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SECTION 01070

STANDARD ABBREVIATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide a standard list and rules for uniform usage of abbreviations used in the Contract Documents.

B. Provide definitions of terms which are common to multiple sections of the Specifications and/or Drawings and which are necessary for proper understanding of those documents.

1.02 ABBREVIATIONS

A. Trend in usage is towards simplification.

B. Abbreviations are used without periods unless the abbreviation itself spells a word.

C. Except where noted, uppercase abbreviations are used on the Drawings and in the Bid Schedule. Lowercase abbreviations are used in text, such as in the Specifications.

D. Acronyms, words formed from the first (or first few) letters of a series of words, remain capitalized wherever used, except where the term has come into common usage (e.g., radio).

E. Standard abbreviations are as follows:

ABV	Above
AFF	Above Finished Floor
AFG	Above Finish Grade
ABUT	Abutment
AP	Access Panel
ACT	Acoustical Tile
ABS	Acrylonitrile-Butadiene- Styrene
ADD	Addendum
ADH	Adhesive
ADJ	Adhesive
AGG	Aggregate
A/C	Air Conditioning
AHU	Air Handling Unit
ALM	Alarm
ALT	Alternate
AC	Alternating Current
ALUM	Aluminum
AMB	Ambient
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
ASTM	American Society For Testing and Materials
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
AWS	American Welding Society
AWG	American Wire Gage
AMP	Ampere
ANC	Anchor, Anchorage
AB	Anchor Bolt
ANOD	Anodized
ACH	Anti-Condensate Heater
APPROX	Approximate
ARCH	Architect(ural)
AD	Area Drain
ACP	Asbestos Cement Pipe
@	At
ASPH	Asphalt
ATM	Atmosphere
AUTO	Automatic
AUX	Auxiliary
AVG	Average
ADDL	Additional
B&B	Ball and Burlap
BLST	Ballast
BSMT	Basement
BP	Base Plate
BRG	Bearing
BPL	Bearing Plate
BJT	Bed Joint
BM	Bench Mark

BEL	Below
BTWN	Between
BVL	Beveled
BIT	Bituminous
BLK	Block
BLKG	Blocking
BD	Board
BOL	Bollard
BDBM	Bond Beam
BS	Both Sides
BW	Both Ways
BOT	Bottom
BC	Bottom Chord/Bedding Class
BO	Bottom Of
BOF	Bottom of Footing
BHP	Brake Horsepower
BRK	Brick
BTU	British Thermal Unit
BRZ	Bronze
BLDG	Building
BUR	Built Up Roofing
BBD	Bulletin Board
BV	Butterfly Valve
CAB	Cabinet
CUH	Cabinet Unit Heater
CAM	Camber
CTLV	Cantilever
CPL	Cap Plate
CPT	Carpet(ed)
CIP	Cast-In-Place/Cast Iron Pipe
CI	Cast Iron
CB	Catch Basin
CK	Calk(ing) Caulk(ing)
CLG	Ceiling
CG	Ceiling Grille
CLG HT	Ceiling Height
CEM	Cement
CML	Cement Mortar Lined
CTR	Center
CC	Center to Center
CL	Center Line
CM	Centimeter(s)
CT	Ceramic Tile
CHBD	Chalkboard
CHAM	Chamfer
CV	Check Valve
CIRC	Circle/Circumference
CKT	Circuit
CO	Clean Out/Conduit Only
CLR	Clear(ance) or Cooler
CLS	Closure
COAX	Coaxial
CW	Cold Water
COL	Column
COMB	Combination
COMP	Composition (Composite)
COMPO	Compress(ed) (ion) (ible)
CONC	Concrete
CMU	Concrete Masonry Unit
CP	Concrete Pipe, Complete Penetration Groove Welds
CRSI	Concrete Reinforcing Steel Institute
CONFIG	Configuration
CONST. JT.	Construction Joint
CONTR	Contractor
COORD	Coordinate
CONN	Connection
CONST	Construction
CONT	Continuous or Continue
CJ	Control Joint
COP	Copper
CORR	Corrugated
CAP	Corrugated Aluminum Pipe
CMP	Corrugated Metal Pipe
CTR	Counter
CRS	Course
CFM	Cubic Feet Per Minute
CFS	Cubic Feet Per Second
CF	Cubic Foot
CU IN	Cubic Inches
CY	Cubic Yard
DPR	Damper
DP	Dampproofing
DL	Dead Load
DEG	Degree
^{o}C	Degrees Centigrade/Celsius
DEMO	Demolish, Demolition
DMT	Demountable
DENS	Density
DEPT	Department
DEC	Department of Environmental Conservation
DEP	Department of Environmental Protection
DOT	Department of Transportation
DTL	Detail
DIAG	Diagonal
DIM	Dimension
DIA	Diameter
DIFF	Difference
DC	Direct Current
DISCH	Discharge
DPR	Dispenser
DIST	Distribution
DO	Ditto

DIV	Division
DR	Door/Drain/Dimension Ratio
DBL	Double
DA	Double-acting
DPDT	Double Pole Double Throw
DPST	Double Pole Single Throw
DWLS	Dowels
DN	Down
DS	Downspout/Disconnect Switch
D	Drain
DRB	Drainboard
DT	Drain Tile
DWR	Drawer
DWG	Drawing
DF	Drinking Fountain
DIP	Ductile Iron Pipe
EA	Each
EIFS	Exterior Insulation and Finish System
EF	Each Face or Exhaust Fan
EW	Each Way
EWTB	Each Way Top and Bottom
E	East
EFF	Efficiency
ELEC	Electric(al)
EB	Electric Baseboard
EC	Electrical Contractor
EMT	Electrical Metallic Tubing
EP	Electrical Panelboard
EWC	Electrical Water Cooler
EL	Elevation
ELEV	Elevator
EMER	Emergency
EMPS	Emergency Power Supply
ENCL	Enclos(ure)
ENGR	Engineer
ENT	Entrance
EPA	Environmental Protection Agency
EQ	Equal
EQP	Equipment
EDR	Equivalent Direct Radiation
EST	Estimate
ETC	Etcetera
EVAP	Evaporator
EXCA	Excavate
EXH	Exhaust
EF	Exhaust Fan
EG	Exhaust Grille
EXG	Existing
EB	Expansion Bolt
EXP JT	Expansion Joint
EJC	Expansion Joint Cover
EXP	Exposed
EP	Explosion Proof
EXT	Exterior
EXTG	Extinguisher
ES	Extra Strength
EXT	Extension/Extended
FWC	Fabric Wall Covering
FAB	Fabricate
F TO F	Face to Face
FM	Factory Mutual
F	Fahrenheit (Degrees)
FCU	Fan Coil Unit
FAS	Fasten
FPM	Feet Per Minute
FPS	Feet Per Second
FT	Feet/Foot
FB	Fiberboard
BGL	Fiberglass
FRP	FiberReinforcedPolyester/Pipe or Fiber Reinforced Panel
FIN	Finish(ed)
FF	Finished Floor
FFE	Finished Floor Elevation
FG	Finished Grade/Fire Grille/Floor Grille
FA	Fire Alarm
FE	Fire Extinguisher
FEC	Fire Extinguisher Cabinet
FHC	Fire Hose Cabinet
FH	Fire Hydrant
FW	Fire Wall
FP	Fireproof
FRC	Fire-Resistant Coating
FRT	Fire-Retardant
FIXT	Fixture
FLG	Flashing
FLX	Flexible
FC	Flexible Connection/Foot Candle/Forward Curved
FLR	Floor(ing)
FLCO	Floor Cleanout
FD	Floor Drain/Fire Damper
FLRPL	Floor Plate
FLUOR	Fluorescent
FJT	Flush Joint
FTG	Footing
FDN	Foundation
FRP	Fiber Reinforced Plastic Paneling
FR	Frame(d), (ing)
FRZR	Freezer
FBO	Furnished By Other/Owner
FUR	Furred (ing)
FUT	Future
FIBO	Furnished and Installed By

	Others/Owner
GA	Gage, Gauge
GAL	Gallon
GPD	Gallons Per Day
GPH	Gallons Per Hour
GPM	Gallons Per Minute
GALV	Galvanized
G	Gas/Girder
GKT	Gasket(ed)
TV	Gate Valve
GC	General Contract(or)
GEN	General/Generator
GL	Glass, Glazing
GLB	Glass Block
GST	Glazed Structural Tile
GOVT	Government
GB	Grab Bar/Grade Beam
GRD	Grade, Grading
GRN	Granite
GRTG	Grating
GVL	Gravel
GFA	Gross Floor Area
GLA	Gross Leasable Area
GND	Ground
GRCI	Ground Fault Circuit Interrupter
GRT	Grout
GYP	Gypsum
GWB	Gypsum Wall Board
GP	Gypsum Plaster
HD	Hand Dryer
HOA	Hand-Off-Automatic
HGR	Hanger
HBD	Hardboard
HDW	Hardware
HWD	Hardwood
HDR	Header
HT	Heat
HTR	Heater
HTG	Heating
HVAC	Heating/Ventilating/Air Conditioning
HD	Heavy Duty
HGT	Height
HCAP	Helically Corrugated Aluminum Pipe
HCMP	Helically Corrugated Metal Pipe
HZ	Hertz
HEX	Hexagonal
H	High
HID	High Intensity Discharge
HP	High Point
HPS	High Pressure Sodium/High Pressure Steam
HC	Hollow Core
HM	Hollow Metal
HORIZ	Horizontal
HP	Horse Power (Mech/Elect), High Point & H Pile (Struct)
HB	Hose Bibb
HW	Hot Water
HWH	Hot Water Heater
HR	Hour
HYD	Hydrant
HPTD	High Point of Trench Drain
ILL	Illumination
INCAND	Incandescent
IN	Inch/Inches
INCIN	Incinerator
INCL	Include(d), (ing)
INFO	Information
ID	Inside Diameter
INSUL	Insulate(d), (ion)
INSC	Insulating Concrete
INSF	Insulating Fill
INT	Interior
INTM	Intermediate
INV	Invert
IPS	Iron Pipe Size
IG	Isolated Ground
JC	Janitor's Closet
JT	Joint
JST	Joist
JB	Junction Box
KP	Kickplate
KV	Kilovolt
KVA	Kilovolt Ampere
KVAR	Kilovolt Ampere Reactive
KWH	Kilowatt Hour
KW(s)	Kilowatt(s)
K	Kips
KSI	Kips per Square Inch
KO	Knockout
LBL	Label
LAB	Laboratory
LAD	Ladder
LAM	Laminate(d)
LDG	Landing
LAV	Lavatory
LH	Left Hand
LHR	Left Hand Reverse
L	Length
LPL	Leveling Plate
LT	Light
LTG	Lighting
LA	Lightning Arrestor
LD	Linear Diffuser

LF	Linear Foot
LL	Live Load
LOC	Location
LRA	Locked Rotor Amps
LKR	Locker
LG	Long/Length
LLV	Long Leg Vertical
LLH	Long Leg Horizontal
LVR	Louver
LP	Low Point
LPS	Low Pressure Steam
LNG	Longitudinal
LV	Low Voltage
LPW	Lumen Per Watt
LPTD	Low Point of Trench Drain
MACH	Machine
MB	Machine Bolt
MAG	Magnet
MDP	Main Distribution Panel
MAINT	Maintenance
MFG	Manufacture(r)
MGR	Manager
MAS	Masonry
MO	Masonry Opening
ML	Match Line
MTL	Material(s) or Metal
MAX	Maximum
MECH	Mechanical
MJ	Mechanical Joint
MED	Medium
MDO	Medium Density Overlay
MPS	Medium Pressure Steam
MBR	Member
MMB	Membrane
HG	Mercury
MV	Mercury Vapor/Millivolts
MTL	Metal
MH	Metal Halide/Manhole
M	Meter(s)
MID	Middle
MPH	Miles Per Hour
MA	Milliamperes
MM	Millimeter(s)
MIN	Minimum
MWK	Millwork
MG	Mirror Glass/Thousand Gallons
MISC	Miscellaneous Channel/Moment Connection
MOD	Modular/Module
MLD	Molding, Moulding
MR	Mop Receptor
MOS	Mosaic
MCC	Motor Control Center
MT	Mount(ed), (ing)
MHT	Mounting Height
MOV	Moveable
MUL	Mullion
NL	Nailable
NEC	National Electric Code
NFPA	National Fire Protection Agency
NAT	Natural
NPRN	Neoprene
NRC	Noise Reduction Coefficient
NOM	Nominal
NST	Non-Slip Tread
NFSD	Nonfused
NC	Normally closed
N	North
NA	Not Applicable
NIC	Not In Contract
NTS	Not To Scale
NO	Number/Normally Open
OFF	Office
OHM	Ohmmeter
OC	On Center(s)
OPG	Opening
OPP	Opposite
OPH	Opposite Hand
OPS	Opposite Surface
OPT	Optional
OZ	Ounce
OTO	Out To Out
OD	Outside Diameter
OF	Outside Face
OA	Overall/Outside Air
OH	Overhead
PT	Paint(ed)/Potential Transformer
PR	Pair
PNL	Panel
PB	Panic Bar
PTD	Paper Towel Dispenser
PTR	Paper Towel Receptor
PRL	Parallel
PKG	Parking/Package
PW	Pass Window
PBD	Particle Board
PTN	Partition
PVMT	Pavement
PED	Pedestal
PDT	Pendant
PCT	Percent
PERF	Perforate(d)
PCAP	Perforated Corrugated Aluminum Pipe
PCMP	Perforated Corrugated Metal Pipe

PERI	Perimeter
PH	Phase
PCS	Pieces
P	Pilot Light Pole/Pump
PLAS	Plaster
PLAM	Plastic Laminate
PL	Plate
PG	Plate Glass/Plate Girder
PWM	Plumbing
PWD	Plywood
PVC	Polyvinyl Chloride
PE	Porcelain Enamel
PCP	Portland Cement Plaster/Precast Concrete Panel
PIV	Post indicator valve
LB(s)	Pound(s)
PCF	Pounds Per Cubic Food
PLF	Pounds Per Lineal Foot
PSF	Pounds Per Square Foot
PSI	Pounds Per Square Inch
PWR	Power
PF	Power Factor
PS	Power Supply
PC	Precast Concrete
PFB	Prefabricate(d)
PFN	Prefinished
PRF	Preformed
PRIM	Premolded
PREP	Prepare
PRES	Pressure
PB	Prestressed Beam/Pull Box/Push Button
PSC	Prestressed Concrete
PRI	Primary
PROJ	Project/Projection
PL	Property Line
PSIA	PSI absolute
PSIG	PSI Gage
POJ	Push on Joint
QTY	Quantity
QT	Quarry Tile
QTR	Quarter
RBT	Rabbet
RL	Rainwater Leader
RTD	Rated
RCVG	Receiving
RCPT	Receptacle
REC	Recessed
RECIRC	Recirculate
RECOM	Recommendation
RECT	Rectifier/Rectangle
RE	Refer
REF	Reference
RFL	Reflect(ed), (ive), (or)
REFR	Refrigeration
RCCP	Reinforced Concrete Cylinder Pipe
RCP	Reinforced Concrete Pipe
RCPP	Reinforced Concrete Pressure Pipe
RPMP	Reinforced Plastic Mortar Pipe
REG	Register/Regulating
REINFG	Reinforcing
R&D	Remove and Dispose
R&R	Remove and Reset
R&S	Remove and Store
REQD	Required
RES	Resilient
RETWALL	Retaining wall
RET	Return
RA	Return Air
RAG	Return Air Grille
RG	Return Grille
REV	Revision(s), Revised
RPM	Revolutions Per Minute
RT	Right
RH	Right Hand/Relative Humidity
RHR	Right Hand Reverse
ROW	Right of Way
R	Riser/Return/Radius/ Thermal Resistance
RF	Roof
RD	Roof Drain/Return Diffuser
RFH	Roof Hatch
RFG	Roofing
RTU	Roof Top Unit
RM	Room
RO	Rough Opening
RIC	Rough-In and Connect
RI	Rough-In Only
RND	Round
RB	Rubber Base
RBT	Rubber Tile
RBL	Rubble
ROB	Run-Of-Bank
RJ	Rustication Joint
SFGL	Safety Glass
SNTD	Sanitary Napkin and Tampon Dispenser
SS	Sanitary Sewer
SCH	Schedule(d)
SNT	Sealant
STG	Seating
SEC	Second
SECT	Section
SENS	Sensible
SERV	Service
SSK	Service Sink

SH	Shear
SC	Shear Connection
SHPL	Shear Plate
SHTH	Sheathing
SHT	Sheet
SMACNA	Sheet Metal & A.C. Contractors National Association
SH	Shelf, Shelving
SHO	Shore(d), (ing)
SIM	Similar
SPDT	Single Pole Double Throw
SPST	Single Pole Single Throw
SK	Sink
SKL	Skylight
SL	Sleeve
SLDG	Sliding
SL	Slope
SD	Smoke Detector/Storm Drain/Supply Diffuser
SOL	Solenoid
SC	Solid Core
SA	Sound Attenuator/Supply Air
STC	Sound Transmission Coefficient
SP	Soundproof
SND	Sounds/Sanitary Napkin Disposal
S	South/Supply
SP	Space/Spare/Static Pressure
SP'G	Spacing
SPKR	Speaker
SPEC	Specification(s)
SPECD	Specified
SPKLR	Sprinkler
SQ	Square
SF	Square Feet
SI	Square Inches
SY	Square Yard(s)
SSTL	Stainless Steel
STD	Standard
C	Standard Channel/Conduit
SDR	Standard Dimension Ratio
STA	Station
ST	Steam/Tee Cut From S Shapes/Sub Total
STL	Steel
SDI	Steel Deck Institute
SJI	Steel Joist Institute
SSPC	Steel Structures Painting Council
STIF	Stiffener
STPR	Storage
SD	Storm Drain
STR	Structural
TS	Structural Tube
SAG	Supply Air Grille
SF	Supply Fan
SR	Supply Register
SUP	Support
SURF	Surface
SUSP	Suspended
SW	Switch/Soft Water/Solvent Weld
SWBD	Switchboard
SWGR	Switchgear
SYM	Symmetrical
SYN	Synchronous/Synthetic
SYS	System
TKBD	Tackboard
TKS	Tackstrip
TK	Tank
TEL	Telephone
TV	Television
TD	Temperature Difference/Trench Drain
TE	Temperature Entering
TEMP	Temperature/Temporary
TEN	Tension
TZ	Terrazzo
TH	Test Hole
T-STAT	Thermostat
THK	Thick(ness)
MBH	Thousand BTU Per Hour
MCM	Thousand Circular Mills
MSF	Thousand Square Feet
THRD	Threaded
THR	Threshold
TC	Time Clock/Top of Curb
TX	Toilet Exhaust
TPD	Toilet Paper Dispenser
TPH	Toilet Paper Holder
TPTN	Toilet Partition
TOL	Tolerance
T&G	Tongue and Groove
TON	Tons of Refrigeration
T&B	Top and Bottom
TOC	Top of Concrete
TOF	Top of Footing
TOJ	Top of Joist
TOM	Top of Masonry
TP	Top of Pavement/Towel Pin/Toe Plate
TOP	Top of Pier
TOS	Top of Steel
TSW	Top of Side Walk
TSS	Top of Structural Steel
TPW	Top of Wall
TOT	Total
TB	Towel Bar
TR	Transom

TRANS	Transportation/Transformer
TRANSV	Transverse
T	Tread
TRTD	Treated
TRWLD	Troweled
TL	Twist Lock/Total Load/Temperature Leaving
TYP	Typical
U	Undercut/Heat Transfer Coefficient
UG	Underground
UL	Underwriters Laboratory
UNF	Unfinished
UH	Unit Heater
UNO	Unless Noted Otherwise
UR	Urinal
V	Valve/Volt/Voltage
VB	Vapor Barrier
VP	Vapor Proof/Vent Pipe
VT	Vapor Tight
VAV	Variable Air Volume
VAR	Varnish
VEH	Vehicle
VEL	Velocity
VNR	Veneer
VTR	Vent Through Roof
VENT	Ventilator/Ventilation
VRM	Vermiculite
VERT	Vertical
VEST	Vestibule
VB	Vinyl Base
VCT	Vinyl Composite Tile
VWC	Vinyl Wall Covering
VCP	Vitrified Clay Pipe
VA	Volt Amperes
VAR	Volt Amperes-Reactive
VD	Voltage Drop/Volume Damper
VM	Voltmeter
VOL	Volume
WSCT	Wainscot
WTW	Wall to Wall
WH	Wall Hung/Wall Hydrant/Watt Hour
WR	Waste Receptacle
WRT	Water
WC	Water Closet
WCOL	Water Columns
WHTR	Water Heater
WR	Water Repellent
WP	Waterproofing
WS	Waterstop
WM	Wattmeter
WT	Weight/Structural Tee Cut From W Shapes
WWF	Welded Wire Fabric
WWM	Welded Wire Mesh
W	West/Width/Watt
WL	Wind Load
WDW	Window
WG	Wired Glass
W/	With
W/O	Without
WD	Wood
WB	Wood Base
WP	Working Point/Weld Prep
YD	Yard
YRD	Yard Drain
YR	Year
Z	Zone

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittal procedures.

B. Construction progress schedules.

C. Proposed products list.

D. Shop drawings.

E. Product data.

F. Samples.

G. Manufacturers' instructions.

H. Manufacturers' certificates.

1.02 RELATED SECTIONS

A. Section 01400 - Quality Control: Manufacturers' field services and reports.

B. Section 01700 - Contract Close-out: Contract warranty and manufacturer's certificates close-out submittals.

1.03 RECORD SUBMITTALS

A. Where indicated in individual specification sections, submit two copies of requested information for Owner's records. The quantity of copies supercedes other requirements for standard submittals as outlined herein. ***No more than two copies of record submittals will be accepted.*** No copies will be returned unless submittals deviate from requirements of specific specification sections. Submit record submittals per submittal procedures.

B. If substitutions are proposed, follow requirements of paragraph 1.09 of this section and submittal procedures.

1.04 SUBMITTAL PROCEDURES

Hannaford Bros. Co. uses and maintains an Internet based program called Project Place to assist in the administration management of the project. This program does not require the general contractor to buy or download any software. All submittials, before being sent to Hannaford Bros. shall be logged into Project Place over the Internet by the general contractor. Then the submittals are to be sent to the Construction Project Manager at Hannaford Bros. Co. by FEDEX.

A. Transmit each submittal with a Letter of Transmittal.

B. Sequentially number the transmittal forms. Resubmittals to have original number with an alphabetic suffix.

C. Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing Sheet and detail number(s), and specification Section number, as appropriate.

D. Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.

E. Schedule submittals to expedite the Project, and deliver to Construction Manager at business address. In scheduling submittals allow ten working days following receipt of submittal for the Owner's review. Coordinate submission of related items.

F. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

G. Provide space for Contractor and Owner's review stamps.

H. Additional requirements not applicable to record submittals:
   1. Revise and resubmit submittals as required, identify all changes made since previous submittal.
   2. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.05 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial progress schedule in duplicate within 15 days after date of notice to proceed for Owner review.

B. Revise and resubmit as required.

C. Submit revised schedules with each Application for Payment, identifying changes since previous version.

D. Submit network analysis diagram using the critical path method, generally as outlined in Associated General Contractors of America (AGC) publication "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".

E. Complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

F. Indicate estimated percentage of completion for each item of Work at each submission.

G. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates.

1.06 SHOP DRAWINGS

A. Submit in the form of one reproducible transparency and three opaque reproductions.

B. Produce all shop drawings accurately to a scale sufficiently large to show all pertinent features of the item and its methods of connection to the work.

C. After review, reproduce and distribute in accordance with Article on Procedures above and for Record Documents described in Section 01700 - Contract Close-out.

1.07 PRODUCT DATA

A. Submit five copies of each Product Data, two copies will be returned to the Contractor.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.

C. After review, distribute in accordance with Article on Procedures above and provide copies for Record Documents described in Section 01700 - Contract Close-out.

1.08 SAMPLES

A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

B. Submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for Owner's selection.

C. Include identification on each sample, with full Project information.

D. Submit the number of samples specified in individual specification Sections; one of which will be retained by Owner.

E. Reviewed samples which may be used in the Work are indicated in individual specification Section.

1.09 SUBSTITUTIONS

A. Owner will consider requests for Substitutions only within 15 days after date of Award of Contract.

B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. A request constitutes a representation that the Contractor:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Will provide the same warranty for the Substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.
   5. Will reimburse Owner for review or redesign services associated with proposed substitution.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure:

1. Submit five copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
3. The Owner will notify Contractor, in writing, of decision to accept or reject request.

1.10 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification Sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.11 MANUFACTURER'S CERTIFICATES

A. When specified in individual specification Sections, submit manufacturers' certificate to Owner for review, in quantities specified for Product Data.

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

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Owner.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Quality assurance and control of installation.

B. References.

C. Field Samples.

D. Mock-up

E. Inspection and testing laboratory services.

F. Manufacturers' field services and reports.

1.02 RELATED SECTIONS

A. Section 01300 - Submittals: Submission of Manufacturers' Instructions and Certificates.

B. Section 01600 - Material and Equipment: Requirements for material and product quality.

1.03 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Should a conflict exist between the specifications and the drawings, request a written clarification from Owner prior to proceeding with affected work.

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

D. Should manufacturers' instructions conflict with Contract Documents, request a written clarification from Owner before proceeding.

E. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

F. Perform work by persons qualified to produce workmanship of specified quality.

G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.04 REFERENCES

A. Conform to reference standard by date of issue current on Contract Documents.

B. Obtain copies of standards when required by Contract Documents.

C. Should specified reference standards conflict with Contract Documents, request clarification from Owner before proceeding.

D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 FIELD SAMPLES

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

B. Acceptable samples represent a quality level for the Work.

C. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by Owner.

1.06 SAMPLE VENEER MASONRY PANEL

A. Assemble and erect specified items, with specified attachment and anchorage devices, flashings, seals, and finishes. Refer to specification section 04300 for specific requirements.

B. The approved sample veneer masonry panel shall be built in a conspicuous location and shall be used to demonstrate the minimum acceptable standards for the wall construction.

C. Remove the approved sample veneer masonry panel upon completion of the exterior masonry work, or at other time directed by the Owner's Project Manager. Legally dispose of the removed panel.

1.07 INSPECTION AND TESTING LABORATORY SERVICES

A. Owner will appoint, employ, and pay for services of an independent firm to perform inspection and testing.

B. The independent firm will perform inspections, tests, and other services specified in individual specification Sections and as required by the Owner.

C. Reports will be submitted by the independent firm to the Owner, in duplicate, indicating observations and results of tests and indicating compliance or non- compliance with Contract Documents.

D. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.
   1. Notify Owner and independent firm 48 hours prior to expected time for operations requiring services.
   2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

E. Retesting required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Owner. Payment for retesting will be charged to the Contractor by deducting inspection or testing charges from the Contract Sum/Price.

1.08 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. Submit qualifications of observer to Owner 15 days in advance of required observations. Observer subject to approval of Owner.

B. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment as applicable, and to initiate instructions when necessary.

C. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

D. Submit report within 15 days of observation to Owner for review.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities: Electricity, lighting, heat, ventilation, water, and sanitary facilities.

B. Temporary Controls: Barriers, enclosures, protection of the Work, and water control.

C. Construction Facilities: Progress cleaning.

1.02 RELATED SECTIONS

A. Section 01700 - Contract Close-out: Final cleaning.

1.03 TEMPORARY ELECTRICITY AND LIGHTING

A. Refer to Section 16200 for temporary electricity and lighting.

1.04 TEMPORARY HEAT

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

B. Maintain minimum ambient temperature of 50 degrees F (10 degrees C) in areas where construction is in progress, unless indicated otherwise in specifications.

C. Once operational, the Owner's new heat plant may be used. Extend and supplement with temporary heat devices as required to maintain specified conditions for construction operations.

1.05 TEMPORARY VENTILATION

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

1.06 TEMPORARY WATER SERVICE

A. Provide, maintain and pay for suitable quality water service required for construction operations.

B. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

1.07 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures.

1.08 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction area and to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide protection for plant life designated to remain. Replace damaged plant life.

C. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

1.09 WATER CONTROL

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

B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

1.10 EXTERIOR ENCLOSURES

A. Provide temporary insulated 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 prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

B. Provide temporary roofing as required.

1.11 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification Sections.

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

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

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

E. Motorized man lifts and vehicles will not be allowed on the sales floor after delivery of refrigerated cases.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Prohibit traffic from landscaped area.

1.12 BUILDING AND SITE STORM PROTECTION

A. When a warning of gale force winds is issued, take precautions to minimize danger to persons, and protect the work and nearby property. Precautions shall include, but not limited to, closing openings; removing loose materials, tools and equipment from exposed locations; and removing or securing scaffolding and other temporary work. Close openings in the work when storms of a lesser intensity pose a threat to the work or nearby property.

1.13 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and

orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Remove waste materials, debris, and rubbish from site as directed and dispose off-site.

1.14 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to Substantial Completion inspection.

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

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

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

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Products.

B. Transportation and handling.

C. Storage and protection.

D. Product options.

E. Substitutions.

1.02 RELATED SECTIONS

A. Section 01400 - Quality Control: Product quality monitoring.

1.03 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

C. Provide interchangeable components of the same manufacturer, for similar components.

1.04 TRANSPORTATION AND HANDLING

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

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

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

1.05 STORAGE AND PROTECTION

A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.

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

C. Provide off-site storage and protection when site does not permit on-site storage or protection.

D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to

avoid condensation.

E. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

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

G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

1.06 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specification, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named per paragraph 1.09 of Section 01300.

END OF SECTION

FACILITY COMMISSIONING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section is to coordinate and define the roles of the various trades involved in the start-up and commissioning of the facility. The purpose of this process is to guarantee that all mechanical, refrigeration, electrical and stand-alone equipment systems are completely installed and functioning as designed prior to the store opening. This process is not to take away or reduce the responsibility of the system designers or installation contractors to provide fully operational systems tuned and balanced to the best of their ability. It is the responsibility of the Manager of Quality and Refrigeration to establish the commissioning (start-up) date based on completion of the system installation milestone list (part of the contract documents). The commissioning should begin approximately 21 days before contract completion and be concluded prior to the contract completion date. A pre-commissioning meeting will be scheduled by the HBC Manager of Quality and Refrigeration (about 10 to 14 days prior to commissioning) for coordination. All members of the commissioning team are expected to attend. The purpose of the pre-commissioning meeting is to document level of readiness for commissioning of every system involved in the process, and formulate a plan for reaching a ready state by the commissioning date. The commissioning process will be considered complete when the HBC Manager of Quality and Refrigeration has received all verification documents..

1. The commissioning team will be comprised of the following:
    a. General Contractor
    b. Mechanical Contractor
    c. Plumbing Contractor
    d. Electrical Contractor
    e. Testing and Balancing Contractor
    f. Refrigeration Installation Contractor
    g. Controls Contractor
    h. Refrigeration Start-up Contractor
    i. LPG Supplier (if applicable)
    j. HBC Project Manager
    k. HBC Equipment Coordinator
    l. HBC Maintenance Representative
    m. Design Mechanical Engineer
    n. Refrigeration Designer

B. The equipment to be commissioned includes (but is not limited to) the following:

1. Mechanical and Refrigeration systems in the following sequence:
    a. exhaust systems
    b. main sales heating/ac
    c. perimeter heating/ac systems
    d. range hoods
    e. mid temp refrigeration systems
    f. low temp refrigeration systems
2. Electrical systems
    a. distribution switchgear
    b. emergency power systems
    c. disconnects
    d. circuit breaker panels (including schedules)
3. Plumbing Systems
    a. domestic hot water system

- b. backflow preventer
- c. water treatment systems
- d. sinks (backflow preventers, check valves)
- e. hand sinks (eyewashes, tempering valves, check valves)
- f. water closets and urinals
- g. lavatories (tempering valves and checkvalves)
- h. produce misting system
- i. hydrants and hose bibs
- j. grease traps and sump pits
- k. waste treatment (septic tank or equipment)
- l. lift stations
- m. floor drains

4. Fire Protection, Security, and Sprinkler Systems
   - a. Sprinkler System
     1. back flow protection
     2. alarm sensors (flow and tamper)
     3. sealant around penetrations into freezers and coolers
     4. eustacions
     5. glycol loop and glycol mix
   - b. Fire Protection System
     1. fire suppression gear
        - a. fire extinguishers
        - b. range hood systems
     2. fire alarms and detection
        - a. smoke detectors
          1. space
          2. duct
        - b. manual pull stations
        - c. sprinkler flow detection
        - d. valve tamper switches
        - e. horns/voice page & strobes
   - c. Security System
     - a. door contacts
     - b. door sounders
     - c. motion detectors
     - d. exterior strobe and siren
     - e. CATV
     - f. back-up cellular phone
5. Building Envelope, and Interiors
   - a. membrane roof and roof penetrations
   - b. flashings, drains, and gutters
   - c. impact doors
   - d. automatic doors and entrance matting
   - e. overhead doors
   - f. dock levelers, seals, and lights
   - g. doors and door hardware
   - h. coolers and cooler doors
   - i. floor, wall, and ceiling finishes
   - j. exit lights
   - k. buzzers at front and rear vendor door
6. Store Equipment
   - a. in store fuel burning equipment (ovens, fryers, etc.)
   - b. bailer and compactor
   - c. checkouts
   - d. bakery proofer
   - e. deli cookers

f. muzak and paging system

C. HBC maintenance or HBC engineer will be present to observe and coordinate the various trades during the commissioning process. The commissioning will be considered complete when the HBC Maintenance Representative determines that the systems are fully functional and operating in the most effective manner, and the team members have verified in writing all sign-off documents. The HBC Project Manager will forward all verification documents to the HBC Maintenance Representative prior to store opening.

1.02 REFERENCES AND STANDARDS

A. AABC Standards
B. ASHRAE Standards & Guidelines
C. NEBB Standards
D. NFPA various standards
E. ADA

1.03 THIS SECTION OUTLINES THE FOLLOWING COMMISSIONING TEAM MEMBERS SPECIFIC RESPONSIBILITIES.

A. General Contractor: Coordinate between contractors to assure completion of installation of the equipment in the time frame of the commissioning process. Provide the testing and balancing agency with one set of the following documents:
   1. Within 30 days after approved selection of the Agency:
      a. Contract drawings.
      b. Applicable specifications.
      c. Addenda as required.
   2. As issued.
      a. Change Orders.
   3. Within 30 days after approval of the following documents;
      a. Approved shop drawings.
      b. Approved equipment manufacturer's submitted data.
      c. Approved temperature control drawings.
   4. The Testing and Balancing Contractor shall be provided with:
      a. A reasonable time, as determined by the Testing and Balancing Contractor, to complete Test and Balance Work prior to the specified commissioning date.
      b. Completely operable systems.
      c. The right to request system adjustments.
      d. Access to system components.

B. Testing and Balancing Contractor: This contract shall be independent of the HVAC contractor. Temperature readings of the domestic hot water system. Sample forms follow this section.

C. Mechanical Contractor: Preparation of the air-side and fuel burning equipment for balancing. Measurement of initial and final operating condition of HVAC systems at the time of start-up. A combustion efficiency test is to be conducted for all fuel burning air and water heating equipment. Participate in the initial start-up of the domestic hot water system. Refer to the sample form at the end of this section. Reports are to be available prior to the last week of commissioning.

D. Refrigeration Installation Contractor: The preparation of the Hydronic equipment for operation. The Air/Water Balancing Contractor shall be responsible for all measurements which include measurement of pressures, temperatures, and flows. Adjustment to achieve the proper pressure drop across the Hydronic coils and a balanced flow will be made by the Balancing Contractor.

E. Refrigeration Start-up Contractor: The initial measurements of the refrigeration system performance are the responsibility of the Refrigeration start-up Contractor at the time of commissioning. Pressures, temperatures, and adjustments of the refrigerant flow and all other refrigeration related issues are the responsibility of the Refrigeration Start-up Contractor. Reports are to be available for review by the Project Manager and HBC Maintenance prior to the last week of the Commissioning Process.

F. Controls Contractor: Proof all control sequences, all settings, and adjusting the HVAC controls for the commissioning team to produce the required conditions for balancing and taking heating/cooling performance measurements.

H. Plumbing Contractor: Pressure test the fuel piping system and furnishing certification that it is leak tight at 50 times working pressure. Installation of the proper secondary pressure reducer and a means to isolate the reducer for repair if needed. Responsible for proper installation of the hot water system and hot water heater. Initial start-up of the domestic hot water system.

1.04 SUBMITTALS FOR ENGINEER'S REVIEW AND APPROVAL

A. Submit certified test reports for review and approval. Provide reports in soft cover, letter size, complete with index page, with cover identification.

B. The TAB Contractor shall provide final copies to the General Contractor for inclusion in operating and maintenance manuals. Refer to Section 15012, “Operating and Maintenance Data” for O&M manual requirements.

1.05 QUALITY ASSURANCE

A. Testing and Balancing Contractor shall be the company specified in Section 15850, “Testing, Adjusting and Balancing”, specializing in the testing, adjusting, and balancing of air/water systems.

B. System balance shall be performed in accordance with NEBB Procedural Standards for Testing, Balancing and Adjusting of Environment Systems.

1.06 REPORT FORMS

A. Submit reports on AABC National Standards for Total System Balance or NEBB forms.

B. Forms shall include the following information:
   1. Title Page:
      a. Company name
      b. Company address
      c. Company telephone number
      d. Project name
      e. Project location
      f. Project Architect
      g. Project Engineer
      h. Project Contractor
      I. Project altitude
      j. Certification numbers
      k. Supervisor’s name
   2. Instrument List:
      a. Instrument
      b. Manufacturer
      c. Model
      d. Serial number

e. Range
f. Calibration date

3. System Diagrams:
   a. Project
   b. Location
   c. System
   d. Schematic diagram, fully labeled and numbered
4. Air Moving Equipment Test Sheets:
   a. Location
   b. Manufacturer
   c. Model
   d. Serial number
   e. Air flow, specified and actual
   f. Return air flow, specified and actual
   g. Outside air flow, specified and actual
   h. Return air temperature
   I. Outside air temperature
   j. Mixed air temperature
   k. Outside/return air ratio
   l. Total static pressure (total external), specified and actual
   m. Inlet pressure
   n. Discharge pressure
   o. Fan RPM
5. Exhaust Fan Data:
   a. Location
   b. Manufacturer
   c. Model
   d. Serial number
   e. Air flow, specified and actual
   f. Total static pressure (total external), specified and actual
   g. Inlet pressure
   h. Discharge pressure
   I. Fan RPM
6. Exhaust Hood Systems:
   a. Balanced as recommended by hood manufacturer.. Include data in final report.
7. Duct Traverse:
   a. System zone/branch
   b. Duct size
   c. Area
   d. Diagram showing reading locations
   e. Design velocity
   f. Design air flow
   g. Test velocity
   h. Test air flow
   I. Duct static pressure
   j. Air temperature
   k. Air correction factor
8. Air Distribution Test sheet:
   a. System schematic (See item 3).
   b. Air terminal number
   c. Room number/location
   d. Terminal type
   e. Terminal size
   f. Area factor
   g. Design velocity

h. Design air flow
I. Test (final) velocity
j. Test (final) air flow
k. Percent of design air flow
l. Building static pressure

C. Completion of the Hannaford Bros. Co. forms by the appropriate members of the commissioning team is required. The following forms are attached:
1. Milestone Sign-Off (from contract)
2. Project Commissioning Schedule & Team List
3. Commissioning Verification Sign -Off Sheet
4. New Construction Refrigeration and HVAC Equipment Installation Schedule
5. Gas Piping Leak Test Certification
6. Gas Fired Heat Apparatus Test Report
7. RTAH & Rooftop/Air Conditioning Unit Test Report
8. Package Rooftop/Air Conditioning Unit Test Report
9. Rack A, Rack B, & Rack AC Controls Verification Forms (7 pages)
10. Refrigeration Start-Up Sheet (4 pages)
11. System Start-up Sheet (2 pages)

1.07 MECHANICAL CONTRACTOR EQUIPMENT COMMISSIONING DATA

A. The following start-up data will be furnished to the Testing and Balancing Contractor for their use and inclusion in the Testing and Balancing Report.
1. Air Cooled Condenser Report (Package Units and Condensing Units):
a. Identification/number
b. Location
c. Manufacturer
d. Model and Serial Numbers
e. Entering DB air temperature, design and actual
f. Leaving DB air temperature, design and actual
g. Number of compressors
h. Refrigerant/Lbs..
I. Low ambient control.
j. Suction pressure/temperature
k. Condenser pressure/temperature
l. Oil pressure/temperature
m. Voltage/amperage
n. KW input
o. Crankcase heater amps
p. No. of fans, fan RPM/CFM
q. Fan motor made/frame/HP
r. Fan motor volts/amps
2. Cooling and Heat Recovery Coil Data:
a. Identification/number
b. Location
c. Service
d. Manufacturer
e. Rows - Fins per inch
f. Face area
g. Air flow, design and actual
h. Entering air DB temperature, design and actual
I. Entering air WB temperature, design and actual
j. Leaving air DB temperature, design and actual
k. Leaving air WB temperature, design and actual
l. Air pressure drop, design and actual

m. Expansion valve/refrigerant
n. Refrigerant suction pressure
o. Refrigerant suction temperature
p. Refrigerant pressure drop

3. Combustion Test:
   a. Burner manufacturer
   b. Model
   c. Firing rate
   d. Over fire draft
   e. Gas meter timing dial size
   f. Gas meter time per revolution
   g. Gas pressure at meter outlet
   h. Gas flow rate
   I. Heat input
   j. Burner manifold gas pressure
   k. Percent carbon monoxide (CO)
   l. Percent carbon dioxide (C02)
   m. Percent oxygen (02)
   n. Percent excess air
   o. Flue gas temperature at outlet
   p. Ambient temperature
   q. Net stack temperature
   r. Percent stack loss
   s. Percent combustion efficiency
   t. Heat output
4. Electric Motors: (Furnished by Mechanical Contractor)
   a. Manufacturer
   b. HP/BHP (show BHP calculations)
   c. Phase, voltage, amperage, nameplate, actual, no load.
   d. RPM
   e. Service factor
5. V-Belt Drive: (Furnished by Mechanical Contractor)
   a. Identification/location
   b. Required driven RPM
   c. Driven sheave, diameter and RPM
   d. Belt, size and quantity
   e. Motor sheave, diameter and RPM
   f. Center to center distance, maximum, minimum, and actual (show diagram)

1.08 EMERGENCY GENERATOR COMMISSIONING DATA

A. The following information is to be completed and furnished to the HBC Project Manager prior to the final week of the Commissioning process:
   1. Start-up Contractors name, address, telephone and fax No.
   2. Manufacturer, model, serial number.
   3. Actual output by phase under load as KW, amperes, voltage, frequency.
   4. Oil and water temperatures and pressures during operation under load.
   5. Room ambient before test, during test.

1.09 GENERAL CONTRACTOR EQUIPMENT COMMISSIONING DATA

A. The following information is to be completed and furnished to the Project Manager prior to the final week of the Commissioning process:
   1. Automatic doors
   a. Installer name, address, telephone and fax no.
   b. Brand, model, serial no.

c. Safety sensor and rail.
d. Verification of conformance to ANSI/BOCA/SBCCI/NFR regulations.

2. Roof systems
   a. Installer name, address, telephone, and fax No.
   b. Brand, model.
   c. Warrantee

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Before commencing commissioning, verify that systems are complete and operable. Ensure the following:
   1. Equipment is operable and in a safe and normal condition.
   2. Temperature control systems are installed completely and operable.
   3. Proper thermal overload protection is in place for electrical equipment.
   4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
   5. Duct systems are clean of debris.
   6. Fan rotation is correct.
   7. Volume dampers are in place and open.
   8. Coil fins have been cleaned and combed.
   9. Access doors are closed and duct end caps are in place.
   10. Air outlets are installed and connected.
   11. Duct system leakage has been minimized.
   12. Hydronic systems have been flushed, filled, and vented.
   13. Pump rotation is correct.
   14. Proper strainer baskets are clean and in place.
   15. Service and balance valves are open.
   16. Remote telephone connections are functional.

B. Report any defects or deficiencies noted during performance of services to HBC Maintenance Representative.

C. Promptly report abnormal conditions in mechanical systems or conditions which prevent system balance.

D. If, for design reasons, system cannot be properly balanced, report as soon as observed.

E. Beginning of work means acceptance of existing conditions.

3.02 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to owner to facilitate spot checks during testing.

B. Provide additional balancing devices as required.

3.03 INSTALLATION TOLERANCE

A. Adjust air handling systems to plus or minus 10 percent for supply systems and plus or minus 10 percent for return make-up air and exhaust systems from figures indicated.

B. Adjust Hydronic systems to plus or minus 10 percent of indicated design conditions.

3.04 ADJUSTING

A. Record data shall represent actually measured, or observed condition.

B. Permanently mark settings of dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not rectified.

D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switches bases, and restoring thermostats to specified settings.

E. At final inspection recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the HBC Maintenance Representative.

3.05 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.

B. Made air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct. Round duct traverses shall be in accordance with NEBB instructions and shall be reported on NEBB report form.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air and return air dampers for design conditions.

J. Measure building static pressure and adjust make-up, supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries with exit doors closed.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Close-out procedures.

