steel panels to make curved scroll housing with shaped cutoff.

D. Forward curved blower (fan) wheels: Galvanized or aluminum construction with inlet flange and shallow blades curved forward in direction of airflow. Mechanically attached to shaft with set screws.

E. Blower section motor source quality control: Blower performance shall be factory tested for flow rate, pressure, power, air density, rotation speed and efficiency. Ratings are to be established in accordance with AMCA 210, "Laboratory Methods of Testing Fans for Rating".

2.5. MOTORS

A. General: Blower motors greater than 3/4 horsepower shall be "NEMA Premium" unless otherwise indicated. Compliance with EPAct minimum energy-efficiency standards for single speed ODP and TE enclosures is not acceptable. Motors shall be heavy-duty, permanently lubricated type to match the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower and pulleys shall be fully machined cast-type, keyed and fully secured to the fan wheel and motor shafts. Electric motors of ten horsepower or less shall be supplied with an adjustable drive pulley. Comply with requirements in Division 23 05 13, matched with fan load.

B. Motors shall be 60 cycle, 3 phase 208 volts.

2.6. UNIT CONTROLS

A. The ERU shall be constructed so that it can function as a stand-alone heating and cooling system controlled by factory-supplied controllers, thermostats and sensors or it can be operated as a heating and cooling system controlled by a Building Management System (BMS).

2.7. FILTER SECTION

A. Energy Recovery Unit shall have permanent metal filters located in the outdoor air intake and shall be accessible from the exterior of the unit. MERV 8 pleated filters shall be provided in the intake air stream and MERV 8 filters in the exhaust air stream.

PART 3 - EXECUTION

3.1. EXAMINATION

A. Prior to start of installation, examine area and conditions to verify correct location for compliance with installation tolerances and other conditions affecting unit performance. See unit IOM.

B. Examine roughing-in of plumbing, electrical and HVAC services to verify actual location and compliance with unit requirements. See unit IOM.

C. Proceed with installation only after all unsatisfactory conditions have been corrected.

3.2. INSTALLATION

A. Installation shall be accomplished in accordance with these written specifications, project drawings, manufacturer's installation instructions as documented in manufacturer's IOM, Best Practices and all applicable building codes.

3.3. CONNECTIONS

A. In all cases, industry Best Practices shall be incorporated. Connections are to be made subject to the installation requirements shown above.

B. Piping installation requirements are specified in Division 22 (Plumbing). Drawings indicate general arrangement of piping, fittings and specialties.

C. Duct installation and connection requirements are specified in Division 23 of this document.

D. Electrical installation requirements are specified in Division 26 of this document.

3.4. FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory authorized service representative to inspect field assembled components and equipment installation, to include electrical and piping connections. Report results to A / E in writing. Inspection must include a complete startup checklist to include (as a minimum) the following: Completed Start-Up Checklists as found in manufacturer's IOM.

3.5. START-UP SERVICE

A. Engage a factory authorized service representative to perform startup service. Clean entire unit, comb coil fins as necessary, install clean filters. Verify water source for compliance with manufacturer's requirements for flow and temperature. Measure and record electrical values for voltage and amperage. Refer to Division 23 "Testing, Adjusting and Balancing" and comply with provisions therein.

3.6. DEMONSTRATION AND TRAINING

A. Contractor to train owner's maintenance personnel to adjust, operate and maintain the entire energy recovery unit. Refer to Division 01 Section Closeout Procedures and Demonstration and Training.

END OF SECTION 237433

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SECTION 233713 - GRILLES, REGISTERS, DIFFUSERS, & LOUVERS

PART 1 - GENERAL

1.1 SUBMITTALS:

A. Product Data: Submit manufacturer's data on outlets and inlets including the following:

B. Schedule of outlets and inlets indicating drawing designation, room location, number furnished, model number, size and accessories furnished.

C. Data sheet for each type of outlet and inlet, and accessory furnished; indicating construction, finish, and mounting details.

D. Performance data for each type of outlet and inlet furnished, velocity traverse, throw and drop, and noise criteria ratings. Indicate selections on data.

E. Ratings are to be certified by ADC or AMCA.

1.2 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Deliver outlets and inlets wrapped in factory fabricated fiberboard type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.

B. Store outlets and inlets in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS

2.1 CEILING AIR DIFFUSERS:

A. General: Except as otherwise indicated, provide manufacturer's standard ceiling air diffusers where shown; of size, capacity, direction of throw, and type indicated; constructed of materials and components as specified in this section and as required for complete installation.

B. Types: Provide ceiling diffusers of type, capacity, and with accessories and finishes as indicated and as specified in this section. The following requirements shall apply:

C. Diffuser Faces:

1. Square: Square housing, core of concentric louvers, square or round duct connection,

housing extended to form panel to fit in ceiling module.

2. Rectangular: Rectangular housing, core of rectangular concentric louvers, square or rectangular duct connection.

D. Ceiling Compatibility: Provide diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling air diffuser.

E. Dampers:

1. Opposed Blade: Adjustable opposed blade damper assembly, key operated from face of diffuser.

2. Butterfly: 2 semi-circular flaps connected to linkage adjustable from face of diffuser with key, and with straightening grid.

F. Diffuser Accessories:

1. Operating Keys: Tools designed to fit through diffuser face and operate volume control device and/or pattern adjustment.