B. Final cleaning.

C. Adjusting.

D. Project record documents.

E. Operation and maintenance data.

F. Warranties.

G. Spare parts and maintenance materials.

1.02 RELATED SECTIONS

A. Section 01500 - Construction Facilities and Temporary Controls: Progress cleaning.

1.03 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Owner's inspection.

B. Provide submittals to Owner that are required by governing or other authorities.

1.04 FINAL CLEANING

A. Execute final cleaning prior to final inspection.

B. Clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Clean equipment and fixtures to a sanitary condition.

D. Replace filters of operating equipment.

E. Clean debris from roof, gutters, downspouts, and drainage system.

F. Clean site; sweep paved areas, rake clean landscaped surfaces.

G. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.05 ADJUSTING

A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.06 PROJECT RECORD DOCUMENTS

A. Maintain on site, one set of the following record documents; record actual revisions to the Work:
   1. Contract Drawings.
   2. Specifications.
   3. Addenda.
   4. Construction change authorizations.
   5. Change Orders, and other Modifications to the Contract.
   6. Reviewed shop drawings, product data, and samples.

B. Store Record Documents separate from documents used for construction.

C. Record information concurrent with construction progress.

D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and Modifications.

E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish main floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   4. Field changes of dimension and detail.
   5. Details not on original Contract Drawings.

F. Submit documents to Owner.

1.07 OPERATION AND MAINTENANCE DATA

A. Submit two sets prior to final inspection, bound in 8- 1/2 x 11 inch text pages, three D side ring capacity expansion binders with durable plastic covers.

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

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

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

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

F. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
   1. Significant design criteria.
   2. List of equipment.

3. Parts list for each component.
4. Operating instructions.
5. Maintenance instructions for equipment and systems.
6. Maintenance instructions for finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.

G. Part 3: Project documents and certificates, including the following:
1. Shop drawings and product data.
2. Air and water balance reports.
3. Certificates.
4. Photocopies of warranties and bonds.

H. Submit one copy of completed volumes in final form 30 days prior to final inspection. This copy will be returned after final inspection, with Owner comments. Revise content of documents as required prior to final submittal.

I. Submit final volumes revised, within ten days after final inspection.

1.08 WARRANTIES

A. Except as longer terms are specified under the various Technical Sections of the Specifications, and barring any conflicting provisions in any Conditions of the Contract, all work on the Project shall be guaranteed against defects in materials and/or workmanship for a period of one (1) year commencing on the date the project, or portion, thereof, is accepted for beneficial use and occupancy for the purpose intended.

B. During the warranty period, the following trades will provide 24 hour per day warranty service with a four hour response time. Names and 24 hour phone numbers for emergency warranty service shall be provided to Owner prior to completion.
1. Automatic Entrance Doors
2. Refrigeration
3. HVAC
4. Plumbing
5. Roofing
6. Sprinkler System
7. Electrical

C. Any such defects occurring within such period shall be promptly corrected without additional charge to the Owner.

D. Provide duplicate notarized copies.

E. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.

F. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.

G. Submit prior to final Application for Payment.

H. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.09 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Section.

B. Deliver to Project site and place in location as directed; obtain receipt prior to final payment.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 02220

STRUCTURAL EXCAVATION, BACKFILL AND COMPACTION
(BUILDING AREA & FOUNDATIONS)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavation for building foundations and slabs-on-grade.

B. Fill under slabs-on-grade.

C. Building perimeter backfilling to sub-grade elevations.

D. Consolidation and compaction.

E. Fill for over-excavation.

F. Fill for existing slab removal to raise elevations.

1.02 RELATED SECTIONS

A. Section 01400 - Quality Control: Inspection of bearing surfaces, testing fill compaction.

B. Section 01500 - Construction Facilities and Temporary Controls: Dewatering excavations and water control.

C. Section 02700 – Sub-drainage Systems: Fill over and around drains.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Coordinate excavation, backfilling, foundation drainage system and other related site construction items with “Geotechnical Engineering Evaluation Report”, File Number 80721-010 by Haley & Aldrich, and site construction documents by Deluca - Hoffman Associates, Inc.

1.04 REFERENCES

A. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

C. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb Rammer and 18 inch Drop.

D. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil In Place by the Rubber Balloon Method.

E. ASTM D2922 - Standard Test Methods for Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth).

F. MDOT - Standard Specifications, Highways and Bridges, State of Maine, Department of Transportation.

1.05 QUALITY ASSURANCE

A. Routine testing of existing soils, and compacted material for compliance with these Specifications shall be performed by a testing agency acceptable to Engineer.

B. Compacted material which does not meet density requirements shall be removed and/or re-compacted, and retested.

1.06 TESTING SERVICES

A. The testing agency shall perform the following services.
   1. Approve all materials proposed by Contractor for use as compacted fill. Review and test material and determine optimum moisture at which maximum density can be obtained in accordance with ASTM D 1557, Modified Procotor.
   2. Review and approve filling and compaction procedures.
   3. Review and approve preparation of footing sub-grade. A licensed professional geotechnical engineer shall be present during proof rolling to identify soils requiring undercutting and replacement; and during excavation to verify footing bearing stratums.
   4. Verify in-place densities of compacted material. Each fill lift shall have a minimum of four tests.
   5. Testing agency shall submit two copies of reports to Architect, Contractor, Engineer, and Owner. Include date of testing, location, elevation, and readings of all density tests.

1.07 RESPONSIBILITIES OF CONTRACTOR

A. Advise testing agency sufficiently in advance of operation to allow assignment of personnel and completion of tests.

B. Use of testing services shall in no way relieve Contractor of his responsibility to furnish materials and construction as specified.

1.08 EXISTING UTILITIES

A. Locate existing underground utilities in area of work before starting earthwork operations. Where utilities are to remain in place, provide adequate means of protection during earthwork operations.

B. If uncharted, or incorrectly charted, piping or other utilities are encountered during excavation, consult utility owner and Architect immediately for directions. Cooperate with Owner, and public and private utility companies to keep their respective services and facilities in operation. Repair damaged utilities as required by utility owner.

C. Coordinate interruption and/or termination of utilities with the utility companies and the Owner.

D. Provide a minimum of forty-eight (48) hours notice to the Owner and receive written notice to proceed before interrupting any utility.

1.09 USE OF EXPLOSIVES

A. Do not bring explosives onto site nor use in work.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. All fill materials shall consist of hard durable particles free from ice, roots, sod, rubbish, lumps or balls of clay, peat, organic materials and other deleterious substances.

B. Structural fill/backfill: For use as backfill and structural fill to support footings and slabs-on-grade and fill against foundation walls. Structural fill shall consist of a sandy gravel or gravelly sand, free from ice, lumps or balls of clay, and other deleterious substances. The material shall conform to the requirements of MDOT 703.06 (a) Type C - Aggregate for Base.

Sieve Size	Percent Passing by Weight
6 inch	100
No. 4	30-90
No. 40	10-50
No. 200	0-8

See Geotechnical Report for compaction requirements.

C. Crushed Stone Fill: For use around foundation drains and as a base for wet footing subgrades. Crushed stone fill shall be free from ice, roots, sod, rubbish, and other deleterious or organic matter, and shall conform to the following gradation requirements:

Sieve Size	Percent Passing by Weight
4 inch	100
3 inch	90-100
1/4 inch	25-90
No. 40	0-30
No. 200	0-5

D. Excavated Materials: May **not** be use as structural fill below and adjacent to the building structure. Refer to soils report for information.

E. All material shall be acceptable to geotechnical engineer.

PART 3 EXECUTION

3.01 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Identify known underground, above ground, and aerial utilities. Stake and flag locations.

C. Notify utility company to remove or relocate utilities.

D. Protect above and below grade utilities which are to remain.

E. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

3.02 JOB CONDITIONS

A. Examine all substrates and conditions under which Work shall be performed. Do not proceed with Work until all unsatisfactory conditions are corrected.

B. During construction, drainage shall be maintained and traffic within building area shall be

restricted to maintain integrity of sub-grade. Failure to observe these precautions may require Contractor, at his own expense, to remove disturbed areas and correct.

C. Protect the sub-grade, soils beneath foundations, and soils adjacent to foundations from frost.

3.03 EXCAVATION

A. Underpin adjacent structures which may be damaged by excavation work, including utilities and pipe chases.

B. Excavation shall consist, in general, of the excavation of whatever substance is encountered to the lines, grades and sections shown on the Drawings, including excavation as necessary for grading and other similar features.

C. The scope of this contract includes only the following types of excavation:
   1. Unclassified Excavation: Shall consist of the removal of all material encountered and removed when establishing grades required for the work, including rock, peat and muck excavation, and unsuitable fill removal.
   2. Rock Excavation: Shall consist of removal of hard ledge rock which cannot be removed by heavy earth moving equipment, and in the opinion of the Owner's Representative, requires blasting.
   3. Excavation of Unsatisfactory Material Within the Building Area: Shall consist of the excavation of all fill materials and organic and inorganic soils to the limits shown on the plans and to a depth approved by the Owner's Representative.
   4. Excavation for Structures:
      a. Shall consist of all excavation for construction of building footings, foundation walls, retaining walls, and all utility structures. Conform to elevations and dimensions shown within a vertical tolerance of one-half (½) in. and extending a sufficient horizontal distance from footings and foundations to permit placing and removal of concrete form-work, installation of services, other construction, and for inspections.
      b. Excavation for footings and foundations shall extend to the depth necessary to remove all fill and unsuitable native material to the depth as determined by the Owner's Representative. When the footing and foundation grades extend into native soils, the native soil shall be excavated to the foundation grades specified on the plans.
      c. After excavation to bearing grade in naturally occurring soil or compacted granular backfill, the exposed footing sub-grade should be compacted with a minimum of four passes of hand-guided vibratory compaction equipment.
      d. Rock shattered due to drilling or blasting operations shall be removed. Excess rock excavation shall be filled with 2500 psi concrete.
   5. Excavation for Trenches:
      a. Conform to elevations and dimensions within a vertical tolerance of one (1) in. Excavate to the uniform width shown or required for the particular item to be installed. Provide adequate working space for compaction equipment.
      b. Excavate trenches to the depth indicated or required. Carry the depth of trenches for piping to establish the indicated flow lines and invert elevations and provide suitable bedding. Pipe bedding is specified in Article 2.01.
      c. Where rock is encountered, carry the excavation six (6) in. below the required elevation and backfill with a 6-in. layer of crushed stone or gravel prior to installing pipe.
      d. Grade bottoms of trenches as indicated, notching under pipe joints to provide solid bearing for the entire body of the pipe.
      e. Do not backfill trenches until authorized by the Owner's Representative. Use care in backfilling to avoid damage or displacement of pipe systems.

6. Muck Excavation: Muck excavation shall consist of the excavation and disposal of saturated and unsaturated mixtures of soils and organic matter not suitable for foundation or embankment material, regardless of moisture content.

D. Suitable materials removed in excavation shall be used in the construction of embankments, sub-grade, shoulders, slopes and at such other places as directed. The Engineer shall be the sole judge of what constitutes suitable material.

E. During construction, the grading operations shall be executed in such a manner that the excavation will be well drained at all times. All grading shall be finished on neat, regular lines conforming to the sections and contours shown on the Plans.

F. Removal of materials beyond the indicated sub-grade elevations, without authorizations by the Engineer, shall be classified as unauthorized excavation and shall be performed at no additional cost to the Owner. Any excess excavation shall be removed from the site to disposal areas at the Contractor's expense. Correct unauthorized excavation at no extra cost to Owner.

G. Excavation shall be performed in proper sequence with all other associated operations.

H. Maintain the slopes of excavation in a safe condition until completion of the grading operation.

I. Excavation cut not to interfere with normal 45 degree bearing splay of foundations.

J. Hand trim excavation. Remove loose matter.

K. All excavation work shall be inspected and approved by the Engineer before proceeding with construction.

L. Notify Architect/Engineer of unexpected subsurface conditions and discontinue affected work in areas until notified to resume work.

M. Remove excavated unsuitable material from site.

3.04 ROCK AND LEDGE REMOVAL

A. Excavated material will be classified as rock only when the following conditions prevail:
1. When the material cannot be broken and removed by power excavating equipment and requires the use of drills, or the use of explosives.
2. Rock or stone in original ledge.
3. Hard shale in original ledge.
4. Boulders in excess of ½ cubic yard in trenches.
5. Boulders in excess of two cubic yards in open excavation.
6. All other excavation shall be classified as "earth" insofar as removal of the material to be excavated is concerned; also removal of existing paving, foundations, or other man made structures is not classified as rock removal.

B. When during the progress of excavation, rock is encountered, such material shall be uncovered and exposed, and the Engineer shall be notified by the Contractor, before proceeding further. The areas in question shall then be cross-sectioned as specified hereinafter. The Contractor shall not proceed with excavation of material claimed as rock until the material has been classified by the Engineer. Failure on the part of the Contractor to uncover such materials, or notify the Engineer, or take cross-sections, will forfeit the Contractor's right-of-claim to any credits. The quantity of rock removed will be based on the

pay line limits as established hereinafter.

C. The Contractor shall employ qualified personnel acceptable to the Engineer, to take cross-sections of rock before removal of same, and to provide computations of cross-sections of rock before removal of same, and to provide computations of cross-sections within the pay-line limits.

D. Rock Excavation for Foundations: All rock bottoms for foundations shall be carefully examined: Loose or shaken rock shall be removed to solid bearing and the rock surface leveled or shelved to a slope not exceeding one inch per foot, or as directed.

E. Rock Excavation Outside the Buildings: Excavate rock encountered in grading the areas outside of the building to depths as follows:
1. Under all steps, slabs, and utility lines to six inches below bottom and to twelve inches each side of pipe or wall (i.e., manholes, catch basins, retaining walls).

F. Blasting:
1. Obtain written permission and approval of method from the local authorities before proceeding with rock excavation. Explosives shall be stored, handled, and employed in accordance with the provisions of the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc.
2. Blasting shall be performed only by licensed personnel.
3. The Contractor shall be solely responsible for the adequacy and safety of blasting methods and procedures and shall be solely responsible for any and all damages caused by blasting operations.
4. The Contractor shall be deemed to have investigated the use and occupancy of buildings in the adjacent area and to have determined whether any facilities or uses of same, such as but not limited to sensitive recording instruments or computers, would require blasting safety procedures more stringent than usual in order to prevent damage to such facilities. The costs of all such protection shall be deemed included in the contract price.

3.05 BACKFILL PREPARATION

A. Verify fill materials to be reused are acceptable.

B. Generally, compact sub-grade to density requirements for subsequent backfill material.

C. Cut out soft areas of sub-grade not capable of in site compaction. Backfill with structural fill and compact to density equal to or greater than requirements for subsequent backfill material.

3.06 BACKFILL AND FILL

A. General: Place unfrozen acceptable soil material in layers to required sub-grade elevations, for each area classification listed below.
1. Within the limits of the building, use compacted granular fill.
2. Backfill within five (5) feet (horizontally) of foundation shall consist of compacted structural fill material.
3. In pipe trenches, use material specified in the typical trench section, unless specified otherwise.

B. Backfill excavations as promptly as work permits, but not until completion of the following:
1. Acceptance by Owner's Representative of construction below finish grade including,

where applicable, dampproofing, waterproofing, and perimeter insulation.
2. Inspection, testing, approval, and recording locations of underground utilities.
3. Removal of concrete form-work.
4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Temporary sheet piling driven below bottom of structures shall be removed in manner to prevent settlement of the structure or utilities, or cut off and left in place if required.
5. Removal of trash and debris.
6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

C. Ground Surface Preparation:

1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, scarify or break-up sloped surfaces steeper than one vertical to four horizontal so that fill material will bond with existing surface.
2. When existing ground surface has a density less than that specified under "Compaction" for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.

D. Fill for Increasing Grades at Existing Slab Removal Locations.

1. Raise grade elevations at existing slab removal locations to bottom of proposed slab on grade. See plans for existing slab removal locations.

E. Placement and Compaction:
1. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than six inches in loose depth for material compacted by hand-operated tampers.
2. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
3. Employ a placement method that does not disturb or damage utilities in trenches.
4. Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around structure to approximately same elevation in each lift. Backfill against supported foundations walls. Do not backfill against unsupported foundations walls. Backfill simultaneously on each side of unsupported foundation walls.

5. Compacted granular backfill below foundations should extend to lateral limits defined by one horizontal to one vertical lines sloped outward and downward from points located two feet horizontally from the bottom exterior edges of footings.

F. Remove surplus backfill materials from site.

G. Leave fill material stockpile areas completely free of excess fill materials.

H. Where a power roller is used for compaction, do not approach nearer than 10 feet from the walls of new or existing construction. Compaction within 10 feet shall be performed with hand-operated vibratory equipment only.

3.07 COMPACTION

A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification.

B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum dry density (determined in accordance with ASTM D1557).
   1. Building Area Excavation: Compact each layer of backfill material to 95% of maximum dry density.
   2. Building Footings Adjacent to Foundation Walls: Compact disturbed sub-grade and each layer of base material to 95% of maximum dry density.
   3. Pipe Trenches: Compact bedding material and each layer of backfill to six (6) inches over the pipe to 90% of maximum dry density.

C. Moisture Control
   1. Where sub-grade or a layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of sub-grade, or layer of soil material, in proper quantities to prevent free water appearing on surface during or subsequent to compaction operations.
   2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
   3. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory level.

3.08 GRADING

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding.

C. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified. Provide final grades within a tolerance of one-half (½) inch when tested with a 10 foot straight edge.

D. Compaction: After grading, compact sub-grade surfaces to the depth and percentage of maximum density for each area classification.

3.09 DEWATERING

A. Perform excavation and filling in a manner and sequence that shall provide proper drainage at all times.

B. Provide all necessary pumping and drainage required to maintain dry excavations at all times.

C. As building construction proceeds, provide temporary devices to prevent water from entering enclosed portions of work. Immediately remove water that does enter.

3.10 TOLERANCES

A. Excavation for structures shall conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet except to facilitate drainage during construction stage.

B. Surface of subbase under building slabs shall be graded smooth and even, free of voids, rolled, and to required elevation. Provide final grades within a tolerance of ½ inch when tested with a 10 foot straightedge.

3.11 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of section 01400.

B. Provide for visual inspection of bearing surfaces.

C. Quality Control Testing During Construction: Allow testing service to examine and test subgrades and fill layers, before further construction work is performed. As a general guideline the Owner will have the following quality control testing performed at no cost to the Contractor.
1. Field density tests in accordance with ASTM D1556 (sand cone method) ASTM D2167 (rubber balloon method), ASTM D2922 (Nuclear Device), as applicable.
2. Laboratory gradation and density on all borrow materials.
3. Laboratory gradation and density on all gravel and fill base materials.

D. If in opinion of the Owner's Representative, based on testing service reports and inspection, sub-grade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense to the Owner.

3.12 PROTECTION OF FINISHED WORK

A. Protect finished work under provisions of Section 01500.

B. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

C. Protect bottom of excavations and soil adjacent to and beneath foundation, from freezing.

D. Recompact fills subjected to vehicular traffic.

3.13 DISPOSAL OF WASTE MATERIALS:

A. Removal from Owner's Property: Remove waste materials, including trash and debris, and dispose of it off Owner's property.

END OF SECTION

SECTION 02700

SUBDRAINAGE SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Foundation perimeter drainage system.

B. Filter aggregate and setting bed.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Coordinate trenching, excavation, backfilling, foundation drainage system and other related items with site construction documents.

1.03 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Section 03200 - Cast in Place Concrete: Installation of pipe sleeves for placement in concrete.

1.04 REFERENCES

A. ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

B. MDOT - Standard Specifications, Highways and Bridges, State of Maine, Department of Transportation.

C. NYDOT - Standard Specifications, Construction and Materials, New York State Department of Transportation, Office of Engineering.

D. NHDOT - State of New Hampshire, Department of Transportation, Standard Specifications for Road and Bridge Construction.

1.05 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Samples:
1. The Contractor shall furnish earth materials to the testing laboratory for analysis and report, as directed by the Engineer, or as outlined in the specifications.
2. One (1) square yard filter fabric.
3. Three (3) feet perforated pipe.

C. Product Data:
1. Submit manufacturer's catalog cuts, specifications and installation instructions for the following:
   a. Pipe
   b. Filter Fabric

1.06 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01700.

B. Accurately record location of pipe runs, connections, cleanouts and invert elevations.

PART 2 PRODUCTS

2.01 PIPE MATERIALS

A. Polyvinyl Chloride Pipe: ASTM D3034 SDR-35; perforated; plain end; 4 inch inside diameter; with required fittings.

2.02 FILTER AGGREGATE

A. Pipe Zone Bedding Material: For the material around drain pipes. This material shall conform to the requirements for crushed stone, material designation NYDOT 703-0201 or crushed gravel, material designation NYDOT 703-0202, size designation 2 which contains the following gradation limits:

Sieve Size	Percent Passing by Weight
1-1/2 inch	100
1 inch	90 -100
½ inch	0 -15

2.03 FILL MATERIAL

A. Compacted Granular Fill: For use as backfill and structural fill to support slabs-on-grade and fill over perimeter drains.

"REFER TO GEOTECHNICAL REPORT"

2.04 ACCESSORIES

A. Pipe Sleeve: 6 inch inside diameter, schedule 40 PVC pipe.

B. Filter Fabric: Mirafi 140N or equivalent.

PART 3 EXECUTION

3.01 JOB CONDITIONS

A. Verify that trench cut is ready to receive work, and excavations, dimensions, and elevations are as indicated on drawings.

B. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with structural compacted granular material.

B. Remove large stones or other hard matter which could damage drainage pipe or impede consistent backfilling or compaction.

3.03 INSTALLATION

A. Install and join pipe and pipe fittings in accordance with manufacturers' instructions.

B. Place pipe with perforations facing down. Mechanically join pipe ends.

C. Place filter fabric wrapped around underslab drain material.

D. Place drain pipe on minimum 6 inch deep bed of underslab drain material.

E. Lay pipe to slope = 1/8" per foot unless noted on drawings.

F. Place a minimum of 12 inches of underslab drain material around drain pipe.

G. Place filter aggregate in maximum 8 inch lifts, compacting each lift.

H. Increase compaction of each successive lift. Refer to Section 02220 for compaction requirements. Do not displace or damage pipe when compacting.

I. Connect to perimeter drain with non-perforated pipe through installed sleeves.

3.04 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01400.

B. Request inspection by Architect/Engineer prior to and immediately after placing filter aggregate cover over pipe.

3.05 PROTECTION

A. Protect finished installation under provisions of Section 01500.

B. Protect pipe and filter aggregate cover from damage or displacement until backfilling operation begins.

END OF SECTION

SECTION 02831

CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fence framework, fabric, and accessories.

B. Excavation for post bases and concrete foundations for posts.

C. Manual gates and related hardware.

1.02 REFERENCES

A. ANSI/ASTM A123 - Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.

B. ASTM A120 - Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless, for Ordinary Uses.

C. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

D. ASTM A392 - Zinc-Coated Steel Chain-Link Fence Fabric.

E. ASTM A569 - Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip Commercial Quality.

F. ASTM C94 - Ready-mixed Concrete.

G. Chain Link Fence Manufacturers Institute (CLFMI) - Product Manual.

1.03 SYSTEM DESCRIPTION

A. Fence Height: Six feet nominal.

B. Line Post Spacing: At intervals not exceeding 10 feet.

1.04 RECORD SUBMITTALS

A. Submit under provisions of Section 01300.

B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components.

C. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with CLFMI - Product Manual.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section.

1.07 FIELD MEASUREMENTS

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

PART 2 PRODUCTS

2.01 MATERIALS

A. Framing (Steel): ASTM A120; Schedule 40 steel pipe, standard weight, one piece without joints.

B. Fabric Wire (Steel): ASTM A392 zinc coated wire fabric.

C. Concrete: ASTM C94; Portland Cement, 2,500 psi strength at 28 days, 3 inch slump; 1 inch nominal sized coarse aggregate.

2.02 COMPONENTS

A. Line Posts: 2.38 inch diameter.

B. Corner and Terminal Posts: 2.88 inch diameter.

C. Gate Posts: 3.5 inch diameter.

D. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.

E. Gate Frame: 1.66 inch diameter for welded fabrication.

F. Fabric: 2 inch diamond mesh interwoven wire, 9 gage thick, top salvage twisted tight, bottom salvage knuckle end closed.

G. Tension Wire: 7 gage thick steel, single strand.

H. Tie Wire: For typing fabric to line posts, use 9 gage ties spaced 12" oc. For tying fabric to rails and braces, use 9 gage ties spaced 24" oc. For tying fabric to tension wire, use 11 gage hog rings spaces 24" oc.

2.03 ACCESSORIES

A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.

B. Fittings: Sleeves, bands, clips, rail ends, tension bards, fasteners and fittings.

C. Gate Hardware: Center gate stop and drop rod; two 180° gate hinges per leaf and hardware for padlock.

2.04 FINISHES

A. Components, Fabric and Hardware:
   1. Pipe: 1.8 oz zinc psf (ASTM A120).
   2. Square Tubing: 2.0 oz zinc psf (ASTM A123).
   3. H - Sections: 2.0 oz zinc psf (ASTM A183).
   4. Hardware and Accessories: zinc weight per Table I (ASTM A153).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install framework, fabric, accessories and gates in accordance with manufacturer's instructions.

B. Set posts plumb in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff.

C. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail, one bay from end and gate posts.

D. Provide top rail through line post tops and splice with 6 inch long rail sleeves.

E. Install center brace rail on corner gate leaves.

F. Stretch fabric between terminal posts, or at intervals of 100 feet maximum, whichever is less.

G. Position bottom of fabric 2 inches above finished grade.

H. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.

I. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

J. Install bottom tension wire stretched taut between terminal posts.

K. Install gate with fabric to match fence. Install three hinges per leaf, latch, catches, drop bolt.

L. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

B. Foundation reinforcing steel dowels to match masonry wall reinforcement.

1.02 RELATED SECTIONS

A. Section 03300 - Cast-in-Place Concrete.

1.03 REFERENCES

A. ACI 301 - Structural Concrete for Buildings.

B. ACI 318 - Building Code Requirements For Reinforced Concrete.

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

D. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.

E. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

F. ANSI/AWS D1.4 - Structural Welding Code - Reinforcing Steel.

G. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

H. CRSI - Concrete Reinforcing Steel Institute Manual of Standard Practice.

I. CRSI 63 - Recommended Practice For Placing Reinforcing Bars.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Shop Drawings: Indicate bar grades, sizes, spacings, locations, and quantities of reinforcing steel and wire fabric; bending and cutting schedules, and supporting and spacing devices. Include special reinforcement required for openings through concrete. Show elevations of reinforcement for all members at minimum 1/4 inch = 1'-0" scale. Show all construction joints.

C. Manufacturer's Certificate: Submit, for record only, certifying that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with CRSI 63 and Manual of Standard Practice; and ACI 301, ACI SP-66 and ACI 318.

1.06 COORDINATION

A. Coordinate with placement of form-work, formed openings and other Work.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars, plain finish.

B. Welded Steel Wire Fabric: ASTM A185 Plain Type; in flat sheets; plain finish.

2.02 ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type ASTM A82.

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

C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type; size and shape as required.

2.03 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice ACI SP-66, ACI 315 and ACI 318.

B. Weld reinforcement in accordance with ANSI/AWS D1.4. Do not field weld grade 60 reinforcing bars.

C. Locate reinforcing splices not indicated on Drawings, at point of minimum stress.

D. Fabricate bars to required lengths, shapes, and bends. Do not re-bend or straighten reinforcement in a manner that shall weaken the material.

PART 3 EXECUTION

3.01 PLACEMENT

A. Comply with the specified codes and standards, and Concrete Reinforcing Steel Institute's "Recommended Practice for Placing Reinforcing Bars" for details and methods of reinforcement placement and supports and as herein specified.

B. At time concrete is placed reinforcement shall be free from mud, oil or other nonmetallic coatings

that adversely affect bonding capacity.

C. Accurately position, support and secure reinforcement against displacement by form-work, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers as required.

D. Place reinforcement to obtain the minimum coverage for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Do not place reinforcing bars more than 2" beyond the last leg of continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

F. Accommodate placement of formed openings.

G. Install welded wire fabric in longest practical lengths. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.02 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01400.

END OF SECTION

SECTION 03252

JOINT FILLERS
USE WITH HTP-FLOOR SYSTEM ONLY

PART 1 – GENERAL

1.01 GENERAL DESCRITPTION OF WORK

A. Provide all labor, products and equipment required to properly install semi-rigid filler in joints in the interior concrete floor slabs.

1.02 SCOPE OF WORK

B. Fill all contraction (control) and construction (formed) joints in the interior concrete floor slab where the joints will be exposed to material handling vehicle wheels. Refer to drawings for additional joints possibly requiring filler, such as joints under racks,joints at column diamonds and pads, etc.

1.03. WORK EXCLUDED

C. This section specifically excludes all caulking and sealant work specified in Section 7900. Refer to 7900 to determine responsibility for filling/sealing isolation joints where slab joins walls or column pads, expansion joints, etc.

1.04. APPLICABLE STANDARDS

D. Products and installation shall be in compliance or exceed the joint filling criteria established in the latest ACI 302 and ACI 360 Committee published documents and all manufacturers instructions and technical literature.

1.05 CONTRACTOR QUALIFICATIONS

E. Installer shall have a minimum of three (3) years experience in the installation of semi-rigid fillers on industrial floors.

2.0 PRODUCTS

2.01 PRODUCT(S)

A. Joint Filler shall be a heavy-duty semi-rigid polyurea.

B. Meeting the ACI 302 Standard for Semi-Rigid Joint Fillers Minimum Shore Hardeness on the “A” Scale of 80.

C. Provide one of the following: Metzger/McGuire Spal-Pro RS-88. **(800/223-6680).** L&M Construction Chemical Joint Tite 750. **(800/362-3331).** No substitutes will be allowed.

D. The Joint Filler color shall be determined by the owner. No other color shall be utilized unless authorized by the owner.

E. The material shall be delivered to the jobsite in original unopened containers. The product must be stored in a temperature between 50-80 degrees F.

2.02 ACCESSORIES

A. Silica sand may be used at contractor's option to choke-off the shrinkage cracks beneath filler. Silica-Sand must be dry, bagged of 20 to 40 grit. Compressible backer use is prohibited other than for non-saw cut construction joints. Refer to installation section for additional information.

3. EXECUTION

3.01 PROJECT CONDITIONS

A. Work area should be free of obstructions and other trades. Slab should be visibly dry and not be exposed to water for at least 24 hours prior to filler installation. Air temperature should be greater than 40deg.F for 24 hours prior to filling.

3.02 TIMING OF INSTALLATION

A. Recommends that filling be deferred as long as possible to allow for maximum slab shrinkage and joint widening. 90-120 day slab cure is advisable. Deferring filling until after facility is under permanent temperature control is best.

3.02 EXAMINATION OF CONDITIONS

A. It is the responsibility of the installer to inspect the project and joint conditions and notify on-site management in writing of any deficiencies that might adversely affect the quality or durability of the work performed or his contract price. Start of work by the installer implies acceptance of conditions.

3.03 PRE-INSTALLATION SAMPLE

A. Before start of actual work contractor shall install samples to demonstrate his intended procedures and finished product. Sample shall include at least (25)linear feet each of both contraction and construction joints in the presence of on-site management. If procedures and finished product are approved they will be considered a standard for the entire project.

3.04 JOINT PREPARATION

A. All saw-cut joints shall be thoroughly cleaned to their full depth or 2" minimum, whichever is lesser. Construction (formed) joints that are not sawn shall be cleaned to a minimum depth of 2". Preparation shall be performed using a vacuum-equipped saw that will reach the 2" minimum depth, and shall be used in a manner that takes both joint walls back to bare concrete, removing all saw laitance, curing compounds, sealers, debris, etc. Where joints have minor edge chips, said chips will be "squared off" and filled along with the joint itself.

3.06 BRIDGING JOINT BOTTOM

A. The installer may, at his option, use a maximum of 1/4" of silica sand placed at the bottom of the saw-cut joints to prevent filler run-thru into the concrete shrinkage crack. Compressible backer rod is prohibited in saw-cut joints unless they exceed 2" deep. Compressible backer rod may be used in through-slab (non-sawn) construction joints but must be recessed at least 2" below the slab surface.
Caution: The use of backer rod in any saw-cut joints less than 2" deep will result in the rejection of all saw-cut joints work.

3.07 FILLER INSTALLATION

A. Properly clean joints as described in section 3.05

B. Install silica sand (contractors option) at base of the joint, or backer rod as allowed and limited in 3.06.

C. Pre-mix the resin portion of the joint filler to re-disburse any settlement that occurred in shipping or storage.

D. Due to the rapid gel time, polyurea joint fillers must be dispensed via power pump (dual-feed line system) or from dual-cartridge units pre-packaged by the manufacturer.

E. Dispense polyurea joint fillers in one continual bead, filling from bottom to top until joint is overfilled (crowned). Allow to cure into a solid.

F. After the polyurea joint filler cures into a solid, razor-off overfill to leave a flush filler profile.

3.08 FINISHED PROFILE

A. A flush filler profile is vital for maximum joint protection. If the joint filler profile is concave (below floor surface), abrade the polyurea surface and apply a cap bead (crowned), allow to cure, then razor flush.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE FOR FOUNDATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cast-in-place concrete foundation walls, footings and stairs.

B. Concrete Form-work with shoring, bracing and anchorage.

C. Steel anchor bolts and embedment plates/anchors for precast concrete wall panels.

D. Perimeter foundation insulation.

1.02 RELATED SECTIONS

A. Section 03200 - Concrete Reinforcement.

B. Section 02700 - Subdrainage Systems.

1.03 REFERENCES

A. ACI 301 - Structural Concrete for Buildings.

B. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

C. ACI 305R - Hot Weather Concreting.

D. ACI 306R - Cold Weather Concreting.

E. ACI 308 - Standard Practice for Curing Concrete.

F. ACI 311 - Recommended Practice for Concrete Inspection.

G. ACI 318 - Building Code Requirements for Reinforced Concrete.

H. ACI 347 - Recommended Practice For Concrete Form-work.

I. AISC "Code of Standard Practice for Steel Buildings and Bridges."

J. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings" and including the "Commentary" and Supplements thereto as issued.

K. ASTM A307 - Carbon Steel Externally Threaded Fasteners.

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

M. ASTM C33 - Concrete Aggregates.

N. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

O. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

P. ASTM C94 - Ready-Mixed Concrete.

Q. ASTM C143 - Standard Test Method for Slump of Portland Cement Concrete.

R. ASTM C150 - Portland Cement.

S. ASTM C172 - Standard Method of Sampling Freshly Mixed Concrete.

T. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

U. ASTM C260 - Air Entraining Admixtures for Concrete.

V. ASTM C494 - Chemical Admixtures for Concrete.

W. ASTM C578 - Preformed, Cellular Polystyrene Thermal Insulation.

X. ASTM C618 - Fly Ash and Raw or Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

Y. ASTM C881 - Epoxy-Resin-Base Bonding Systems for Concrete.

Z. ASTM C1059 - Latex Agents for Bonding Fresh to Hardened Concrete.

AA PS-1 - Construction and Industrial Plywood.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Manufacturer's Product Data: Submit for approval, manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures, patching compounds, joint systems, anchor bolts, foundation insulation and others as requested by the Engineer.

C. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent work.

D. Submit, for record only, materials certificates certifying that each material complies with Specifications.

E. Concrete Mix Designs:
1. Submit, for review and approval, the proposed mix designs, and required documentation, including laboratory test results for concrete materials and mix design tests if trial batch or field experience methods are utilized to establish the mix design per ACI 301. Proposed mix designs shall include strength of concrete, brand and type of cement, aggregate

source, admixtures, percent of entrained air and water-cement ratio.

2. Submit proposed mix designs for concrete at least 15 days before start of concreting. No concrete shall be placed without an approved mix design. All concrete placed without an approved mix design shall be subject to in-place testing (cores or non-destructive testing as required by the Engineer). All such testing shall be at the Contractor's expense.

1.05 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01700.

B. Accurately record actual locations of embedded utilities and components which are concealed from view.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301, ACI 318 and ACI 347.

B. Maintain one copy of each document on site.

C. Acquire cement and aggregate from same source for all work.

D. Conform to ACI 305R when concreting during hot weather.

E. Conform to ACI 306R when concreting during cold weather.

F. Workmanship: The Contractor is responsible for the correction of concrete work which does not conform to the specified requirements, including strength, tolerance and finishes. Correct deficient concrete as directed by the Engineer.

G. Concrete Testing Service: Employ, at Contractor's expense, a testing laboratory acceptable to Engineer to perform material evaluation tests and to design concrete mixes.

1. The Owner will employ a separate testing laboratory to perform all other concrete tests and to submit test reports to the Engineer.

2. Materials and installed work may require testing and retesting, as directed by the Engineer, at any time during the progress of the work. Allow free access to material stockpiles and facilities at all times. Tests, not specifically indicated to be done at the Owner's expense, including the retesting of rejected materials and installed work, shall be done at the Contractor's expense.

H. Tests for Concrete Materials: Test aggregates by the methods of sampling and testing of ASTM C33.

1. For Portland cement, sample the cement and determine the properties by the methods of test of ASTM C150.
2. Submit written reports to the Engineer, for each material samples and tested, prior to the start of work. Provide the project identification name and number, date of report, name of contractor, name of concrete testing service, source of concrete aggregates, material manufacturer and brand name for manufactured materials, values specified in

the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.

3. Certificates of material properties and compliance with specified requirements may be submitted in lieu of testing, when acceptable to the Engineer. Certificates of compliance must be signed by the material producer and the Contractor.

I. Quality Control Testing During Construction: Concrete shall be sampled and tested for quality control during the placement of concrete, as follows:

1. Sampling Fresh Concrete: ASTM C172, except modified for slump to comply with ASTM C94.
2. Slump: ASTM C143; one test for each concrete load at point of discharge; and one for each set of compressive strength test specimens.
3. Air Content: ASTM C231, pressure method; one for each set of compressive strength test specimens.
4. Compression Test Specimens: ASTM C31; one set of 6 standard Cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required. Store undisturbed, and in an insulated box during cold weather. Deliver to lab between 24 and 48 hours after making.
5. Concrete Temperature: Test hourly when air temperature is 40^{o} F. and below, and when 80^{o} F. and above; and each time a set of compression test specimens is made.
6. Compressive Strength Tests: ASTM C39; one set for each 50 cu. yds, or fraction thereof, of each concrete class placed in any one day or for each 5,000 sq. ft. of surface area placed; 2 specimens retained in reserve for later testing if required.

    a. When the frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
    b. When the total quantity of a given class of concrete is less then 30 cu. yards, the strength tests may be waived by the Engineer if, in his judgment, adequate evidence of satisfactory strength is provided.
    c. When the strength of field-cured cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

7. During cold weather concreting, one additional test cylinder shall be taken and cured on job site under same conditions as concrete it represents.
8. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate the specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Engineer. The testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.
9. Report test results in writing to the Engineer and the Contractor on the same day that tests are made. Reports of compressive strength test shall contain the project identification name, and number, date of concrete placement, name of contractor, name of concrete supplier and truck number, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials; and the specific information of slump, air

content, compressive breaking strength and type of break for both 7-day tests and 28-day test.

10. Field reports of concrete inspection shall contain general information noted above, plus ambient temperature, concrete temperature, weather, slump, air content, cylinder numbers and length of time concrete was in truck.

J. Fire and Insurance Ratings: For perimeter insulation comply with fire-resistance, flammability, and insurance ratings indicated, and comply with governing regulations as interpreted by authorities.

1.07 COORDINATION

A. Coordinate the placement of joint devices, anchor bolts and embedment plates with erection of concrete form-work and placement of form accessories.

B. Tie chairs to reinforcement prior to placing form-work to ensure sufficient concrete cover.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I - Normal or Type II - Moderate Portland type.

B. Fine and Coarse Aggregates: ASTM C33.

1. Use 1 inch aggregate for all foundation walls and footings

C. Water: Clean and not detrimental to concrete.

2.02 ADMIXTURES

A. Air Entrainment: ASTM C260.

B. Chemical: ASTM C494, Type A - Water Reducing admixture; containing no Set-Accelerating or Set-Retarding compounds; nor any chlorides, fluorides or nitrates.

2.03 WOOD FORM MATERIALS

A. Forms for Exposed Finish Concrete: Unless otherwise shown or specified, construct all form-work for exposed concrete surfaces with plywood, metal, metal-framed plywood-faced or other acceptable panel type materials to provide continuous, straight, and smooth exposed surfaces. Furnish in largest practical size to minimize number of joints. Provide form material with sufficient strength and stiffness to withstand pressure of newly placed concrete without bow or deflection.

1. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood" Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible trademark of an approved inspection agency, unless otherwise acceptable to Engineer.

B. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed with plywood, lumber, metal or other acceptable material.
   1. Lumber shall be 6" or 8" wide with 1" nominal thickness dressed on at least 2 edges and one side. Plywood shall be as specified for exposed concrete.

C. Form Coating: Provide commercial form coating that will not bond with, stain, nor adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces to be cured with water or curing compound.

2.04 PREFABRICATED FORMS

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

2.05 ACCESSORIES

A. Bonding Agent: Latex bonding agent complying with ASTM C1059 Type II or epoxy resin base bonding agent complying with ASTM C881.

B. Grout/Drypack: Non-shrink type, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 5,000 psi in 28 days.

C. Unfinished bolts, nuts and washers: ASTM A307, Grade A, regular Hexagon type, low carbon steel.

D. Unfinished embedment plates: ASTM A36.

E. Perimeter foundation board insulation: Extruded polystyrene foam board insulation; closed cell, complying with ASTM C578, Type IV; 25 PSI minimum compressive strength; 2.5% maximum water absorption; k value of 0.27; manufacturer's standard lengths and widths.

F. Form Ties:

   1. Snap-off metal ties, designed to prevent form deflection, free of defects that could leave holes larger than one inch in concrete surface and prevent spalling surfaces upon removal. Portion remaining after removal shall be at least one inch in from concrete surface.
   2. For exposed concrete provide plastic cone snap-ties and one inch concrete plugs.

G. Reinforcement Chairs: Provide plastic chairs to the height needed to provided the concrete coverage required.

H. Form Release Agent: Colorless mineral oil which will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

I. Corners: Chamfered, wood strip type; 3/4 x 3/4 inch.

J. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sizes as required, of sufficient strength and

character to maintain form-work in place while placing concrete.

2.06 CONCRETE MIX

A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.

B. Select proportions for normal weight concrete in accordance with ACI 301 Chapter 3-Proportioning. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the project for each class of concrete required.

C. Provide concrete for foundations to the following criteria:

1. Compressive Strength 7 days: 1800 psi
2. Compressive Strength 28 days: 3000 psi
3. Slump: 2 to 4 inches.
4. Maximum Water/Cement Ratio: .48.

D. Use accelerating admixtures in cold weather only when approved by Engineer. Use of admixtures will not relax cold weather placement requirements.

E. Use set retarding admixtures during hot weather only when approved by Engineer.

F. Use air-entraining admixtures in all concrete exposed to the weather, unless otherwise shown or specified. Add air-entraining admixture at the manufacturers prescribed rate to result in concrete at the point of placement having air content within the following limits:

1. Concrete structures and slabs exposed to freezing and thawing or subject to hydraulic pressure:

   3% to 6% for maximum 2" aggregate.
   4% to 7% for maximum 3/4 aggregate.
   4.5% to 8% for maximum 2" aggregate.
   All other concrete: 2% to 4% air.

2. The concrete mix design shall be adjusted by the addition of cement content, reduction of water content, or both, as required to offset the weakening action of air-entraining admixtures.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels and centers before proceeding with form-work. Ensure that dimensions agree with Drawings.

B. Verify requirements for concrete cover over reinforcement.

C. Verify that anchors, seats, pipe sleeves, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.02 PREPARATION

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

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

C. Pre-Placement Preparation: Before placing concrete, complete the form work installation, reinforcing steel, and items to be embedded or cast-in and inspect same to assure compliance with contract requirements. Notify other crafts to permit the installation of their work; cooperate with other trades in setting such work, as required. Be sure that all debris and other foreign matter is removed from forms, including but not limited to ice, water, trash and wire.

D. Anchor Bolts: Furnish/Install anchor bolts and other connectors required for securing structural steel to foundations and other in-place work. Furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations.

3.03 ERECTION - FORM-WORK

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

B. Provide bracing to ensure stability of form-work. Shore or strengthen form-work subject to over stressing by construction loads.

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

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

E. Obtain approval before framing openings in structural members which are not indicated on Drawings.

F. Provide chamfer strips on external corners of foundation walls.

3.04 APPLICATION - FORM RELEASE AGENT

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

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

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

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in or passing through concrete work.

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

C. Coordinate work of other Sections in forming and placing openings, recesses, chases, sleeves, bolts, anchors, and other inserts.

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

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

F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will be apparent in exposed concrete surfaces.

3.06 FORM CLEANING

A. Clean and remove foreign matter within forms as erection proceeds.

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

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

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

3.07 PLACING CONCRETE

A. Place concrete in accordance with ACI 304 and ACI 301.

B. Pre-Placement Review: Footing bottoms, reinforcement and all work shall be subject to review by engineer or designated representative. Notify the engineer 48 hours prior to scheduled placement and obtain approval or waiver of review prior to placement.

C. Ensure reinforcement, inserts, and embedded items, are not disturbed during concrete placement.

D. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306R and as herein specified.

1. When air temperature has fallen to or is expected to fall below 40^{o} F., uniformly heat all water and aggregates before mixing as required to obtain a concrete mixture temperature of not less than 50^{o} F., and not more than 80^{o} F. at point of placement.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen sub-grade or on sub-grade containing frozen materials.
3. Do not use calcium chloride, salt or other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in writing by the Engineer.

4. All temporary heat, form insulation, insulated blankets, coverings, hay, or other equipment and materials necessary to protect the concrete work from physical damage caused by frost, freezing action, or low temperature shall be supplied under this section when required.

E. Hot Weather Placing: When hot weather conditions exist that would seriously impair the quality and strength of concrete, place concrete in compliance with ACI 305R and as herein specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90^{o} F. Mixing water may be chilled, or chopped ice may be used to control the concrete temperature provided the water equivalent of the ice is calculated into the total amount of mixing water.
2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperature at the time of concrete placement.
3. Wet forms thoroughly before placing concrete.
4. Do not use retarding admixtures without written acceptance of the Engineer.

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

G. Place concrete continuously between predetermined expansion, control, and construction joints.

H. Do not interrupt successive placements; do not permit cold joints to occur.

3.08 FORM REMOVAL

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

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

C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

3.09 CONCRETE FINISHING

A. Provide formed concrete surfaces to be left exposed with smooth rubbed finish.

3.10 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury according to provisions of ACI 301, Chapter 12 and ACI 308.

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

3.11 FIELD QUALITY CONTROL

A. Inspect erected form-work, shoring, and bracing to ensure that work is in accordance with form-work design, and that support, fastenings, wedges, ties, and items are secure.

B. Do not reuse wood form-work more than 2 times for concrete surfaces to be exposed to view. Do not patch form-work.

C. Field inspection and testing will be performed in accordance with ACI 301, ACI 311 and Paragraph 1.07.I of this Section and under provisions of Section 01400.

D. Provide free access to Work and cooperate with appointed firm.

E. Submit proposed mix design to inspection and testing firm for review prior to commencement of Work.

F. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.

3.12 PATCHING

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

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

C. Patch imperfections in accordance with ACI 301 and as herein specified.

3.13 DEFECTIVE CONCRETE

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

B. Repair or replacement of defective concrete will be determined by the Engineer.

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

D. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and to verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.

1. Repair finished unformed surfaces that contain defects which adversely affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.
2. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.
3. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish

repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Engineer.

4. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete, and brush with a neat cement grout coating or concrete bonding agent. Place patching concrete before grout takes its initial set. Mix patching concrete of same type or class as original concrete. Place, compact and finish to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.
5. Repair isolated random cracks and single holes not over 1" in diameter by dry-pack method. Grove top of cracks and cut-out holes to sound concrete and clean of dust, dirt and loose particles. Dampen cleaned concrete surfaces and brush with neat cement grout coating. Place dry-pack before cement grout takes its initial set. Mix dry-pack, consisting of one part Portland Cement to 2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for not less than 72 hours.
6. Repair methods not specified above may be used, subject to acceptance of Engineer.

3.14 INSTALLATION - PERIMETER FOUNDATION INSULATION

A. Verify that substrate is flat, dry and free of honeycombs, fins, or foreign material that will impede adhesive bond or damage insulation board.

B. Beginning of installation means installer accepts existing conditions.

C. Place backfill directly in contact with insulation board. Do not leave board exposed above grade.

3.15 TOLERANCES

A. Construct form-work to maintain tolerances required by ACI 301.

B. Footings:
1. Variation of dimensions in plan: plus 2 inches or minus 2 inch.
2. Variation of center from specified center in plan: 2 percent of footing width in direction of variation, plus or minus 2 inches maximum variation.
3. Variation of bearing surface from specified elevation: plus or minus 2 inch.

C. Piers and Walls:

1. Variation in cross-sectional dimensions of piers and in thickness of walls: plus or minus 1/4 inch.
2. Variation in plan from specified location in plan: Plus or minus 2 inch for any member in any location.
3. Deviation in plan from straight lines parallel to specified linear building lines: 1/40 inch per ft., adjacent members less than 20 ft. apart or any wall length less than 20 ft.; 2 inch for adjacent members 20 ft. or more apart or any wall length of 20 ft.
4. Deviation from plumb: 1/4 inch for any 10 ft. of height; 1 inch maximum for entire height.

END OF SECTION

SECTION 03320

CONCRETE SLAB ON GRADE AND STRUCTURAL CONCRETE SLABS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete slab on grade, mezzanine concrete floors and sidewalks.

B. Control and contraction joint devices and isolation joint materials for slabs.

C. Underslab insulation.

1.02 RELATED SECTIONS

A. SECTION 03326, HTP-Floor Systems

B. SECTION 03252, Joint Fillers (for HTP-Floor System only)

1.03 REFERENCES

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.

B. ACI 301 - Structural Concrete for Buildings.

C. ACI 302 - Guide for Concrete Floor and Slab Construction.

D. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

E. ACI 305R - Hot Weather Concreting.

F. ACI 306R - Cold Weather Concreting.

G. ACI 308 - Standard Practice for Curing Concrete.

H. ACI 318 - Building Code Requirements for Reinforced Concrete.

I. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

J. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

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

L. ASTM C33 - Concrete Aggregates.

M. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

N. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

O. ASTM C94 - Ready-Mixed Concrete.

P. ASTM C143 - Standard Test Method for Slump of Portland Cement Concrete.

Q. ASTM C150 - Portland Cement.

R. ASTM C171 - Sheet Materials for Curing Concrete.

S. ASTM C172 - Standard Method of Sampling Freshly Mixed Concrete.

T. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

U. ASTM C260 - Air Entraining Admixtures for Concrete.

V. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.

W. ASTM C494 - Chemicals Admixtures for Concrete.

X. ASTM C578 - Preformed, Cellular Polystyrene Thermal Insulation.

Y. ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

Z. ASTM D2103 - Polyethylene Film and Sheeting.

AA. ASTM E1155 - Determination of Floor Flatness and Levelness Using the "F Number" System.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Manufacturer's Product Data: Submit manufacturer's specifications with product characteristics, compatibility, limitations and application and installation instructions for proprietary materials and items including: admixtures, curing and sealing compounds, HTP-Floor System, patching compounds, joint systems, underslab insulation and others as requested by the Engineer.

C. Submit materials certificates certifying that each material complies with specifications.

D. Concrete Mix Designs:

1. Submit, for review and approval, the proposed mix designs, and required documentation, including laboratory test results for concrete materials and mix design tests if trial batch or field experience methods are utilized to establish the mix design per ACI 301. Proposed mix designs shall include strength of concrete, brand and type of cement, size, gradation and source of aggregate, admixtures, percent of entrained air and water-cement ratio.
2. Submit proposed mix designs for concrete at least 15 days before start of concreting. No concrete shall be placed without an approved mix design. All concrete placed without an approved mix design shall be subject to independent testing (cores or non-destructive testing as required by the Engineer). All such testing shall be at the Contractor's expense.

1.05 QUALITY ASSURANCE

A. Comply with ACI 302 "Guide for Concrete Floor and Slab Construction."

B. Perform work in accordance with ACI 117, ACI 301 and ACI 318.

C. Maintain one copy of each document on site.

D. Acquire cement and aggregate from same source for all work.

E. Conform to ACI 305R when concreting during hot weather.

F. Conform to ACI 306R when concreting during cold weather.

G. Workmanship: The Contractor is responsible for the correction of concrete work which does not conform to the specified requirements, including strength, tolerance and finishes. Correct deficient concrete as directed by the Engineer.

H. Concrete Testing Service: Employ, at Contractor's expense, a testing laboratory acceptable to Engineer to perform material evaluation tests and to design concrete mixes.

1. The Owner will employ a separate testing laboratory to perform all other concrete tests and to submit test reports to the Engineer.
2. Materials and installed work may require testing and retesting, as directed by the Engineer, at any time during the progress of the work. Allow free access to material stockpiles and facilities at all times. Tests, not specifically indicated to be done at the Owner's expense, including the retesting of rejected materials and installed work, shall be done at the Contractor's expense.

I. Tests for Concrete Materials: Test aggregates by the methods of sampling and testing of ASTM C33.

1. For Portland cement, sample the cement and determine the properties by the methods of test of ASTM C150.
2. Submit written reports to the Engineer, for each material samples and tested, prior to the start of work. Provide the project identification name and number, date of report, name of contractor, name of concrete testing service, source of concrete aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.
3. Certificates of material properties and compliance with specified requirements may be submitted in lieu of testing, when acceptable to the Engineer. Certificates of compliance must be signed by the material producer and the Contractor.

J. Quality Control Testing During Construction: Concrete shall be sampled and tested for quality control during the placement of concrete, as follows:

1. Sampling Fresh Concrete: ASTM C172, except modified for slump to comply with ASTM C94.

2. Slump: ASTM C143; one test for each concrete load at point of discharge; and one for each set of compressive strength test specimens.
3. Air Content: ASTM C231, pressure method; one for each set of compressive strength test specimens.
4. Compression Test Specimens: ASTM C31; one set of 6 standard Cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required. Store undisturbed, and in an insulated box during cold weather. Deliver to lab between 24 and 48 hours after making.
5. Concrete Temperature: Test hourly when air temperature is 40^{o} F. and below, and when 80^{o} F. and above; and each time a set of compression test specimens is made.
6. Compressive Strength Tests: ASTM C39; one set for each 100 cu. yds, or fraction thereof, of each concrete class placed in any one day or for each 5,000 sq. ft. of surface area placed; 2 specimens retained in reserve for later testing if required.
   a. When the frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
   b. When the total quantity of a given class of concrete is less then 50 cu. yards, the strength tests may be waived by the Engineer if, in his judgment, adequate evidence of satisfactory strength is provided.
   c. When the strength of field-cured cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
7. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate the specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Engineer. The testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.
8. Report test results in writing to the Engineer and the Contractor on the same day that tests are made. Reports of compressive strength test shall contain the project identification name, and number, date of concrete placement, name of contractor, name of concrete supplier and truck number, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials; and the specific information of slump, air content, compressive breaking strength and type of break for both 7-day tests and 28-day test.
9. Field reports of concrete inspection shall contain general information noted above, plus ambient temperature, concrete temperature, weather, slump, air content, and cylinder numbers.

K. Install slabs after the roof membrane has been installed and roof is watertight, unless otherwise acceptable to Owner.

L. Before pouring slab on grade, verify plumbing, electrical stub-ups, and pit locations with refrigeration designer, mechanical contractor, and Owner.

M. Tolerance testing of slabs: Owner shall employ an independent testing laboratory to perform an instrument check of the slab surface for flatness and levelness, as follows:

1. Slabs on grade that receive architectural floor finishes including the HTP-Floor System; ASTM E1155.
2. Remaining slabs on grade and mezzanine slabs; ACI 301.
3. Written reports will be submitted to the Engineer showing a small scale floor plan of the slab surfaces and the results of the tolerance testing. The reports shall indicate if the slabs are acceptable.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products under provisions of Section 01600.

PART 2 PRODUCTS

2.01 MATERIALS

A. Reinforcement: ASTM A 615, Grade 60.

B. Welded Wire Fabric: ASTM A 185, flat sheets.

C. Cement: ASTM C150, Type I - Normal or Type II - Moderate Portland type.

D. Coarse Aggregate: Coarse, clean, sharp, crushed quarried stone only.

1. For slabs on grade and Sidewalks: Use 1 inch nominal maximum size: ASTM C33, size No. 6 or No. 67.

E. Fine Aggregate: ASTM C33.

F. Air Entrainment Admixtures: ASTM C260

G. Water: Potable and not detrimental to concrete.

H. Water Reducing Admixture: ASTM C494, Type A.

I. Set-control Admixtures: Not permitted.

J. Calcium Chloride: Not permitted.

K. Expansion Joint Filler: Provide resilient and non-extruding premolded bituminous fiberboard units complying with ASTM D 1751.

L. Construction Joint Form: Keyed joint, 24-gauge galvanized, superior screed keyed joint or accepted equivalent.

M. Joint Sealant: Sonneborn, Inc. - "Sonolastic SL1 Sealant" or approved equal.

N. Membrane-forming Curing Compound: Resin Type, Complying with ASTM C309 Type 1-D, containing a fugitive dye not subject to reactivation by solvents. Dye shall be reading distinguishable upon the concrete surface for at least 4 hours after application. Color shall be

inconspicuous within 7 days.

O. Curing Compound: Kure-N-Seal 0800 by Sonneborn, Clear Seal by A.C. Horn Company or approved equal.

P. Concrete Sealer: Sonoglaze by Sonneborn or approved equal.

Q. Anti-Spalling Compound: Sika Sikagard 70 for all exterior slabs.

R. Underslab board insulation: Extruded polystyrene foam board insulation; closed cell, complying with ASTM C578, Type IV; 25 PSI minimum compressive strength; 2.5% maximum water absorption; k value of 0.27; manufacturer's standard lengths and widths.

2.02 CONCRETE MIX

A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.

B. Select proportions for normal weight concrete in accordance with ACI 301. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the project for each class of concrete required.

C. Provide concrete to the following criteria:

1. Concrete for Internal Slabs on Grade:
   a. Compressive Strength 3 days: 1800 psi.
   b. Compressive Strength 28 days: 3000 psi.
   c. Slump: 2 to 4 inches.
   d. Maximum Water/Cement Ratio: .48.
   e. No Air Content.
2. Concrete for Exterior Slabs on Grade and Sidewalks:
   a. Compressive Strength 28 days: 4000 psi.
   b. Minimum cement content of 564 lbs. per cu. yd.
   c. Maximum water/cement ratio: .45.
   d. Slump: 2 to 4 inches.
   e. Minimum of 7 days of moist curing at or above 50 degrees F.
   f. Minimum air content: 5 - 7%.

D. Use accelerating admixtures in cold weather only when approved by Engineer. Use of admixtures will not relax cold weather placement requirements.

E. Use set retarding admixtures during hot weather only when approved by Engineer.

F. Use air-entraining admixtures in all concrete exposed to the weather, unless otherwise shown or specified. Add air-entraining admixture at the manufacturers prescribed rate to result in concrete at the point of placement having air content within the following limits:

1. Concrete slabs exposed to freezing and thawing or subject to hydraulic pressure:
   3% to 6% for maximum 1/2" aggregate.
   4% to 7% for maximum 3/4" aggregate.
2. The concrete mix design shall be adjusted by the addition of cement content, reduction of

water content, or both, as required to offset the weakening action of air-entraining admixtures.

PART 3 EXECUTION

3.01 GENERAL

A. Examine conditions under which work shall be performed. Do not proceed with work until all unsatisfactory conditions are corrected.

3.02 PRE-CONCRETE PLACEMENT

A. Do not place concrete for slab on grade until roof membrane has been installed and roof is watertight, unless otherwise acceptable to owner.

B. Before pouring slab on grade, verify plumbing and electrical stub-ups and pit locations with refrigeration designer, mechanical contractor, and owner. All electrical conduit and horizontal plumbing lines shall be buried in the sub-grade.

C. Concrete placement operations shall not damage underground plumbing, electrical or refrigeration lines nor damage any embedded items. Wheelbarrows, buggies or pumps shall be used if access to the placement area by truck is restricted or may result in damage to underground items. Any underground lines damaged by concrete placement operations shall be repaired at the Contractor's expense.

D. Just before concrete slab on grade placement, wet sub-grade but do not saturate.

E. Sub-grade shall be frost free.

F. Wherever possible, air temperatures should be rising after concrete placement. Attempt to schedule slab placements according to favorable weather reports.

G. Place underslab insulation, thickness as noted on the drawings, on graded, smooth, dry compacted **Structural fill/backfill**. Refer to Section 02220 for soil gradation requirements. Stagger all joints when insulation is stacked to achieve design thickness. Pour concrete slab directly over underslab insulation.

3.03 EDGE FORMS AND SCREED STRIPS FOR SLABS

A. Set edge forms or bulkheads and intermediate screed for slabs to obtain required elevations and contours in finished slab surface. Provide secure edge forms or screed strips to support strike-off templates or accepted compacting vibrating-type screeds. Wet screeding will not be permitted.

3.04 REINFORCEMENT PLACEMENT

A. Place welded wire fabric one-third of slab thickness below top surface of slab.

B. Place flat sheets in as long lengths as practical. Lap adjoining sheets at least one full mesh. Offset laps to prevent continuous laps in either direction.

C. Do not continue welded wire fabric through any control joints.

3.05 CONSTRUCTION JOINTS

A. Locate and install construction joints which are not shown on Drawings so as not to impair strength and appearance of structure, as acceptable to Engineer. Joints are not permitted in slabs of coolers or freezers.

3.06 ISOLATION JOINTS

A. Construct isolation joints in slabs on grade at all points of contact with vertical surface, and elsewhere as indicated.

3.07 CONTROL JOINTS

A. Saw cut control joints. Using 3/16 inch thick blade, cut into 1/4 depth of slab thickness.

B. Saw cut joints as soon as possible after finishing, generally within 4 to 12 hours. Make a sample cut to determine if concrete surface is firm enough so that it is not torn nor damaged by the blade.

C. Make initial saw cut at mid-length of slab and proceed by saw-cutting at mid-length of each subsequent panel until all joints have been cut.

3.08 PLACING CONCRETE SLABS

A. Install joint fillers and joint devices in accordance with manufacturer's instructions.

B. Separate slabs on grade from vertical surfaces with 2 inch thick joint filler. Extend joint filler from bottom of slab to within 1/8 inch of finished slab surface. Conform to section 07900 for finish joint sealer requirements.

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

D. Install joint device anchors. Maintain correct position to allow joint cover flush with floor finish.

E. Maintain records of concrete placement. Record date, location, quantity, air temperature, test samples taken and time concrete is in truck.

F. Do not interrupt successive placements; do not permit cold joints to occur.

G. Place floor slab in strip pattern.

H. Deposit and consolidate concrete slabs in a continuous operation, within the limits of predetermined expansion, control and construction joints, until placing of panel or section is completed.

I. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

J. Bring slab surfaces to correct level with a straight-edge and strike off. Uniformly slope to drains. Use bull floats or darbies to smooth surface, leaving it free of humps or hollows. Do not

sprinkle water on plastic surface. Do not disturb slab surfaces before beginning finishing operations.

K. Maintain reinforcement in proper position during concrete placement operations. See requirements for reinforcement placement.

L. Screed floors and slabs on grade level, maintaining surface flatness as noted under "Tolerances".

M. In areas with floor drains, maintain floor elevation at walls; pitch uniformly to drains at 1/8 inch per foot or as indicated on Drawings.

3.09 TOLERANCES

A. Surface tolerance shall be Class A, per ACI 301 (1/8 inch measured as departure from testing edge of 10-foot straightedge parallel to and in contact with surface) except at slabs on grade receiving architectural floor finishes which shall be per ACI 117, F_F/F_L = 36/25.

3.10 MONOLITHIC SLAB FINISHES

A. To achieve an ACI 302 Class 4 finish interior slabs:

1. Float Finish: Apply float finish to monolithic slab surfaces that are to receive trowel finish. Uniformly slope surfaces to drains.
2. Trowel Finish: Apply steel trowel finish to monolithic slab surfaces that are to be exposed to view, covered with resilient flooring, paint, or other thin film finish coating system. After floating, begin first trowel finish operation using a power-driven trowel. Consolidate concrete surface by two hand troweling operations leaving surface free of trowel marks, and uniform in texture and appearance. Grind smooth all surface defects.
3. Scratch Finish: Apply to slab surfaces receiving ceramic or quarry tile.

3.11 EXTERIOR SLAB FINISHES

A. Non-slip Broom Finish: Apply non-slip heavy broom finish to all exterior concrete slab surfaces. Immediately after trowel finishing, roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coat slabs with two coats of anti-spalling compound in accordance with manufacturer's recommendations.

3.12 CURING AND PROTECTION

A. Protect freshly placed slabs from premature drying and excessive cold or hot temperature, and maintain without drying at a relatively constant temperature for a period of time necessary for hydration of cement and proper hardening according to provisions of ACI 301, Chapter 12 and ACI 308.

B. Areas of exposed concrete in receiving area, grocery storage, freezers and coolers are to receive the following treatment:

1. Cure slab completely by covering with curing paper for at least seven days (Refer to ASTM C171). Avoid rapid drying at end of final curing period.

2. Place curing cover in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair all holes or tears in cover during curing period.
3. As an alternative to curing paper covers, Contractor may submit a proposed plan for moist curing by use of burlap, soaker hoses, and ponding to Engineer for review. If Contractor can demonstrate effectiveness in achieving desired final product, then proposed moist curing method will be accepted. Do not use any curing compounds.
4. Do not allow foot or other traffic over slabs during seven-day curing period. Do not use slabs to store construction materials during seven day curing period.
5. Cure slabs or pads a minimum of 14 days before placing equipment.
6. Apply two coats of floor sealer in accordance with manufacturer's recommendations.

C. Coat interior slabs receiving tile or carpet with two coats of a curing/sealing compound. Apply compound in accordance with manufacturer's recommendations.

1. Do not allow foot or other traffic over slabs during seven-day curing period. Do not use slabs to store construction materials during seven day curing period.
2. Place finish toppings, coatings, tile, or other materials to be bonded to slabs after slabs have cured a minimum of 28 days.

D. Sidewalks and exterior slabs shall receive the following treatment:

1. Cure slab completely by covering with curing paper for at least seven days. Avoid rapid drying at end of final curing period.
2. Do not allow construction or vehicular traffic over slabs during seven day curing period. Do not use slabs to store construction materials during seven day curing period.
3. Do not use curing compound.
4. Apply 2 coats of anti-spalling compound, Sikagard 70, in accordance with manufacturer's recommendations a minimum of thirty days after slab has cured.

3.13 FLOOR SEALER

A. All concrete floor not receiving flooring (i.e., freezers, coolers, and back room storage areas) are to receive two coats of sealer.

B. Floor sealer shall be "Clear Seal" by A.C. Horn Company; "Kure-N-Seal" by Sonneborn Building Products Inc. or an approved equal.

C. Sealing of concrete in freezers and coolers must be in advance of equipment start-up by four weeks.

3.14 JOINT SEALANT

A. Install sealant in all construction, isolation, and control joints in all concrete floors not receiving flooring (i.e., back room storage areas) in accordance with manufacturer's recommendations.

B. Clean joints thoroughly before applying sealant.

3.15 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances, or

specified requirements.

B. Repair or replacement of defective concrete will be determined by the Architect/Engineer.

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

D. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and to verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.

1. Repair finished unformed surfaces that contain defects which adversely affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.
2. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.
3. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Engineer.
4. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete, and brush with a neat cement grout coating or concrete bonding agent. Place patching concrete before grout takes its initial set. Mix patching concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.
5. Repair isolated random cracks and single holes not over 1" in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and brush with neat cement grout coating. Place dry-pack before cement grout takes its initial set. Mix dry-pack, consisting of one part Portland Cement to 2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for not less than 72 hours.
6. Repair methods not specified above may be used, subject to acceptance of Engineer.

END OF SECTION

Section 03326

HTP – FLOOR SYSTEM
(Hi-Tech Performance Floor System)

SECTION 03326

PART 1 – GENERAL

1.01 SUMMARY

This Section includes all colored, polished, high performance, Cementious Floor surfaces indicated on the finish schedule.

Work includes providing a floor system within the scope of the "Patented," HTP Floor System. Process will include HTP products and placing, finishing, curing and conditioning of the floor surface by a licensed applicator.

1.02 RELATED DOCUMENTS

Drawing and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

Cast – in place Concrete, Section 03320

NOTE: WORK SPECIFIED IN ARTICLE 3.02 OF THIS SECTION SHALL NOT BEGIN UNTIL AFTER THE WALLS AND THE ROOF ARE IN PLACE, AND READYING THE STRUCTURE FOR INSTALLATION OF THIS SPECIALTY FLOOR SYSTEM IS COMPLETED. ALL ACI SPECIFICATIONS REFERENCED WILL BE FOLLOWED.

1.03 REFERNCES

Comply with following code standards, and guide:

ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, And Mass Concrete.

ACI 212 "Guide for Use of Admixtures in Concrete".

ACI 301 "Specifications for Structural Concrete for Buildings"

ACI 302 "Guide for Concrete Floor and Slab Construction"

ACI 304 "Guide for Measuring, Mixing, Transporting, and Placing Concrete."

ACI 306 "Hot Weather Concreting." The use of a monomolecular Film and evaporation retardant manufactured by the Surface hardener manufacturer shall be used in accordance With ACI 302-80 to ensure compatibility.

ACI 306 "Cold Weather Concreting."

ACI 308 "Standard Practice For Curing Concrete."

ACI A185 "Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement."

ASTM 497 "Standard Specification for Deformed Steel Welded Wire Fabric."

ASTM C33 "Specification for Concrete Aggregate."

ASTM C39 "Test Method for Compressive Strength of Cylindrical Concrete Specimens."

ASTM C94 "Specification for Ready-Mixed Concrete."

ASTM C150 "Specification for Portland Cement."

ASTM C309 "Specification for Liquid Membrane-Forming Compounds for Curing Concrete."

ASTM C494 "Specification for Chemical Admixtures for Concrete."

ASTM C779 "Test Method for Abrasion Resistance of Horizontal Concrete Surfaces."

ASTM C1028 "Test Method for Determining the Static Coefficient Of Friction of Ceramic Tile and Other like Surfaces by The Horizontal Dynamometer Pull-Meter Method."

1.04 SUBMITTAL

Refer to Section 01300 " Submittals" for general information.

Shop Drawings: Submit one (1) copy of drawings showing construction
And control joint layout for all slabs-on-grade.

Mix Designs: A minimum of one month prior to any concrete placement,
Submit copies of all concrete mix designs to the General Contractor and the Owner's Engineer or representative. Proportioning shall conform to ACI 211 Footnote to Table 6.36 whenever placement is made with mechanical placing equipment. Submit concrete mix designs to Hi-Tech Consulting, Inc. for review. Any requests for admixtures should be made at this time, including product specifications

and historical data. No admixtures will be allowed unless given prior approval by Engineer. Submit test results of mix using exact components including cement manufacturer and type, aggregate type and supply and admixtures.

Reports: Submit promptly one (1) copy of all test inspection reports by Quality Assurance provision to the General Contractor, Engineer, and System applicator. Immediately report to the Engineer any deviations from The Specifications or Drawings encountered by testing or inspection Personnel.

1.05 QUALITY ASSURANCE

See section 03320, 1.05

1.06 FIELD SERVICE

Pre-installation Conference: General Contractor shall provide 2 weeks
Notice to Hi-Tech Floors to arrange a “pre-job” conference related to all aspects of the complete installation of the HTP Floor System. At the “pre-job” conference, pour schedules, specification review and all application procedures will be reviewed in detail. Notification to be submitted by calling Hi-Tech Floors, Inc. at (952) 895-1602 (Dave Phillips).

1.07 WARRANTY

Hi-Tech Floors and its licensed applicators warranty the floor system for one (1) year.

Hi-Tech Floors and its Component Manufacturer expressly warrants that The HTP Floor System shall be free from defects in materials and workmanship for 1 year.

PART 2 PRODUCTS

2.01 MATERIALS

See section 03320, 2.01

2.02 PROPORTIONING AND MIX DESIGN

See section 03320, 2.02

PART 3 EXECUTION

3.01 ARROVED APPLICATORS

Hi-Tech Floors, Inc./ 12701 Sheridan Avenue / Burnsville, MN 55337 / 952-895-1602, shall install and produce the (HTP) Floor System a formal, “Performance Contract,” for field installation will be submitted to the selected General Contractor by Hi-Tech. This contract will include the application of

the 3 stage process under the complete “High Gloss Hardened Concrete Floor System”,(U.S. PATENT GRANTED). The 3 stages are:

Installation of concrete, dowels, mesh (when specified), HTP Premium Floor Hardener, special finishing process, curing, and saw-cut control joints. General Contractor/Owner will need to keep the floor swept and free of all debris and potential for stain and/or damage after this stage is completed, OR protect floor by covering.

After a minimum 30 day cure, Hi-Tech will return to install the joint filler and remove the curing compound.

The third and final stage will be scheduled near “Grand”, opening. During this stage Hi-Tech will return to the project and do any patching, punch list work or touch ups. Hi-Tech will clean, polish and buff the floor to the desired sheen. At this time Hi-Tech will train the floor maintenance team on equipment needed, daily maintenance and care of the HTP Floor System.

3.02 CONCRETE PLACEMENT

Section 03320, Part 3.

3.03 APPLICATION OF (HTP) FLOOR SYSTEM

Only Hi-Tech Floors or one of Hi-Tech’s licensed trained applicators are Qualified to install the (HTP) Floor System. The system is a U.S. patented held process. Contact: Hi-Tech Floors (Dave Phillips) for quotes and bids. 952-895-1602

3.03 CURING AND PROTECTION

Floor protection will be covered during the pre-job meeting. (Under
FIELD SERVICE 1.07). Floor should be protected from damage from oil, machinery leaks, torch cutting.

Maintain floors free of traffic and loads for at least 7 days after

Completion. Provide adequate provisions for maintaining the concrete temperature at 50 degrees F (10 Degrees C) or above during the curing period.

3.04 TOLERANCES

SEE SECTION 03320, 3.09.

END OF SECTION

SECTION 03366
CHEMICALLY STAINED CONCRETE FLOOR

PART 1 GENERAL

1.01 SUMMARY
- A. Section Includes:
  1. Chemically stained concrete floor finish
  2. Seal coats

- B. Related Sections
  1. Section 03300-FL-Cast-In-Place Concrete

1.02 SUBMITTALS
- A. Contractor shall submit specified manufacturer's complete technical data sheets for all products to be used, including installation instructions

1.03 QUALITY ASSURANCE
- A. Manufacturer Qualifications: Manufacturer of specified stain and sealer shall have a minimum 10 years experience in the production of the specified products.

- B. Contractor Qualifications: Contractor must have a minimum 3 years experience in staining applications and successfully completed not less than 6 projects comparable in scale and complexity.
  1. Statement of Contractor Qualifications
     a. Submit list of at least 6 completed projects including project name, project address and owner contact information.

- C. Regulatory Requirements
  1. Products shall comply with the United States Clean Air Act for maximum Volatile Organic Compound (VOC) content as specified in PART 2 of this section.

- D. Mockups and Field Samples: Prepare field sample at project site for architects review and approval.
  1. Samples shall be constructed on site and shall be 4'x4'. If there is existing concrete, the Architect shall select an area where the samples will be placed.
  2. Construct sample-using processes and techniques intended for use on permanent work, including curing procedures. Include samples of control, construction, and expansion joints in sample panels.
  3. Sample shall be stained and sealed by the individual workers who will actually be performing the work for the project.
  4. Obtain written approval of the sample from project Architect before start of work.
  5. Retain approved samples through completion of the work for use as a quality standard for finished work.

1.04 DELIVERY, STORAGE AND HANDLING
- A. Deliver the specified products in original, unopened containers with legible manufacturer's identification and information.
- B. Store specified products in conditions recommended by the manufacturer.

1.05 JOB SITE CONDITIONS
- A. Environmental Conditions: Maintain an ambient temperature of between 50° F and 90° F during application and at least 48 hours after application.

- B. Protection: Precautions shall be taken to avoid damage or contamination of any surfaces near the work zone. Protect completed stain work from moisture or contamination.
- C. Do not use any solvents or curing compounds.

D. Use only white chalk to define the saw cuts
E. Use only white pencils for any layout marks.
F. Charge all lifts in the back room. All lifts leak acid when charging.
G. All lifts shall have white rubber tires.
H. All painting supplies shall be stored in the back room.
I. Never use any tape other than blue painter's tape which should only be used to protect the slab adjacent to saw cuts from the joint filler. Tape is to be removed the same day.
J. All pipe cutting and threading must be done on clear sealed areas.

1.06 PRE-JOB CONFERENCE

A. One week prior to the placement of Chemical Stain a meeting will be held to discuss the project and application of materials.
B. It is suggested that the Architect, General Contractor, Sub-Contractor and a Manufacture Representative be present.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Floor Stain: Chemical Stain shall be a reactive water-based solution of metallic salts which react with the calcium hydroxide in the cured concrete substrate to produce permanent, variegated or translucent color effects.

LITHOCHROME® Chemstain™ as manufactured by the L.M. SCOFIELD COMPANY, Douglasville, Georgia, is considered to conform to the requirements of this specification.

B. Sealer: Sealer shall be a two-part, water-based, clear aliphatic urethane specifically formulated for protecting chemically stained concrete hardscapes and floors

SCOFIELD™ Clearcoat™ polyurethane sealer as manufactured by the L.M. SCOFIELD COMPANY, Douglasville, Georgia, is considered to conform to the requirements of this specification.

Contact: L.M. Scofield Company
250 Kehoe Blvd.
Carol Stream, Illinois 60188
Office: (630) 752-9424
Fax: (630) 752-9446
Mobile: (630) 215-8671

1. Colors:
   a) CS-15 Antique Amber

C. Substitutions: The use of any products other than those specified will be considered providing that the contractor requests it's use in writing within fourteen (14) days prior to bid date. This request shall be accompanied by:
   1. A certificate of compliance from the material manufacturer stating that the proposed products meet or exceed the requirements for this specification.
   2. Documented proof that the proposed material has a ten (10) year proven record of performance for staining concrete substrates, confirmed by at least five (5) local projects that the Architect can examine.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Contractor shall examine areas and conditions under which work will be performed and identify conditions detrimental to proper and timely completion of work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. New Concrete
   1. Newly placed concrete should be sufficiently cured to allow the concrete to become reactive, a minimum 14 days.
   2. If one or more of the following colors are being used, the minimum cure time of the concrete shall be 30-60 days to meet water vapor transmission requirements.
      a. Copper Patina
      b. Fern Green
      c. Weathered Bronze
   3. Liquid curing materials shall not be used. Concrete flatwork should be cured with new and unwrinkled, non-staining, high quality curing paper.
   4. All surfaces should be cured by the same method and different sections (pours) chemically stained when the concrete is the same age.
   5. Immediately prior to chemically staining, the concrete must be thoroughly cleaned. The surface should be swept, then pressure washed or scrubbed using a rotary floor machine. Use of suitable, high quality commercial detergents will facilitate cleaning. The surface must be rinsed after cleaning until the rinse water is completely clean. Allow floor to dry completely prior to application of floor stain.

B. Existing Concrete
   1. The concrete surface shall be cleaned so that the surface is completely penetrable before receiving the initial application of chemical stain. An indication of whether the concrete is penetrable can be obtained by spotting the surface with water. The water should immediately darken the substrate and be readily absorbed. If the water beads and does not penetrate or only penetrates in some areas, additional surface preparation and testing must be performed. On denser floors, acid washing with a solution of one (1) part muriatic acid (20° Baume or 31.4% pool acid) to 20 parts of water, or a light sanding may be needed to open up the surface.
   2. The cleaning method to be used depends on the condition of the concrete surface. To remove dirt and other contaminates, detergents and other commercial grade cleaners should be considered and tested.
   3. Rinse the concrete substrate until the rinse water is completely clean.

3.03 APPLICATION OF CHEMICAL STAIN

A. All concrete surfaces must be dry and properly prepared as described above. Surrounding areas must be protected from over-spray, run-off and tracking. The surface should be divided into small work sections using wall, joint lines, or other stationary breaks as natural stopping points.
B. Chemical Stains should be applied full strength (undiluted) at the coverage rate recommended by the manufacturer and using application equipment described in the manufacturer's printed technical literature. The color of the liquid chemical stain will have no resemblance to the final color produced on the concrete substrate.
C. Chemical stains normally fizz when reacting with the concrete. If fizzing does not occur, the substrate has not been adequately prepared or the concrete has too low of a pH level. If this should happen, contact the local representative for further recommendations.
D. The chemical stain should be transferred to the substrate by brush or spray and immediately scrubbed into the surface.
E. The reaction time depends on wind conditions, temperatures, and humidity levels.
F. When multiple coats of one or more colors are required, washing and drying between colors is desirable to evaluate the color prior to the next coat.

G. After the final coat of chemical stain has remained on the surface for a minimum of four (4) hours, all residue must be removed by wet scrubbing with a commercial grade detergent. The surface must be rinsed after scrubbing until the rinse water is completely clean. Run off may stain the adjacent areas or harm plants. It should be collected by wet vacuuming or absorbed with an inert material.
H. Allow to dry completely before applying clear sealer.

3.04 APPLICATION OF CLEAR SEALER
A. Concrete substrate should be completely dry.
B. The surface shall be sealed with a clear sealer produced by the manufacturer of the chemical stain.
C. Apply primer according the manufacturer's written instructions at a rate of 300-400 square feet per gallon.
D. Apply urethane topcoat according to manufacturer's written instructions at the rate of 400-500 square feet per gallon per coat.
E. Maintain a wet edge at all times.
F. Allow sealer to completely dry before applying additional coats.
G. Apply second coat of sealer at 90° to the direction of the first coat using the same application method and rates.

3.05 PROTECTION
A. Protect floor from traffic for at least 72 hours after final application of sealer.

3.06 MAINTENANCE
A. Chemically stained and sealed floors should be maintained by sweeping. Spills should be cleaned when they occur and dirt rinsed off with water. Heavily soiled areas may be wet-cleaned by mopping or by scrubbing with a rotary floor machine equipped with a scrubbing brush and a suitable, high quality commercial detergent. Interior floors that require polishing should be maintained using a compatible, premium-grade, emulsion-type, commercial floor polish, following manufacturer's instructions and safety requirements. Information on commercial floor polishes can be obtained by contacting:
Johnson Wax Professional
Sturtevant, Wisconsin
1-800-558-2332

END OF SECTION

SECTION 03450

ARCHITECTURAL PRECAST CONCRETE WALL PANELS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Architectural precast concrete wall panels.

B. Supports, anchors, and attachments.

C. Grouting of panels in footing keyway.

1.02 RELATED WORK

A. Section 01400 - Quality Control: Testing laboratory services.

B. Section 03300 - Cast-in-Place Concrete: Building structural foundation.

C. Section 05121 - Structural Steel Erection: Building structural frame.

D. Section 07900 - Joint Sealers: Perimeter and intermediate joint sealants and backing.

E. Section 09900 - Painting: Panel coating.

1.03 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings.

B. ACI 318 - Building Code Requirements for Reinforced Concrete.

C. ASTM A36 - Structural Steel.

D. ASTM A185 - Welded Steel Wire Fabric For Concrete Reinforcement.

E. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.

F. ASTM A386 - Zinc Coating (Hot-Dip) on Assembled Steel Products.

G. ASTM A416 - Uncoated Seven-Wire Stress-Relieved Strand for Prestressed Concrete.

H. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

I. ASTM A666 - Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar for Structural Applications.

J. ASTM C31 - Making and Curing Concrete Test Specimens in the Field.

K. ASTM C33 - Concrete Aggregates.

L. ASTM C143 - Test for Slump of Portland Cement Concrete.

M. ASTM C150 - Portland Cement.

N. ASTM C260 - Air-Entraining Admixtures for Concrete.

O. ASTM C330 - Lightweight Aggregates for Structural Concrete.

P. AWS D1.1 - Structural Welding Code.

Q. PCI Design Handbook - Precast and Prestressed Concrete, Third Edition.

R. PCI MNL-116 - Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.

1.04 SYSTEM DESCRIPTION

A. Members to withstand own weight, design loads due to pressure and suction of wind, erection forces, forces due to restrained volume changes of concrete, and live and dead loads, as indicated on Drawings.

B. Provide adjustment to accommodate misalignment of structure without permanent distortion, damage to components, wracking of joint connection or breakage of seals.

1.05 QUALITY ASSURANCE

A. Design members under direct supervision of Professional Engineer experienced in design of precast concrete units, registered in the State of Maine.

B. Conform to requirements of PCI Design Handbook, PCI MNL-116, and to ACI 318.

C. Precast Manufacturer and Erectors: Qualified in accordance with PCI MNL - 116.

D. Welding: All welding shall be performed by AWS certified welders and in accordance with AWS D1.1.

E. Manufacture, Transportation, and Installation: Company specializing in providing architectural precast products and services normally associated with precast concrete construction with high quality architectural finishes.

F. Take 6 concrete test cylinders for each 50 cu yds of concrete placed in accordance with ASTM C31.

G. Take 1 slump test for every 6 test cylinders in accordance with ASTM C143.

H. Take water absorption tests in accordance with PCI MNL-116.

1.06 SUBMITTALS

A. Submit shop drawings under provisions of Section 01300.

B. Indicate locations, fabrication details, unit identification marks, reinforcement, location and type of anchors, connection details, dimensions, openings and relationship to adjacent materials. Provide erection drawings indicating erection sequence.

C. Submit, for review and approval, shop drawings signed and sealed by a Professional Engineer registered in the State of Maine.

D. Submit, for record only, calculations signed and sealed by a Professional Engineer registered in the State of Maine.

E. Submit, for record only, welders' certificates certifying welders employed on the Work have satisfactorily passed AWS qualification tests within the previous 12 months.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Transport, handle, store, and protect under provisions of Section 01600.

B. Handle precast members to position, consistent with their shape and design. Lift and support only from support points.

C. Lifting or Handling Equipment: Capable of maintaining units during manufacture, storage, transportation, erection, and in position for fastening.

D. Blocking and Lateral Support During Transport and Storage: Clean, non-staining, without causing harm to exposed surfaces. Provide temporary lateral support to prevent bowing and warping.

E. Protect edges of members to prevent staining, chipping, or spalling of concrete.

F. Mark units with date of production and final position in structure, in location not visible to exterior view.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Spancrete Northeast, Inc., South Bethlehem, NY 12161.

B. Unistress Corp., Pittsfield, MA 01202.

2.02 CONCRETE MATERIALS

A. Cement: ASTM C150, Portland type I - normal or Type III - high early strength or Type II - sulphate resisting; color, gray.

B. Concrete Aggregates: ASTM C33; water and sand.

C. Reinforcing Steel: ASTM A615, deformed steel bars; ASTM A185, welded steel wire fabric; ASTM A416, prestressing strand; plain finish; strength and size commensurate with precast unit design.

D. Air Entrainment Admixture: ASTM C260.

E. Grout: Non-shrink, minimum 5,000 psi 28 day compressive strength.

2.03 SUPPORT DEVICES

A. Connecting and Support Devices: ASTM A36 steel.

2.04 ACCESSORIES

A. Sealant: Same type specified in Section 07900.

2.05 MIX

A. Concrete: Minimum 5000 psi 28 day strength, air entrained. Proportion mix in accordance with ACI 301.

2.06 FABRICATION

A. Maintain plant records and quality control program during production of precast units. Make records and access to plant available to Architect/Engineer upon request.

B. Maintain consistent quality during manufacture.

C. Embed reinforcing steel, anchors, inserts, plates, angles, and other cast-in items as indicated on shop drawings.

D. Fabricate connecting devices, plates, angles, items fit to steel framing members, inserts, bolts, and accessories. Fabricate to permit initial placement and final attachment.

E. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.

F. Minor patching in plant acceptable, providing structural adequacy and appearance of units is not impaired.

G. Identify each precast unit with corresponding code on erection drawings, in location not visible in finish work.

2.07 FINISH - PRECAST UNITS

A. Ensure exposed-to-view finish surfaces of precast units are uniform in color and appearance.

B. Exterior Finish shall be broom finished with grooved highlight indentations.

C. Interior finish shall be block texture bed cast surface.

2.08 FINISH - SUPPORT DEVICES

A. Clean surfaces of rust, scale, grease, and foreign matter.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify building structure, anchors, devices, and openings are ready to receive work of this Section.

B. Beginning of installation means acceptance of existing condition.

3.02 PREPARATION

A. Provide for erection procedures and induced loads during erection. Maintain temporary

bracing in place until final support is provided.

B. Provide necessary hoisting equipment.

3.03 ERECTION

A. Erect units without damage to shape or finish. Replace or repair damaged panels.

B. Erect members level and plumb within allowable standard industry tolerances.

C. Align and maintain uniform horizontal and vertical joints as erection progresses.

D. When members require adjustment beyond design or tolerance criteria, discontinue affected work; advise Architect/Engineer.

E. Fasten and weld units in place. Perform welding, including tack welds, in accordance with AWS D1.1 and approved manufacturers shop drawings.

F. Set vertical units dry, without grout, attaining joint dimension with lead or plastic spacers.

G. All cutting of wall panels in length or width in the field to be done with a saw. No breaking or chipping will be accepted.

H. Grout solid base of units.

3.04 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01400.

B. The Owner will engage an independent testing and inspection agency to inspect welded connections and to perform tests and prepare test reports.
   1. The testing agency shall conduct and interpret the tests and state in each report whether the test specimens comply with the requirements, and specifically state any deviations therefrom.

C. The testing agency shall perform the following:
   1. Visual inspection of all welds according to AWS.
   2. Inspect field welding in accordance with Section 6 of the AWS Code, including qualification tests of welders.
   3. Inspect the Work to determine if the Work is plumb, level, and aligned within the tolerances specified in Paragraph 3.05.
   4. Perform compressive strength tests for grout.
   5. Prepare and submit test reports to Engineer. Cooperate with Engineer to determine corrective measures necessary for defective work.
   6. Upon completion certify that erection complies with the Contract Documents.