G. Available Manufacturers: Subject to compliance with requirements, manufacturers offering diffusers which may be incorporated in the work include, but are not limited to the following:

1. Airguide Corp.
2. Anemostat Products Div., Dynamics Corp. of America
3. Carnes Co., Div. of Wehr Corp.
4. Barber-Colman Co., Air Distribution Div.
5. Environmental Elements Corp., Subs. Koppers Co.
6. Krueger Mfg. Co.
7. Tuttle & Bailey Div. of Interpace Corp.
8. Titus Co.

2.2 CEILING RETURN, EXHAUST AND TRANSFER AIR REGISTERS AND GRILLES:

A. General: Except as otherwise indicated, provide manufacturer's standard ceiling registers and grilles, where shown, of size, capacity and type indicated; constructed of materials and components as specified in this section; and as required for complete installation.

B. Ceiling Compatibility: Provide registers and grilles with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with

accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling register or grille.

C. Register and Grille Materials:

1. Aluminum Construction: Manufacturer's standard extruded aluminum frames and adjustable blades, unless noted otherwise.

D. Register and Grille Faces:

1. Horizontal Straight Blades: Horizontal blades, individually adjustable, at manufacturer's standard spacing.

2. Vertical Straight Blades: Vertical blades individually adjustable at manufacturer's standard spacing.

E. Register Dampers:

1. Opposed Blade: Adjustable opposed blade damper assembly, key operated from face of register.

F. Register and Grille Accessories:

1. Operating Keys: Tools designed to fit through register or grille face and operate volume control device and/or pattern adjustment.

G. Available Manufacturers: Subject to compliance with requirements, manufacturers offering registers and grilles which may be incorporated in the work include, but are not limited to the following:

1. Airguide Corp.
2. Anemostat Products Div., Dynamics Corp. of America
3. Barber Colman Co., Air Distribution Div.
4. Carnes Co., Div. of Wehr Corp.
5. Environmental Elements Corp., Subs, Koppers Co.
6. Tempmaster Corp.
7. Titus Co.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Examine areas and conditions under which outlets and inlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

A. General: Install all outlets and inlets as recommended by the manufacturer; in accordance with recognized industry practices; to insure that products serve intended functions.

B. Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of outlets and inlets with other work.

C. Provide transition ductwork as required to mate to the device inlet/outlet.

END OF SECTION 233713.

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SECTION 238127 - UNITARY HVAC EQUIPMENT

PART 1 - GENERAL

1.1 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacturer of terminal units, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. ARI Compliance: Test and rate heat pump units in accordance with Air Conditioning and Refrigeration Institute (ARI) Standards.

C. UL or ETL Compliance: Construct and install heat pump units in compliance with applicable standards.

1.2 SUBMITTALS:

A. Shop Drawings: Submit assembly type shop drawings showing unit dimensions, construction details, and field connection details.

B. Maintenance Data: Submit maintenance instructions, including lubrication instructions, filter replacement, motor, and drive replacement, and spare parts lists. Include this data in maintenance manuals.

PART 2 - PRODUCTS

2.1 HEAT PUMP CONDENSING UNITS (HP):

A. The exterior condensing units shall be Trane, York, McQuay, Carrier, Lennox, or approved equal. Provide split system heat pump service or cooling only service as listed on the drawings. Units shall be UL and ARI listed.

B. Provide unit with compressor mounted on vibration isolators, suction accumulator, loss of charge protection, high pressure cut-out, low suction pressure protection, external service valves, test port, crankcase heater, liquid line solenoid valve, thermostatic expansion valve, and liquid line filter-drier.

C. Provide unit with reversing valve, low voltage controls, defrost controls, crankcase heaters, and required transformers.

D. Provide unit with heavy ga. chassis and weather resistant coating, and full charge of R-22 refrigerant.

E. Provide unit with accessories and additional requirements as listed on the drawings.

2.2 AIR HANDLING UNITS (AHU)

A. Provide vertical or horizontal heat pump air handling units equal to Trane, McQuay, Carrier, York, Lennox or equal as scheduled on the drawings. Orientations shall be as indicated. Unit construction shall be listed by U.L. Filter and return air inlets shall be on the side of the unit, or a return air plenum must be provided for the base.

B. Unit casing shall be heavy gauge steel with baked enamel finish. The heat exchanger section shall be insulated, and the filters shall be 1" replaceable.

C. Unit shall be provided with standard factory controls. Provide "auto-on-off" automatic change-over thermostat. Provide all control transformers and relays as required.

D. Provide vertical units with discharge refrigerant 'A' frame cooling coil. All coils to be manufactured of copper tubes and aluminum fins. Coil casings shall be insulated, and shall be provided with drain pan and condensate pipe connections. Capacity control by factory installed expansion valve.

E. Electric heaters shall meet the performance listed on the Drawings at rated voltage. Provide heater with magnetic contactors, and thermal overload protection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install HVAC units as indicated and in accordance with manufacturer's installation instructions.

B. Uncrate units and inspect for damage. Verify that nameplate data corresponds with unit designation.

C. Protect units with protective covers during balance of construction.

D. Suspend units on vibration isolators and make duct connections with flexible duct connectors. If units set on floor or platform, set units onto neoprene vibration pads.

3.2 ADJUSTMENT AND CLEANING OF HVAC UNITS:

A. General: After construction is completed, including painting, clean unit exposed surfaces, vacuum clean terminal coils and inside of cabinets.

B. Retouch any marred or scratched surfaces of factory finished cabinets, using finish materials furnished by manufacturer.

END OF SECTION