3.05 TOLERANCES

A. Variation from Plane of Location: 1/4 inch in 10 feet and 3/8 inch in 100 feet maximum, non-cumulative.

B. Offset from True Alignment Between Two Connecting Members: 1/4 inch maximum.

C. Out of Square: 1/8 inch in 10 feet maximum, non-cumulative.

D. Variation in Top of Panel Elevation: Plus or minus ½ inch.

E. Variation in Dimensions Indicated on Shop Drawings: Plus or minus 1/8 inch.

F. Misalignment of Anchors, Inserts, Openings: 1/8 inch maximum.

G. Bowing of Units: Length of bow/360.

H. Exposed Joint Dimension: 3/8 inch plus or minus 1/4 inch.

3.06 PROTECTION

A. Protect members from damage.

B. Provide non-combustible shields during welding operations.

END OF SECTION

SECTION 03455

ARCHITECTURAL PRECAST CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Precast concrete stairs (optional).

B. Architectural precast concrete sills.

C. Supports, anchors, and attachments.

1.02 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings.

B. ACI 318 - Building Code Requirements for Reinforced Concrete.

C. ASTM A36 - Structural Steel.

D. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

E. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.

F. ASTM A325 - High Strength Bolts for Structural Steel Joints.

G. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

H. ASTM C31 - Making and Curing Concrete Test Specimens in the Field.

I. ASTM C33- Concrete Aggregates.

J. ASTM C143 - Test for Slump of Portland Cement Concrete.

K. ASTM C150 - Portland Cement.

L. ASTM C260 - Air-Entraining Admixtures for Concrete.

M. AWS D1.1 - Structural Welding Code.

N. PCI Manual For Structural Design of Architectural Precast Concrete.

O. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.

1.03 QUALITY ASSURANCE

A. Conform to requirements of PCI Manual for Structural Design of Architectural Precast Concrete and to ACI 318.

B. Precast Manufacturer and Erectors: Qualified in accordance with PCI MNL-117.
C. Welding: ANSI/AWS D1.1

D. Manufacture, Transportation, and Installation: Company specializing in providing architectural precast products and services normally associated with precast concrete construction with high quality architectural finishes.

E. Inspection and testing under provisions of Section 01400.

1.04 SUBMITTALS

A. Submit shop drawings under provisions of Section 01300.

B. Indicate locations, fabrication details, unit identification marks, reinforcement, connection details, dimensions, and relationship to adjacent materials. Provide erection drawings.

C. Submit manufacturer's surface cleaning instructions under provisions of Section 01300.

D. Submit samples under provisions of Section 01300.

E. Submit a sample 12 X 12 inches in size illustrating surface finish color and texture.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Transport, handle, store, and protect under provisions of Section 01600.

B. Handle precast members to position, consistent with their shape and design. Lift and support only from support points.

C. Lifting or Handling Equipment: Capable of maintaining units during manufacture, storage, transportation, erection, and in position for fastening.

D. Blocking and Lateral Support During Transport and Storage: Clean, non-staining, without causing harm to exposed surfaces. Provide temporary lateral support to prevent bowing and warping.

E. Protect edges of members to prevent staining, chipping, or spalling of concrete.

F. Mark units with date of production and final position in structure, in location not visible to exterior view.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

A. Cement: ASTM C150, Portland Type I - normal or II - sulphate resisting; white color.

B. Concrete Materials: ASTM C33; water and sand.

C. Reinforcing Steel: ASTM A615, deformed steel bars; ASTM A185, welded steel wire fabric; galvanized finish; strength and size commensurate with precast unit design.

D. Air Entrainment Admixture: ASTM C260.

E. Color to match concrete masonry units.

F. Grout: Non-shrink, minimum 7,000 psi 28 day strength.

2.02 MIX

A. Concrete: Minimum 5000 psi 28 day strength, air entrained in accordance with ACI 301.

2.03 FABRICATION

A. Maintain plant records and quality control program during production of precast units. Make records and access to plant available to Architect/Engineer upon request.

B. Use rigid molds, constructed to maintain precast unit uniform in shape, size, and finish.

C. Maintain consistent quality during manufacture.

D. Embed reinforcing steel, anchors, inserts, plates, angles, and other cast-in items as indicated on shop drawings.

E. Fabricate connecting devices, plates, angles, inserts, bolts, and accessories. Fabricate to permit initial placement and final attachment.

F. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.

G. Minor patching in plant acceptable, providing structural adequacy and appearance of units is not impaired.

H. Identify each precast unit with corresponding code on erection drawings, in location not visible in finish work.

2.04 FINISH - PRECAST UNIT

A. Ensure exposed-to-view finish surfaces of precast units are uniform in color and appearance.

B. Remove cement mortar from areas affected by aggregate retarder.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify building structure, anchors, devices, and openings are ready to receive work of this Section.

B. Beginning of installation means acceptance of existing condition.

3.02 PREPARATION

A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.

B. Provide necessary hoisting equipment.

3.03 ERECTION

A. Erect units without damage to shape or finish. Replace or repair damaged panels.

B. Erect members level and plumb within allowable tolerances.

C. Align and maintain uniform horizontal and vertical joints as erection progresses.

D. When members require adjustment beyond design or tolerance criteria, discontinue affected work; advise Architect/Engineer.

3.04 TOLERANCES

A. Variation from Plane of Location: 1/4 inch in 10 feet and 3/8 inch in 200 feet maximum, non-cumulative.

B. Offset from True Alignment Between Two Connecting Members 1/4 inch maximum.

C. Out of Square: 1/8 inch in 10 feet maximum, non-cumulative.

D. Variation in Dimensions Indicated on Shop Drawings: Plus or minus 1/8 inch.

3.05 PROTECTION

A. Protect members from damage.

B. Provide non-combustible shields during welding operations.

END OF SECTION

SECTION 04100

MORTAR AND GROUT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Mortar and grout for masonry.

1.02 RELATED WORK

A. Section 01400 - Quality Control: Testing laboratory services.

B. Section 04300 - Unit Masonry System: Installation of mortar.

1.03 REFERENCES

A. ACI 530-92 - Building Code Requirements for Concrete Masonry Structures.

B. ACI 530.1-92 - Specification for Concrete Masonry Construction.

C. ASTM C5 - Quicklime for Structural Purposes.

D. ASTM C94 - Ready-Mixed Concrete.

E. ASTM C143 - Slump of Portland Cement Concrete.

F. ASTM C144 - Aggregate for Masonry Mortar.

G. ASTM C150 - Portland Cement.

H. ASTM C207 - Hydrated Lime for Masonry Purposes.

I. ASTM C270 - Mortar for Unit Masonry.

J. ASTM C404 - Aggregates for Masonry Grout.

K. ASTM C476 - Grout for Masonry.

L. ASTM C780 - Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.

M. ASTM C1019 - Method of Sampling and Testing Grout.

N. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.04 SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Submit mix designs for grout and mortar, indicate proportion or property method used, required environmental conditions, and admixture limitations.

C. Samples: Submit under provisions of Section 01300.

D. Samples: Submit two ribbons of mortar color, illustrating color and color range.

E. Submit test reports under provisions of Section 01400.

F. Submit test reports on mortar indicating conformance to ASTM C270 and C780.

G. Submit test reports on grout mixes indicating conformance to ASTM C476 and C1019.

H. Submit manufacturer's certificate under provisions of Section 01400 that products meet or exceed specified requirements.

I. Submit Product Data for integral water repellent and mixture.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.

C. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

D. Store cementitious materials off the ground, under cover and in dry location.

E. Store aggregates where grading and other required characteristics can be maintained.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

B. Perform the following construction procedures while the work is progressing. Temperature ranges indicated below apply to air temperatures existing at time of installation except for grout. For grout, temperature ranges apply to anticipated minimum night temperatures. In heating mortar and grout materials, maintain mixing temperature selected within 10 degrees F (6 degrees C).

1. 40 degrees F (4 degrees C) to 32 degrees F (0 degrees C):

a. Mortar: Heat mixing water to produce mortar temperature between 40 degrees F and 120 degrees F.
b. Grout: Same as Mortar.

2. 32 degrees F (0 degrees C) to 25 degrees F (-4 degrees C):

a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 degrees F and 120 degrees F; maintain temperature of mortar on boards above freezing.
b. Grout: Heat grout materials to 90 degrees F to produce in place grout temperature of 70 degrees F at end of work day.

3. 25 degrees F (-4 degrees C) to 20 degrees F (-7 degrees C):

a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 degrees F and 120 degrees F; maintain temperature of mortar on boards above freezing.
b. Grout: Heat grout materials to 90 degrees F to produce in place grout temperature of 70 degrees F at end of work day.
c. Heat both sides of wall under construction using salamanders or other heat sources.
d. Install wind breaks all around construction when wind velocity exceeds 15 mph.

4. 20 degrees F (-7 degrees C) and below:

a. Provide an enclosure for the masonry under construction and use heat sources to maintain temperatures above 32 degrees F within the enclosure. The heated enclosure shall remain for a minimum of 36 hours after construction of the masonry structure is completed.

5. Do not heat water for mortar and grout to above 160 degrees F (71 degrees C).

6. See Section 04200 for Cold Weather Requirements for masonry under construction.

1.07 QUALITY ASSURANCE

A. Perform work in accordance with ACI 530 and ACI 530.1

B. Maintain one copy of each document on site.

C. Acquire cement, sand and aggregate from same source for all work.

D. Workmanship: The Contractor is responsible for the correction of mortar and grout work which does not conform to the specified requirements, including strength, tolerance and finishes. Correct deficient work as directed by the Engineer.

E. Concrete Testing Service: Employ, at Contractor's expense, a testing laboratory acceptable to Engineer to perform material evaluation tests and provide reports of results to engineer.

1. The Owner will employ a separate testing laboratory to perform all other tests and to submit test reports to the Engineer.
2. Materials and installed work may require testing and retesting, as directed by the Engineer, at any time during the progress of the work. Allow free access to material stockpiles and facilities at all times. Tests, not specifically indicated to be done at the Owner's expense, including the retesting of rejected materials and installed work, shall be done at the Contractor's expense.

F. Tests for Grout & Mortar Materials: Test aggregates by the methods of sampling and testing of ASTM C33.

1. Submit written reports to the Engineer, for each material samples and tested, prior to the start of work. Provide the project identification name and number, date of report, name of contractor, name of testing service, source of aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.
2. Certificates of material properties and compliance with specified requirements may be submitted in lieu of testing, when acceptable to the Engineer. Certificates of compliance must be signed by the material producer and the Contractor.

G. Quality Control Testing During Construction: Mortar and Grout shall be sampled and tested for quality control during placement, as follows:

1. Sampling and Testing Mortar: ASTM C780
2. Provide strength tests on mortar, one test for every 4,000 SF of wall surface being constructed, and submit reports to Engineer.
3. Sampling and Testing Grout: ASTM C1019
4. Provide slump test for grout, one test for each grout load at point of discharge; and one for each set of compressive strength test specimens.
5. Provide grout Compression Tests, one set for each 40 cu. yds, or fraction thereof, or for grout placed in any one day or for each 4,000 sq. ft. of wall surface area placed.
6. During cold weather grouting, one additional set of tests shall be taken and cured on job site under same conditions.
7. Additional Tests: The testing service will make additional tests of in-place grout and mortar when test results indicate the specified strengths and other characteristics have not been attained in the structure, as directed by the Engineer. The testing service may conduct tests to determine adequacy of grout and mortar by cored cylinders complying with ASTM C42, or by other methods as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable grout and mortar is verified.
8. Report test results in writing to the Engineer and the Contractor on the same day that tests are made. Reports of compressive strength test shall contain the project identification name, and number, date of concrete placement, name of contractor, name of supplier and truck number, name of testing service, location of batch in the structure, design compressive strength at 28 days, mix proportions and materials; and the specific information of slump, compressive breaking strength and type of break for both 7-day tests and 28-day test.

H. Single Source Responsibility for Mortar and Grout Materials: Obtain ingredients of uniform quality, including mortar color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

PART 2 PRODUCTS

2.01 MATERIALS

A. Portland Cement: ASTM C150, Type I, except Type III may be used for cold weather construction, white color.

B. Masonry Cement: Shall not be used.

C. Mortar Aggregate: ASTM C144, standard masonry type.

D. Hydrated Lime: ASTM C207, Type S.

E. Quicklime: ASTM C5, non-hydraulic type.
F. Grout Coarse Aggregate: ASTM C404, Size No. 8.

G. Grout Fine Aggregate: ASTM C404, Size No. 2.

H. Water: Clean and potable.

MORTAR COLOR

A. Mortar Color: Match color of unit masonry as directed by Architect.

2.03 MORTAR MIXES

A. Mortar for Reinforced Masonry: ASTM C270, Type S utilizing the Proportion Method to achieve 2500 psi strength.

B. Mortar for Masonry Veneer: ASTM C270, Type M or S utilizing the Proportions Method to achieve 2500 psi strength.

C. Limit cementitious material in mortar to portland cement-lime.

2.04 MORTAR MIXING

A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270.

B. Add mortar color in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
C. Do not use anti-freeze compounds to lower the freezing point of mortar.

D. If water is lost by evaporation, retemper only within two hours of mixing.

E. Use mortar within two hours after mixing at temperatures of 80 degrees F, or two-and-one-half hours at temperatures under 50 degrees F.

2.05 GROUT MIXES

A. Reinforced Unit Masonry: 3000 psi strength at 28 days; 7-8 inches slump; mixed in accordance with ASTM C476, Coarse grout.

B. Use coarse grout in grout spaces 2" or more in least horizontal dimension, unless otherwise indicated.

2.06 GROUT MIXING

A. Thoroughly mix grout ingredients in plant (not at site) in quantities needed for immediate use in accordance with ASTM C476, Coarse grout. Only grout that is plant mixed and delivered to site in truck will be accepted.

B. Do not use anti-freeze compounds to lower the freezing point of grout.

PART 3 EXECUTION

3.01 EXAMINATION

A. Request inspection of spaces to be grouted at least 48 hours in advance of any grouting operations.

3.02 PREPARATION

A. All grout cells shall be clean of any loose materials and excess mortar extending into cell 1/4 inch or more. Heavy duty vacuum may be required to remove loose materials.

B. Plug cleanout holes with block masonry units to prevent leakage of grout materials. Brace masonry for wet grout pressure.

C. Wet masonry surface prior to grouting cells.

3.03 INSTALLATION

A. Install mortar and grout in accordance with ACI 530 and ACI 530.1.

B. Work grout into masonry cores and cavities within first five (5) minutes after grout has been poured to eliminate voids.

C. Do not displace reinforcement (horizontally) or embedded items while placing grout.

D. All grout shall be placed with pumping equipment only unless approved otherwise by Engineer.

END OF SECTION

SECTION 04300

UNIT MASONRY SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete masonry units.

B. Brick masonry units.

C. Decorative concrete masonry units.

D. Reinforcement, anchorage, and accessories.

E. Erection of sample veneer masonry panel.

1.02 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

A. Section 05100 - Structural Steel: Placement of steel anchors, angles, bearing plates and masonry ties.

B. Section 05200 - Steel Joists: Placement of anchors for bridging angles.

C. Section 05500 - Metal Fabrications: Placement of loose steel lintels, anchors for door frames, bearing plates and fabricated steel items.

D. Section 07800 - Roof Accessories: Placement of reglets for flashing.

1.03 RELATED SECTIONS

A. Section 01400 - Quality Control: Testing laboratory services.

B. Section 04100 - Mortar and grout.

C. Section 09900 - Painting.

1.04 REFERENCES

A. ACI 530/ASCE 5 - Building Code Requirements for Concrete Masonry Structures.

B. ACI 530.1/ASCE 6 - Specification for Concrete Masonry Construction.

C. ANSI/ASTM A82 - Cold-Drawn Steel Wire for Concrete Reinforcement.

D. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

E. ASTM A153 - Ainc Coating (Hot-Dip) on Iron and Steel Hardware.

F. ASTM A167 - Stainless and Heat-Resisting Chrominum-Nickel Steel Plate.

G. ASTM A525 - Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip Process.

H. ASTM A580 - Stainless and Heat-Resisting Steel Wire.

I. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

J. ASTM B370 - Copper Sheet and Strip for Building Construction.

K. ASTM C90 - Hollow Load Bearing Concrete Masonry Units.

L. ASTM C140 - Method of Sampling and Testing Concrete Masonry Units.

M. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Cold Weather Masonry Construction.

N. UL - Underwriters' Laboratories.

1.05 SUBMITTALS

A. Submit product data and samples under provisions of Section 01300.

B. Submit product data for prefaced masonry units and fabricated wire reinforcement.

C. Submit two samples of decorative units to illustrate color, texture, pattern and extremes of color range.

D. Submit manufacturer's certificate under provisions of Section 01400 that products meet or exceed specified requirements.

1.06 QUALIFICATIONS

A. Installer: Company specializing in performing the work of this Section with minimum five years experience.

1.07 QUALITY ASSURANCE - FIELD INSPECTION

A. Masonry construction shall be inspected by the Engineer or authorized representative.

B. Single Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.

1.08 SAMPLE VENEER MASONRY PANEL

A. Provide sample veneer panel of masonry under provisions of Section 01400.

B. Construct at the site in an area directed by the project Manager, a 4 foot by 4 foot sample veneer masonry panel of veneer wall construction conforming to the typical front exterior wall construction. Panel shall be constructed as follows:
   1. Exterior veneer masonry shall be constructed of the typical 4" split face concrete masonry unit as specified.
   2. Back-up construction shall be cold formed metal stud wall framing with gypsum

sheathing, and asphalt felt.

3. Sample panel shall show bond pattern, masonry color and texture, mortar color, joint finishing, weep holes, horizontal reinforcement, anchors, ties, and other pertinent details of construction, including proposed method of keeping cavities free of mortar.
4. Sample veneer masonry panel shall also include control joint with proposed sealant.

C. Coordinate erection so that, in addition to masonry work indicated, other related trades are ready for installation of their work. Related trades include but are not limited to the following:
1. Cold formed metal framing (05400).
2. Asphalt felt (09250).
3. Caulking at control joints (07900).
4. Gypsum sheathing (09250).

1.09 PRE-INSTALLATION CONFERENCE

A. Convene one week prior to commencing work of this section, under provisions of Section 01200.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.

C. Concrete masonry units shall be shrink wrapped and palletized.

D. Accept prefaced units on site. Inspect for damage.

E. Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion or other causes.

F. Limit moisture absorption of concrete masonry units during delivery and until time of installation to the maximum percentage specified for Type 1 units for the average annual relative humidity as reported by the U.S. Weather Bureau Station nearest the project site.

G. Store masonry accessories including metal items to prevent deterioration by corrosion and accumulation of dirt.

1.11 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements: IMIAC - Recommended Practices and Specifications for Cold Weather Masonry Construction.

B. Do not lay masonry units which are wet or frozen.

C. Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.

D. Remove masonry damaged by freezing conditions.

E. See Section 04100 for Cold Weather Requirements for mortar and grout.

F. Maintain masonry units at same temperatures as mortar. Follow requirements for temperature

differences as indicated for mortar in Section 04100.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Hollow Decorative Block Units: ASTM C90, Grade N, Type I - Moisture Controlled; Design - Single score split face color as selected by Architect (Beveled edges will not be acceptable at ends of individual blocks.). Net area compressive strength of concrete masonry units shall be 1900 psi minimum.

B. Hollow Concrete Units: ASTM C90, Grade N, Type 1 - Moisture Controlled, Nominal weight. Net area compressive strength of concrete masonry units shall be 1900 psi minimum. Provide special units for 90 degree corners, bond beams, lintels and as indicated on the drawings.

C. Brick Veneer: ASTM C62, Grade SW, Moisture Controlled, Unit compressive strength = 2,500 psi.

2.02 REINFORCEMENT AND ANCHORAGE

A. Single Wythe Joint Reinforcement: Ladder type; hot dip galvanized after fabrication cold-drawn steel conforming to ASTM A82, No. 9 side rods and cross ties; Dur-O-Wal Ladur type (only acceptable style) manufactured by Dur-O-Wall Inc. or approved equal.

B. Reinforcing Steel: ASTM A615, 60 ksi yield grade, deformed billet bars.

C. Anchors and Ties:
1. Provide straps, bars, bolts and rods fabricated from not less than 16-gauge sheet metal or 3/8" diameter rod stock, unless otherwise indicated.
2. Wire Ties: Where loose masonry ties are indicated to anchor masonry to steel framework, provide steel wire ties, triangle type, 3/16" diameter minimum, galvanized as noted above. Provide type D/A 701-708, size as required to fit wall, as manufactured by Dur-O-Wal, Inc. or approved equal.
3. Veneer Anchors: For anchoring masonry veneer to structural metal stud back-up, provide 2 piece anchors which will permit horizontal and vertical movement of masonry but will provide lateral restraint. Provide type D/A 213 by Dur-O-Wal, Inc. or approved equal.
4. Flexible Anchors: Where masonry is indicated to be anchored to structural framework with flexible anchors, provide 2-piece anchors which will permit horizontal and vertical movement of masonry but will provide lateral restraint. Provide type D/A 213 by Dur-O-Wal, Inc. or approved equal.
5. In exterior wythe of exposed walls, fabricated from steel with hot-dip galvanized coating, ASTM A153, Class B-2. For interior work, including devices which extend only into interior wythes of exterior masonry, fabricate from steel with mill galvanized or hot-dip coating.

2.03 FLASHING

A. Copper/Kraft Paper Flashing: 5 oz/sq ft sheet copper bonded to fiber reinforced asphalt treated Kraft paper; as manufactured by York Manufacturing, York, Maine.

2.04 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, heat fused joints, as manufactured by Dur-O-Wal.

B. Weep Holes: Preformed plastic tubes with cotton inserts.

C. Cleaning Solutions: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 EXECUTION

3.01 EXAMINATION

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

B. Verify items provided by other Sections of work are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

D. Beginning of installation means installer accepts existing conditions.

3.02 JOB CONDITIONS

A. Protection of Work: During erection, cover top of walls with heavy waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress. Extend cover a minimum of 24 inches down both sides of wall and hold cover securely in place.

B. Do not apply uniform floor or roof loading for at least 24 hours after grouting masonry wall or columns. Do not apply concentrated loads for at least 3 days after grouting masonry walls or columns.

C. Prevent grout or mortar or soil from staining the face of masonry to be left exposed or painted. Immediately remove grout or mortar in contact with such masonry.

D. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.

3.03 PREPARATION

A. Direct and coordinate placement of metal anchors supplied to other Sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.04 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Lay concrete masonry units in running bond with single score aligned with vertical joint below. Course: one unit and one mortar joint to equal 8 inches. Recess and tool mortar joints to the

depth of the single score. Form concave mortar joints in the vertical and horizontal joints (Joint width exposure to be no greater than standard joint width.).

3.05 PLACING AND BONDING

A. Install masonry block in accordance with ACI 530 and ACI 530.1.

B. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

C. Lay hollow masonry units with full bedding on entire head and bed joint surfaces.

D. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.

E. Remove excess mortar from cavities and cells as work progresses. Mortar extending 1/4 inch or more into cell shall be removed.

F. Interlock intersections and external corners.

G. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

H. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

I. Isolate masonry partitions from vertical structural framing members with a control joint.

J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.06 WEEPS AND VENTS

A. Install weep holes in veneer at 24 inches on center horizontally above through-wall flashing.

3.07 CAVITY WALL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep holes.

B. Build inner wythe ahead of outer wythe to receive cavity insulation air/vapor barrier adhesive.

3.08 REINFORCEMENT AND ANCHORAGES - REINFORCED UNIT MASONRY

A. Install horizontal joint reinforcement 16 inches o.c. minimum and as noted on drawings.

B. Place 8" deep masonry bond beam with 2 - #5 continuous in first horizontal course below openings. Extend minimum 16 inches each side of openings.

C. Place joint reinforcement continuous in first joint below top of walls and in first joint above bottom of walls.

D. Place 1 - #5 vertical in grouted cells at all wall intersections, corners and window or door jambs. See plans for additional reinforcement.

E. Lap joint reinforcement ends minimum 6 inches. Extend minimum 16 inches each side of openings.

F. Support and secure reinforcing bars from displacement. Maintain position within ½ inch of dimensioned position.

G. Reinforce joint corners and intersections with horizontal bent bars that lap and match wall bond reinforcement.

H. Install loose masonry ties to steel framework and embed in masonry. Provide ties at 24" o.c. unless otherwise indicated.

3.09 REINFORCEMENT AND ANCHORAGES - VENEER MASONRY

A. Install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place joint reinforcement continuous in first joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

E. Secure veneer anchors to metal stud back-up and embed into masonry veneer at maximum 24 inches o.c. vertically and maximum 24 inches o.c. horizontally. Place at maximum 8 inches o.c. each way around perimeter of openings, within 16 inches of openings.

3.10 MASONRY FLASHING

A. Lap end joints minimum 6 inches and seal watertight.

B. Use flashing manufacturer's recommended adhesive and sealer.

3.11 GROUTED COMPONENTS

A. Support and secure reinforcing bars from displacement. Maintain position within ½ inch of dimensioned position.

B. Place grout fill with pumping equipment (unless approved otherwise by Engineer) and consolidate without displacing reinforcing.

C. At bearing locations, fill masonry cores with grout for a minimum 16 inches either side of opening.

D. Use metal lath, mortar or special units to confine grout to area required. Do not use materials which may inhibit bond or are combustible.

3.12 REINFORCED UNIT MASONRY

A. Lay masonry units with core cells vertically aligned, clear of mortar and unobstructed.

B. Place mortar in masonry unit bed joints back 1/4 inch from edge of unit Grout spaces, bevel back and upward. Permit mortar to cure 48 hours before placing grout.

C. Reinforce masonry unit cores with reinforcement bars and grout as indicated.

D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters. Splice reinforcement as indicated on Drawings.

E. Wet masonry unit surfaces in contact with grout just prior to grout placement.

F. Grout spaces less than 2 inches in width with fine grout using low lift grouting techniques. Grout spaces 2 inches or greater in width with coarse grout using low lift grouting techniques.

G. When grouting is stopped for more than one hour, terminate grout 2 inches below top of upper masonry unit to form a positive key for subsequent grout placement.

H. Low Lift Grouting:
1. Comply with low-lift grouting method in NCMA TEK 23A "Grouting for Concrete Masonry Walls."
2. Place grout in lifts not to exceed 4 feet; puddle in place.
3. Stop grout 2 inches from top of block at end of each lift.
4. Fill cores of blocks solid with grout as shown on Drawings.
5. Do not use grout which has begun to set or if more than 2 hours has elapsed since initial mixing.

I. High Lift Grouting:
1. Provide cleanout opening no less than 4 inches high at the bottom of each cell to be grouted by cutting one face shell of masonry unit.
2. Clean out masonry cells with high pressure water spray. Permit complete water drainage.
3. All reinforcing, bolts, other embedded items and cleanout closures shall be located properly and secured in place before grouting is started.
4. Place vertical barriers consisting of masonry units and mortar in bond beam type hollow units to be grouted at 30 feet maximum intervals to limit horizontal flow of grout.
5. Request the Engineer to inspect the cells. Allow 3 days advance notice of inspection.
6. After cleaning and cell inspection, seal openings with masonry units.
7. Pump grout into spaces. Maintain water content in grout to intended slump without aggregate segregation.
8. Limit grout lift to 48 inches and rod for grout consolidation. Wait 30 to 60 minutes and reconsolidate grout prior to loss of plasticity and before placing next lift. Reconsolidation of previous pour and consolidation of succeeding pour may be done in the same operation if the timing is suitable.
9. Complete full height of any section of wall in one day.

3.13 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

C. Size control joint in accordance with Section 07900 for sealant performance.

3.14 BUILT-IN WORK

A. As work progresses, build in fabricated metal frames anchor bolts, plates and other items furnished by other Sections.

B. Build in items plumb and level.

C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout.

D. Do not build in organic materials subject to deterioration.

3.15 FIELD QUALITY CONTROL

A. Masonry construction shall be inspected by the Engineer of authorized representative.

B. The inspector shall verify compliance with design drawings and specifications and keep a record that shall cover:
1. Quality and testing of masonry units and materials for mortar, grout, and making of prisms.
2. Proportions, mixing, and consistency of mortar and grout.
3. Laying, mortaring, and grouting of masonry units and masonry structural elements.
4. Condition, grade, size, spacing, and placing of reinforcement.
5. Any significant or unusual construction loads on completed masonry structural elements.
6. General progress of work.

C. When the ambient temperature falls below 40° F or rises above 100°F, a complete record shall be kept of weather conditions and of preconditioning and protection given to masonry materials, and protection and curing of completed work.

D. Records of inspection shall be submitted to the Engineer.

3.16 TOLERANCES

A. Maximum Variation From Alignment of Columns: 1/4 inch.

B. Maximum Variation From Unit to Adjacent Unit: 1/32 inch.

C. Maximum Variation From Plane of Wall: 1/4 inch in 10 feet and ½ inch in 20 feet or more.

D. Maximum Variation From Plumb: 1/4 inch per story.

E. Maximum Variation From Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; ½ inch in 30 feet.

F. Maximum Variation Joint Thickness: 1/8 inch in 3 feet.

G. Maximum Variation From Cross Sectional Thickness of Walls: 1/4 inch.

3.17 CUTTING AND FITTING

A. Cut and fit for chases, pipes, conduit, sleeves and grounds. Coordinate with other Sections of work to provide correct size, shape, and location.

B. Obtain Engineer approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.18 CLEANING

A. Clean work under provisions of Section 01700.

B. Remove excess mortar and mortar smears.

C. Replace defective mortar. Match adjacent work.

D. Clean soiled surfaces with cleaning solution.

E. Use non-metallic tools in cleaning operations.

F. With clean, soft, damp rags, wipe off glazed CMU surfaces as soon as mortar smears and spatters occur. Do not allow hardening. Do not use acid, steel wool or other abrasive to clean glazed surfaces.

3.19 PROTECTION OF FINISHED WORK

A. Protect finished installation under provisions of Section 01500.

B. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

END OF SECTION

SECTION 05120

STRUCTURAL STEEL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Structural steel framing members and support members.

B. Baseplates, masonry bearing plates and angles.

C. Grouting under baseplates.

D. Erection of structural steel.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Section 03300 - Cast-In-Place Concrete: Anchors for casting into concrete.

B. Section 04300 - Unit Masonry System: Anchors for embedding into masonry.

1.03 RELATED SECTIONS

A. Section 05210 - Steel Joists and Joist Girders.

B. Section 05300 - Steel Deck: Support framing for small openings in deck.

C. Section 05500 - Metal Fabrications: Non-framing fabrications affecting structural steel work.

D. Section 07253 - Cellulose Fireproofing: Fireproofing.

E. Section 09900 - Painting: Finish painting.

1.04 REFERENCES

A. ASTM A6 - General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural use.

B. ASTM A 992/A 992M “Specifications for High-Strength Low-Allow Columbium-Vanadium Structural Steel”

C. ASTM A36 - Miscellaneous Structural Steel.

D. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless.

E. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality.

F. ASTM A123 - Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.

G. ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware.

H. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.

I. ASTM A325 - High Strength Bolts for Structural Steel Joints.

J. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.

K. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

L. AWS A2.0 - Standard Welding Symbols.

M. AWS D1.1 - Structural Welding Code.

N. AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

O. AISC - Code of Standard Practice for Steel Buildings and Bridges.

P. AISC - Specification for Structural Joints Using ASTM A325 or A490 Bolts approved by the Research Council on Structural Connections of the Engineering Foundation.

Q. AISC - Specification for Architectural Exposed Structural Steel.

R. SSPC - Steel Structures Painting Council.

1.05 SUBMITTALS

A. Submit under provisions of Section 01300.

B. General: Review of submittals will be for general consideration only. Compliance with requirements for materials, fabrication, erection, and dimensions of structural steel shall be Contractor's responsibility. Resubmitted shop drawings shall have revisions identified and dated.

C. Shop Drawings:
1. Indicate profiles, cuts, copes, sizes, spacing, and locations of structural members; openings, attachments and fasteners.
2. Connections.
3. Cambers.
4. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths.
5. Provide setting drawings, templates, and directions for the installation of anchor bolts and other anchorages to be installed by others.
6. Provide calculations for single plate connections and as required by the Engineer.

D. Manufacturer's Data: For approval, submit five copies of producer's or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data as required to show compliance with these specifications (including specified standards). Indicate by transmittal form that a copy of applicable instruction has been distributed to each fabricator, installer, and erector:

1. Structural steel primer paint.

2. Weld-on and loose masonry anchors.
3. Non-shrink grout.

E. Manufacturer's Data: For record only, submit one copy of producer's or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data as required to show compliance with these specifications (including specified standards). Indicate by transmittal form that a copy of applicable instruction has been distributed to each fabricator, installer, and erector:
1. High-strength bolts (each type), including nuts and washers.
2. Unfinished bolts and nuts.
3. Welding electrodes.

F. Manufacturer's Mill Certificate: For record only, submit under provisions of Section 01300 certifying that products meet or exceed specified requirements.

G. Welders' Certificates: For record only, submit under provisions of Section 01300 Manufacturer's Certificates, certifying welders employed on the Work, verifying AWS qualifications within the previous 12 months.

1.06 QUALITY ASSURANCE

A. Comply with the provisions of the following except as otherwise indicated:
1. AISC "Code of Standard Practice for Steel Buildings and Bridges."
2. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings" and including the "Commentary" and Supplements thereto as issued.
3. AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts" approved by the Research Council on Structural Connections of the Engineering Foundation.
4. AWS D1.1 "Structural Welding Code."
5. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use"
6. Steel Structures Painting Council (SSPC) "Surface Preparation Specifications".

B. Maintain one copy of each document on site.

1.07 QUALIFICATIONS

A. Fabricator: Company specializing in performing the work of this Section with minimum eight years experience.

B. Erector: Company specializing in performing the work of this Section with minimum eight years experience.

C. Qualify welding processes and welding operators in accordance with the AWS "Standard Qualification Procedure."
1. Provide certification that welders to be employed in the work have satisfactorily
2. If recertification of welders is required, retesting will be the Contractor's responsibility.

D. Design connections not detailed on the Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Maine.

E. Source Quality Control: Materials and fabrication procedures are subject to inspection and tests in the mill, shop, and field, conducted by a qualified inspection agency. Such inspections

and tests will not relieve the Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements. Promptly remove and replace materials or fabricated components which do not comply.

F. Design of Members and Connections: Verify dimensions at the site as necessary without causing delay in the work. Promptly notify the Engineer whenever design of members and connections for any portion of the structure is not clearly indicated.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.

C. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay that work.

D. Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

E. Do not store materials on the structure in a manner that might cause distortion or damage to the members or in the supporting structures. Repair or replace damaged materials or structures as directed.

1.09 FIELD MEASUREMENTS

A. Verify that field measurements are as (shown on (Drawings) (shop drawings).) (instructed by the manufacturer.)

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel Beam Sections: ASTM A992

B. Miscellaneous Steel Members: ASTM A36.

C. Structural Tubing: ASTM A500, Grade B, FY=46 KS1.

D. Structural Pipe Columns: ASTM A501.

E. Pipe: ASTM A53, Grade B.

F. Bolts, Nuts, and Washers: ASTM A325.

G. Anchor Bolts: ASTM A307.

H. Tension Control Bolts: TC Bolt Corporation or approved equal.

I. Welding Materials: AWS D1.1; E70 and in accordance with AWS.

J. Grout/Drypack: Non-shrink type, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 2,400 psi in 48 hours and 5,000 psi at 28 days.

K. Shop and Touch-up Primer: SSPC Paint 15, Type 1, (ALL PRIMER TO BE GRAY).

L. Weld-on Masonry Anchors: No. 317 continuous weld-on anchor rod for columns and No. 315 anchor rod for beams by Heckmann Building Products or approved equal. These shall be shop welded to steel sections.

M. Furnish loose masonry anchors which are to be field attached to structural steel by others. Provide No. 316 triangular ties and No. 318 web ties (size to suit wall) by Heckmann Building Products or approved equal.

N. Expansion Bolts: Wedge anchors for concrete, sleeve anchors for masonry block by HILTI Fastening Systems.

2.02 FABRICATION

A. Fabricate structural steel in strict accordance with reviewed shop drawings and referenced standards.

B. Fabricate and assemble structural material in shop to greatest extent possible.

C. Fit stiffeners neatly between flanges of girders; and where tight fits are required to transmit bearing, mill or grind ends of stiffeners to ensure an even bearing against flange.

D. Provide camber as indicated on Drawings. Where no camber is indicated, fabricate steel with mill camber up.

E. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.

F. Remove extension bars or run-off plates upon completion and cooling of groove welds. Grind ends of welds smooth and flush with edges of abutting parts.

G. Make splices only where indicated.

H. Provide holes for securing other work to structural steel framing and for the passage of other work through steel framing members, only as shown on the Contract Documents.

I. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in base and bearing plates.

J. Mill and weld column bases to columns.

K. Furnish leveling plates, and/or other devices necessary for setting anchoring bolts required for securing structural steel to foundation, concrete, or masonry.

L. Anchors: Furnish anchor bolts, bearing plates and other required devices to be built into masonry construction for securing structural steel, joists and/or metal deck to masonry.

Furnish templates as necessary for the accurate location of anchors in other work.

1. Furnish unfinished threaded fasteners for anchor bolts, unless otherwise indicated.

M. Continuously seal joined members by continuous welds. Grind exposed welds smooth.

N. Standard holes shall be used in all high strength bolted connections.

2.03 FINISH

A. Shop paint all structural steel work gray, except those members or portions of members to be embedded in concrete or mortar, or receive a spray-on fireproofing.

B. Do not paint surfaces which are to be welded.

C. Apply two coats of paint to surfaces which will be inaccessible after assembly or erection or exposed to weather.

D. Surface Preparation: After inspection and before shipping, clean steel work to be painted. Remove loose rust, loose mill scale and spatter, slag or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:

SP-3 "Power Tool Cleaning" - for interior steel.
SP-6 "Commercial Blast" - for steel exposed to weather.

E. Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide a uniform dry-film thickness of 2.0 mils (per coat). Use painting methods which will result in full coverage of joints, corners, edges, and exposed surfaces.

2.04 CONNECTIONS

A. Weld or bolt shop connections.

B. Bolt field connections wherever possible.

C. No one-sided or other eccentric connections will be permitted, unless shown on Design Drawings. Submit calculations for all eccentric and one-sided connections.

D. Minimum Capacity of Beam Connections: For connections not detailed, provide connection capacity of at least one-half the allowable uniform load (Wc/2L) as derived from Uniform Load Constants in AISC Manual for the given steel member.

E. Provide high-strength threaded fasteners for all principal bolted connections.

F. Unless otherwise indicated all connections shall be classified as snug-tight bearing connections. Bolts installed in these connections shall be snug-tight as defined in Section 8© of the Bolt Specification.

G. Provide unfinished threaded fasteners for bolted connections of secondary framing members to primary members; including, but not limited to, girts, door framing systems, roof opening, and other framing systems taking only nominal stresses and in no way reacting in stress on primary members.

PART 3 EXECUTION

3.01 EXAMINATION

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

B. Beginning of installation means erector accepts existing conditions.

3.02 ERECTION

A. Setting Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean the bottom surface of base and bearing plates.
   1. Set loose and attached base plates and bearing plates for structural members on wedges, nuts or other adjusting devices.
   2. Tighten the anchor bolts after the supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the base or bearing plate prior to packing with grout.
   3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure in strict compliance with the manufacturer's instructions, or as otherwise required.

B. Set structural frames accurately to lines and elevations indicated. Align and adjust the various members forming part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustment to compensate for discrepancies in elevations and alignment.
   1. Level and plumb individual members of the structure within specific AISC tolerances.
   2. Members with adjustable connections shall be installed within 1/8 inch of the intended line, elevation and plumbness.
   3. Do not enlarge unfair holes in members by burning or by the use of drift pins. Ream holes that must be enlarged to admit bolts.
   4. During the final placing of solid web structural members, the load shall not be released from the hoisting line until the members are secured with not less than two bolts, or the equivalent at each connection and drawn up wrench tight.

C. Install and tighten high strength bolts in accordance with the Specification for Structural Joints Using ASTM A325 or A490 Bolts (Bolt Specification).

   1. Install High Strength Bolts in slip-critical connections per Section 8(d) of the Bolt Specification.
   2. Install High Strength Bolts in snug-tight bearing connections per Section 8© of the Bolt Specification.
   3. For Slip-Critical Joints, contact surfaces of the bolted parts shall have Class A surface conditions in accordance with Table 3 of the Bolt Specification.
   4. A representative sample of not less than three bolts and nuts of each diameter, length and grade to be used in the work shall be checked at the start of work in a device capable of indicating bolt tension. The test shall demonstrate that the method of estimating the snug-tight condition and controlling turns from snug-tight to be used by the bolting crews develops a tension not less than five percent greater than the tension required by Table 4.

D. Splice members only where shown or specified.

E. Maintain work in a stable condition during erection.

F. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to the Engineer. Finish gas-cut sections equal to a sheared appearance when permitted.

G. Do not field cut or alter structural members without approval of Architect/Engineer.

H. It is the Contractors Responsibility to design and install temporary shoring, bracing and guying during the steel erection to prevent excessive stresses and failure under all weather conditions. Remove after installation of metal decking, precast concrete walls and reinforced masonry walls.

3.03 TOLERANCES

A. Tolerances shall be within limits in AISC "Code of Standard Practice".

B. Fabrication and mill tolerance shall be within limits in AISC Standard Mill Practice.

3.04 TOUCH-UP PAINTING

A. After erection is complete, touch-up paint damaged shop priming coats and welded areas. Remove weld slag before applying touch-up paint. Apply paint to exposed areas with the same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

3.05 SOURCE/FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01400.

B. The Owner will engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.

1. The testing agency shall conduct and interpret the tests and state in each report whether the test specimens comply with the requirements, and specifically state any deviations therefrom.
2. Provide access for the testing agency to places where structural steel work is being fabricated or erected so that required inspection and testing can be accomplished.
3. The testing agency may inspect structural steel at the plant before shipment; however, the Engineer reserves the right, at any time before final acceptance, to reject material not complying with specified requirements.
4. Correct deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any noncompliance of the original work, and as may be necessary to show compliance of corrected work.

C. The testing agency shall perform the following:
1. Inspect quality of base material.
2. Inspect shop fabricated structural steel members.

3. Visual inspection of all welds according to AWS.
4. Inspect shop and field welding in accord with Section 6 of AWS Code, including qualification tests of welders.
5. Inspect high strength bolting in accordance with Section 9 of the Specification for Structural Joints.
   a. Visual inspection of bolts in snug-tight bearing connections is satisfactory.
   b. Inspect calibration procedures and installation and tightening of bolts in accordance with Section 9 of the Bolt Specification.
   c. Determine slip coefficient for coatings used on contact surfaces of slip-critical connections in accordance with Appendix A of the Bolt Specification.
6. Inspect 60 percent of erected columns for plumbness within tolerances specified in Section 3.03. Columns shall be considered plumb if the deviation of the working line from a plumb line does not exceed 1:500.
7. Visual inspection of all erected steel for damage.
8. Inspect shop painting.
9. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in the work. Record work required and performed to correct deficiencies.
10. Prepare and submit test reports to Engineer. Cooperate with Engineer to determine corrective measures necessary for defective work.
11. Upon completion certify that fabrication and erection comply with Contract Documents.

3.06 TEMPORARY SHORING AND BRACING

A. Provide temporary shoring and bracing members as required, with connections of sufficient strength, to bear imposed loads.

B. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

C. Remove temporary members and connections when permanent members are in place and final connections are made.

1. This structure is a non-self-supporting structure as defined in the AISC Code of Standard Practice. The structure is designed to be self-supporting and stable after the building is complete. Temporary supports shall remain in place until all necessary non-structural steel elements (including but not limited to, precast concrete walls and reinforced masonry walls) are complete.

3.07 PROTECTION

A. Do not use members for storage or working platforms until permanently secured.

B. Do not exceed load capacity of members with construction loads.

END OF SECTION

SECTION 05210

STEEL JOISTS AND JOIST GIRDERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Open web steel joists, longspan steel joists and joist girders; with bridging, attached seats, and anchors.

B. Erection of open web steel joists, longspan steel joists and joist girders; with bridging, attached seats, and anchors.

1.02 RELATED SECTIONS

A. Section 05120 - Structural Steel.

B. Section 05300 - Steel Deck: Support framing for small openings in deck.

C. Section 05500 - Metal Fabrications: Non-framing steel fabrications.

D. Section 07253 - Cellulose Fireproofing: Fireproofing.

E. Section 09900 - Painting.

1.03 REFERENCES

A. ASTM A36 - Structural Steel.

B. ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware.

C. ASTM A307 - Carbon Steel Threaded Standard Fasteners.

D. ASTM A325 - High Strength Bolts for Structural Steel Joints.

E. AWS D1.1 - Structural Welding Code.

F. FS TT-P-636 - Primer Coating, Alkyd, Wood and Ferrous Metal.

G. SJI - Standard Specifications for Open Web Steel Joists K Series.

H. SJI - Standard Specifications for Longspan Steel Joists LH Series and Deep Longspan Steel Joists DLH Series.

I. SSPC - Steel Structures Painting Council.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. General: Review of submittals will be for general consideration only. Compliance with requirements for materials, fabrication, erection, and dimensions shall be Contractor's responsibility.

C. Manufacturer's Data: For record only, submit one copy of manufacturer's specifications and installation instructions for each type of joist and its accessories. Include manufacturer's certification as required to show compliance with these specifications. Indicate by transmittal form that a copy of each instruction has been distributed to the Erector.

D. Shop Drawings:
1. Do not reproduce structural drawings for shop drawing purposes.
2. Indicate standard designations, configuration, sizes, spacing, locations of joists and joist leg extensions.
3. Joist coding, bridging, connections, attachments, and accessories.
4. Cambers.
5. Submit certification that special joists and joist girders with special loadings are designed in accordance with the S.J.I. Specification.

E. Structural calculations for all special Girders and Special Joists sealed by a Professional Structural Engineer with a valid state seal where the building is located.

F. Welders' Certificates: For record only, submit manufacturer's certificates under provisions of Section 01300 that welders employed on the Work have met AWS verification within the previous 12 months.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with SJI Standard Specifications, Load Tables, and Weight Tables, including headers and other supplementary framing. The fabricator shall be a member of the Steel Joist Institute and shall have approval from that Institute for the joists and joist girders supplied for this project. Only Joists and Joist Girders approved by SJI will be accepted.

B. The manufacturer shall design special joists and joist girders to support the loads noted on the plans and load diagrams. The joist and joist girder manufacturer shall be solely responsible for the design of the joists and joist girders and shall submit a letter of certification stamped by a Professional Engineer registered in the State of Maine stating that all special joists and joist girders are designed in accordance with the S.J.I. Specification to safely support all loads noted on the Contract Documents.

C. Maintain one copy of each document on site.

1.06 QUALIFICATIONS

A. Fabricator: Company specializing in performing the work of this Section with minimum eight years experience.

B. Erector: Company specializing in performing the work of this Section with minimum eight years experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01600 and to SJI requirements.

B. Store and protect products under provisions of Section 01600 and to SJI requirements.

C. Protect joists from distortion or damage.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel: Comply with SJI and AISC specifications.

B. High-strength Threaded Fasteners: ASTM A325 or A490 as required, heavy hexagon structural bolts with nuts and hardened washers.

C. Unfinished Threaded Fasteners: ASTM A307, grade A, regular hexagon type, low carbon steel.

D. Primer: FS TT-P-636 or SSPC-SP-15-68T, Type 1, gray color.

E. Structural Steel for Supplementary Framing and Joist Leg Extensions: ASTM A36.

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

2.02 FABRICATION

A. General: Fabricate steel joists in accordance with SJI and AISC Specification.

B. Top and bottom chord members shall be limited in shape to angles or structural tees for all joists.

C. Holes in Chord Members: Provide holes in chord members where shown for securing other work to the steel joists; however, deduct the area of holes from the area of the chord when calculating the strength the member.

D. Ceiling Extensions: Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord element or a separate unit, to suit manufacturer's standards, of sufficient strength to support the ceiling construction. Maintain ½" clear distance from the finished wall surface unless otherwise indicated.

E. Extended Ends: Provide extended top chords as shown on the drawings.

F. Bridging:
1. Provide horizontal or diagonal type bridging for "open web" joists, complying with AISC-SJI "Specifications."
2. Provide horizontal and diagonal type bridging for "longspan" joists, complying with AISC-SJI "Specifications."
3. Provide bridging anchors for ends of all bridging lines terminating at walls or beams.
4. Bridging shall be bolted or welded as shown on design drawings.

G. End Anchorage: Provide end anchorages to secure joists to adjacent construction complying with SJI and AISC Specifications, unless otherwise indicated.

H. Fabricate joist girders so joists framing onto top chord load the joist girders at panel points.

I. Provide the same depth bearing seat for all joist girders.

J. Header Units: Provide header units to support joists at openings not framed with structural shapes.

2.03 FINISH

A. After inspection and before shipping, prepare all surfaces by removing loose scale, rust, and other foreign materials. Preparation shall be equivalent to SSPC-SP2 "Hand Tool Cleaning".

B. Immediately after surface preparation, apply one shop coat of primer paint to steel joists and accessories, unless otherwise indicated, by spraying, dipping, or other methods to provide a continuous dry paint film thickness of not less than 2.0 mils.

C. Shop prime joists using a gray color primer.

PART 3 EXECUTION

3.01 EXAMINATION

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

B. Beginning of installation means erector accepts existing conditions.

3.02 ERECTION

A. Erect and bear joists on supports. Place and secure steel joists in accordance with SJI and AISC Specifications and as herein specified.

B. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment until completion of erection and installation of permanent bridging and bracing.

C. Anchors: Furnish anchor bolts and other required devices to be built into masonry construction. Furnish templates as may be necessary for the accurate location of anchors in other work.
1. Furnish unfinished threaded fasteners for anchor bolts, unless otherwise indicated.

D. Placing Joists: Do not start placement of steel joists until supporting work is in place and secured. Place joists on supporting work, adjust and align in accurate location and spacing before permanently fastening.
1. Provide temporary bridging, connections, and anchors as required to provide lateral stability during construction.
2. Where "open web" joist lengths are 40 feet and longer, install a center row of bolted bridging to provide lateral stability before slackening of hoisting lines.

E. Bridging: Install bridging immediately after joist erection, before any construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

F. Fastening Joists: Field weld joists to supporting steel framework in accordance with SJI and AISC specifications for the type of joists used. Coordinate welding sequence and procedure with the placing of joists.
1. Provide unfinished threaded fasteners for bolted connections except where high-strength bolts or welded connections are shown.
2. Provide High-strength threaded fasteners for bolted connections of steel joists to steel columns, and at other location where shown, installed in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

G. Coordinate placement of anchors in masonry construction for securing bearing plates.

H. Frame floor and roof openings greater than 24 inches with supplementary framing.

I. Do not permit erection of decking until joists are braced, bridged, and secured.

J. Do not field cut or alter structural members without approval of joist fabricator.

3.03 TOUCH-UP PAINTING

A. After joist installation, paint all field bolt heads and nuts, and abraded or rusty surfaces on joists and steel supporting members. Wire brush surfaces and clean with solvent before painting. Use the same type of paint as used for shop painting.

3.04 ERECTION TOLERANCES

A. Tolerances shall be within limits of AISC "Code of Standard Practice" and SJI requirements.

3.05 PROTECTION

A. Do not use members for storage nor working platforms until permanently secured.

B. Do not exceed load capacity of joists with construction loads.

C. Members damaged by shipping and handling shall be repaired or replaced. Fabricator's representative shall inspect damaged members and provide alternative methods for corrections.

3.06 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01400.

B. The Owner shall employ a testing laboratory acceptable to Engineer to perform visual inspection of all field welds according to AWS

END OF SECTION

SECTION 05300

STEEL DECK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Steel roof deck and accessories.

B. Steel floor deck and accessories.

C. Erection of steel roof deck and accessories.

D. Erection of steel floor deck and accessories.

E. Formed steel cant strips.

F. Formed steel deck end forms to contain wet concrete.

1.02 RELATED SECTIONS

A. Section 03200 - Concrete Reinforcement.

B. Section 03320 - Concrete slab on grade and structural concrete slabs.

C. Section 05120 - Structural Steel.

D. Section 05210 - Steel Joists and Joist Girders.

E. Section 07253 - Cellulose Fireproofing: Spray applied fireproofing.

1.03 REFERENCES

A. AISI - Specification for the Design of Cold-Formed Steel Structural Members.

B. ASTM A36 - Structural Steel.

C. ASTM A611 - Steel, Cold-Rolled Sheet, Carbon, Structural.

D. AWS D1.1 - Structural Welding Code.

E. SDI - Design Manual for Composite Decks, Form Decks, Roof Decks.

F. SSPC - Steel Structures Painting Council.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Shop Drawings: Indicate deck plan; gravity, wind, and shear load capacities; support locations, anchorage details, welding patterns, projections, openings and reinforcement, closure angles, and accessories. Indicate temporary shoring of deck where required for construction loads.

C. Product Data: Submit for approval; provide deck profile characteristics and dimensions, structural properties, and finishes. Provide manufacturer's load tables for each type of deck specified.

D. Manufacturer's Installation Instructions: Submit for record only, Indicating specific installation sequence, and special instruction.

1.05 QUALITY ASSURANCE

A. Comply with the provisions of the following codes and standards, except as otherwise shown or specified:

1. AISI "Specifications for the Design of Cold-Formed Steel Structural Members."
2. AWS D1.1 "Structural Welding Code."
3. SDI "Steel Deck Institute Design Manual for Composite Decks, Floor Decks and Roof Decks" and "Diaphragm Design Manual."
4. Factory Mutual Engineering Loss Prevention Data Sheets 1-28 and 1-29.
5. Roof Deck shall be Factory Mutual approved as qualifying for Class I Insulated Steel Roof Deck.

1.06 QUALIFICATIONS

A. Installer: Company specializing in performing the work of this Section with minimum of five years experience.

B. Welding Work: Qualify welding processes and welding operators in accordance with the AWS "Standard Qualification Procedure."

1. Deck welding in place is subject to inspection and testing. Expense of removing and replacing any portion of deck for testing purposes will be borne by the Owner if welds are found to be satisfactory. Remove work found to be defective and replace with new acceptable work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.

C. Cut plastic wrap to encourage ventilation.

D. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel for Painted Finish: ASTM A611, Grade C (Deck to be painted gray).

B. Miscellaneous Steel Shapes: ASTM A36.

C. Deck Accessories: Minimum 20-gage galvanized sheet steel.

D. Welding Materials: AWS D1.1.

E. Touch-up primer: Red oxide type with gray paint for repair of damaged surfaces.

2.02 FABRICATION

A. General: Form deck units in lengths to span 3 or more support spacings, with nested 2 inch end laps and nested side laps, unless otherwise shown or specified. Minimum end bearing is 4 inches unless otherwise noted. Provide deck configurations complying with SDI "Basic Design Specifications," and as specified.

B. Metal roof deck shall be wide rib, type B, (22)-gauge, 1-1/2 inch deep, 36 inches wide (min.) painted sheet carbon steel with a minimum yield point of 33,000 psi. Maximum top opening in deck shall be 2-1/2 inches. Ribs shall be a maximum of 6 inches on center. Deck shall have a minimum section modulus of (0.186) in^3 and minimum moment of inertia of (.167) in^4 and have a shear capacity greater than 225 plf.

C. Floor deck shall be non-composite wide rib 26-gauge, 9/16 inch deep galvanized sheet carbon steel with a minimum yield point of 33,000 psi. Deck shall have minimum section modulus of .042 in^3 and minimum moment of inertia shall be .013 in^4. Sections shall have male and female interlocking side joints that can be crimped from the top. Average widths of metal deck ribs to receive concrete shall not be less than 4 inches.

D. Provide all necessary special metal plates, closures and stops. Fabricate metal closure strips of not less than 20 gauge sheet metal of the same quality and finish as the deck. Form to the configuration required to provide tight fitting closures at edges of roof deck to provide for uniform support of blocking; and as required for a complete job.

E. Provide continuous galvanized screed angles at perimeter of all concrete filled deck, unless otherwise indicated. The gauge shall be sufficient to support the concrete during the concreting operation, but not thinner than 14 gauge, and of the same quality as the deck units.

F. Metal Deck shall be supplied free of amounts of lubricants or oils which would significantly impair the adhesion of spray applied fireproofing.

PART 3 EXECUTION

3.01 EXAMINATION

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

B. Beginning of installation means installer accepts existing conditions.

3.02 INSTALLATION

A. Erect metal deck and accessories in accordance with SDI Design Manual for Composite Decks, Form Decks, Roof Decks; manufacturer's instructions and shop drawings.

B. Bear deck on masonry support surfaces with 4 inch minimum bearing. Align and level.

C. Bear deck on steel supports with 3 inch minimum bearing. Align and level.

D. Position deck on supporting steel framework and adjust to final position with ends bearing on supporting members and accurately aligned end-to-end before being permanently fastened. Lap ends 2 inches minimum.

E. Do not stretch nor contract the side lap interlocks.

F. Roofs with a slope of 1/4 inch or more per foot shall be erected beginning at the low side to insure that end laps are shingle fashion.

G. Fastening Deck Units: Permanently fasten deck units to steel supporting members by not less than 5/8" diameter puddle welds or elongated welds of equal strength, see design drawings for spacing.

1. Comply with AWS requirements and procedures for manual shielded metal-arc welding, the appearance and quality of welds, and the methods used in correcting welding work.
2. Lock side laps between adjacent deck units as shown on design drawings.
3. Use weld washers for form deck.

H. Ridge and Valley Plates:

1. Weld ridge and valley plates to top surface of roof deck.
2. Lap end joints not less than three inches with laps in direction of water flow.

I. Install 6 inch minimum wide sheet steel cover plates, of same thickness as deck, where deck changes direction. Weld 12 inches o.c. maximum.

J. To contain wet concrete, install stops at slab edge upturned to top surface of slab. Provide stops of sufficient strength to remain stationary under wet concrete without distortion.

K. Cutting and Fitting: Deck erector shall cut all openings in roof deck which are shown on the erection drawings. Cut and fit deck units and accessories around other work projecting

through or adjacent to the decking. Provide neat, square and trim cuts. Openings not shown on the erection drawings shall be cut (and reinforced, if necessary) by the trades requiring the openings.

L. Do not use cutting torches.

M. Closure Strips:
1. Install sheet steel closure strips and angle flashings at all open uncovered ends and edges of deck, and in voids between deck and walls, columns, openings and other construction.
2. Weld into position to provide complete deck installation.

N. Place metal cant strips in position and weld.

3.03 TOUCH-UP PAINTING

A. Wire brush, clean, and paint scarred areas, welds, rust spots on top and bottom surfaces of units and supporting steel members.

B. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.

C. Touch-up shop painted surfaces with the same paint used in the shop, as recommended by the deck manufacturer.

D. In areas where touch-up painted surfaces are to be exposed, apply the paint to blend into the adjacent surfaces in a manner that will minimize visual discontinuity in the coatings.

3.04 PROTECTION

A. Coordinate and cooperate with structural steel erector in locating deck bundles to prevent overloading of structural members.

B. Do not use deck for storage nor working platforms until permanently secured in position.

C. Do not exceed load capacity of deck with construction loads.

D. Before roofing, check welds and reweld all broken and damaged welds.

END OF SECTION

SECTION 05400

COLD FORMED METAL FRAMING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Load and non-load bearing formed steel stud exterior wall and interior wall framing.

B. Formed steel joist and rafter framing and bridging for canopy.

C. Structural metal framing for exterior veneer wall system.

1.02 RELATED WORK

A. Section 05501 - Metal Fabrications: Miscellaneous structural framing.

B. Section 06001 - Carpentry Work: Rough wood blocking.

C. Section 07213 - Batt and Blanket Insulation: Insulation within framing members.

D. Section 07710 - Roof Specialties: Head and sill flashings.

E. Section 07900 - Joint Sealers.

F. Section 09260 - Gypsum Board Systems.

G. Section 09511 - Suspended Acoustical Ceilings: Suspension system.

1.03 REFERENCES

A. AISI (American Iron and Steel Institute) - Design of cold formed steel structural members.

B. ASTM A90 - Test Method for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.

C. ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by Hot Dip Process, Structural (Physical) Quality.

D. ASTM A570 - Steel, Sheet and Strip. Carbon, Hot-Rolled, Structural Quality.

E. ASTM A611 - Steel, Sheet, Carbon, Cold-Rolled, Structural Quality.

F. AWCI (Association of Wall and Ceiling Industries) - Specifications Guide for Cold Formed Steel Structural Members.

G. AWS D1.1 - Structural Welding Code.

H. FS TT-P-636C - Primer, Paint, Zinc-Chromate, Alkyd Type.

1.04 QUALITY ASSURANCE

A. Manufacturer: Company specializing in structural framing components with five years minimum experience.

B. Calculate structural properties of framing members in accordance with AISI requirements.

1.05 SUBMITTALS

A. Submit, for review and approval, shop drawings and product data under provisions of Section 01300.

B. Indicate on shop drawings, member sizes and properties, component details, framed openings, bearing, anchorage, welds, type and location of fasteners, and accessories or items required of other related work.

C. Provide detailed wall elevations of structural metal framing for veneer wall. Provide connection details and layout of each member.

D. Provide canopy roof truss layout, member sizes and connections.

E. Describe method for securing studs to tracks and provide framing connection details.

F. Submit for approval product data on standard framing members. Describe materials and finish, product criteria, limitations and structural properties.

G. Submit manufacturer's installation instructions under provisions of Section 01300.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Incor Division, Dale Industries.

B. Marino Industries Corp.

C. U. S. Gypsum Co.

D. Substitutions: Under provisions of Section 01600.

2.02 FRAMING MATERIALS

A. Studs: Manufacturer's standard load-bearing steel studs of size, shape and gauge indicated, with 1-5/8 inch minimum flanges and flange return lip.

B. Joists and Rafters: Manufacturer's standard C-shape sections of size and gauge indicated, with 2 inch flanges and flange return lip.

C. Materials:

1. For 16 gauge and heavier members fabricate metal framing components from structural quality sheet steel, ASTM A570 grade 50 for painted members and ASTM A446 grade D for galvanized members, minimum yield point of 50,000 psi.

2. For 18 gauge and lighter members fabricate metal framing components from structural quality sheet steel, ASTM A611 grade C for painted members and ASTM A446 grade A for galvanized members, minimum yield point of 33,000 psi.

D. Track: Formed sheet steel; channel shaped; same width and gauge as studs, tight fit; solid web.

E. Stud and Joist Bridging: Cold rolled sheet steel; channel shape; 18 gage thick; 2 2 x 2 inch nominal size.

2.03 ACCESSORIES

A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.

B. Plates, Gussets, Clips: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.

2.04 FASTENERS

A. Self-drilling, Self-tapping Screws, Bolts, Nuts and Washers: ASTM A90, hot dip galvanized.

B. Anchorage Devices: Power driven and Drilled expansion bolts.

C. Welding: In conformance with AWS D1.1.

2.05 FABRICATION

A. Fabricate assemblies of framed sections of sizes and profiles required; with framing members fitted, reinforced, and braced to suit design requirements.

B. Fit and assemble in largest practical sections for delivery to site, ready for installation.

2.06 FINISHES

A. Galvanizing: G60 coating class.

B. Primer: FS TT-P-636C, touch-up for galvanized surfaces.

C. All members for canopy framing shall be galvanized.

D. All members for structural metal framed veneer wall shall be galvanized.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that substrate surfaces or building framing components are ready to receive work.

B. Beginning of installation means acceptance of substrate.

3.02 ERECTION OF STUDDING

A. Install components in accordance with manufacturer's instructions.

B. Align floor and ceiling tracks; locate wall layout. Secure in place at maximum 24 inches o.c.

C. Place studs at 16 inches o.c., unless otherwise indicated; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks with fasteners or welds.

D. Connections shall be made with self-drilling screws or welding so that the connection meets or exceeds the loads required at that connection.

E. Temporary bracing shall be provided and left in place until work is permanently stabilized.

F. Erect load bearing studs one piece full length. Splicing of studs is not permitted.

G. Erect load bearing studs, brace, and reinforce to develop full strength to meet design requirements.

H. Refer to Drawings for locations of partitions extending to ceiling only, and partitions extending through ceiling to structure above.

I. Provide deflection allowance in stud track, directly below horizontal building framing for non-load bearing framing.

J. Provide cold rolled channel bridging as indicated on drawings and in accordance with manufacturer's recommendations.

K. Construct corners using minimum three studs. Double stud at wall opening, door, and window jambs.

L. Install intermediate studs above and below openings to match wall stud spacing.

M. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.

N. Attach cross studs to studs for attachment of fixtures anchored to walls.

O. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

P. Touch-up field welds and damaged galvanized surfaces with primer.

Q. Complete framing ready to receive plywood or drywall.

3.03 ERECTION OF JOISTS AND RAFTERS

A. Install framing components in accordance with manufacturer's instructions.

B. Make provisions for erection stresses. Provide temporary alignment and bracing.

C. Place joists and rafters at spacings noted on drawings; not more than 2 inches from abutting walls. Connect joists to supports using fastener or welding method. Provide lateral bracing and bridging as indicated and in accordance with manufacturer's recommendations.

D. Connections shall be made with self-drilling screws or welding so that the connection meets or exceeds the loads required at that connection.

E. Set ceiling joists parallel and level, with lateral bracing and bridging.

F. Locate joist end bearing directly over load bearing studs or provide load distributing member to top of stud track.

G. Provide joist and rafter web stiffeners at reaction points.

H. End blocking shall be provided where joist ends are not otherwise restrained from rotation.

I. Provide cold rolled channel bridging as indicated on drawings and in accordance with manufacturer's recommendations.

J. Provide additional joists under parallel partitions where the partition length exceeds one half of the joist span.

K. Provide additional framing around all floor/roof openings which are larger than the joist spacing.

L. Touch-up field welds and damaged galvanized surfaces with primer.

M. Complete framing ready to receive sheathing or ceiling.

3.04 TOLERANCES

A. Maximum Variation from True Position: 1/8 inch.

B. Maximum Variation of any Member from Plane: 1/8 inches.

C. Vertical alignment (plumbness) of studs shall be within 1/960th (1/8" in 10'-0") of the span.

D Horizontal alignment (levelness) of walls shall be within 1/960th (1/8" in 10'-0") of their respective lengths.

END OF SECTION

SECTION 05500

METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The extent of miscellaneous metal fabrication work is shown on Drawings and includes items fabricated from iron and steel shapes, plates, bars, strips, tubes, pipes, and castings which are not specified as part of the structural steel or other metal sections of these Specifications.

B. Furnish and install miscellaneous metal items, all supplementary or miscellaneous items necessary for a secure and complete installation, including but not limited to the following:

Ladders

Steel pipe railings and handrails.

Steel framed stairs and platforms.

Structural steel door frames.

Loose steel lintels.

Miscellaneous framing and supports.

Miscellaneous steel trim.

Steel floor plate.

Trench drain covers

Burglar bars.

Metal decking reinforcement.

Steel bollards.

Stair nosing.

Floor gratings.

Miscellaneous shelves, hangers and supports.

Unistrut.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Section 03320 - Concrete: Placement of metal fabrications in concrete.

B. Section 04300 - Unit Masonry System: Placement of metal fabrications in masonry.

1.03 RELATED SECTIONS

A. Section 05120 - Structural Steel.

B. Section 09900 - Painting: Paint finish.

1.04 REFERENCES

A. ASTM A6 - General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling, and Bars and Structural Use.

B. ASTM A27 - Specification for Mild to Medium Strength Carbon Steel Castings for General Application.

C. ASTM A36 - Structural Steel.

D. ASTM A47 - Malleable Iron Castings.

E. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.

F. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality.

G. ASTM A123 - Zinc (Hot-Galvanized) Coatings on Products Fabricated From Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strip.

H. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

I. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

J. ASTM A276 - Stainless and Heat-Resisting Steel Bars and Shapes.

K. ASTM A283 - Carbon Steel Plates, Shapes, and Bars.

L. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.

M. ASTM A325 - High Strength Bolts for Structural Steel Joints.

N. ASTM A386 - Zinc-Coating (Hot-Dip) on Assembled Steel Products.

O. ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by Hot Dip Process, Physical (Structural) Quality.

P. ASTM A484 - General Requirements for Stainless and Heat Resisting Wrought Steel Products.

Q. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.

R. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

S. ASTM A570 - Hot-Rolled Carbon Steel Sheet and Strip. Structural Quality.

T. ASTM A611 - Steel, Cold-Rolled Sheet, Carbon, Structural.

U. AWS A2.0 - Standard Welding Symbols.

V. AWS D1.1 - Structural Welding Code.

W. SSPC - Steel Structures Painting Council.

X. FS-FF-B-561
FS-FF-B-588

FS-FF-S-92
FS-FF-S-111
FS-FF-W-84
FS-FF-W-92
FS-QQ-F-461

1.05 SUBMITTALS

A. Submit under provisions of Section 01300.

B. General: Review of Shop Drawings will be for general considerations only. Compliance with requirements for materials, fabrication, and erection of structural steel shall be the Contractor's responsibility.

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

D. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

E. Material Data: For record only, submit laboratory test reports and other data as required to show compliance with Specifications. Submit producers' or manufacturers' specifications and installation instructions.

1.06 QUALITY ASSURANCE

A. Comply with the provisions of the following except as otherwise indicated:

1. American Institute of Steel Construction (AISC)

   a. "Code of Standard Practice for Steel Buildings and Bridges."
   b. "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings" and including the "Commentary" and Supplements thereto as issued.
   c. "Specifications for Structural Joints Using ASTM A325 or A490 bolts" approved by the Research Council on Structural Connections of the Engineering Foundation.

2. AWS D1.1 "Structural Welding Code."
3. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."
4. Steel Structures Painting Council (SSPC) "Surface Preparation Specifications."
5. National Association of Architectural Metal Manufacturers "Pipe Railing Manual", "Metal Bar Grating Manual", "Metal Stairs Manual".

B. Qualify welding processes and welding operators in accordance with the AWS "Standard Qualification Procedure."

1. Provide certification that welders to be employed in the work have satisfactorily passed AWS qualifications tests within the previous 12 months.
2. If recertification of welders is required, retesting will be the Contractor's responsibility.

C. Fabricator: Company specializing in performing the work of this Section with minimum eight years experience.

D. Erector: Company specializing in performing the work of this Section with minimum eight years experience.

1.07 SYSTEM PERFORMANCES:

A. Structural Performances: Provide assemblies which, when installed, comply with the following minimum requirements for structural performance, unless otherwise indicated.

1. Treads and Platforms of Steel Stairs: Capable of withstanding a uniform load of 100 lbs per sq. ft. or a concentrated load of 300 lbs. so located as to produce maximum stress conditions.
2. Handrails and Top-rails: Capable of withstanding the following loads.

a. Concentrated loads of 200 lbs applied at any point in any direction.
b. Uniform load of 50 lbs per linear ft. applied simultaneously in both vertical and horizontal directions.
c. Concentrated and uniform loads above need not be assumed to act concurrently.

3. Guards: Intermediate rails, balusters and panel fillers capable of withstanding a uniform load of 25 lbs per sq. ft. of gross area of guard, including any open areas, of which they are a part.

Above load need not be assumed to be acting concurrently with uniform horizontal loads on Top-rails of railing assembly in determining stress on guard supporting members.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.

C. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay that work.

D. Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

E. Do not store materials on the structure in a manner that might cause distortion or damage to the members or in the supporting structures. Repair or replace damaged materials or structures as directed.

1.09 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on Drawings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel Shapes, Plates and Bars: ASTM A36.
B. Steel Tubing: ASTM A500, Grade B or ASTM A501.

C. Plates: ASTM A283.

D. Pipe: ASTM A53, Grade B Schedule 40 Black Finish unless otherwise indicated.

E. Structural Steel Sheet: ASTM A570 or ASTM A611, CLASS 1, of grade required for design loading.

F. Galvanized Structural Steel Sheet: ASTM A446, of grade required for design loading; coating designation G90 or as indicated.

G. Stainless Steel Plate and Sheet: ASTM A167, ASTM A276 and A484, Type 304.

H. Bolts, Nuts, and Washers: ASTM A325, galvanized to ASTM A153 for galvanized components.

I. Shear Stud Connectors: ASTM A108, Grade 1015, forged steel, headed, uncoated.

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

K. Shop and Touch-up Primer: SSPC 15, Type 1, red oxide.

L. Touch-up Paint for Galvanized Surfaces: Zinc rich type complying with MIL-P-21035 or SSPC-Paint-20.

M. Coal Tar-Epoxy Coating: 46-413 Tneme-Tar by Tnemec Company, Inc. or approved equal.

N. Rough Hardware: Furnish custom-fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes for framing and supporting and anchoring woodwork.

O. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 28 days.

P. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.

Q. Weld-on Masonry Anchors: No. 317 continuous weld-on anchor rod by Heckmann Building Products for columns and No. 315 anchor rod for beams. These shall be shop welded to steel sections.

R. Furnish loose masonry anchors which are to be field attached to structural steel by others. Provide No. 316 triangular ties and No. 318 Web ties (size to suit wall) by Heckmann Building Products.

S. Threaded Rod Hangers: ASTM A36.

T. Fasteners:
1. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
2. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.
3. Lag Bolts: Square head type, FS FF-B-561.
4. Machine Screws: Cadmium plated steel, FS FF-S-92.
5. Wood Screws: Flat head carbon steel, FS FF-S-111.
6. Plain Washers: Round, carbon steel, FS FF-W-92.
7. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class and style as required.

8. Lock Washers: Helical spring type carbon steel, FS FF-W-84.
9. Expansion Bolts: Wedge anchors for concrete, sleeve anchors for masonry block by HILTI fastening systems.

2.02 MANUFACTURERS

A. Unistrut Channels: Type P1000 Channel, Plain finish, 600 linear feet; Manufactured by Unistrut Corporation, Wayne, Michigan 48184.

B. Industrial Grille: Steel ornamental railing panels with closed channel caps, 1 2 inch No. 14 flattened, mill finish, field painted; as Manufactured by Burtman Iron Works, Inc., Readville, MA 02137-0005.

C. Expanded Metal: Carbon steel - flattened, style 3/4 inch #16F as manufactured by McNichols Co., Tampa, Florida 33609.

2.03 FABRICATION

A. Fabricate according to reviewed shop drawings.

B. Fit and shop assemble in largest practical sections, for delivery to site.

C. Drill or punch all holes. Burned holes are not acceptable.

D. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive finish hardware and similar items.

E. Fabricate items with joints tightly fitted and secured.

F. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.

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

H. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.

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

J. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise. Fabricate and space anchoring devices to provide adequate support for intended use.

2.04 MISCELLANEOUS METAL FABRICATIONS

A. LADDERS:

1. Fabricate ladders for the location shown, with dimensions, spacings, details and anchorages as indicated. Comply with the requirements of ANSI A 14.3, except as otherwise indicated.

Unless otherwise shown, provide 3/8" x 2-1/2" continuous structural steel flat bar side rails with eased edges, spaced 24" apart.

Provide 3/4" diameter solid structural steel bar rungs, spaced as shown.

2. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.
3. Support each ladder at top and bottom and at intermediate points spaced not more than 5'-0" o.c. Use welded or bolted steel brackets, designed for adequate support and anchorage, and to hold the ladder clear of the wall surface with a minimum of 7" clearance from wall to centerline of rungs. Extend rails 42" above top rung, and return rails to wall or structure unless other secure handholds are provided. If the adjacent structure does not extend above the top rung, goose-neck the extended rails back to the structure to provide secure ladder access.
4. Provide non-slip surface on the top of each rung, either by coating the rung with aluminum oxide granules set in epoxy resin adhesive, or by using a type of manufactured rung which is filled with aluminum oxide grout.

B. STEEL PIPE RAILINGS AND HANDRAILS:

1. Fabricate steel pipe railings and handrails to design, dimensions, and details indicated. Provide railings and handrail members formed of pipe of sizes and wall thickness indicated, or if not shown, as required to support design loading.
2. Interconnect railing and hand rail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.

   At tee and cross intersections provide coped joints.

   At bends interconnect pipe by means of prefabricated elbow fittings or flush radius bends, as applicable, of radiuses indicated.

   At elbow bends provide mitered joints.

   Form bends by use of prefabricated elbow fittings and radius bends or by bending pipe, at fabricator's option.
3. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting or otherwise deforming exposed surfaces of pipe.
4. Provide wall returns at ends of wall-mounted handrails, except where otherwise indicated.
5. Close exposed ends of pipe by welding 3/16" thick steel plate in place or by use of prefabricated fittings.
6. Toe Boards: Where indicated, provide toeboards at railings around openings and at the edge of open-sided floors and platforms. Fabricate to dimensions and details shown, or if not shown, use a 4" high x 1/8" plate welded to, and centered between, each railing post.
7. Brackets, Flanges, Fittings and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.
   a. For railing posts set in concrete provide sleeves of galvanized steel pipe not less than 6" embedment into concrete and 6" above concrete surface and with an outside diameter not less than 1/16" less than the inside diameter of pipe. Provide steel plate closure welded to bottom of sleeve and of width and length not less than 1" greater than

outside diameter of sleeve (see plans for detail).

b. Provide friction fit, removable covers designed to keep sleeves clean and hold top edge of sleeve 2" below finished-surface of concrete.

C. STEEL FRAMED STAIRS AND PLATFORMS:

1. General: Construct stairs to conform to sizes and arrangements indicated; join pieces together by welding unless otherwise indicated. Provide complete stair assemblies including metal framing, hangers, columns, railings, newels, balusters, struts, clips, brackets, bearing plates and other components necessary for the support of stairs and platforms and as required to anchor and contain the stairs on the supporting structure.
2. Stair Framing: Fabricate stringer of structural steel channels, or plates, or a combination thereof, as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural steel channel headers and miscellaneous framing members as shown. Bolt or weld headers to stringers, newels and framing members to stringers and headers; fabricate and join so that bolts, if used, do not appear on finish surfaces. Where masonry walls support steel stairs, provide temporary supporting struts designed for erection of steel stair components before installation of masonry.

3. Metal Pan Risers, Subtreads, and Subplatforms: Shape metal pans for risers and subtreads to conform to configuration shown. Provide thicknesses of structural steel sheet for metal pans indicated but not less than that required to support total design loading.

   a. Form metal pans of hot-rolled or cold-rolled carbon steel sheet, unless otherwise indicated.
   b. Form metal pans of galvanized carbon steel sheet, where indicated.
   c. Directly weld risers and subtreads to stringers, locate welds on side of metal pans to be concealed by concrete fill.
   d. Attach risers and subtreads to stringers by means of brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting or bolting.
   e. Provide subplatforms of configuration and construction indicated, or if not indicated, of same metal as risers and subtreads and in thicknesses required to support design loading. Attach subplatform to platform framing members with welds.

D. STRUCTURAL STEEL DOOR FRAMES:

1. Fabricate steel door frames of structural shapes and bars as shown, fully welded, uniform, square and true. Plug weld built-up members, continuously weld exposed joints; grind exposed welds smooth. Provide 5/8" x 1-1/2" steel bar stops, unless otherwise indicated. Secure removable stops to frame with countersunk machine screws, uniformly spaced at not more than 10" o.c. Provide necessary reinforcements and drill and tap as required for finish hardware.
2. Provide steel strap anchors for securing door frames into adjoining concrete or masonry, using 1/8" x 2" straps of the length required for a minimum 8" embedment, unless otherwise indicated. Weld anchors to frame jambs no more than 12" from both bottom and head of frame and space anchors not more than 30" apart.
3. Extend bottom of frames to floor elevation indicated and secure to concrete with steel angle clips welded to frames, anchored with expansion shields and bolts.

E. LOOSE STEEL LINTELS:

1. Provide loose galvanized structural steel lintels for openings and recesses in masonry walls and partitions as shown. Weld adjoining members together to form a single unit where indicated. Provide not less than 8" bearing at each side of openings, unless otherwise indicated.

F. MISCELLANEOUS FRAMING AND SUPPORTS:

1. Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete work.
2. Fabricate miscellaneous units to sizes, shapes and profiles indicated or, if not indicated, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars, of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.
3. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.

   Except as otherwise indicated, space anchors 24" o.c. and provide minimum anchor units of 1-1/4" x 1/4" x 8" steel straps.

G. MISCELLANEOUS STEEL TRIM:

1. Provide shapes and sizes indicated for profiles shown. Except as otherwise indicated, fabricate units from structural steel shapes and plates and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings and anchorages as required for coordination of assembly and installation with other work.

H. FLOOR PLATE:

1. Raised Pattern Floor Plates: Provide floor plate complying with FS QQ-F-461, with class as indicated below and selected from manufacturer's standard pattern, unless otherwise indicated:

   Class 1 - carbon steel.

2. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

   Inland Steel.
   Lukens Steel Co.
   U.S. Steel Co.

3. Include steel angle stiffeners as required.

I. TRENCH DRAIN COVERS

1. Fabricate from stainless steel plate, ASTM A167 Type 304. Fabricate covers to dimensions and details indicated. Furnish mill finish, material shall have a smooth bright surface, easy to polish. See plans for prefabricated trench drain units.

J. BURGLAR BARS

1. Burglar bars are required at any opening through the wall or roof 12" square or larger. For roofs, use 2" dia. steel rods at 6" o.c. plug welded to a 4" x 3" x 1/4" angle frame, set perpendicular to the least dimension. For walls, use 5/8" dia. rods at 4" o.c. plug welded to 2 2" x 2 2" x 1/4" angles, set vertical at jamb with welded strap anchors for securing to masonry.

K. METAL DECKING REINFORCEMENT:

1. For deck openings over 6 inches and less than 12 inches wide and not supported by structural members, fabricate from minimum 18-gauge galvanized sheet metal. Fusion weld to bottom surface of floor deck or to top surface of roof deck. Extend at least 12 inches wider and longer than opening. Weld at each corner and provide 2 welds to each rib crossed. Weld edges parallel with deck at 12 inches on center.
2. For deck openings from 12 inches to 24 inches wide and not supported by structural members, weld a 2" X 2" X 1/4" steel angle to underside of deck at right angles to deck ribs. Extend angles three ribs beyond each side of opening and puddle weld to bottom surface of each rib. Reinforce side of opening parallel to ribs with 18-gauge sheet metal 12 inches wide placed on bottom surface of floor deck or on top surface of roof deck weld plate at each corner and at 12 inches on center along edges.
3. For deck openings 24 inches wide or greater, provide structural steel for edge support around entire opening. Frame into adjacent structural members.
4. For sleeved penetrations which are smaller than rib width, no reinforcing is required.

L. STEEL BOLLARDS

1. Fabricate from 4 in. diameter (unless noted otherwise on plans) extra strength steel pipe, ASTM A53 or A501.
2. Size to provide minimum 48 in. projection above ground, more if so indicated, and minimum 48 in. embedment in concrete.
3. Fill with concrete with rounded top. Clean concrete from sides of post.

M. STAIR NOSING:

1. Provide cast aluminum safety stair nosing as shown on plans. Provide 3 inch wide stair nosing with strap anchors not more than 4 inches from each end and 12 inches on center for embedding in concrete. Surface of treads shall be Aluminum Oxide (AL_20_3) cast integrally with tread and receive cross-hatch pattern. All holes required in treads shall be machine-made such that fasteners do not protrude above tread surface. Furnish nosing long enough to terminate not more than 4 inches from ends of steps.

2.05 FINISHES

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

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime paint items to provide a uniform dry film thickness of 2.0 mils. Shop paint all items not specified to be galvanized after fabrication.

D. Galvanize all exterior exposed steel and lintels in exterior walls unless shown as painted on Architectural drawings.

E. Galvanizing: Provide a zinc coating for those items shown or specified to be galvanized, as follows:
1. ASTM A 153 for galvanizing iron and steel hardware.
2. ASTM A 123 for galvanizing rolled, pressed and forged steel shapes, plates, bars and strip 1/8" thick and heavier.
3. ASTM A 386 for galvanizing assembled steel products.
4. Provide minimum 1.25 oz/sq. ft. zinc coating.

PART 3 EXECUTION

3.01 EXAMINATION

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

B. Beginning of installation means erector accepts existing conditions.

3.02 PREPARATION

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

B. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.03 INSTALLATION

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

B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components indicated on Drawings or shop drawings.

D. Perform field welding in accordance with AWS D1.1.

E. Obtain Architect/Engineer approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions, and surfaces not shop primed except surfaces to be in contact with concrete.

G. Coat all base plates and anchor bolts that are below the slab-on-grade with a coal tar-epoxy coating prior to placing concrete.

H. For galvanized surfaces: Clean field welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

I. Setting Loose Plates: Clean concrete and masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

1. Set loose leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut-off flush with the edge of the bearing plate before packing with grout. Use metallic non-shrink grout in concealed locations where not exposed to moisture; use non-metallic non-shrink grout in exposed locations, unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

J. Steel Pipe Railings and Handrails:

1. Adjust railings prior to anchoring to ensure matching alignment as abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loadings. Plumb posts in each direction. Secure posts and railing ends to building construction as follows.

   a. Anchor posts to concrete by means of pipe sleeves preset and anchored into concrete. After posts have been inserted over sleeves, tighten to each sleeve with a minimum of two headless screws.
   b. Anchor posts to steel with steel oval flanges, angle type or floor type as required by conditions, welded to posts and bolted to steel supporting members.
   c. Anchor rail ends into concrete and masonry with steel round flanges welded to rail ends and anchored into wall construction with lead expansion shields and bolts.
   d. Anchor rail ends to steel with steel oval or round flanges welded to rail ends and bolted to structural steel members, unless otherwise indicated.

2. Secure handrails to wall with wall brackets and end fittings. Provide bracket with not less than 1-1/2" clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required for design loading. Secure wall brackets and wall return fittings to building construction as follows:

   a. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
   b. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.
   c. For hollow masonry anchorage, use toggle bolts having square heads.
   d. For stud partitions use lag bolts set into wood backing between studs. Coordinate with stud installations for accurate location of backing members.

3.04 ERECTION TOLERANCES

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

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

END OF SECTION

SECTION 06200

CARPENTRY WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Rough carpentry, finish carpentry, fiber reinforced paneling, plastic laminate, exterior asphalt felt

1.02 RELATED WORK

A. Section 07500 - Elastomeric Sheet Roofing-Mechanically Attached: Wood blocking.

B. Section 09250 - Gypsum Board Systems: Asphalt felt installation.

C. Section 10160 - Metal Toilet Compartments: Wood blocking.

D. Section 10800 - Toilet Room Accessories: Wood Blocking.

E. Section 09900 - Painting: Site finishing of finish carpentry and cabinetwork.

1.03 REFERENCES

A. MIL-L-1914-C Lumber and Plywood, Fire Retardant Treated.

B. MIL-V-13518C(1) Wood Preservative: Tetrachlorophenol and Pentachlorophenol, Surface Sealing Compound

C. PS 1 - Construction and Industrial Plywood

D. PS 20 - American Softwood Lumber Standard

E. NFPA - National Design Specification for Wood Construction.

F. ASTM D226 - Asphalt Saturated Organic Felt.

1.04 QUALITY ASSURANCE

A. Rough Carpentry Lumber: Visible grade stamp, of agency certified by National Forest Products Association (NFPA).

B. Provide and install asphalt felt on sample veneer masonry panel.

C. When applicable, fabricate site made finish carpentry items in accordance with recommendations of Quality Standards of Architectural Woodwork Institute (AWI).

1.05 RECORD SUBMITTALS

A. Submit shop drawings and product data for FRP paneling, and plastic laminate under provisions of Section 01300.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver shop fabricated carpentry items until site conditions are adequate to receive the work. Protect items from weather while in transit.

B. Store indoors, in ventilated areas with a constant, minimum temperature of 60 degrees F (16 degrees C), maximum relative humidity of 25 to 55 percent.

PART 2 PRODUCTS

2.01 ROUGH CARPENTRY MATERIALS

A. Lumber: PS 20; graded in accordance with established Grading rules; maximum moisture content of 19 percent; of following species and grades:
1. Non-structural Light Framing: Construction grade.

B. Douglas Fir Plywood: Sheathing grade.

C. Nails, Spikes and Staples: Galvanized for exterior locations, high humidity locations and treated wood; plain finish for other interior locations; size and type to suit application.

D. Bolts, Nuts, Washers, Lags, Pins and Screws: Low carbon steel; sized to suit application galvanized for exterior locations, high humidity locations and treated wood; plain finish for other interior locations.

E. Fasteners: Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolts or power activated type for anchorage to steel.

F. Asphalt Felt: No. 15 unperforated organic felt over entire surface conforming to ASTM D 225.

2.02 FINISH CARPENTRY

A. Softwood Lumber: PS 20; graded in accordance with the requirements of AWI; maximum moisture content of 6 percent for interior work and10 percent for exterior work of following species and grades:

Item	Species	Quality
Handrail,	Douglas Fir	Custom
Trim	White Pine	Custom
Shelving	Eastern Spruce	Economy

B. Douglas Fir Plywood: Graded in accordance with AWI; core material of veneer; of the following grades and eventual finishes:

Item	Grade	Finish
Plywood Wainscot	BC	-
Loose shelving	Custom	Opaque
Counter tops	Custom	Plastic Laminate
MDO Plywood	AD	Opaque
Plywood Paneling	BC	-

C. Fiber Reinforced Plastic Paneling (FRP): Minimum 3/32 inches thick; Acceptable manufacturers: Marlite, Kemlite, Kal-Lite and Structoglas.

1. In toilet rooms, deli/bakery, and janitors closet, provide mildew - resistant one part silicone sealant, Dow Corning 786 or approved equal.
2. Use non-flammable adhesive - Marlite number C551/Kemlite No. 260. Do not use attachment screws and cover buttons

D. Plastic Laminate Backing: High pressure paper base laminate without a decorative finish; minimum 1/32 inches thick.

E. Adhesive: For shop fabricated work, adhesive: of type recommended by millwork manufactured to suit application.

F. Plastic Edge Trim: Extruded convex shaped; smooth finish; self locking serrated tongue; of width to match plywood thickness; brown color.

G. Nails: Size and type to suit application.

H. Bolts, Nuts, Washers, Lags, Pins and Screws: Size and type to suit application; plain finish in concealed location and satin finish in exposed locations.

2.04 WOOD TREATMENT

A. Fire Retardant: Provide materials which comply with AWPA standards for pressure impregnation with fire- retardant chemicals, and have a flame spread rating of not more than 25, in accordance with ASTM E84, or UL test 723.

B. Wood Preservative: Brush apply two coats of preservative treatment on wood in contact with cementitious materials. Apply preservative treatment in accordance with manufacturer's recommendations. Ensure site-sawn ends are similarly treated. Allow preservative to cure prior to erecting members. Shop pressure treat and deliver to site ready for installation, wood materials requiring pressure impregnated preservatives. All roof blocking shall be pressure treated. Comply with requirements of roof system manufacturer with concern to chemical compatibility. Do not use oil based preservative on roof blocking.

2.05 FABRICATION

A. Fit shelves and exposed edges with plastic edging. Use full length pieces only.

B. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Corners and joints to be hairline. Slightly bevel arises. Locate counter butt joints at least 2 feet from sink cut-outs.

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

D. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.

E. Use exposed fastening devices or nails only when unavoidable.

F. Shop assemble cabinetwork and finish carpentry items for delivery to site in sizes easily handled and to ensure passage through building openings.

2.06 PREPARATION OF FINISH CARPENTRY ITEMS FOR FINISHING

A. Sand work smooth and set exposed nails and screws. Apply wood filler in exposed nail and screw indentations and leave ready to receive site applied finishes. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.

B. Seal, stain and varnish concealed and semi-concealed surfaces. Brush apply only.

C. Preservative treat surfaces in contact with cementitious materials.

D. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fitments. Verify locations of cutouts from site dimensions. Seal contact surfaces of cutouts.

PART 3 EXECUTION

3.01 FRAMING, FURRING, AND STRIPPING

A. Erect wood framing, furring, stripping and nailing members true to lines and levels. Do not deviate from true alignment more than 1/4 inch.

B. Construct members of continuous pieces of longest possible lengths.

3.02 SHEATHING

A. Place roof and wall sheathing with end joints staggered. Secure sheets over firm bearing. Maintain minimum 1/16 inch and maximum 1/8 inch spacing between joints of sheets on walls. Place perpendicular to framing members.

3.03 INSTALLATION OF FINISH CARPENTRY ITEMS

A. Set and secure finish carpentry items in place rigid, plumb, and square.

B. Use purpose designed fixture attachments for mounting components.

D. When necessary to cut and fit on site, make material with ample allowance for cutting. Provide trim for scribing and site cutting.

F Counter-sink semi-concealed anchorage devices used to wall mount components and conceal with solid plugs of species to match surrounding wood. Place flush with surrounding surfaces.

I. Install hardware, fixtures and accessories supplied under other Sections for installation. Install items in accordance with manufacturer's instructions.

J. Ensure that mechanical and electrical items affecting this Section of work are properly placed, complete, prior to commencement of installation.

END OF SECTION

SECTION 07175

WATER REPELLENT COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water repellent coating for all exterior non-painted masonry surfaces.

1.02 RELATED SECTIONS

A. Section 04300 - Unit Masonry: Masonry surfaces

B. Section 07900 - Joint Sealers

1.03 REFERENCES

A. FS SS-W-110 - Water Repellent, Colorless Silicone, Resin Base.

1.04 QUALITY ASSURANCE

A. Applicator: Acceptable to manufacturer.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Do not apply coating when ambient temperature is lower than 50 degrees F or higher than 100 degrees F.

1.06 RECORD SUBMITTALS

A. Submit Product Data under provisions of Section 01300.

PART 2 PRODUCTS

2.01 MATERIALS AND MANUFACTURER

A. Liquid Water Repellent Coating: White Roc 10 as manufactured by Sonneborn Building Products, Minneapolis, MN 55435.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify joint sealants are installed and cured.

B. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of coating.

C. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

A. Remove loose particles and foreign matter.

B. Remove oil or foreign substances with a chemical solvent which will not affect coating.

C. Scrub and rinse surfaces with water and let dry.

D. Protect adjacent surfaces not scheduled to receive coating.

E. If applied on unscheduled surfaces, remove immediately by approved method.

F. Protect landscaping property and vehicles.

3.03 APPLICATION

A. Delay work until masonry mortar substrate is cured a minimum of 60 days.

B. Apply two coatings in strict conformance to manufacturer's instruction, by airless spray.

C. Do not apply product to masonry until after four (4) full days of clear weather under which the surface has not received substantial moisture in the form of rain or snow.

END OF SECTION

SECTION 07200

BATT AND BLANKET INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fiberglass batt insulation as indicated on the drawings.

1.02 RELATED SECTIONS

A. Section 09250 - Metal Stud Framing System: Supportive construction.

1.03 REFERENCES

A. FS HH-I-521 - Insulation Blankets, Thermal, Mineral Fiber for Ambient Temperatures.

B. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials

1.04 PERFORMANCE REQUIREMENTS

A. Materials of this Section shall provide continuity of thermal barrier at building enclosure elements in conjunction with thermal insulating materials in Section 04300 and 07532.

1.05 RECORD SUBMITTALS

A. Submit Product Data under provisions of Section 01300.

B. Product Data: Submit data on product characteristics, performance criteria, and limitations under provisions of Section 01300.

1.06 COORDINATION

A. Coordinate work of this Section with all Section referencing this Section.

PART 2 PRODUCTS

2.01 MATERIALS

A. Batt Insulation: FS HH-I-521 Type I - without membranes preformed glass fiber batt; friction fit, conforming to the following:

Thermal Resistance	R of 11/19
Batt Size	3 1/2 /6 inch thick
Vapor barrior	Polyethylene #6 mil

B. Staples: Steel wire; galvanized; type and size to suit application.

C. Tape: Polyethylene self-adhering type.

D. Insulation Fasteners: Steel impale spindle and clip on flat metal base, self adhering backing, length to suit insulation thickness, capable of securely and rigidly fastening insulation in place.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation are dry and ready to receive insulation.

3.02 INSTALLATION

A. Install insulation in accordance with insulation manufacturer's instructions.

B. Install in exterior walls spaces without gaps or voids.

C. Trim insulation neatly to fit spaces.

D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.

END OF SECTION

SECTION 07240

EXTERIOR INSULATION AND FINISH SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior insulation and finish system including rigid insulation, fabric reinforcing and finish system.

B. Expansion/control joints.

C. Sealants at wall system including joint backers and primer.

1.02 RELATED WORK

A. Section 09250 - Gypsum Board Systems: Gypsum Sheathing

B. Section 07900 - Joint Sealers.

1.03 QUALITY ASSURANCE

A. Applicator trained and certified by the manufacturer of the wall system.

B. Experienced in performing at least two completed projects of similar size and quality.

1.04 RECORD SUBMITTALS

A. Manufacturer's Instructions: Furnish manufacturer's printed material specifications and application instructions.

B. Submit samples of texture, finish and color.

C. Submit Manufacturer's Certification that applicator has been trained and certified for installation of this wall system.

D. Submit copy of manufacturer's 5 year warranty under provisions of Section 01700.

1.05 PRODUCT, DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unopened packages bearing name of manufacturer and product identification.

B. Reject damaged packages found unsuitable for use and remove from job site.

C. Store materials off ground, under cover, and away from damp surfaces.

D. Keep materials dry at all times.

1.06 JOB CONDITIONS

A. Environmental Conditions: Do not apply wall coating when temperature of substrate material is below 40 degrees F. and surrounding air temperature is below 40 degrees F. A minimum temperature of 40 degrees F. or above must be maintained continuously for a seven day

curing period.

B. Protection: Mask adjacent masonry prior to applying trowel coating and remove protection at completion.

C. Scaffolding: Provide temporary safe working platforms.

1.07 WARRANTY

A. The wall system Installer/Manufacturer shall provide labor and materials as required to replace any defects within a 5 year period from date of substantial completion. Defects are defined as delamination of materials, failure of bond or failure to withstand the elements.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:
1. Manufacturers: Materials are specified by brand names to establish a standard of quality, or by performance requirements and general description of product. The Owner reserves the right to reject any material which, in their opinion, will not produce the quality of work specified herein.
2. The following manufacturer has been selected as base bid for exterior insulation/finish system. STO Energy Conservation Inc., Rutland, VT. Insulation /Finish System I.
3. The following other manufacturer's products will be considered only if their products are non-cementitious and are of 100% acrylic co- polymer emulsion formulation. Finished product shall be flexible, durable, waterproof and have integral color.
   a. Thermwall.
   b. Dow/Insul/Crete.
   c. H. B. Fuller.
   d. Sencon Systems.
   e. R-Wall.
   f. Dryvit Systems, Inc.
   g. Synergy.

B. Sheathing: See Section 09250. Sheathing shall be compatible with, and approved by, manufacturer of insulation and finish system.

C. Adhesive: STO Dispersion Adhesive, a non-cementitious, ready-mixed 100% acrylic co-polymer emulsion based, waterproof, vapor permeable adhesive as manufactured by STO Energy Conservation Inc.

D. Insulation Board:
1. Expanded polystyrene (EPS board) less than 25 flame spread, 1.0 lbs./cu ft. average density; u = 0.21 per inch; Federal Specs. C578-85, Type 1, Class A.
2. Dimensional tolerances shall be as follows:
   a. Edges shall be square within 1/32 inch per foot.
   b. Thickness shall be plus or minus 1/16 inch.
3. EPS board shall be aged by air drying for eight (8) weeks or equivalent kiln dried.
4. Maximum size of EPS boards shall not exceed 2' x 4'..
5. Bead fusion shall be 80% or better with no visible voids.
6. Boards shall be manufactured by a STO approved and licensed EPS molder. Each board must have manufacturer's quality control number clearly marked.
7. EPS boards shall be shipped in plastic bags, stored horizontally and out of direct sunlight.

E. Ground Coat: Shall be STO RFP, a ready-mixed, non- cementitious, 100% acrylic co-polymer emulsion based, waterproof, vapor permeable, glass fiber reinforced ground coat.

F. Fabric Reinforcing: Fabric shall be STO "Reinforced Fiber Mesh" with symmetrical interlaced glass fiber made from twisted multi-end strands, styrene butadiene coated at least 20 grams per square yard for alkaline resistance and compatibility with STO materials. The mesh shall be shiftproof with trimmed roll edges to minimize building on overlapped seams.

G. Finish: Shall be STO Exterior/Interior ready-mixed acrylic based wall coating as manufactured by STO Energy Conservation Inc.
1. Type: STO trowel plaster.
2. Texture: Stolit R.
3. Colors: 93860 Sandstone
4. Aggregate Size: 1.5.
5. Submit duplicate samples and texture for Architect's approval, prior to fabrication.

H. Sealant and Primer: Non-sag, one component, chemically cured gun grade sealant as specified in Section 07900, color as selected.

I. Sealant Backer Rod: See Section 07900.

J. Other Materials: Materials not specifically indicated on the drawings or specified herein, but required to complete the Work of this Section, shall be provided by the Contractor, subject to the approval (in advance of fabrication) of the Architect and STO Energy Conservation Inc.

K. Trim, Control joints, Drip edge, etc.

PART 3 EXECUTION

3.01 TOLERANCES

A. Verify tolerance of 1/4" in 10 feet for substrate.

B. Mix proprietary materials in strict accordance with manufacturer's specifications.

C. Provide 1/2" expansion joints at frequency shown on Drawings per manufacturer's instructions.

3.02 INSTALLATION OF WALL COATING SYSTEM

A. Install insulation board horizontally with adhesive.

B. Apply ground coat to insulation per manufacturer's instructions.

C. Place fabric reinforcement horizontally with sheets lapped 4" minimum.

D. Install troweled wall finish coating to the recommended thickness, following manufacturer's recommendations.

E. Install primer, backer rod and sealants as specified in Section 07900.

3.03 CLEANING

A. Remove all masking and protective papers.

B. Remove scaffolding and protective panels.

C. Remove all debris from site and leave work areas in a broom clean condition.

END OF SECTION

SECTION 07400

PREFORMED METAL ROOFING & SIDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preformed metal siding for walls and roofing, with related flashings and accessory components.

1.02 RELATED WORK

A. Section 05400 - Cold Form Metal Framing: Purlins.

l.03 REFERENCES

A. ANSI/ASTM Al53 - Zinc Coating (Hot-Dip) Iron and Steel Hardware.

B. ANSI/ASTM A446 - Steel Sheet, Zinc Coated (Galvanized) by the Hot Dip Process, Structural (Physical) Quality.

C. ANSI/ASTM D226 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

D. ASTM E84 - Surface Burning Characteristics of Building Materials.

l.04 RECORD SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Indicate dimensions, panel layout, construction details, method of anchorage, method of installation.

PART 2 PRODUCTS

2.0l ACCEPTABLE MANUFACTURERS

A. Atas Aluminum Corp., Allentown, PA 18106. System: Dutch Seam.

B. Berridge Manufacturing Co., 1720 Maury St., Houston, Texas 77026

2.02 SHEET MATERIALS

A. Sheet Stock: Prefinished 24 gauge, 15" wide panels without stiffening ribs; ANSI/ASTM A446; Grade A galvanized steel; Minimum 0.90 oz/sq ft galvanized coatings.

2.03 MATERIALS

A. Sealants and Gaskets: Manufacturer's standard type suitable for use with installation of metal siding; ultra-violet and ozone resistant for exterior applications; color as selected.

B. Contact Cement: Waterproof, all-weather type, cured resilient without final set.

C. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers; galvanized to ANSI/ASTM Al53; finish to match metal arising when exposed.

D. Touch-up Paint: As recommended by manufacturer.

2.04 FABRICATION

A. Roofing and Siding Panels: Minimum 24 gage sheet stock: 15 inches wide; interlocking edges fitted with continuous gaskets.

B. Internal and External Corners: Same materials, thickness, and finish as siding; of profile to suit system; brake formed shop cut and factory mitered to required angles. Mitered internal corners, back braced with minimum 24 gage sheet stock, to maintain continuity of profile.

C. Trim, Closure Pieces, Caps, Facias, Infills, Same material, thickness, and where exposed, finish as sheet stock; brake formed to required profiles.

D. Fabrication of component profiles on site not permitted.

2.05 FINISH

A. Exposed Surfaces of Siding System: Kynar 500 Fluorocarbon Coating; Color - See plan.

PART 3 EXECUTION

3.01 INSTALLATION

A. Use UL rated clips with two screws per clip for mounting to purlins.

B. Install metal siding and related components in accordance with manufacturer's instructions.

C. Protect siding surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.

D. Remove site cuttings from finish surfaces.

E. Permanently fasten siding system to structure; align, level, and plumb, within specified tolerances. Provide expansion joints as required by the manufacturer.

F. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.02 TOLERANCES

A. Maximum Offset from True Alignment Between Adjacent Members Butting or In line: l/l6 inch.

B. Maximum Variation from Plane or Location Indicated on Drawings: l/8 inch.

END OF SECTION

SECTION 07500

ELASTOMERIC SHEET ROOFING - MECHANICALLY ATTACHED

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulation, membrane roofing base flashings roofing membrane expansion joints and counter flashings.

1.02 RELATED SECTIONS

A. Section 05300 - Steel Deck

B. Section 06200 - Carpentry Work: Wood nailers.

C. Section 07800 - Roof Accessories: Roof hatch, counter flashing and gravel stops.

1.03 REFERENCES

A. ASTM C578 - Preformed, Cellular Polystyrene Thermal Insulation.

B. ASTM C728 - Perlite Thermal Insulation Board.

C. ANSI/ASTM - Rubber Properties in Tension.

D. ANSI/ASTM D746 - Brittleness Temperature of Plastics and Elastomeric by Impact.

E. ASTM D2240 - Rubber Property - Durometer Hardness.

F. ASTM E96 - Water Vapor Transmission of Materials.

G. Factory Mutual Engineering & Research Corporation (FM) - Roof Assembly Classifications.

H. National Roofing Contractors Association (NRCA) - Roofing and Waterproofing Manual.

I. Underwriters Laboratories (UL) - Fire Hazard Classifications.

1.04 SYSTEM DESCRIPTION

A. Sheet Membrane Conventional Roofing System: One ply membrane system with insulation and mechanically applied membrane.

1.05 RECORD SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Provide characteristics on membrane materials, flashing materials, and insulation.

C. Manufacturer's Installation Instructions: Indicate special precautions required for seaming the membrane.

D. Manufacturer's Field Reports: Submit under provisions of Section 01400.

E. Reports: Indicate procedures followed; ambient temperatures, humidity, and wind velocity during application.

1.06 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this section and approved by system manufacturer.

B. Work of this section to conform to manufacturer's instructions.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable code for roof assembly fire hazard requirements.

B. Factory Mutual Engineering & Research Corporation (FM): Roof Assembly Classification, of Class 1 Construction, wind uplift requirement of I90, in accordance with FM Construction Bulletin 1-28.

1.08 PRE-INSTALLATION CONFERENCE

A. Convene one week prior to commencing work of this section.

B. Review installation procedures and coordination required roof openings with relating Work.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01600.

B. Deliver products in manufacturer's original containers, dry, undamaged, seals and labels intact.

C. Store products in weather protected environment, clear of ground and moisture.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Do not apply roofing membrane during inclement weather.

B. Do not apply roofing membrane to damp or frozen deck surface.

C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.11 COORDINATION

A. Coordinate the work with the installation of associated metal flashings, as the work of this section proceeds.

1.12 WARRANTY

A. Provide ten year warranty under provisions of Section 01700.

B. Warranty: Cover damage resulting from failure to prevent penetration of water.

PART 2 PRODUCTS

2.01 MANUFACTURERS - ROOFING SYSTEM

A. Carlisle Syntec Systems 5 - Mechanically Fastened Roofing System -.060" thick, Sure-Seal Polyester-Reinforced EPDM Membrane, Color - Black.

B. Firestone Building Products - Reinforced mechanically attached system - .060” thick Rubbergard Polyester Reinforced EPDM Membrane, Color - Black.

C. J.P. Stevens Hi-Tuff Single Ply Roofing System - .060 inches thick, reinforced mechanically attached system, Hi-Tuff EP synthetic rubber, hot-air welded seams, Color - Black.

D. Carlisle TPO (heat welded) Sure Weld - 0.060 inches thick, Color - Gray.

E. Versico's Versiweld TPO single ply membrane - .060 thick. The manufacturer's technical representative must be on site at the roofing project start-up.

F. GenFlex - Mechanically Fastened Roofing System -.060" thick, EDPM, Color – Black

G. Sarnafil - Mechanically Fastened Roofing System -.060" thick, EnergySmart S327 Roof Membrane

2.02 MANUFACTURERS - INSULATION

A. 1 layer of 2 1/2" E'nrg'y 2 roof insulation (R=18.2) as manufactured by NRG Barriers Inc., Saco, ME.

B. 1 Layer of 2 1/2" AC Foam II roof insulation (R=18.0) as manufactured by Atlas Roof Corp., Atlanta, Georgia.

2.03 ANCHORAGE MATERIALS

A. Seam Plates: As recommended by membrane manufacturer for roofing system.

2.04 ADHESIVE MATERIALS

A. Surface Conditioner: Compatible with membrane.

B. Membrane Adhesives: As recommended by membrane manufacturer.

C. Thinner and Cleaner: As recommended by adhesive manufacturer, compatible with sheet membrane.

D. Seaming Materials for EPDM installations - seam tape, any other installation as recommended by membrane manufacturer.

2.05 FLASHINGS

A. Flexible Flashings: Same material as membrane; manufactured by membrane supplier.

B. Roof Accessories: As specified in Section 07800.

2.06 ACCESSORIES

A. Seam Plates: As recommended by membrane manufacturer for roofing system.

B. Roofing Nails: Galvanized, hot dipped or non-ferrous type, size as required to suit application.

C. Insulation Fasteners: Appropriate for purpose intended and approved by Factory Mutual and system manufacturer; length required for thickness of material with metal washers.

D. Sealants: As recommended by membrane manufacturer.

E. Strip Reglet Devices: Galvanized steel; maximum possible lengths per location, with attachment flanges.

F. Traffic Surfacing: Flexible walkway pads as compatible with roofing system.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify deck is supported and secure.

C. Verify deck is clean and smooth, free of depressions, waves, or projections.

D. Verify deck surfaces are dry and free of snow or ice.

E. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, and wood nailing strips and reglets are in place.

3.02 INSULATION APPLICATION

A. Mechanically fasten insulation to deck in accordance with Factory Mutual and insulation manufacturer's instructions.

B. Place boards perpendicular to deck flutes with edges over flute surface for bearing support.

C. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

D. Apply no more insulation than can be covered with membrane in same day.

E. Tape joints of insulation in accordance with insulation manufacturer's instructions.

3.03 MEMBRANE APPLICATION

A. Apply membrane in accordance with manufacturer's instructions.

B. Apply adhesive in accordance with manufacturer's instructions.

C. Roll out membrane, free from air pockets, wrinkles, or tears. Firmly press sheet into place without stretching. Allow to relax 30 minutes before attachment.

D. Lap-end and seam edges a minimum of 3" unless otherwise instructed by manufacturer.

E. Space, locate, and fasten seam plates according with manufacturers instructions.

F. Cover seam plates with membrane per manufacturer instructions.

G. Shingle joints on sloped substrate in direction of drainage.

H. Extend membrane up cant strips a minimum of 6 inches onto vertical surfaces.

I. Seal membrane around roof penetrations.

3.04 FLASHINGS AND ACCESSORIES

A. Apply flexible flashings to seal membrane to vertical elements.

B. Secure to nailing strips and reglets at 4 inches o.c.

C. Coordinate installation of roof top equipment and related flashings.

D. Seal flashings and flanges of items penetrating membrane.

E. Install walkway pads.

3.05 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 1400.

B. Correct identified defects or irregularities.

3.06 CLEANING

A. In areas where finished surfaces are soiled by Work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

B. Repair or replace defaced or disfigured finishes caused by Work of this Section.

3.07 PROTECTION

A. Protect building surfaces against damage from roofing work.

B. Where traffic must continue over finished roof membrane, protect surfaces.

END OF SECTION

SECTION 07600

GUTTERS AND DOWNSPOUTS

PART l GENERAL

l.0l SECTION INCLUDES

A. Precoated Galvanized steel gutters.

B. Galvanized Steel downspouts.

l.02 RELATED SECTIONS

A. Section 09900 - Painting: Field painting of metal surfaces.

l.03 REFERENCES

A. ANSI/ASTM A 446 - Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip Process, structural (Physical) Quality.

B. ANSI/ASTM B32 - Solder Metal.

C. ASTM A525 - General Requirements for Steel Sheet, Zinc- Coated (Galvanized) by the Hot-Dip Process.

D. FS O-F-506 - Flux, Soldering, Paste and Liquid.

E. FS QQ-S-57l - Solder, Tin Alloy, Tin-Lead Alloy, and Lead Alloy.

F. FS TT-C-494 - Coating Compound, Bituminous, Solvent Type, Acid Resistant.

G. SMACNA - Architectural Sheet Metal Manual.

l.04 RECORD SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Indicate on shop drawings, general construction, configurations, jointing methods and locations, fastening methods, locations, and installation details.

C. Provide product data on prefabricated components.

l.05 QUALITY ASSURANCE

A. Conform to SMACNA Manual Drawings for nominal sizing of components for rainfall intensity determined by a storm occurrence of 1 in 10 years.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.

C. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to aid

ventilation. Slope to drain.

D. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

PART 2 PRODUCTS

2.01 MATERIALS

A. Gutters - Galvanized Steel: ASTM A525, G90; core steel. (To be painted –see plan)

B. Exterior Downspouts – Galvanized steel (Dull finish) – See plan

2.02 COMPONENTS

A. Gutters: Rectangular profile.

B. Downspouts: Round.

C. End Caps, Downspout Unions, Gutter Downspout Straps, Down Spout Basket Downspout Header: Profiled to suit gutters and downspouts.

2.03 ACCESSORIES

A. Anchorage Devices: SMACNA requirements.

B. Gutter Supports: Galvanized Straps & Brackets

C. Downspout Supports: Straps

D. Protective Backing Paint: Zinc chromate alkyd.

E. Protective Back Coating: FS TT-C-494, bituminous.

F. Solder: ANSI/ASTM B32.

G. Flux: FS 0-F-506.

2.05 FABRICATION

A. Form gutters profiles and sizes downspouts as indicated.

B. Field measure site conditions prior to fabricating work.

C. Fabricate with required connection pieces.

D. Form sections square, true, and accurate in size, in maximum possible lengths and free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.

E. Hem exposed edges of metal.

F. Solder metal joints. After soldering, remove flux. Wipe and wash solder joints clean.

G. Fabricate gutter and downspout accessories; solder watertight.

2.06 SHOP FINISHING

A. Shop prepare and prime exposed ferrous metal surfaces to receive paint where shown on drawings.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work and conditions are as indicated on shop drawings.

B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.

B. Join lengths with seams sealed watertight. Flash and solder gutters to downspouts and accessories.

C. Apply backing paint to metal back surfaces.

D. Apply bituminous protective backing on surfaces in contact with dissimilar materials.

E. Slope gutters as indicated on drawings.

F. Seal metal joints watertight.

G. Connect downspouts to downspout boot system. Seal connection watertight.

END OF SECTION

SECTION 07800

ROOF ACCESSORIES

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Coping and roof edge flashing systems.

B. Reglet flashing system.

C. Roof Hatch

D. Snow retention system for metal roofing

1.02 REFERENCES:

A. Factory Mutual Research Corporation (FMRC), P.O. Box 9102, Norwood, MA 02082, 617-762-4300.

B. SPRI Sheet Membrane and Component Suppliers to the Commercial Roofing Industry, 175 Highland Ave., Needham, MA 02194, 617-444-0242, fax: 617-444-6111.

1.03 WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

A. Furnish flashing reglets to Section 04200 - Unit Masonry for installation.

1.04 RELATED WORK

A. Section 07500 - Membrane Sheet Roofing - Mechanically Attached: Roofing system and base flashings.

1.05 QUALITY ASSURANCE

A. High performance coping shall be CERTIFIED by the coping manufacturer to meet performance design criteria according to the following test standards:
   1. SPRI Test RE-3 for Coping: Wind Resistance Guide for Edge Systems Used with Low Slope Roofing Systems (current edition). The coping system shall be tested simultaneously on horizontal and vertical surfaces and shall exceed horizontal and vertical design wind pressure as calculated in accord with the SPRI Test RE-3.
   2. FMRC Loss Prevention Data Sheet I-49 “Perimeter Flashing.” The coping product shall be listed in current Factory Mutual Research Corporation Approval Guide approved for Zone 2, 90 PSF uplift.

1.06 RECORD SUBMITTALS

A. Submit shop drawings under provisions of Section 01300.

B. Provide shop drawings on shape of components, materials and finishes, anchor types and locations.

PART 2 PRODUCTS

2.01 MANUFACTURER:

A. W.P. Hickman Company
P. O. Box 15005
Asheville, NC 28813-0005
1-704-274-4000
Fax: 1-704-274-4031

2.02 PARAPET COPING SYSTEM:

A. Permasnap Coping: Metal coping cap with galvanized steel anchor cleats and gutter support chairs for capping any parapet wall. The system shall be watertight, maintenance free, and not require exposed fasteners or sealant. Joints shall be butt type with concealed splice plates.

B. Performance characteristics:
1. Coping sections shall expand and contract freely while mechanically locked in place on anchor cleats.
2. Coping sections shall lock to anchor cleats by mechanical pressure from support chairs.
3. All coping cover joints shall be underlayed with gutter/support chairs capable of draining water.

C. Metal : .050" aluminum for all sizes.

D. Coping cap: Length of 10'-0"; width of 6" to 16" in 1" increments.

E. Coping vertical face and back leg: standard 4" nominal.

F. Internal splice plates: Shall be concealed with matching finish to maintain outside face continuity.

G. Coping Cleat: 20 gauge galvanized steel anchor cleat; normally 12" wide @ 5'-0" on center to be adhesive bonded or mechanically fastened as indicated and detailed.

H. Coping chair: Molded styrene chair; 3" wide @ 5'-0" on center for watertightness.

I. Fasteners: Shall be screw type with a minimum pull-out resistance of 240# supplied by the installer as recommended by the manufacturer per substrate application. No exposed fasteners shall be permitted. Fasteners shall be electrolytically compatible.

J. Optional construction adhesive: Provide adhesive by coping manufacturer for bonding steel anchor cleats to unit masonry substrates per the manufacturer’s installation instructions.

K. Finishes: Shall be standard precoated Kynar-500 from manufacturer's color list. Color shall be as indicated on the drawings.

2.03 ROOF EDGING SYSTEM:

A. Econosnap: Decorative metal fascia with continuous galvanized steel spring cant to terminate single-ply roofing at perimeter. The system shall be watertight with concealed joint splice plates and no exposed fasteners. Model(s) shall be: Type 1 Extruded Aluminum Fascia with 2-1/2" cant for all membrane attachments: #ECX120.

B. Performance characteristics:
1. Roof edging shall lock membranes, preventing wind pullback.
2. Fascia shall freely thermal cycle on spring cant substrate, preventing periodic maintenance.
3. Fascia may be factory modified for true radius application.

C. Fascia metal gauge: .080" thick extruded aluminum; with Kynar-500 finish.

D. Fascia length: Standard length of 10'-0"; with matching concealed splice plates at all joints.

E. Spring cant: Shall be continuous 24 gauge type G90 galvanized steel of 10'-0" standard lengths.

F Fasteners: As recommended by the manufacturer per substrate application. No exposed fasteners permitted.

G. Exterior Fascia finishes: custom color Kynar-500. Color as indicated on the drawings.

2.04 REGLET FLASHING SYSTEM

A. Reglet Flashing: Type MA - 4 as manufactured by Fry Reglet Corp. Norcross, Georgia 30071.

2.05 ROOF HATCH

A. Roof Hatch:
1. Model S-20 as manufactured by Bilco Co.
New Haven, CT 06505.
2. Model 6-101 as manufactured by Babcock-Davis, Arlington, MA 02174.

2.06 ACCESSORIES

A. Corners, end caps, pier caps, etc. shall be fabricated by the coping manufacturer. Factory fabricated, mitered corners shall have nominal 24" (610 mm) leg lengths. Welded assembly shall be used to maintain watertight integrity.

B. Corners, end caps, pier miters, fascia sumps, or spillouts, etc. shall be fabricated by the roof edging manufacturer. Factory fabricated, mitered corners shall have 12” nominal (305 mm) leg lengths. Welded assembly shall be used to maintain watertight integrity of corners.

C. Reglet flashing and roof hatch: Provide accessories as required by manufacturer.

2.07 SNOW RETENTION SYSTEM

A. Traditional Two-Pipe fastening system for vertical standing seam metal roof as manufactured by Snow Management Systems, A Division of Contek, Inc.699 Harrel Street, Morrisville, VT 05661 Tel: 802.888.7100.
The Snowguard system’s pipe ends shall be closed with matching Pipe End Caps.
Color of the system to match roofing, see architectural drawings for color selection and location. The Standing Seam Snowguard groove width to be compatible with the roofing system. Height of the metal roof seam shall be field verified.
System to include Ice Flags which shall fit between roof seams, and be attached directly to the pipe system.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions. Coordinate with installation of roofing system and related flashings. Provide weathertight installation.

B. Apply bituminous paint on metal surfaces of units in contact with cementitious materials and dissimilar metals.

C. Coordinate installation of sealants and roofing cement with work of this Section to ensure water tightness.

D. Coordinate installation of flashing flanges into reglets.

END OF SECTION

SECTION 07900

JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preparing sealant substrate surfaces.

B. Sealant and backing.

C. Intumescent Sealants.

1.02 RELATED SECTIONS

A. Section 03450 - Architectural Precast Concrete Wall Panels: Sealant at system joints.

B. Section 06200 - Carpentry Work: FRP panel sealant.

C. Section 04200 - Unit Masonry: Sealants used in conjunction with masonry.

D. Section 07240 - Exterior Insulation and Finish System: Sealant at system joints.

E. Section 08100 - Standard Steel Doors and Frames: Sealants used in conjunction with door frames.

F. Section 08400 - Aluminum Entrances and Storefronts: Perimeter sealants.

G. Section 08800 - Glazing: Sealants used in conjunction with glazing methods.

1.03 REFERENCES

A. ANSI/ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.

B. FS TT-S-00230 - Sealing Compound: Elastomeric Type, Single Component.

C. SWI (Sealing and Waterproofers Institute) - Sealant and Caulking Guide Specification.

1.04 RECORD SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Submit product data indicating sealant chemical characteristics, performance criteria, limitations, and color availability.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.05 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum five years documented experience.

B. Applicator: Company specializing in applying the work of this Section with minimum three years documented experience.

C. Install per manufacturers requirements.

D. Furnish and install sealant in control joint of sample veneer masonry panel as specified in section 04300, Unit Masonry System.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not install solvent curing sealants in enclosed building spaces.

B. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.08 SEQUENCING AND SCHEDULING

A. Coordinate the work of this Section with all Sections referencing this Section.

1.09 WARRANTY

A. Provide three year warranty under provisions of Section 01700.

B. Warranty: Include coverage of installed sealants and accessories which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 SEALANTS

A. General Purpose: Polysulfide Sealant: FS TT-S-00230C, Type II - non-sag, I - self-leveling, Class A; color; as selected.

B. Precast Concrete Panel: Sonolastic NP2 two part polyurethane sealant as manufactured by Sonneborn Building Products; Chemrex Inc., Minneapolis, MN 55435. Color: See Plan.

C. Intumescent Sealants: 3M Brand Fire Barrier Caulk CP 25N/S No-Sag for wall applications and CP 25S/L Self-Leveling for floor applications. (Sealants to be used in areas requiring fire rating). Apply or install in accordance with manufacturer's instructions to obtain required fire rating.

2.02 FINISH

A. Sealant around doors, windows and control joints in decorative masonry shall be the same color as the decorative masonry.

B. Sealant around doors, windows and joints in the precast concrete wall panels shall be Desert.

C. Interior sealant shall be paintable.

2.03 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: ANSI/ASTM D1056; round, closed cell polyethylene foam rod; oversized 40

percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joint openings are ready to receive work and field measurements are as shown on Drawings and recommended by the manufacturer.

B. Beginning of installation means installer accepts existing substrate.

3.02 PREPARATION

A. Clean and prime joints in accordance with manufacturer's instructions.

B. Remove loose materials and foreign matter which might impair adhesion of sealant.

C. Verify that joint backing and release tapes are compatible with sealant.

D. Perform preparation in accordance with manufacturers instructions.

E. Protect elements surrounding the work of this Section from damage or disfiguration.

3.03 INSTALLATION

A. Install sealant in accordance with manufacturer's instructions.

B. Measure joint dimensions and size materials to achieve required width/depth ratios.

C. Install joint backing to achieve a neck dimension no greater than 1/3 the joint width.

D. Install bond breaker where joint backing is not used.

E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

G. Tool joints concave.

3.04 CLEANING REPAIRING

A. Clean work under provisions of Section 01700.

B. Clean adjacent soiled surfaces.

C. Repair or replace defaced or disfigured finishes caused by work of this Section.

3.05 PROTECTION OF FINISHED WORK

A. Protect finished installation under provisions of Section 01500.

B. Protect sealants until cured.

END OF SECTION

SECTION 08100

STANDARD STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-rated and fire rated rolled steel doors, and frames.

B. Interior light frames.

1.02 RELATED WORK

A. Section 04100 - Mortar and Grout: Masonry mortar fill of metal frames.

B. Section 08200 - Wood Doors.

C. Section 08700 - Hardware.

D. Section 08800 - Glazing.

E. Section 09250 - Gypsum Board Systems.

F. Section 09900 - Painting: Field painting of doors and frames.

1.03 REFERENCES

A. ASTM E152 - Methods of Fire Tests of Door Assemblies.

B. DHI - Door Hardware Institute: The installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.

C. NFPA 80 - Fire Doors and Windows.

D. NFPA 252 - Fire Tests for Door Assemblies.

E. SDI - 100 - Standard Steel Doors and Frames.

F. SDI - 105 - Recommended Erection Instructions for Steel Frames.

G. UL 10B - Fire Tests of Door Assemblies.

1.04 QUALITY ASSURANCE

A. Conform to requirements of SDI-100.

B. Fire rated door and frame construction to conform to UL 10B.

C. Installed frame and door assembly to conform to NFPA 80 for fire rated class indicated on Drawings.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated frames and doors.

1.06 RECORD SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Indicate frame configuration, anchor types and spacing, location of cutout for hardware, reinforcement, and finish.

C. Indicate door elevations, internal reinforcement, closure method, and cut outs for glazing.

D. Submit manufacturer's installation instructions under provisions of Section 01300.

1.07 DELIVER, STORAGE AND PROTECTION

A. Protect products under provisions of Section 01600.

B. Protect doors and frames with resilient packaging sealed with heat shrunk plastic.

C. Break seal on-site to permit ventilation.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Curries Co., Mason City, Iowa 50401.

B. Steelcraft Manufacturing Division, Cincinnati, Ohio 45242.

C. Amweld Building Products, Inc., Garretsville, Ohio 44231.

2.02 DOORS AND FRAMES

A. Exterior Doors: SDI-100 Grade II Model 2.

B. Interior Doors: SDI-100 Grade II Model 2.

C. Exterior Frames: 16 gage thick material, core thickness.

D. Interior Frames: 16 gage Thick material, core thickness.

E. All exterior doors and frames shall be fabricated from galvanized sheet steel.

2.03 DOOR CORE

A. Core: Impregnated cardboard honeycomb, Laminated to both inside faces.

2.04 ACCESSORIES

A. Anchors: Minimum of 6 jamb anchors and 2 base anchors per frame.

B. Rubber Silencers Resilient rubber.

C. Frames for light openings: 18 ga. cold rolled steel, factory primed and approved for use in door of fire rated indicated.

2.05 PROTECTIVE COATINGS

A. Bituminous Coating: Fibered asphalt emulsion.

B. Primer: Zinc chromate type.

2.06 FABRICATION

A. Fabricate frames as welded units for masonry openings, and knock down field assembly type for drywall installations.

B. Provide metal T shaped astragals for double doors.

C. Fabricate frames and doors with hardware reinforcement plates welded in place. Each frame shall receive reinforcing for closer, whether scheduled to receive closer or not. Provide mortar guard boxes.

D. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.

E. Prepare frame for silencers. Provide three single rubber silencers for single doors on strike side, and two single silencers on frame head at double doors without mullions.

F. Attach fire rated label to each frame and door unit. Do not paint over labels.

G. Close top edge of exterior door flush with inverted steel channel closure. Seal joints watertight.

H. Fabricate frames for masonry wall coursing with 4 inch head member.

2.07 FINISH

A. Doors and Frames: Bonderized, one coat baked-on prime paint.

B. Coat inside of frame profile with bituminous coating to a thickness of 1/16 inch. Coating may be shop or field applied, specify accordingly.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install frames in accordance with SDI-105.

B. Install doors in accordance with DHI.

C. Coordinate with masonry and wallboard wall construction for anchor placement.

D. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

3.02 TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.03 ADJUSTING AND CLEANING

A. Adjust hardware for smooth and balanced door movement.

END OF SECTION

SECTION 08200

WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wood doors (fire rated and non-rated).

B. Louvers.

C. Door lights.

1.02 RELATED WORK

A. Section 08100 - Standard Steel Doors and Frames: Steel frames.

B. Section 08700 - Hardware.

C. Section 08800 - Glazing.

D. Section 09900 - Painting: Site finishing doors.

1.03 REFERENCES

A. ANSI/NWMA I.S.1 - Industry Standard For Wood Flush Doors (Includes Standards I.S.1.1 through I.I.S.1.7).

B. ANSI A135.4 - Basic Hardboard.

C. ASTM E90 - Measurement of Airborne Sound Transmission Loss of Building Partitions.

D. ASTM E152 - Methods of Fire Tests of Door Assemblies.

E. AWI - Quality Standards of Architectural Woodwork Institute.

F. NFPA 80 - Fire Doors and windows.

G. NFPA 252 - Standard Method of Fire Tests for Door Assemblies.

H. UL 10B - Fire Tests of Door Assemblies.

1.04 QUALITY ASSURANCE

A. Conform to requirements of AWI Quality Standard Section 1300 and 1400 Custom Grade.

B. Fire Door Construction: Conform to UL 10B.

C. Installed Doors Conform to NFPA 80 for fire rated class indicated.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated doors.

1.07 RECORD SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Indicate door elevations, stile and rail reinforcement, internal blocking for hardware attachment, and cutouts for glazing, and louvers.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.08 DELIVERY, STORAGE, AND PROTECTION

A. Protect products under provisions of Section 01600.

B. Protect doors with resilient packaging, sealed with heat shrunk plastic. Break seal on site to permit ventilation.

C. Package, deliver, and store doors in accordance with ANSI/NWMA requirements.

1.09 WARRANTY

A. Provide two year manufacturer's warranty under provisions of Section 01700.

B. Warranty: NWNA Standard Guarantee.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Weyerhauser, Marshfield, WI 54449.

B. Mohawk Flush Doors, Inc., Northumberland, PA 178757

2.02 DOOR TYPES

A. Flush Interior Doors: 1-3/4 inches thick; solid core construction; wood veneer faces, fire rated as indicated.

2.03 DOOR CONSTRUCTION (ANSI/NWMA - I.S.1 STANDARD)

A. Solid, Non-Rated Core: ANSI/NWMA I.S.1.

B. Solid, Special Function Core: ANSI/NWMA I.S.1; labeled fire performance type.

2.04 FLUSH DOOR FACING

A. Facing Quality: AWI custom grade.

B. Flush Interior Door Veneer: Birch species wood, rotary sliced with random matched grain, for transparent finish.

2.05 ACCESSORIES

A. Frames for light openings: 18 ga cold rolled steel, factory primed and prepared for countersunk style screws, approved for use in door of fire rating indicated.

2.06 FABRICATION

A. Fabricate non-rated doors in accordance with ANSI/NWMA I.S.1 requirements.

B. Fabricate fire rated doors in accordance with ANSI/NWMA I.S.1 and to UL requirements. Attach fire rating label to door edge.

C. Premachine doors for finish hardware.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install doors in accordance with manufacturer's instructions.

B. Machine cut relief for hinges and closers and coring for handsets and cylinders.

C. Trim door width by cutting equally on both jamb edges. Trim fire door width from lock edge only, to a maximum of 3/16 inch.

D. Trim door height by cutting equally on top and bottom edges to a maximum of 3/4 inch. Trim fire door height at bottom edge only, to a maximum of one inch.

E. Pilot drill screw and bolt holes.

F. Prepare doors to receive finish hardware in accordance with ANSI/NWMA requirements.

G. Conform to ANSI/NWMA requirements for fit tolerances.

H. Coordinate installation of glass and glazing.

I. Install door louvers.

3.02 INSTALLATION TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.03 ADJUSTING AND CLEANING

A. Adjust for smooth and balanced door movement.

END OF SECTION

SECTION 08300

SPECIAL DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Impact Doors.

B. Access Doors

1.02 RELATED SECTIONS

A. Section 05400 - Cold Form Metal Framing: Canopy framing.

B. Section 05500 - Metal Fabrications: Channel and Tube Frames.

C. Section 09260 - Gypsum Board Systems: Exterior gypsum ceiling board.

D. Section 09900 - Painting: Field paint finish.

1.03 RECORD SUBMITTALS

A. Submit shop drawings under Provisions of Section 01300.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under Provisions of Section 01600.

B. Store and Protect products under Provisions of Section 01600.

PART 2 PRODUCTS

2.01 MATERIALS

A. Impact Doors
1. Heavy-duty pivot hinges with 9" lower hinge guard, 125 degree swing hinges, as indicated on the Door Schedule.
2. Provide door with reinforced spine.
3. Fully gasketed at coolers.
4. 30" high spring bumpers on each side. Color: See Plan
5. Windows: Lexan Vision panels - use standard sizes closest to the following sizes: 16" W X 16" H on 30" doors, 23" W X 23" H on 36" and 42" doors.

B. Access Doors – Mechanical Access
1. Fabricate frames and flanges of 14 gage steel and door panels of 14 gage steel.
2. Weld, fill, and grind joints to assure flush and square unit.
3. Hardware: 175 degree steel hinges with removable pin, cylinder lock with latch, two keys for each unit.

2.02 ACCEPTABLE MANUFACTURERS

A. Impact Doors:
1. Model HCP-10 (HCG-10 at coolers and freezers) as manufactured by Eliason, Corp.,

Kalamazoo, MI 49003. Color: See Plan
2. Polycor as manufactured by Rubbair Door Division, Ayer, MA 01432. Color: See Plan

B. Access Doors:
1. Karp Associates, Inc., Maspeth, NY 11378.
2. Milcor Incorporated, Lima, OH 45804.
3. Nystrom, Inc., Minneapolis, MN 55413.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that openings are ready to receive work.

B. Verify that field measurements are as shown on approved shop drawings.

C. Beginning of installation means installer accepts existing substrate conditions.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.03 PROTECTION

A. Protect finish installation under Provisions of Section 01500.

END OF SECTION

SECTION 08334
ROLLING COUNTER DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Overhead counter doors, operating hardware, operation.

1.02 RELATED SECTIONS

A. Section 08700 - Door Hardware: Cylinder core and keys.

1.03 SYSTEM DESCRIPTION

A. Manual push up (crank operation).

B. Surface mounted.

1.04 DESIGN REQUIREMENTS

A. Design door assembly to withstand wind/suction load of 22 psf without undue deflection or damage to door or assembly components.

1.05 RECORD SUBMITTALS

A. Submit under provisions of Section 01300.

B. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.

C. Product Data: Provide general construction, component connections and details.

D. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.

1.06 MAINTENANCE DATA

A. Submit under provisions of Section 01700.

B. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.07 FIELD MEASUREMENTS

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Bottle Room - Rolling Counter Door
1. Overhead door, Dallas, TX 75380, 652 Series Counter Doors

2.02 MATERIALS

A. Curtain: Interlocking slats, Type FE-138 fabricated of aluminum. Endlocks shall be attached to alternate slats to maintain curtain alignment and prevent lateral slat movement.

B. Bottom Bar: Aluminum tubular extrusion with vinyl bottom astragal.

C. Guides: Extruded aluminum shapes with clear anodized finish with continuous silicone-treated woolpile strips.

D. Brackets: Steel to support counterbalance, curtain and hood.

E. Counterbalance: Helical torsion spring type housed in steel tube or pipe barrel.

F. Hood: Aluminum. Provide intermediate support brackets as required.

G. Manual Operation: Manual push up. (Crank operation)

H. Locking: Slide bolt locks suitable for use with padlock.

I. Wall Mounting Condition:(Face-of-wall mounting.)

2.03 FINISHES

A. Finish: Aluminum with clear anodized finish.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION

A. Install door unit assembly in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.

F. Install perimeter trim and closures.

3.03 ERECTION TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Maximum Variation from plumb: 1/16 inch.

C. Maximum Variation from level: 1/16 inch.

D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.04 ADJUSTING

A. Adjust work under provisions of Section 01700.

B. Adjust door, hardware and operating assemblies.

3.05 CLEANING

A. Clean work under provisions of 01700.

B. Clean door and components.

C. Remove labels and visible markings.

END OF SECTION

SECTION 08340

FOLDING AND OVERHEAD ROLLING GRILLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Rolling metal grilles with accessories; manual operation.

B. Side folding metal grilles with accessories; manual operation.

1.02 RELATED WORK

A. Section 05500 - Metal Fabrications: Steel tubes.

B. Section 08700 - Hardware: Cylinder core and keys.

1.03 RECORD SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Provide opening sizes, details of grilles, track and hardware, attachments, related and adjacent work, materials, and finishes.

C. Submit manufacturers' installation instructions under provisions of Section 01300.

1.04 OPERATION AND MAINTENANCE DATA

A. Submit manufacturer's operation and maintenance data under provisions of Section 01700.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Pharmacy - Overhead Rolling Grille with perforated metal panels (for maximum visibility):
1. Sentinel as manufactured by Dynaflair Corp., Tampa, FL (813) 248-8100. www.dynaflair.com

2. Ventana as manufactured by Dynamic Closures, Massena, NY (800) 663-4599. www.dynamicclosures.com

B. Pharmacy - Side folding Grille with perforated metal panels (for maximum visibility):
1. Sentry (with perforated steel panels) as manufactured by Dynaflair Corp., Tampa, FL (813) 248-8100. www.dynaflair.com
3. Paravent as manufactured by Dynamic Closures, Massena, NY (800) 663-4599. www.dynamicclosures.com

2.02 MATERIALS:

A. Overhead Rolling Grille with perforated steel panels (Pharmacy):
1. Curtain: Perforated, interlocking slats of 22 ga. galvanized steel.
2. Guides: Manufacturer’s standard heavy duty aluminum.
3. Bottom Bar: Manufacturer’s standard heavy duty extruded aluminum with side bolts at both sides.

4. Hood: Manufacturer's standard galvanized sheet steel.
5. Barrel: Six (6) inch max. diameter steel pipe designed to carry curtain load with a maximum deflection of .03 inch per foot of width.
6. Counter Balance: Heat treated helical torsion springs secured within pipe barrel. Provide high quality ball bearings for all rotating parts.
7. End Plates: Steel plate not less than 3/16 inch thick, bolted to support brackets or plates.
8. Operations: Angled hand crank.
9. Hardware: As specified in Section 08700.

B. Side Folding Grille (Pharmacy):
1. Curtain: The curtain is constructed of four (4) 5/8 inch wide sixteen (16) ga. perforated steel panels. the top and bottom of each section to be fitted with solid aluminum panels. Each perforated panel is fitted into full height aluminum hinge sections to provide for a smooth and easy operation. 3/16 inch round holes, fifty percent open area.
2. Track: Track is extruded aluminum section 1-5/16" wide x 1-9/16" high. Curves, where indicated, are to be 10" or 14" radius. The track must be adequately secured to a horizontal header (by others) structurally sufficient to support the weight of the curtain and posts. Bracing, storage pockets, pocket doors and miscellaneous trim are not included. Standard finishes to be anodized silver.
3. Standard Finish: Curtain, lead post, intermediate posts, trailing post and the track are Duracon thermosetting acrylic enamel in anodized silver.
4. Intermediate Posts: Will be spaced 10'-0" apart maximum. When grille is furnished with a curve, an intermediate post will be positioned in each curve for security. Each intermediate post will be furnished with a recessed cylinder and floor bolt. Additional posts may be specified to increase security.
5. Locking: Leading post to be equipped with Adamsrite lock assembly complete with standard mortise cylinders on each side. The leading post will engage an extruded aluminum full height wall jamb. Trailing post to be free floating self locking at top and bottom inside the storage pocket. Intermediate posts will have shoot bolt into floor. All cylinders will be keyed alike.
6. Header: Track support must be a continuous header securely fastened and/or suspended from the structure above, designed to support the total load per lineal foot of the grille at any point across the opening. This support must include a minimum of a 2" x 6" wood blocking to accept a 1 1/2" fastener. A minimum of 1/4" thick steel can also be used in cases where wood blocking is not acceptable.
7. Operation: Manual operation.

D. Hardware: As specified in Section 08700.

2.03 FINISH

A. Anodized aluminum of natural color.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install overhead coiling grilles in accordance with manufacturer's instructions.

B. Fit, align, and adjust grille assemblies level and plumb; provide smooth operation.

END OF SECTION

SECTION 08360

VERTICAL LIFT DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manual vertical lift doors.

B. Operating hardware and supports.

C. Bottom Panel

1.02 RELATED WORK

A. Section 05500 - Metal Fabrications Steel channel frame for door opening.

B. Section 08700 - Hardware: Padlock and Hasp.

1.03 REFERENCES

A. ANSI A216.1 - Section Overhead Type Door (NAGDM 102).

B. ANSI/ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process, Structural (Physical) Quality.

C. ANSI/ASTM A526 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process, Commercial Quality.

1.04 SYSTEM DESCRIPTION

A. Panels: Flush steel 2 inches thick.

B. High lift track and hardware.

C. Manual operation with pull rope operation requiring a maximum exertion of 35 lbs force.

1.05 QUALITY ASSURANCE

A. Manufacturer: Company specializing in overhead door construction with five years minimum experience.

B. Applicator: Company specializing in installing overhead doors with five years experience.

C. Door Construction: ANSI A216.1.

1.06 RECORD SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Indicate opening dimensions and tolerances, component construction, connections and details, anchorage methods and spacing, hardware and locations, and installation details.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.07 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Section 01700.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS – Receiving - Vertical Lift Door (Upper panels only)

A. Raynor Garage Doors, Dixon, IL, Product S-16.

ACCEPTABLE MANUFACTURERS – Receiving - Vertical Lift Door (Bottom Panels only)

A. Rite Hite Corp., Milwaukee, WI, 53223, Product: Rite Flex PE Replacement Panel.

2.03 MATERIALS

A. Sheet Steel: ASTM A526; galvanized to 0.90 oz/sq ft flat.

B. Weather-stripping: Resilient neoprene strip.

C. Metal Primer Paint: Manufacturer's Standard.

2.04 COMPONENTS

A. Panels: Flush steel construction; outer steel sheet of 16 gage thick, flat profile.

B. Track: 11 gage thick by 3 inch wide rolled steel track, continuous, vertical mounted; galvanized steel mounting brackets, 1/4 inch thick.

C. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel ball bearing rollers, located at top and bottom of each panel at meeting joint.

D. Door Panel Weather-stripping: At bottom and top of door panel, full width; contact resilient.

E. Jamb Weather-stripping: Roll formed steel fitted full height of jamb with integral resilient weather-stripping in moderate contact with door panels.

F. Lift Mechanism: Torsion spring on cross head shaft, with braided steel lift cables.

2.05 FINISHES

A. Exterior Steel: Painted with primer.

B. Interior Painted with primer. Prepared for paint finish.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within limits.

B. Beginning of installation means acceptance of existing surfaces.

3.02 PREPARATION

A. Prepare opening to permit correct installation of door unit and air and vapor barrier seal.

3.03 INSTALLATION

A. Install door unit assembly in accordance with manufacturer's instructions.

B. Install bottom panel substitute in place of standard metal panel. Substitute panel will utilize the hardware that would be used on the metal panel.

C. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

E. Fit and align door assembly including hardware, level and plumb, to provide smooth operation.

3.04 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Variation from Plumb: 1/16 inch maximum.

C. Variation from Level: 1/16 inch maximum.

D. Longitudinal or Diagonal Wrap: Plus or minus 1/8 inch from 10 ft (3 m) straight edge.

3.05 ADJUSTING AND CLEANING

A. Adjust door assembly.

B. Clean doors, frames.

C. Remove labels and visible markings.

END OF SECTION

SECTION 08400

ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum, frames and glazed lights.

B. Anchors, brackets, and attachments.

C. Perimeter sealant.

D. Casement windows.

E. Doors.

1.02 RELATED WORK

A. Section 07900 - Joint Sealers: Perimeter sealant and back-up materials.

B. Section 08722 - Automatic Door Equipment - Swing: Package Unit.

C. Section 08800 - Glass and Glazing: Insulated Glass.

1.03 REFERENCES

A. ANSI/ASTM A36 - Structural Steel.

B. ANSI/ASTM A386 - Zinc Coating (Hot-Dip) on Assembled Steel Products.

C. ANSI/ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.

D. ANSI/ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.

E. ANSI/ASTM E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors.

F. ANSI/ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

G. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

H. FS TT-P-31-Paint, Oil: Iron Oxide, Ready Mixed, Red and Brown.

I. FS TT-P-641 - Primer Coating; Zinc Dust-Zinc Oxide for Galvanized Surfaces.

J. FS TT-P-645 - Primer, Paint, Zinc Chromate, Alkyd Type.

1.04 PERFORMANCE

A. System to provide for expansion and contraction within system components caused by a cycling temperature range of 120 F degrees without causing detrimental effects to system or components.

B. Design and size members to withstand dead loads and live loads caused by pressure and suction of wind to a design pressure of 26 lb/sq ft and a suction of 37 lb/sq ft.

C. Limit mullion deflection to 1/200 or flexure limit of glass with full recovery of glazing materials, whichever is less.

D. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior.

E. Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of assembly surface area, measured at a reference differential pressure across assembly of 0.3 inches water gage as measured in accordance with ANSI/ASTM E283.

F. System to accommodate, without damage to system or components, or deterioration of perimeter seal: Movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.

1.05 RECORD SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Include system and component dimensions; components within assembly; framed opening requirements and tolerances; anchorage and fasteners; glass and infills; door hardware requirements; and affected related work.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and handle system components under provisions of Section 01600.

B. Store and protect system components under provisions of Section 01600.

C. Provide wrapping to protect prefinished aluminum surfaces.

1.07 WARRANTY

A. Provide five year manufacturer's warranty under provisions of Section 01700.

B. Warranty: Cover complete system for failure to meet specified requirements.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Frame style Trifab - 451T as manufactured by Kawneer Co. Inc., Norcross, GA 30092.

B. Frame style T-14000 as manufactured by Tubelite Architectural Products, Reed City, MI 49677.

C. Frame style FG-3000-S as manufactured by Vistawall Architectural Products, Terrell, TX 75160.

2.02 MATERIALS

A. Extruded Aluminum: ANSI/ASTM B221; Alloy and Temper as recommended by manufacturer.

B. Sheet Aluminum: ASTM B209; Alloy and Temper as recommended by manufacturer.

C. Fasteners: Stainless steel.

2.03 FABRICATED COMPONENTS

A. Frames: 2 x 4 1/2 inch profile, thermally broken with interior portion of frame insulated from exterior portion, applied glazing stops.

2.0 CASEMENT WINDOWS

[This spec for use when storefront casement windows are indicated on the elevations.]

A. Casement window: 190 narrow stile door, fabricate unit with 2 inch profile on all sides.

B. Hardware: Hinges - Roton continous aluminum hinge, Model 780-300HD, Lock - Adams Rite MS-1850A deadlock (keyed to master system), Door Stop - Applied door stop 69-154 with weatherstripping (all sides).

C. Glazing: Clear, 1/4" tempered glass.

2.0 DOORS

[This is a spec for entrance doors, other than automatic doors. Automatic doors are provided by the automatic door manufacturer.]

A. Doors: Kawneer 350 medium stile.

B. Hardware: Push/Pull - Style 2, Closer - Norton 1605 surface with back check, Lock - Adams Rite 1850-505A hookbolt lock (must be able to accept Best cores).

C. Glazing: Clear, 1/4" tempered glass.

2.04 GLASS AND GLAZING MATERIALS

A. Glass and Glazing Materials: As specified in Section 08800.

B. All window and transoms shall be 1" insulating glass.

2.05 FABRICATION

A. Fabricate frames allowing for minimum clearances and shim spacing around perimeter of assembly, yet enabling installation.

B. Rigidly fit and secure joints and corners with internal reinforcement. Make joints and connections flush, hairline, and weatherproof.

C. Develop drainage holes with moisture pattern to exterior.

D. Prepare components to receive anchor devices. Fabricate anchorage items.

E. Arrange fasteners, attachments, and jointing to ensure concealment from view.

2.06 FINISHES

A. Exterior Extruded Aluminum Surfaces: See Plan.

B. Apply two coats of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install frames, and glazing in accordance with manufacturer's instructions.

B. Use anchorage devices to securely attach frame assembly to structure.

C. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

D. Install sill flashings.

E. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

F. Install glass in accordance with Section 08800, using exterior dry method of glazing.

G. Install perimeter Polysulfide type sealant, backing materials, and installation requirements in accordance with Section 07900.

3.03 TOLERANCES

A. Variation from Plane: 0.03 inches per foot maximum or 0.25 inches per 30 feet, whichever is less.

B. Misalignment of Two Adjoining Members Abutting in Plane: 0.015 inches.

3.04 CLEANING

A. Remove protective material from prefinished aluminum surfaces.

B. Wash down exposed surfaces using a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 08700

DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for wood, hollow steel, aluminum doors and grilles.

1.02 WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

A. Furnish templates to Section 08100 and 08200 for door and frame preparation.

B. Furnish cylinders to Section 08721 and 08722 for installation.

1.03 RELATED WORK

A. Section 08100 - Standard Steel Doors and Frames.

B. Section 08200 - Wood Doors.

C. Section 08360 - Vertical Lift Doors: Padlock and slide bolt.

D. Section 08721 - Automatic Door Equipment - Sliding: Cylinders for same.

E. Section 08722 - Automatic Door Equipment - Swing: Cylinders for same.

1.04 REFERENCES

A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.

B. ANSI/NFPA 80 - Fire Doors and Windows.

C. AWI - Architectural Woodwork Institute.

D. BHMA - Builders' Hardware Manufacturers Association.

E. DHI - Door and Hardware Institute.

F. NAAAM - National Association of Architectural Metal Manufacturers.

G. NFPA 101 - Life Safety Code.

H. SDI - Steel Door Institute.

1.05 COORDINATION

A. Coordinate work of this Section with other directly affected Sections involving manufacturer of any internal reinforcement for door hardware.

1.06 QUALITY ASSURANCE

A. Hardware Supplier: Company specializing in supplying commercial door hardware with five

years documented experience.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable code for requirements applicable to fire rated doors and frames.

B. Conform to the applicable sections of Chapter 5 of NFPA 101.

1.08 RECORD SUBMITTALS

A. Submit schedule, shop drawings, and product data under provisions of Section 01300.

B. Indicate locations and mounting heights of each type of hardware.

C. Provide product data on specified hardware.

D. Submit manufacturer's parts lists, and installation instructions under provisions of Section 01300.

1.09 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Section 01700.

B. Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of section 01600.

B. Store and protect products under provisions of Section 01600.

C. Package hardware items individually; label and identify package with door opening code to match hardware schedule.

D. Protect hardware from theft by cataloging and storing in secure area.

1.11 WARRANTY

A. Provide one year warranty under provisions of Section 01700.

1.12 MAINTENANCE MATERIALS

A. Provide special wrenches and tools applicable to each different or special hardware component.

B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

PART 2 PRODUCTS

2.01 MATERIALS AND MANFACTURERS

A. HINGES
1. All hinges for this project shall be steel, stainless steel, solid bronze, ball bearing type

except as noted.

2. The following is a guide for hinge size and type required for this specification.

a.

	MANUFACTURER	EXTERIOR	INTERIOR
1 3/4" Doors up to 3'-0" wide	Stanley	FBB191-4 1/2"	FBB179-4 1/2"
		F191-4 1/2"	F179-4 1/2"
	Hager	1191-4 1/2"	1279-4 1/2"
	McKinney	TB2314-4 1/2"	TB2714-4 1/2"
		2314-4 1/2"	2714-4 1/2"
1 3/4" Doors over 3'-0" wide	Stanley	FBB199-4 1/2"	FBB168-4 1/2"
	Hager	BB1199-4 1/2"	BB1168-4 1/2"
	McKinney	T4B3386-4 1/2"	T4B3786-4 1/2"

b. The width of hinges shall be sufficient to clear all trim.

c. Wood fire rated doors with hinge stiles not properly constructed to receive full mortise hinges, shall have half surface-hinges of a comparable weight as listed for full mortise hinges.

d. Doors in channel iron frames shall have half mortise hinges of a comparable weight as listed for full mortise hinges.

e. Hinges of foreign manufacture shall not be considered acceptable for this project.

3. Two hinges shall be provided for each door leaf up to and including 5'-0" in height. An additional hinge shall be required for each additional 2'-6" or fraction thereof in height.

4. All exterior doors, and any interior doors so indicated in hardware sets, shall be stainless steel and furnished with non-removable pins (NRP).

5. Refer to finish section for hinge finish.

B. SPRING HINGES:

1. Where spring hinges are specified in the hardware set numbers, provide a self closing type spring hinge in the gauge and sizes indicated in the hinge specification Section 2.01 A.

2. The following manufacturers and model numbers will be acceptable:

Stanley - 2060
Hager - 1250
McKinney - 1502

3. Hinges of foreign manufacture shall not be considered acceptable for this project.

C. CYLINDRICAL OR BORED LOCKS.

1. Best Lock Corporation, Indianapolis, IN 46250, Product: Type 93K
2. Arrow, Brooklyn, NY 11236, Product: H Series
3. Corbin Russwin, Berlin CT 06037, Product: CL3400 Series

a. All locks for this project, whatever type and function, must be able to receive 6 pin Best cores. Contractor shall retain pins for owners use.

b. All locksets shall be ANSI, A156.2 series 4000, Grade 1 heavy duty. Lever shall be a minimum of 3-1/2 inches long, with an angle return, and a minimum of 2 9/16 inch Rose.

The following function for cylindrical or bored locks shall be required where specified:

FUNCTION	OPERATION
I	Outer lever fixed. Entrance by key only. Inner lever always free.
II	Turn-button locking-pushing and turning button locks outside lever requiring use of key at all times until

	button is manually restored to unlock position. Push button locking- pushing button locks outside lever until unlocked with key or inside lever is turned.
III	Push button locking. Can be opened from outside by emergency key, screwdriver or similar tool.
IV	Both levers always free.
V	Deadlocking latchbolt operated by key from either side. Both knobs always fixed.

D. EXIT DEVICES
1. All exit devices for this project shall be of the same series and design, and shall be manufactured by one manufacturer.
2. They shall have a continuous horizontal housing and shall be of the same size, and the same configuration, for all doors throughout.
3. All exit devices, regardless of function, except for Fire Rated devices, shall have one point Allen wrench dogging.
4. Trim for exit devices shall be one of the following as specified:
   a. Pull handles as specified in Section Push and Pull Bars.
5. The following is a list of the functions referred to under hardware sets and the model numbers of the acceptable manufacturers.

TYPE	SARGENT	VON DUPRIN
R-1	2828	22EO

E. DOOR STOPS:
1. It shall be the responsibility of the hardware supplier to provide door stops for all doors in accordance with the following requirements.
2. Wall type bumpers with a concealed type flange shall be used wherever possible and shall be one of the following:
   Ives - 407 1/2
   Glynn Johnson - 60W
   Rockwood - 409
3. Where wall type bumpers cannot be used, such as on unreinforced partitions or in situations where door comes in contact with materials such as glass, provide dome type floor stops of the proper height.
   Ives - 436, 438
   Glynn Johnson - FB13, FB14
   Rockwood - 440, 442
4. Exterior doors striking masonry and other doors specified to have door stops and holders shall have cast bronze wall or floor type door stops holders with hook or staple to engage door and to selectively hold in open position. The following will be acceptable:
   Ives - 445, 446
   Baldwin - 4091, 4096
   Rockwood - 473, 477

F. DOOR HOLDERS:
1. Flip down door stop CD07096 die cast aluminum as manufactured by Stanley.

G. SLIDE BOLTS:
1. Slide bolts where required shall be wrought steel, polished and plated.
2. Slide bolt will accept padlock with 3/8" maximum diameter shackle and 1 3/4" minimum shackle opening height.
3. Slide bolt will have 1 3/16" throw, 1 5/16" projection and 2 1/32" O.A. width. Length as needed.

4. The following products will be acceptable:
   Ives - 0454

H. KICK PLATE:
1. Kick plates throughout shall be 1/8" thick (.125), black, warp resistant, acid proof, plastic laminate. All plates shall be by the same manufacturer and shall be the product of one of the following: Nevamar, American Cyanamid Formica, and General Electric Textolite. Where called for in the hardware set the kickplate shall be installed on the push side of the door. All plates shall be furnished in the following sizes or as noted.
   a. Kick plates shall be 16" high by 1 1/2" less door width for single doors.
   b. Kick plates shall be 16" x 1" less door width for pairs of doors.

I. ARMOR PLATES:
1. Armor plates throughout shall be 14 gauge (.0747) galvanized steel 30" high by 1 1/2" less door width for single doors and 1" less door width for pairs.
2. Armor plates shall be applied to push and pull side of door .

J. PULLS:
1. Pull units for doors with non fire rated exit devices and for doors with push plates shall be 1" diameter solid stainless steel round bar, 10" center to center, with 2 1/2" projection and 1 1/2" clearance. Where used with exit devices, the pull unit shall be through bolted top and bottom.
2. Flush Pulls: Model 1111C as manufactured by Trimco BBW, Los Angeles, CA 90023-0277.

K. DOOR CLOSERS:
1. All door closers for this project shall be the product of one manufacturer. Door closers shall be full rack-and-pinion type with cast aluminum body.
2. Closers shall be surface mounted (with mounting screws exposed). Closers mounted to hollow doors shall be through bolted.
3. Closers shall be non-handed to permit installation on either hand door, and supplied with a standard show and soffit plate to allow regular arm, parallel arm or top jamb mounting.
4. Hydraulic fluid shall be non-gumming and non- freezing.
5. Closer shall have a combination non-critical regulating valve to adjust both the sweep and the latch speed. Closer to have adjustable backcheck cushioning.
6. The regular and top jamb non-hold-open arm show shall permit a 15 percent adjustment (+/- 7- 1/2%) by relocation of the forearm pivot.
7. Closer shall be enclosed in a molded cover.
8. The hardware contractor shall insert in the hardware schedule, beside each door listing, the required degree of opening for each door. If the door swing is over 140 degrees, parallel arm type closers shall be used. Door closers mounted on brackets, or top jamb application, shall not be permitted.
9. The installing contractor shall be responsible for proper installation of door closers in accordance with degree of opening indicated on hardware schedule. Adjustment of all valves, for proper control of closing speed, latching speed, delayed action, backcheck, and spring power adjustments, shall be the responsibility of the installing contractor as set forth in Part III Execution.
10. The following Manufactures will be acceptable:

    A. Yale, Dorma, and Norton

L. THRESHOLD - WEATHERSTRIPPING - DOOR BOTTOMS
1. THRESHOLDS: Provide a flat extruded or cast aluminum threshold 5" wide by full

width of door opening. Threshold shall be 1/2" high and shall have beveled edges and a corrugated surface. Anchor thresholds with no less than four (4) machine screw anchors for 3'-0" lengths. Provide non ferrous solid brass or stainless steel screws.

2. WEATHERSTRIPPING: Provide premium quality pressure sensitive silicone rubber gasketing material (weather-stripping) for head and jambs for all exterior door frames. The seals shall be an airfoil design to permit full and positive closure between door and jamb. Seals shall be applied, with factory applied adhesive backing, on the stop rabbet and shall be concealed when door is in a closed position. Do not apply gasketing in temperatures under 50 degrees F. Weather-stripping (gasketing material) shall be classified by Underwriters Laboratories for application on fire door frames, for openings rated up to 3 hours.
3. DOOR BOTTOMS: Provide nylon brush weatherstripping 967C, as manufactured by Reese, at the bootom of all exterior doors.

M. ELECTRIC STRIKE:
1. Model no. 1639-10 with solennoid power unit, 24 volt, as manufactured by Precision Hardware Inc.

2.02 KEYING

A. All keyed locks to be supplied with construction cores.

B. The construction master key shall operate all locks and cylinders, and shall permit access to all areas by the general contractor, during the construction period.

C. All permanent cores supplied by Owner.

D. Supply keys in the following quantities:
1. 6 construction master keys.

2.03 FINISHES

A. With the exceptions of door closers, plates, coordinators, thresholds and weather-stripping, all hardware items shall be furnished in US 26D finish.

B. Exceptions are as follows:
Coordinators: USP
Door Closers: Sprayed Aluminum
Thresholds: Aluminum
Weather-stripping: Aluminum

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.

B. Verify that power supply is available to power operated devices.

C. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions.

B. Use the templates provided by hardware item manufacturer.

C. Mounting heights for hardware from finished floor to center line of hardware item: As directed by manufacturer.

D. Install all door closers, except for closers at the emergency exits, so they cannot be seen from the sales area.

E. Conform to ANSI A117.1 for positioning requirements for the handicapped.

3.03 HARDWARE SCHEDULE

Set #1 Automatic Entrance Doors, Pharmacy Folding Grille
Adam's Rite Dead Lock, Rim cylinder exterior Side, turn knob inside

Set #2 Emergency Egress Doors
Each leaf shall have: Hinges (NRP) - Exit Device (R-1)-No exterior hardware - Closer - threshold - Door Bottom - Weatherstrip (Delete threshold at interior doors)

Set #3 NOT USED

Set #4 Receiving Vertical Lift
Each leaf shall have: Padlock - slide bolt & hasp each jamb.

Set #5 Sprinkler Room Door
Each leaf shall have: Plain bearing hinges (NRP) -Lockset (I) - threshold - door bottom - weather-strip -door stop

Set #6 Till Room Door
Each leaf shall have: Hinges - Lockset (II) (key on sales side) at sales - closer - kickplate - door stop.

Set #7 Toilet Rooms and Bottle Room
Each leaf shall have: Hinges - Closer (Handicap) - Push Plate - Pull Plate - Kickplate (both sides) - Door stop

Set #8 Customer Service/Pharmacy
Each leaf shall have: Hinges - Lockset (I) (key on sales side) – closer – kickplate – electric strike – door stop

Set #9 Cash Office
Each leaf shall have: Hinges - Lockset (Use Protex Trilogy T2 digital lock # DL 2700/IC 26D) - closer - kickplate - door stop.

Set #10 Computer Room
Each leaf shall have: Hinges - Lockset (I) - closer -door stop

Set #11 Office Doors
Each leaf shall have: Hinges - Lockset (II)
- door stop-closer

Set #12 Storage

Each leaf shall have: Hinges - latchset (I) - closer - door holder

Set #13 Mechanical Center

Surface mounted vertical rod panic device with outside handle, cylinder core lock – see part 2 Products. Balance of hardware provided by Mechanical Center manufacturer.

Set #14 Compactor Door

Each leaf shall have: Continuous Hinge (NRP) - Closer: LCN 4310Med- with LCN swing free arm (stand alone system) and LCN step down transformer 120 volt to 24 volt (4310-3210) - slide bolt and padlock - weather-strip. Latchset (IV).

Set #15 NOT USED

Set #16 Pharmacy & Bottle Room Coiling Grille

Slide bolt inside, no sales side hardware.

END OF SECTION

SECTION 08721

AUTOMATIC DOOR EQUIPMENT - SLIDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electric operated sliding door equipment.

B. Control system for actuation and safety.

1.02 RELATED WORK

A. Section 08700 - Door Hardware: Cylinder locks.

B. Section 08800 - Glazing: Glass for doors.

1.03 REFERENCES

A. ANSI/BHMA A156.1 - Power Operated Pedestrian Door.

B. ANSI A117.1 - Specifications for Making Building and Facilities Accessible to and Usable by Physically Handicapped People.

C. NFPA 101 - Life Safety Code.

D. UL 235 - Electric Door, Drapery, Gate, Louver and Window Operators and Systems.

1.04 SYSTEM DESCRIPTION

A. Automatic Door Equipment: Electrically operated with actuation and safety control device.

B. Door: Bi-part sliding, track mounted operation.

1.05 PERFORMANCE

A. Automatic door equipment to accommodate heavy pedestrian traffic, and weight of doors.

B. Design system to operate, hold open and close doors under design wind and suction loads calculated in accordance with applicable code.

C. Provide for thermal expansion and contraction of door and frame units, transmitted to operating equipment.

D. Provide for dimensional distortion of components during operation.

E. Eliminate the possibility of water accumulating and freezing in door power units.

F. Provide for opening and closing operation of door panels in the event of power failure.

G. Operating Temperature Range: -20 to 140 degrees F ambient.

H. Provide fully adjustable operators for opening and closing speeds, checking speeds, hold open time.

1.06 QUALITY ASSURANCE

A. Comply with ANSI/BHMA A156.1.

B. Provide units produced by a firm with not less than five years successful fabrication of automatic doors. Engage an installer who is an authorized representative of the manufacturer for both the installation and maintenance of the type of units required for this project, and who has a service center located within 100 miles of the project location.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable code for automatic release of control drive unit to permit manual opening of doors.

B. Conform to applicable sections of Chapter 5 of NFPA 101.

1.08 RECORD SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Indicate on shop drawings, layout, dimensions, head, jamb, and sill conditions, elevations, components, anchorage, recesses, materials and finishes.

C. Identify installation tolerances required, assembly conditions, routing and service lines and conduit, and locations of operating components and boxes.

D. Provide product data on system components, sizes, features, and finishes.

E. Submit manufacturer's installation instructions under provisions of Section 01300.

1.09 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01700.

B. Accurately record locations of concealed equipment, services, and conduit.

1.10 OPERATION AND MAINTENANCE DATA

A. Submit data under provisions of Section 01700.

B. Include manufacturer's parts list and maintenance instructions of each type of hardware.

1.11 PREINSTALLATION CONFERENCE

A. Convene a preinstallation conference one week prior to commencing work of this Section.

1.12 COORDINATION

A. Coordinate with the work of Division 16 for location of electrical service.

1.13 WARRANTY

A. Provide one year parts and labor warranty under provisions of Section 01700.

B. Warranty: Include coverage of operating unit.

1.14 WARRANTY SERVICE

A. Furnish complete service and maintenance of operating equipment for one year from Date of Substantial Completion.

B. Response time to required or necessary service shall be within 4 hours from time of the call.

1.15 MAINTENANCE MATERIALS

A. Provide wrenches and tools required for maintenance of equipment.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Astro-Slide as manufactured by Dor-O-Matic, Chicago,IL.

B. Power Glide AMD-2 as manufactured by Besam Inc., East Windsor, NJ 08520.

C. Series 2000 as manufactured by Horton Automatics, Corpus Christy, TX 78405.

D. Options:
1. Glass and glazing as specified in Section 08800. Glass in door unit shall be 1/4 inch.
2. Emergency breakout on both fixed and sliding panels.

2.02 AUTOMATIC SLIDE OPERATOR

A. Variable speed control for opening, closing, backcheck and latchcheck cycles.

B. On/Off/Hold Open: Rocker switch at inside head of doors.

C. Field adjustable safety reversing feature.

2.03 PROXIMITY SENSOR CONTROL DEVICE

A. Product and Manufacturer:
1. Sliding door centrally processed threshold sensing and motion detector system CPSS-12 as manufactured by B.E.A. Inc. Pittsburgh, PA 15215.
2. Besam Eye - Cue Doorway Monitoring System as manufactured by Besam Inc., East Windsor, NJ 08520.

B. Two photo-electric beams mounted in vertical rails of sidelite at 24 and 48 inches. Each shall parallel door opening for safety.

2.04 FINISHES

A. Exposed Operator and Components: Color and finish match with components from Section 08400.

B. Steel Clips, Supports, and Steel Anchors: Galvanized to 1.25 oz/sq ft.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that surfaces are ready to receive work and opening dimensions are as indicated on shop drawings.

B. Verfiy that 120 VAC, 60 cycle, 1 phase, 15 amp power supply is available to each power operated device.

C. Beginning of installation means acceptance of existing surfaces and conditions.

3.02 INSTALLATION

A. Install equipment in accordance with approved shop drawings and manufacturer's instructions.

B. Coordinate installation of components with related and adjacent work, level and plumb.

3.03 ADJUSTING AND CLEANING

A. Clean exposed surfaces

B. Adjust door equipment for correct function and smooth operation.

3.04 DEMONSTRATION

A. Demonstrate operation, operating components, adjustment features, and lubrication requirements to Owner under provisions of Section 01600.

3.05 PROTECTION

A. Protect finished installation under provisions of Section 01500.

END OF SECTION

SECTION 08722

AUTOMATIC DOOR EQUIPMENT - SWING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electric operated swinging door equipment.

B. Control system for actuation and safety.

C. Handrails adjacent to doors.

D. Medium stile doors.

1.02 RELATED WORK

A. Section 08400 - Aluminum Entrances and Storefronts: Installation Coordination.

B. Section 08700 - Door Hardware: Cylinder locks.

C. Section 08800 - Glazing: Glass for doors.

1.03 REFERENCES

A. ANSI/BHMA A156.1 - Power Operated Pedestrian Door.

B. ANSI A117.1 - Specifications for Making Building and Facilities Accessible to and Usable by Physically Handicapped People.

C. NFPA 101 - Life Safety Code.

D. UL 235 - Electric Door, Drapery, Gate, Louver and Window Operators and Systems.

1.04 SYSTEM DESCRIPTION

A. Automatic Door Equipment: Electrically operated with actuation and safety control device.

B. Door: Single swing, pivot.

1.05 PERFORMANCE

A. Automatic door equipment to accommodate heavy pedestrian traffic, and weight of doors.

B. Design system to operate, hold open and close doors under design wind and suction loads calculated in accordance with applicable code.

C. Provide for thermal expansion and contraction of door and frame units, transmitted to operating equipment.

D. Provide for dimensional distortion of components during operation.

E. Eliminate the possibility of water accumulating and freezing in door power units.

F. Provide for opening and closing operation of door panels in the event of power failure.

G. Operating Temperature Range: -20 to 140 degrees F (-7 to 60 degrees C) ambient.

H. Provide fully adjustable operators for opening and closing speeds, checking, hold open time, and cancellation on activation of fire alarm and smoke detection system.

1.06 REGULATORY REQUIREMENTS

A. Comply with ANSI/BHMA A1567.1.

B. Provide units produced by a firm with not less than five years successful fabrication of automatic doors. Engage an installer who is an authorized representative of the manufacturer for both the installation and maintenance of the type of units required for this project, and who has a service center located within 100 miles of the project location.

C. Conform to applicable code for automatic release of control drive unit to permit manual opening of doors.

D. Conform to applicable sections of Chapter 5 of NFPA 101.

1.07 RECORD SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Indicate on shop drawings, layout, dimensions, head, jamb, and sill conditions, elevations, components, anchorage, recesses, materials and finishes.

C. Identify installation tolerances required, assembly conditions, routing of service lines and conduit, and locations of operating components and boxes.

D. Provide product data on system components, sizes, features, and finishes.

E. Submit manufacturer's installation instructions under provisions of Section 01300.

1.08 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01700.

B. Accurately record locations of concealed equipment, services, and conduit.

1.09 OPERATION AND MAINTENANCE DATA

A. Submit data under provisions of Section 01700.

B. Include manufacturer's parts list and maintenance instructions for each type of hardware.

1.10 WARRANTY

A. Provide one year parts and labor warranty under provisions of Section 01700.

B. Warranty: Include coverage of operating unit.

1.11 WARRANTY SERVICE

A. Furnish complete service and maintenance of operating equipment for one year from Date of Substantial Completion.

B. Response time to required or necessary service calls shall be within 4 hours from time of call.

1.12 MAINTENANCE MATERIALS

A. Provide wrenches and tools required for maintenance of equipment.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Astro-Swing as manufactured by Dor-O-Matic, Chicago,IL.

B. Swingmaster as manufactured by Besam Inc., East Windsor, NJ 08520.

C. Series 4000 as manufactured by Horton Automatics, Corpus Christy, TX 78405.

D. Options:
1. Glass and glazing as specified in Section 08800. Glass in door unit shall be 1/4 inch.
2. Emergency breakout on swing panels.

2.02 AUTOMATIC PIVOT OPERATOR

A. Concealed overhead electromechanical operator for accommodating door action.

B. Variable speed control for opening, closing, backcheck, and latchcheck cycles.

C. On/Off/Hold Open: Rocker switch at inside head of doors.

D. Operator to be manufactured and assembled by door manufacturer.

2.03 PROXIMITY SENSOR CONTROL DEVICE

A. Actuation Device: Radio frequency microwave fanning out from radiant device, in a controlled pattern; distance of control sensitivity, adjustable.

B. Safety Sensor: Provide presence sensor protection on the swing side of door and photoelectric presence verification mounted in safety rails.

2.04 DOORS

A. Medium Stile as manufactured by Automatic Operator.

2.05 SAFETY RAILS

A. 1-7/8" diameter, Schedule 40, High Polish stainless steel tube with Kydex panel insert and two bumper wheels per rail. Style: CE920 as manufactured by Curran Engineering Company, Van Nuys, CA.

2.06 FINISHES

A. Finishes of exposed components – see plans.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that openings and recesses are ready to receive work and opening dimensions are as indicated on shop drawings.

B. Verify that 120 VAC, 60 cycle, 1 phase, 15 amp power supply is available to each power operated devices.

C. Beginning of installation means acceptance of existing surfaces and conditions.

3.02 INSTALLATION

A. Install equipment in accordance with approved shop drawings and manufacturer's instructions.

B. Coordinate installation of components with related and adjacent work, level and plumb.

3.03 ADJUSTING AND CLEANING

A. Clean exposed surfaces.

B. Adjust door equipment for correct function and smooth operation.

3.04 DEMONSTRATION

A. Demonstrate operation, operating components, adjustment features, and lubrication requirements to Owner under provisions of Section 01600.

3.05 PROTECTION

A. Protect finished installation under provisions of Section 01500.

END OF SECTION

SECTION 08800

GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass and glazing for aluminum entrances and storefronts.

B. Glass and glazing for hollow metal work and windows.

C Glass and Plastic for Interior Wood Frame Windows and Half Walls.

D. Mirrors

1.02 RELATED WORK

A. Section 07900 - Joint Sealers: Sealant and back-up materials.

B. Section 08100 - Standard Steel Doors and Frames: Glass for door lites and interior windows.

C. Section 08200 - Wood Doors - Glass for door Lites.

D. Section 08400 - Aluminum Entrances and Storefronts: Glass and glazing for exterior windows.

E. Section 08721 - Automatic Door Equipment - Sliding: Glass for doors.

F. Section 08722 - Automatic Door Equipment - Swing: Glass for Doors.

G. Section 10800 - Toilet and Bath Accessories: Mirrors.

1.03 REFERENCES

A. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.

B. ASTM E84 - Surface Burning Characteristics of Building Materials.

C. FS DD-G-451 - Glass, Float or Plate, Sheet, Configured flat, for Glazing, Mirrors and Other Uses.

D. FS DD-G-1403 - Glass, Plate Float, Sheet, Figured, and Spandrel Heal Strengthened and Fully Tempered.

E. SIGMA No. 64-7-2 - Specification for Sealed Insulating Glass Units.

F. FGMA - Glazing Manual.

1.04 QUALITY ASSURANCE

A. Conform to Flat Glass Marketing Association FGMA Glazing/Manual for glazing installation methods.

1.05 RECORD SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.

1.07 WARRANTY

A. Provide ten year manufacturer's warranty under provisions of Section 01700.

B. Warranty: Include coverage of sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

PART 2 PRODUCTS

2.01 GLASS MATERIALS

A. GLASS PRODUCTS:
Float/Plate Glass: Type I, 1/4 in., Quality q3, clear unless otherwise indicated.

B. PROCESSED GLASS:
Tempered Glass: Provide prime glass of color and type indicated, which has been heat treated to strengthen glass in bending to not less than 4.5 times annealed strength.
1. Provide tempered glazing on entry/exit unit doors, all glazed openings within 5'-0" of the hinge side of all operating doors and all glass within 15 in. of finished floor.

C. FABRICATED GLASS UNITS:
Insulating Glass: Provide 2 sheets of glass as follows, dry air or gas-filled space with -2o F (-29o C) with Class A sealant-type edge construction to maintain a hermetic seal; fabricated to provide the following overall performance characteristics (except as indicated otherwise):
1. Both sheets of glass: 1/4" in thickness, with 1/2" air space where shown on plans to be 1" insulating glass.
2. Edge Construction: Twin primary seals of polyisobutylene; tubular aluminum or galvanized steel space-bar frame with welded or soldered sealed corners, and filled with desiccant; and secondary seal outside of bar, bonded to both sheets of glass and bar, of polysulfide, silicone or hot-melt butyl elastomeric sealant (fabricator's option).
3. Required Performance - insulating Glass: U- value of: .56 max. for winter at night (for 1")
4. Warranty: Provide manufacturer's standard 10-year product warranty of maintained hermetic seal.

D. One Way Glass, 3/8" thick with gray glass substrate (no mirror finish). One Piece – no joint in glass.

E. Mirror: No. 1 quality 1/4" float/plate, electrolytically copper plated.

2.02 PLASTIC SHEET MATERIALS

A. Acrylic Sheet: Plastic compound; clear ultraviolet stabilized; 1/2 inch thick.

2.03 GLAZING COMPOUNDS

A. Sealants and Compounds: Comply with manufacturer's recommendations for selection of hardness, depending upon location of each application, and performance requirements. Materials used shall be compatible with surfaces contacted. Match color of contacted surfaces.

2.04 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene or EPDM; 70-90 Shore A durometer hardness; with proven compatibility with sealants used.

B. Spacer Shims: Neoprene pr EPDM; 40-50 Shore A durometer hardness; with proven compatibility with sealants used.

C. Glazing Tape: Closed cell, flexible, self-adhesive, non-extruding, polyvinyl chloride foam tape; recommended by manufacturer for exterior installation of glass.

D. Glazing Splines: Resilient polyvinylchloride extruded shape to suit glazing channel retaining slot; match frame color.

E. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify surfaces of glazing channels or recesses are clean, free of obstructions, and ready for work of this Section.

B. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses.

C. Prime surfaces scheduled to receive sealant.

3.03 EXTERIOR DRY METHOD (PREFORMED GLAZING)

A. Cut glazing tape to length; install on glass pane. Seal corners by butting tape and dabbing with butyl sealant.

B. Place setting blocks at 1/4 points.

C. Rest glass on setting blocks and push against fixed stop with sufficient pressure to attain full contact at perimeter of panel.

D. Install removable stops without displacement of glazing spline. Exert pressure for full continuous contact.

E. Trim protruding tape edge.

3.04 CLEANING

A. After installation, mark pane with "X" by using plastic tape or removable paste.

B. Remove glazing materials from finish surfaces.

C. Remove labels after work is completed.

END OF SECTION

SECTION 09250

GYPSUM BOARD SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal framing material and installation.

B. Gypsum board materials and installation.

C. Cementitious backer board.

D. Acoustic insulation.

E. Asphalt felt installation.

1.02 RELATED WORK

A. Section 05400 - Cold Formed Metal Framing: 20 ga and heavier framing

B. Section 06200 - Carpentry Work: Wood blocking and asphalt felt.

C. Section 07200 - Batt and Blanket insulation: Thermal insulation.

D. Section 08100 - Standard Steel Doors and Frames.

E. Section 08300 - Special Doors: Metal access panels.

F. Section 09900 - Painting: Surface finish.

1.03 REFERENCES

A. ANSI/ASTM C36 - Gypsum Wallboard.

B. ANSI/ASTM C79 - Gypsum Sheathing Board.

C. ANSI/ASTM C442 - Gypsum Backing Board.

D. ANSI/ASTM C475 - Joint Treatment Materials for Gypsum Wallboard Construction.

E. ANSI/ASTM C514 - Nails for Application of Gypsum Wallboard.

F. ANSI/ASTM C557 - Adhesive for Fastening Gypsum Wallboard to Wood Framing.

G. ANSI/ASTM C630 - Water Resistant Gypsum Backing Board.

H. ANSI/ASTM C645 - Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw. Application of Gypsum Board.

I. ANSI/ASTM C646 - Steel Drill Screws for the Application of Gypsum Sheet Material to

Light Gage Steel Studs.

J. ANSI/ASTM C754 - Installation of Framing Members to Receive Screw Attached Gypsum Wallboard, Backing Board, or Water Resistant Backing Board.

K. ANSI/ASTM E90 - Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.

L. ANSI/ASTM E119 - Fire Tests of Building Construction and Materials.

M. FS HH-I-521 - Insulation Blankets, Thermal (Mineral Fiber, for Ambient Temperatures).

N. GA-201 - Gypsum Board for Walls and Ceilings.

O. GA-216 - Recommended Specifications for the Application and finishing of gypsum board.

1.04 SYSTEM DESCRIPTION

A. Acoustic Attenuation for Identified Interior Partitions: 50 STC in accordance with ANSI/ASTM E90.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated assemblies as indicated on the drawings.

1.06 QUALITY ASSURANCE

A. Furnish and install gypsum sheathing on sample veneer masonry panel as specified in section 04300, Unit Masonry System.

1.07 RECORD SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Provide product data on metal framing, gypsum board, joint tape.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

PART 2 PRODUCTS

2.01 FRAMING MANUFACTURERS

A. U.S. Gypsum Co., Chicago, Illinois 60606

B. Marino Industries Corp., Westbury, New York 11590

C. Superior Steel Studs Inc., Astoria, New York 11102

2.02 FRAMING MATERIALS

A. Studs and Tracks: ANSI/ASTM C645; galvanized sheet steel, 25 gage 'C' shape, with serrated faces. 20 gage required at door openings and for members over 12 feet long.

B. Furring, Framing and Accessories: ANSI/ASTM C645.

C. Refer to section 05400 for framing material that is 20 gage and heavier.

D. Fasteners: GA-201 and GA-216.

E. Adhesive: GA-201 and GA-216.

2.03 GYPSUM BOARD MANUFACTURERS

A. United States Gypsum Co. Chicago, IL 60606.

B. Domtar Gypsum, Ann Arbor, MI 48106.

C. Gold Bond Building Products, Charlotte, NC 28211.

D. James Hardie Building Products, Mission Viejo, CA. 92691 www.hardibacker.com

2.04 GYPSUM BOARD MATERIALS

A. Standard Gypsum Board: ANSI/ASTM C36; 5/8 inch thick, maximum permissible length; ends square cut, tapered and beveled edges.

B. Fire Rated Gypsum Board: ANSI/ASTM C36; fire resistive type, UL rated; 5/8 inch thick, maximum permissible length; ends square cut, tapered and beveled edges.

C. Moisture Resistant Gypsum Board: ANSI/ASTM C630; 5/8 inch thick, maximum permissible length; ends square cut, tapered and beveled edges.

D. Gypsum Sheathing: ASTM C79; 1/2 inch thick, maximum permissible length x 2' wide, ends square cut, V - T & G long edges.

E. Cementitious Backer Board: Hardibacker 500, ½" thick, maximum permissible length, ends square cut, tapered edge.

2.05 ACCESSORIES

A. Acoustical Insulation: FS-HH-I-521; preformed mineral wool, friction fit type without integral vapor barrier membrane, 3 inch thick.

B. Trim and Corner Bead: L-trim, J-trim and corner bead shall be metal and finished with joint compound. **Plastic or exposed type trims will not be allowed.**

C. Joint Materials: ANSI/ASTM C475; reinforcing tape, joint compound, adhesive, water, and fasteners.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that site conditions are ready to receive work and opening dimensions are as instructed by the manufacturer.

B. Beginning of installation means acceptance of substrate.

3.02 METAL STUD INSTALLATION

A. Install studding in accordance with GA 201 and GA 216.

B. Metal Stud Spacing: 24 inches on center.

C. Door Opening Framing: Install double studs at door frame jambs.

D. Blocking: Nail wood blocking to studs. Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, and owner supplied equipment.

E. Coordinate installation of bucks, anchors, blocking, electrical and mechanical work placed in or behind partition framing.

3.03 WALL FURRING INSTALLATION

A. Erect wall furring for direct attachment to concrete block walls.

B. Erect furring channels vertically. Secure in place to masonry at maximum 16 inches on center.

C. Space furring channels maximum 16 inches on center, not more than 4 inches from floor and ceiling lines and abutting walls.

3.04 CEILING FRAMING INSTALLATION

A. Install in accordance with GA 201 and GA 216.

B. Coordinate location of hangers with other work.

C. Install ceiling framing independent of walls, columns, and above-ceiling work.

D. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with Lateral Channel Bracing. Extend Bracing a Minimum 24 inches past each end of openings.

E. Laterally brace entire suspension system.

3.05 ACOUSTICAL ACCESSORIES INSTALLATION

A. Place acoustical 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.

3.06 GYPSUM BOARD INSTALLATION

A. Install gypsum board in accordance with GA 201 and GA 216.

B. Erect single layer standard gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.

D. Use screws when fastening gypsum board to metal furring or framing.

E. Treat cut edges and holes in moisture resistant gypsum board with sealant.

F. Place control joints at intervals specified by manufacturer.

G. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials, or edges are exposed.

3.07 JOINT TREATMENT

A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

B. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.

C. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile.

D. Erect in accordance with manufacturer's instruction.

3.08 GYSUM SHEATHING INSTALLATION

A. Sheathing: Apply gypsum sheathing panels horizontally to metal studs by means of powder-driven S-12 drywall screws located not over 8 inches on center. Stagger vertical joints of each row of panels and use EJ clips at unsupported edges of panels.

B. Asphalt Felt Installation: Apply over entire surface of gypsum sheathing. Apply shingle fashion working from bottom up. Lap horizontal edges 2 inches, vertical lap 4 inches. Secure with adhesive as approved by moisture barrier and gypsum sheathing manufacturers; unless otherwise recommended by manufacturers or approved by Architect apply beads of adhesive horizontally along back edges and centers of membrane, and in no event more than 24 inches on center.

C. NOTE: Coordinate work with installation of through-wall flashing specified under Section 04300 - Unit Masonry. Ascertain that through-wall flashing system at bottom of cavity walls, above lintels and the like, extends through a horizontal joint in the gypsum sheathing and is fastened above such joint to the steel studs.

3.09 TOLERANCES

A. Maximum Variation from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09300

TILE WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Ceramic & Quarry tile floor and base finish using the thinset application method.

B. Ceramic tile wall finish using the thinset application method.

C. Quarry tile floor finish using the full mortar bed method application.

1.02 RELATED SECTIONS

A. Section 03300 - Concrete Slab on Grade and Structural Concrete Slabs: Tile substrate.

B. Section 09250 - Gypsum Board Systems: Tile base substrate.

1.03 REFERENCES

A. ANSI/TCA A108.3 - Quarry Tile and Paver Tile Installed With Portland Cement Mortar.

B. ANSI/TCA A108.5 - Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex Portland Cement Mortar.

C. ANSI/TCA A108.6 - Ceramic Tile Installed with Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy.

D. ANSI/TCA A118.1 - Dry-Set Portland Cement Mortar.

E. ANSI/TCA A118.4 - Latex-Portland Cement Mortar.

F. ANSI/TCA A137.1 - Specification for Ceramic Tile.

G. TCA (Tile Council of America) - Handbook for Ceramic Tile Installation.

1.04 RECORD SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Submit product data indicating material specifications, characteristics, and instructions for using adhesives and grouts.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

D. Submit maintenance data under provisions of Section 01700.

E. Include recommended cleaning and stain removal methods, cleaning materials.

1.05 QUALITY ASSURANCE

A. Conform to ANSI/TCA A137.1

B. Conform to TCA Handbook for Ceramic Tile Installation.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.

C. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not install adhesives in a closed, unventilated environment.

B. Maintain 50 degrees F (10 degrees C) during installation of mortar materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS - WALL/FLOOR TILE

A. Manufacturers, sizes, patterns, and tile and grout color shall be as indicated on the drawings.

1. Porcelain Tile Supplier: Creative Materials Corp., Niskayuna, NY 12309. Telephone 518-347-0944.
2. Ceramic Tile Manufacturer: The Quarry Tile Co. Spokane, Washington 99216. Telephone: 1-800-423-2608. Order at time of contract award.

2.02 MORTAR MATERIALS

A. Ceramic Tile Mortar Materials: ANSI/TCA A118.1; Portland cement, sand, latex additive.

B. Quarry Tile Mortar Materials: ANSI/TCA A118.1; Portland cement, sand and water.

C. Porcelain Tile Mortar Materials: ANSI/TCA A118.4 as follows: Latex-Portland Cement Mortar: Prepackaged dry mortar mix incorporating dry polymer additive in the form of re-emulsifiable powder to which only water is added at the job-site.

2.03 GROUT MATERIALS

A. Ceramic Tile Grout: Cementitious type with latex additive.

B. Quarry Tile Grout: Cementitious type, resistant to shrinking.

C. Porcelain Tile Grout: Latex-Portland Cement Grout: Provide product complying with ANSI A118.6 for the following composition and of color indicated: Prepackaged dry grout mix

incoporating dry polymer additive in the form of a re-emulsifiable powder to which only water is added at the job site.

2.04 QUARRY AND PORCELAIN TILE ACCESSORIES

A. Floor Edging: Brass Edge Strip.

2.05 CERAMIC TILE ACCESSORIES

A. Marble thresholds not required.

B. Use 2"x2" tile for cove base.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Beginning of installation means installer accepts condition of existing substrate.

3.02 PREPARATION

A. Protect surrounding work from damage or disfiguration.

B. Vacuum clean existing substrate and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Apply sealer to surfaces as recommended by adhesive manufacturer.

3.03 TILE INSTALLATION - THINSET METHOD

A. Install adhesive, tile, and grout in accordance with manufacturer's instruction.

B. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align floor, and base joints.

C. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.

D. Form internal angles square and external angles bullnosed.

E. Sound tile after setting. Replace hollow sounding units.

F. Allow tile to set for a minimum of 48 hours prior to grouting.

G. Grout tile joints.

H. Apply sealant to junction of tile and dissimilar materials and at junction of dissimilar planes.

3.4 QUARRY TILE INSTALLATION - FULL MORTAR BED METHOD

A. Install mortar bed, tile and grout in accordance with manufacturer's instructions.

B. Place edge strips at exposed tile edges.

C. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align floor and base joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight without voids, cracks, excess mortar or excess grout.

E. Sound tile after setting. Replace hollow sounding units.

F. Allow tile to set for a minimum of 48 hours prior to grouting.

G. Grout tile joints.

H. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.05 CLEANING

A. Clean work under provisions of 01700.

B. Clean tile surfaces.

3.06 PROTECTION

A. Protect finished installation under provisions of Section 01500.

B. Do not permit traffic over finished floor surface.

END OF SECTION

SECTION 09500

SUSPENDED ACOUSTICAL CEILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. NOT USED

B. Acoustical tile.

C. Acoustic insulation over acoustic units.

D. Perimeter trim.

E. NOT USED

1.02 RELATED WORK

A. Section 08340 - Folding and Overhead Coiling Grilles: Installation coordination.

1.03 REFERENCES

A. ASTM C635 - Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

B. ASTM C 636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

C. FS HH-I-521 - Insulation Blankets, Thermal Mineral Fiber, for Ambient Temperatures.

D. UL - Underwriter's Laboratories System Ratings.

1.04 QUALITY ASSURANCE

A. Installer: Company approved by manufacturer.

1.05 RECORD SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Provide product data on metal grid system components, acoustic units & EPS laminated panels.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Maintain uniform temperature of minimum 60 degrees F and humidity of 20 to 40 percent prior to, during, and after installation.

1.07 SEQUENCING/SCHEDULING

A. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested and approved.

B. Schedule installation of acoustic units after interior wet work is dry.

1.08 EXTRA STOCK

A. Provide an extra 5 cartons/each color of acoustic units under provisions of Section 01700.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - SUSPENSION SYSTEM

A. USG Interiors, Inc. Chicago, IL, 60606.

B. Chicago Metallic Corporation, Chicago, Illinois 60638.

C. Donn Ceiling Suspension Systems, Tarrytown, NY 10591.

D. Armstrong, Natick, Massachusetts, 01760.

2.02 SUSPENSION SYSTEM MATERIALS

A. Grid: ASTM C635, intermediate duty, non-fire rated exposed T; components die cut and interlocking.

B. Accessories: Stabilizer bars clips splices, edge moldings, and hold down clips required for suspended grid system.

C. Grid Material: 15/16" exposed Tee System.

D. Grid Finish: To match acoustic units.

E. Support Channels and Hangers: Galvanized steel; size and type to suit application, to rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1/360.

ACCEPTABLE MANUFACTURERS - ACOUSTIC UNITS

A. Refer to schedule on the drawings.

2.04 ACOUSTIC UNIT MATERIALS

A. Acoustic Panels: Conforming to the following:

1. Size: 24 x 48 inches.
2. Thickness: 5/8 inches.
3. Composition: Mineral.
4. Density: 0.67 lb/cu ft.
5. NRC Range: 0.50 to 0.60.
6. STC Range: 35 to 39.

2.07 ACCESSORIES

A. Acoustic Batt Insulation: FS HH-I-521, friction fit type, unfaced; 3 inch.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that existing conditions are ready to receive work.

B. Verify that layout of hangers will not interfere with other work.

C. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install system in accordance with ASTM C636 and as supplemented in this Section.

B. Install system capable of supporting imposed loads to a deflection of 1/360 maximum.

C. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.

D. Securing directly to steel deck will not be acceptable.

E. Hang system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

G. Locate system according to the reflected ceiling plan.

H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.

I. Do not eccentricity load system, or produce rotation of runners.

J. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.

K. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.

L. Install acoustic units level, in uniform plane, and free from twist, warp and dents.

M. Lay acoustic insulation for a distance of 48 inches either side of acoustic partitions.

N. Install hold-down clips to retain panels tight to grid system within 20 ft of an exterior door.

O. Provide hangers for supporting light fixtures to be installed in the ceiling grid.

3.03 TOLERANCES

A. Variation from Flat and Level Surface: 1/8 inch in 10 ft.

B. Variation from Plumb of Grid Members Caused by Eccentric Loads: Two degrees maximum.

END OF SECTION

SECTION 09650

RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient tile flooring.

B. Resilient base.

C. Underlayment Substrate

1.02 RELATED SECTIONS

A. Section 03300 - Concrete Slab on Grade and Structural Concrete Slabs: Tile substrate.

B. Section 09250 - Gypsum Board Systems: Wall materials to receive base.

1.03 REFERENCES

A. ASTM E84 - Surface Burning Characteristics of Building Materials.

B. FS RR-T-650 - Treads, Metallic and Non-metallic, Non-skid.

C. FS SS-T-312 - Tile, Floor: Asphalt, Rubber, Vinyl, Vinyl Composition.

D. FS SS-W-40 - Wall Base: Rubber and Vinyl Plastic.

1.04 QUALITY ASSURANCE

A. Conform to applicable code for flame/fuel/smoke rating requirements in accordance with ASTM E84.

B. Convene a pre-installation conference one week prior to commencing work of this section. Conference should include general contractor, flooring contractor, flooring representative, Flooring Underlayment Representative and owners representative.

C. Review installation procedures and coordination required with related work.

D. 1. Underlayment -Installation shall be by an applicator using mixing equipment and tools approved by manufacturer.
2. Underlayment -shall be applied per manufacturer’s recommendations

1.05 RECORD SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Provide product data on specified products, describing physical and performance characteristics, sizes, patterns and colors.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.06 OPERATION AND MAINTENANCE DATA

A. Submit cleaning and maintenance data under provisions of Section 01700.

B. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Store materials for three days prior to installation in area of installation to achieve temperature stability.

B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 hours after installation of materials.

1.08 EXTRA MATERIALS

A. Provide 2 full unopened cartons of each tile color , under provisions of Section 01700.

PART 2 PRODUCTS

2.01 MANUFACTURERS - TILE FLOORING

A. Standard Tile: Armstrong, Natick, MA 01760. Color: As indicated on drawings.

2.02 TILE FLOORING MATERIALS

A. Vinyl Composition Tile: 12 x 12 inch size, 1/8 inch thick, see drawings for tile selection.

2.03 MANUFACTURERS - BASE MATERIALS

A. Armstrong, Natick, MA 01760. Color: See plans

B. Kentile Floors Inc., New York, NY 10022. Color: See plans

C. Johnsonite, Chagrin Falls, OH 44023. Color: See plan

2.06 BASE MATERIALS

A. Base: FS SS-W-40, Type I rubber or Type 2 vinyl; 4 and 6 inch high; 1/8 inch thick; top set coved; premolded external corners.

B. Base Accessories: Premolded end stops and external corners, of same material, size, and color as base.

2.07 UNDERLAYMENT MATERIALS

A. Underlayment-Floor Leveling System: Cement & Polymer based self-leveling system

Ardex K-15 by Ardex 1-724-203-5000

For product information please see:
www.ardex.com

For site visits, recommendations and questions please call:

Manufacturer's Rep.: Rich Dooley 978-807-4997
Manufacturer's Rep.: Mike Harris 866-433-4567
Manufacturer's Rep.: Barry Cullen 508-785-1905

2.08 ACCESSORIES

A. Adhesives: Henry 530 Latex based Adhesive

B. Edge Strips: Vinyl, Color: Dark Brown.

C. Sealer and Wax: Types recommended by flooring manufacturer

D. Underlayment Primer – Ardex P-51 or P-82 Primer (See manuf. for recommendation)

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are smooth and flat with maximum variation of 1/8 inch in 10 ft, and are ready to receive Work.

B. Verify concrete floors are sufficiently dry for the installation of the floor tile, by performing Armstrong's bond and moisture test. Using the flooring material specified, install 3 foot square panels approximately 50 feet apart throught out the installation area, with the specified adhesive. The subfloor is considered acceptable, if the panels are securely bonded after a period of 72 hours.

E. Beginning of installation means acceptance of existing substrate and site conditions.

F. Check all shelf life package labels when received, Product has 1 year shelf life

3.02 UNDERLAYMENT PREPARATION

A. All floors must be sound, solid, thoroughly clean, free of any grease, oil, wax latex gypsum patching compounds or existing non-secure leveling materials which may act as a bond breaker, see manufacturer's recommendations. Installer is responsible for the proper subfloor preparation for a solid bond. **Do not use any Paraffin or oil based sweeping**

compounds.

B. Mechanically clean floor by shot-blasting, scarifying or other means which leave no residue. Do not use chemical means, acid etching and the use of solvents are not acceptable means of cleaning the substrate.

C. All cracks in the subfloor shall be repaired to minimize telegraphing through underlayment

D. Substrates shall be inspected and corrected for moisture or any other conditions that could affect the performance of the underlayment or the finished floor covering.

3.03 TILE PREPARATION

A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with underlayment

B. Apply underlayment per manufacturer's recommendations to leave a smooth, flat, hard surface

C. Prohibit traffic from area or protect area until flooring is to be installed.

D. Vacuum clean substrate

3.04 INSTALLATION - UNDERLAYMENT

A. Install in accordance with manufacturer's instructions

B. Priming – Per manufacturer's recommendations

C. Mixing - Per manufacturer's instructions

D. Application - Per manufacturer's instructions

3.05 INSTALLATION - STANDARD TILE MATERIAL

A. Install in accordance with manufacturer's instructions.

B. Mix tile from container to ensure shade variations are consistent.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Set flooring in place, press with heavy roller to attain full adhesion.

3.06 INSTALLATION - BASE MATERIAL

A. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints.

B. Miter internal corners. At external corners, use premolded units. At exposed ends use premolded units.

C. Install base on solid backing. Bond tight to wall and floor surfaces.

E. Scribe and fit to door frames and other interruptions.

3.08 PROTECTION

A. Prohibit traffic on floor finish for 48 hours after installation.

B. Underlayment – Prior to the installation of the finish floor, Underlayment must be protected from abuse by other trades by the use of plywood, masonite or other suitable protection course.

3.09 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean floor and base surfaces in accordance with manufacturer's instructions.

END OF SECTION

SECTION 09900

PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Paint.

B. Stain.

C. Metal Ceiling Refinishing

D. Non-Slip Floor Coating

E. Surface preparation.

F. Acoustical Ceiling Tile Refinishing

1.02 RELATED WORK

A. Section 06200 - Carpentry Work: Wood trim, handrails.

B. Section 03450 - Architectural Precast Concrete Wall Panels.

C. Section 05100 - Structural Steel.

D. Section 05200 - Steel Joists.

E. Section 05300 - Steel Deck.

F. Section 05500 - Metal Fabrications: Metal pan stairs, pipe bollards, pipe railings.

G. Section 08100 - Standard Steel Doors and Frames.

H. Section 08200 - Wood Doors: Staining.

I. Section 08300 - Special Doors.

J. Section 09250 - Gypsum Board Systems.

K. Section 15190 - Mechanical Identification.

L. Section 16195 - Electrical Identification.

1.03 REFERENCES

A. ANSI/ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.

B. ASTM D2016 - Test Method for Moisture Content of Wood.

1.04 DEFINITIONS

A. Conform to ANSI/ASTM D16 for interpretation of terms used in this Section.

B. Applicator: Company specializing in commercial painting and finishing with five years documented experience.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame/fuel/smoke rating requirements for finishes.

1.06 RECORD SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Provide product data on all finishing products.

C. Submit color samples on 12 inch square gypsum board.

D. Submit manufacturer's application instructions under provisions of Section 01300.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.

C. Deliver products to site in sealed and labeled containers; inspect to verify acceptance.

D. Container labeling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.

E. Store paint materials at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in well ventilated area, unless required otherwise by manufacturer's instructions.

F. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 50 degrees F for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.

C. Minimum Application Temperatures for Latex Paints: 45 degrees F (7 degrees C) for interiors; 50 degrees F (10 degrees C) for exterior; unless required otherwise by manufacturer's instructions.

D. Minimum Application Temperature for Varnish Finishes: 65 degrees F (18 degrees C) for interior or exterior, unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft candles measured mid- height at substrate surface.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS – PAINT

A. Pratt & Lambert

B. One coat of Unibond as manufactured by Tenemec Co. Inc, Kansas City, MO, 64141. This may be substituted as coating for open ceiling areas.

2.02 ACCEPTABLE MANUFACTURERS - STAIN

A. Olympic., Minwax

(For use on Remodel)

2.04 ACCEPTABLE MANUFACTURERS – METAL CEILING REFINISHING

A. GLID-GUARD Epoxy Chromate Metal Primer No. 5251/5252 for use on bare metal
B. LIFEMASTER PRO High Performance Acrylic Coating for use on coated metal
   1. Primer: GLID-GUARD “VINYL COTE” Finish Nos. 5521 or 5522
   2. Installation shall be by an applicator certified by the manufacturer.

(For use on Remodel)

2.05 ACCEPTABLE MANUFACTURERS – ACOUSTICAL CEILING TILE REFINISHING

A. Acoustech or Equivalent (See Acceptable Installer)

(For use on Remodel)

2.06 ACCEPTABLE INSTALLER – ACOUSTICAL CEILING TILE REFINISHING

A. Ceilspray Ceiling Refinishing, Inc.
55 South Commerical St.
Manchester, NH. 03101
1-800-258-3096
www.ceilspray.com

Contact: Brian Nolen

2.07 MATERIALS

A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous

coating.

B. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.

C. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.08 FINISHES

A. Refer to schedule at end of Section for surface finish schedule.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that substrate conditions are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
1. Plaster and Gypsum Wallboard: 12 percent.
2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
3. Interior Located Wood: 15 percent, measured in accordance with ASTM D2016.
4. Exterior Located Wood: 19 percent, measured in accordance with ASTM D 2016.
5. Concrete Floors: 7 percent.

D. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or finishing.

B. Correct minor defects and clean surfaces which affect work of this Section.

C. Shellac and seal marks which may bleed through surface finishes.

D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

E. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

F. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.

G. Concrete Floors: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

H. Gypsum Board Surfaces: Latex fill minor defects. Spot prime defects after repair.

I. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Galvanized surfaces to be painted shall not be passivated galvanized. Verify with deck supplier.

J. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

O. Uncoated Steel and Iron Surfaces: Remove grease, scale, dirt, and rust. Where heavy coatings of scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.

L. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

M. Interior Wood Items Scheduled to Receive Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.

N. Exterior Wood Scheduled to Receive Paint Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied.

O. Wood and Metal Doors Scheduled for Painting: Seal top and bottom edges with primer.

P. Metal Ceiling Refinishing: Surface preparation prior to repainting, the entire surface being refinished must be cleaned of any surface contamination or poorly adherent coating (see section 3.04-L). Corroded areas must be cleaned to bare metal by sandblasting, power tool cleaning or hand sanding. Any areas cleaned in this manner must be then be pressure cleaned to remove sanding residue. Pressure washing using a detergent solution (such as Tide) mixed 1/3 cup with water and a brush. Follow with a clear water rinse. In areas of were mildew is present wash & scrub with a solution of 1/3 cup dry powered laundry detergent (such as Tide), 2/3 cup tri-sodium phosphate or TSP (such as Soilax), 1 qt. Sodium hypochlorite %5 solution (such as Clorox), mixed with 3 qts. water. (Avoid strong solvent and abrasive-type cleaners). Remove caulk compounds, oil, grease, tars wax and similar substances by wiping with a cloth soaked in mineral spirits. Wipe only contaminated areas; follow with detergent cleaning and rinse thoroughly.

Q. Acoustical Ceiling Tile Refinishing: All flush mounted light fixtures with lenses shall be removed prior to spraying and replaced after completion..

3.03 PROTECTION

A. Protect elements surrounding the work of this Section from damage or disfiguration.

B. Repair damage to other surfaces caused by work of this Section.

C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.

D. Remove empty paint containers from site.

E. Protect all equipment, product, walls, windows & flooring, etc. from ceiling over-spray using plastic sheeting, masking paper and tape. Sprinkler heads shall also be masked off completely. All masking shall be removed in a manner as to not damage surface that has been masked

3.04 GENERAL APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry.

C. Apply each coat to uniform finish.

D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.

E. Sand lightly between coats to achieve required finish.

F. Allow applied coat to dry before next coat is applied.

G. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

H. Prime back surfaces of interior and exterior woodwork with primer paint.

I. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

3.05 METAL CEILING REFINISHING APPLICATION

J. Apply coatings when both air and substrate temperatures are above 50° F

K. Spray application is required for large surface areas to achieve optimum appearance.

L. All bare metal surfaces must receive one complete coat of primer (Section 2.04 A). Allow 3-4 hours before recoating ,Complete all recoating in within 96 hours.

M. All Coated Metal Surfaces shall be properly cleaned (Section 3.02-P) and receive one coat of Vinyl Primer (Section 2.04-B)

N. Allow to dry a minimum of 2 hours before recoating.

O. All properly cleaned and primed surfaces shall receive two complete coats of Lifemaster Pro coating.

P. Recoatibility Test-

1. Clean and otherwise prepare a small representative area of the surface being repainted.
2. Apply a coat of the desired touch-up coating system (including appropriate primer as specified) allow to dry per manufacturer's instructions.
3. When dry, take about 8 inches of gray duct tape; firmly smooth 3 to 5 inches of the tape onto the repainted area while holding the remaining tape by the free end..
4. Rapidly pull off the tape, attempting to remove the touch-up coating
5. If the tape successfully removes the touch-up coating, an intercoat adhesion primer must be used.

3.06 ACOUSTICAL CEILING TILE REFINISHING APPLICATION

A. Apply coating with commercial airless sprayer to tile and grid at a rate of 250 Sq. Ft. per gallon, following manufacturer's specifications.
B. Coat shall adhere to both tile and grid.
C. Apply coating to acoustical ceiling, with tile in place.
D. Apply product in accordance with manufacturer's instructions

3.07 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to Mechanical and Electrical Sections for schedule of color coding and identification banding of equipment, ductwork, piping, and conduit.
B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

C. Prime and paint insulated and exposed ducts, hangers, brackets, collars and supports, except where items are prefinished.

D. Replace identification markings on mechanical or electrical equipment when painted accidentally.

E. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets that are visible through grilles, and louvers with one coat of flat black paint, to limit of sight line. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

F. Paint exposed conduit and electrical equipment occurring in finished areas.

G. Paint both side and edges of plywood backboards for electrical and telephone equipment before installing equipment.

H. Replace electrical plates, hardware, light fixture trim, and fittings removed prior to

finishing.

3.08 CLEANING

A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.

B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.

E. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

F. Clean light bulbs free from ceiling over-spray

3.09 SCHEDULE - GENERAL

A. Following schedule shall not be considered as entirely inclusive, but shall be construed as general guide for complete painted, finishing of building, including closet space, recesses, returns, reveals, soffits, haunches and the like forming part of particular surface, room, or face.

B. Where items or surfaces are not specifically mentioned, paint these the same as adjacent or similar materials or areas.

C. Number of coats scheduled are minimum acceptable. Apply additional coats when substrate, undercoats, stains, or other conditions show through the final coat of paint, until the finished coat is of uniform finish, color, and texture.

D. Each coat must be inspected and approved before application of succeeding coats.

3.10 SCHEDULE - EXTERIOR SURFACES

A. Concrete Block.
1. Two coats Block/Precast coating.

B. Precast Wall Panels.
1. One coat - Block/Precast coating.

C. Exterior Insulation and Finish Systems
1. Two coats acrylic latex (gloss).

D. Steel - Unprimed.
1. One coat acrylic primer direct-to-metal.
2. Two coats water reducible acrylic direct-to-metal enamel coating (gloss).

E. Steel - Shop Primed
1. Touch-up with zinc rich primer.
2. Two coats water reducible acrylic direct-to-metal enamel coating (gloss).

F. Steel - Galvanized
1. One coat all purpose primer.
2. Two coats water reducible acrylic direct-to-metal enamel coating (gloss).

G. Metal Ceiling Refinishing
1. One-coat Primer
2. Two coats Finish LIFEMASTER PRO Hi Performance Acrylic Coating No. 6900 Series

3.11 SCHEDULE - INTERIOR SURFACES

A. Wood - Painted
1. One coat alkyd prime sealer.
2. Two coats alkyd enamel, semi-gloss.

B. Wood - Transparent
1. One coat stain.

C. Wood Doors - Transparent.
1. One coat stain.
2. Two coats satin polyurethane, sand between coats.

D. Steel - Unprimed
1. One coat all purpose primer.
2. Two coats water reducible acrylic direct-to-metal enamel coating (gloss).

E. Steel - Primed
1. Touch-up with original primer.
2. Two coats water reducible acrylic direct-to-metal enamel coating (gloss).

F. Steel - Galvanized

1. One coat zinc chromate primer.
2. Two coats water reducible acrylic direct-to-metal enamel coating (gloss).

G. Roof deck, roof structure
1. One coat water reducible acrylic dry fall-out, flat.

H. Gypsum Board
1. One coat acrylic primer sealer.
2. Two coats acrylic enamel, eggshell.

I. Precast Concrete Wall Panel (around compactor door)
1. One coat block filler/primer.
2. One coat high build acrylic coating.

J. Concrete floors
1. One coat sealer or primer.
2. One coat non-slip floor coating

K. Acoustical Ceiling Tile Refinishing
1. One coat acoustical coating (per manuf. instructions)

END OF SECTION

SECTION 10150

METAL TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal toilet compartments, floor mounted, head rail braced.

B. Urinal screens, wall mounted with floor to ceiling pilaster brace.

1.02 RELATED SECTIONS

A. Section 06200 - Carpentry Work: In wall framing and plates for partition panel support.

B. Section 10800 - Toilet and Bath Accessories.

1.03 REFERENCES

A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to And Usable by Physically Handicapped People.

B. ANSI/ASTM A424 - Steel Sheets for Porcelain Enameling.

C. ANSI/ASTM A526 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip process, Commercial Quality.

D. ASTM A167 - Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

1.04 RECORD SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Indicate on shop drawings, partition plan and elevation views, dimensions, details of wall and floor supports, and door swings. Note: Door widths and clearances for handicap stalls shall comply with ANSI A117.1 and ADA requirements.

C. Provide product data on panel construction, hardware, and accessories.

D. Submit manufacturer's installation instructions under provisions of Section 01300.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metpar Steel Products, Westbury, NY 11590, System FP500. Color: See plan

B. Global Steel Products, Deer Park, NY 11729,System Glo-Gard. Color: See plan

C. All American Metal Corp., Freeport, NY 11520. Color: See plan

2.02 MATERIALS

A. Sheet Steel: ANSI/ASTM A526, with G90 zinc coating. ANSI/ASTM A424, Type I, commercial quality.

B. Head Rails: Hollow aluminum tube, 1 x 1-5/8 inch size, with anti-grip strips and cast socket wall brackets.

C. Attachments, Screws, and Bolts: Stainless steel; tamper proof type; heavy duty extruded aluminum brackets.

D. Hardware: Chrome plated non-ferrous cast pivot hinges, gravity type, adjustable for door close positioning; nylon bearings; thumb turn door latch; door strike and keeper with rubber bumper; cast alloy chrome plated coat hook and bumper.

2.03 FABRICATION

A. Fabricate components of steel sheet as follows:
1. Panel and Door Faces: 22 gage.
2. Pilaster Faces: 20 gage.
3. Reinforcement: 12 gage.

B. Doors and Panels: One inch thick by 24 inch wide x 58 inch high, sheet steel face, pressure bonded to sound deadening core; 36 inch wide door, swinging out on stalls for handicapped use.

C. Pilasters: 1-1/4 inch thick, constructed same as doors, of sizes required to suit cubicle width and spacing.

D. Pilaster Shoes: Formed chromed steel with polished finish.

E. Doors, Panels, and Pilasters: Form and close edges, miter and weld corners, grind smooth.

F. Internal Reinforcement: Provide in areas of attached hardware and fittings. Mark locations of reinforcement for partition mounted washroom accessories.

2.04 FACTORY FINISHING

A. Clean, degrease, and neutralize panels.

B. Follow with a phosphatizing treatment, prime coat and two finish coats baked enamel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.

B. Verify correct spacing of plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing, where required.

D. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install partitions secure, plumb, and level in accordance with manufacturers' instructions.

B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to wall using anchor devices.

D. Attach panels and pilasters to bracket with through sleeve tamperproof bolts and nuts. Locate headrail joints at pilaster center lines.

E. Anchor urinal screen panels to walls with two panel brackets and vertical upright consisting of pilaster anchored to floor and ceiling.

F. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster. Conceal floor fastenings with pilaster shoes.

G. Equip each door with two hinges, one door latch, and one coat hook and bumper.

H. Install door strike and keeper with door bumper on each pilaster in alignment with door latch.

I. Adjust hinges to locate doors in partial opening position when unlatched. Return outswing doors to closed position.

3.03 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

3.04 CLEANING

A. Remove protective masking. Clean surfaces.

B. Field touch-up of scratches or damaged enamel finish will not be permitted.

C. Replace damaged or scratched materials with new materials.

END OF SECTION

SECTION 10260

WALL AND CORNER GUARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall guards.

B. Corner guards.

C. Bumper Guards.

1.02 RELATED SECTIONS

A. Section 09250 - Gypsum Board Systems: Wall construction.

1.03 RECORD SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Indicate physical dimensions, features, and anchorage details.

C. Manufacturer's Installation Instructions: Indicate installation rough-in measurements and instructions.

1.04 COORDINATION

A. Coordinate the work with wall or partitions Sections for installation of concealed blocking or anchor devices.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Pawling Corporation Pawling, New York 12564,
   1. Wall Guards: Product Pro-Tek, Series WG-8.
   2. Corner Guards: Product Pro-Tek, Series CG-17
   3. Bumper Guards: Product Pro-Tek, Series WG-3

B. Construction Specialties, Muncy, PA 17756,
   1. Wall Guards: Crash Rail - Model SCR-64.
   2. Corner Guards: Lexan Corner Guard - Model LG-118.
   3. Bumper Guards: Ext Wall Guard - Model FR-200.

C. Institutional Products Corporation, Muskego, Wisconsin 53150
   1. Wall Guards: 700 Wall Guard
   2. Corner Guards: 1 1/8" clear polycarbonate corner guard
   3. Bumper Guards: 500 Wall Guard

2.02 COMPONENTS

A. Wall and Bumper Guard: Surface mounted, projecting 1 inch from wall to outside of rail, vinyl, with preformed return to wall end caps, internal and external corners.

B. Corner Guard - Surface Mounted: 1 1/8 inch leg.

C. Mounting Brackets and Attachment Hardware: Appropriate to component and substrate.

2.03 FABRICATION

A. Fabricate components with tight joints, corners and seams.

B. Predrill holes for attachment.

C. Form end trim closure by capping and finishing smooth.

2.04 FINISHES

A. Wall Guard: Vinyl, Color - see plans .

B. Corner Guard: Polycarbonate, Clear.

C. Bumper Guard: Vinyl, Color - see plans.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough-in for components are correctly sized and located.

3.02 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position.

B. Refer to drawings for mounting height. Provide at all Gypsum Board walls exposed to contact with shopping carts.

C. Position corner guard 4 inches above finished floor to 48 inches high. Provide corner guards at all outside corners in the sales area.

3.03 ERECTION TOLERANCES - HORIZONTAL WALL GUARD

A. Maximum Variation From Required Height: 1/4 inch.

B. Maximum Variation From Level For Visible Length: 1/8 inch.

END OF SECTION

SECTION 10800

TOILET ROOM ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Toilet and washroom accessories.

B. Attachment hardware

1.02 RELATED SECTIONS

A. Section 06200 - Carpentry Work: In wall framing and plates for support of accessories.

B. Section 10150 - Metal Toilet Compartments.

1.03 REFERENCES

A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible To and Usable by Physically Handicapped People.

B. ANSI/ASTM A366 - Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.

C. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

D. ASTM A269 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

1.04 RECORD SUBMITALS

A. Submit product data and Manufacturer’s installation under provisions of Section 01300.

B. Provide product data on accessories describing size, finish, details of function, attachment methods.

1.05 KEYING

A. Master key all accessories.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for installing work in conformance with ANSI A117.1.

1.07 SEQUENCING AND SCHEDULING

A. Coordinate the work of this Section with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Bobrick Inc., Clifton Park, New York 12065.

B. American Specialties, Inc., Yonkers, New York 10701.

C. Bradley Corporation, Mt. Laurel, NJ 08054.

2.02 MATERIALS

A. Sheet Steel: ANSI/ASTM A366.

B. Stainless Steel Sheet: ASTM A167, Type 304.

C. Tubing: ASTM A269, stainless steel.

D. Fasteners, Screws, and Bolts: Hot dip galvanized, tamperproof.

E. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FABRICATION

A. Weld and grind smooth joints of fabricated components.

B. Form exposed surfaces from single sheet of stock, free of joints.

C. Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

D. Back paint components where contact is made with building finishes to prevent electrolysis.

E. Shop assemble components and package complete with anchors and fittings.

F. Provide steel anchor plates, adapters, and anchor components for installation.

G. Hot dip galvanize exposed and painted ferrous metal and fastening devices.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that site conditions are ready to receive work and dimensions are as instructed by manufacturer.

B. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site at appropriate time for building-in.

B. Provide templates and rough-in measurements as required.

C. Verify exact location of accessories for installation.

3.03 INSTALLATION

A. Install fixtures, accessories and items in accordance with manufacturers' instructions.

B. Install plumb and level, securely and rigidly anchored to substrate.

3.04 SCHEDULE A

A. Mirror Handicap: 18" wide by 36" high, stainless steel frame. Provide one each handicappedlavatory. B-165 1836.

Mirror Standard: 24" wide by 24" high, stainless steel frame. Provide one each non-handicapped lavatory.
B-165 2424.

B. Grab Bars, Wall Mounted: 1 1/2" diameter stainless steel satin finish, exposed mounted. B-6206 Series, 36 and 42 inch lengths.

C. Surface Mounted Feminine Napkin Dispenser: Provide 1 per women's room. B-2802 1107, 25 cent coin operation.

D. Surface Mounted Feminine Napkin Disposal: Provide one per each women's room compartment: B-2708" wide x 11" high x 4" deep.

Note: Toilet Accessory Schedule is based on Bobrick, Inc., Catalog Numbers, unless otherwise noted.

3.05 SCHEDULE B

A. Contractor to provide and install soap dispensers, toilet tissue dispensers, paper towel dispensers. This equipment is available at no charge to Hannaford from the listed manufacturers. Shipping and handling is the responsibility of the contractor.

Toilet tissue and paper towel dispensers:	Portsmouth Paper Company, 4 Cutts Street, Portsmouth, NH 03802 Phone: 800-423-3411.
Soap dispensers:	Chem Star, Phone: 800-327-0777 Steve Wood.

1. JRT SR Toilet Tissue Dispenser - Scott - Provide one at all toilet stalls.
2. Lev-R-Matic Towel Dispenser - Scott - Provide one in each restroom to be located per plans. Provide one for each handwash station in work areas throughout the store, to be located per HBC Project Manager's direction.
3. Soap Dispenser - Provide one for each hand sink in toilet rooms. Install per drawings, one at each handwash station in work areas throughout the store. Locate soap dispenser over sinks.

END OF SECTION

SECTION 11160

DOCK EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Dock Levelers.

B. Dock Seals.

C. Dock Bumpers.

1.02 RELATED WORK

A. Section 03000 - Concrete Slab on Grade and Structural Concrete Slabs: Concrete pit.

B. Section 03450 - Precast Concrete Wall Panels

1.04 RECORD SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Indicate existing conditions of construction, materials and finish, installation details, and roughing-in measurements.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

D. Submit Operation and Maintenance Data for dock levelers under Provisions of Section 01700.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - DOCK LEVELERS

A. Rite Hite Corp., Milwaukee, Wisconsin 53223. Product HD1686.

B. Kelley Company, Inc., Milwaukee, Wisconsin 53209. Product H608K.

C. Serco Engineering, London, Canada N6A 4M4. Product HR800.

D. W. B. McGuire Co., Inc., Hudson, New York 12534. Product MKA2068

E. System Requirements for above listed hydraulically operated dock levelers:
1. Deck Size: 72 x 96 inches.
2. Rollover/Crossover Capacity: 30,000 lbs.
3. Travel: 12 inches above dock level, and 12" inches below dock level.
4. 20 inch lip, lock in vertical position when leveler is at rest.
5. Three position safety stops.
6. Automatic night locks.
7. Brush Weather seals.
8. Quick-pit manufacturer’s pre-fab form.

9. 20 year warranty
10. Automatic return to dock feature.
11. Push button operation from remote pad.
12. Limiting Switch - Prevent activation when door is closed.
13. Steel angle frame with concrete anchors.

2.02 ACCEPTABLE MANUFACTURERS - DOCK SEALS

A. Series 900, with 12" square head, and 12" side pads with 4" exposure pleats as manufactured by Frommelt Industries, Dubuque, IA 52004. Color - Black.

B. Model TS-181- H with 12" square head, and 12" side pads with 4" exposure pleats as manufactured by W.B. McGuire Co., Hudson, NY 12534. Color - Black.

C. Model S600 with 12" square head, and 12" side pads with 4" exposure pleats as manufactured by Serco Corp., Dallas, TX 75237. Color - Black.

2.03 ACCEPTABLE MANUFACTURERS - DOCK BUMPERS

A. Kelley Company, Inc., Milwaukee, Wisconsin 53209.

B. Pawling Corporation, Pawling, New York 12564-1188

2.04 DOCK BUMPERS

A. Vendor Dock: Fabric reinforced laminated rubber pads 4-1/2 inches thick, with galvanized steel rods between 3 x 2-1/2 x 1/4 inch galvanized steel angle end plates; 12 inches wide x 36 inches long.

B. Vertical Lift Doors: Fabric reinforced laminated rubber pads 9 inches thick, with galvanized steel rods between galvanized steel angle end plates; 12 inches wide x 20 inches high.

C. Attachment Hardware: 3/4 inch diameter galvanized bolts and expansion shields.

PART 3 EXECUTION

3.01 INSTALLATION - DOCK LEVELER

A. Provide pit frame and anchors, rough-in sizes, and templates for building into Work as specified in Section 03000.

B. Install in prepared pit in accordance with manufacturer's instructions.

C. Set square and level; anchor securely flush to dock; weld back of leveling dock to pit frame. Touch-up weld with primer.

D. Adjust installed unit for smooth and balanced operation.

3.02 INSTALLATION - DOCK SEALS

A. Provide pit frame and anchors, rough-in sizes, and templates for building into Work as

specified in Section 03000.

B. Erect door seal in accordance with manufacturer's instructions and shop drawings.

C. Attach anchors and fittings to prepared wall construction and opening frame.

D. Use galvanized fasteners permitting site adjustment and alignment.

3.03 INSTALLATION - DOCK BUMPERS

A. Install dock bumpers in accordance with manufacturer's instructions.

B. Bolt angle end frames in concrete. Weld angle end frames to steel angle dock frame. Touch up weld with primer.

END OF SECTION

SECTION 12670

ENTRANCE MATS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Recessed entrance mats.

1.02 RELATED SECTIONS

A. Section 09300 - Tile Work: Porcelain Tile Floor Finish.

B. Section 03300 - Concrete Slab on Grade and Structural Concrete Slabs: Concrete Finishing.

1.03 REFERENCES

A. SAE AMS 3110F - Primer, Zinc Chromate.

1.04 RECORD SUBMITTALS

A. Submit manufacturer's specifications and installation instructions for each type of entrance mat. Include methods of installation for each type of substrate.

B. Submit 3 inch by 4 inch samples of each type and color of matting and 2 inch long samples of frame members.

C. Submit shop drawings showing full scale section of typical installations. Show details of layout, anchors, and accessories. Include relevant details of adjacent work. Coordinate shop drawing submitted with concrete work shop drawings showing recess for mat frames.

D. Submit manufacturer's printed instructions for cleaning, drying, maintaining and rehandling of removable entrance mat units.

1.05 PROJECT CONDITIONS

A. Install recessed frames for mats after building enclosure is completed and related interior work is in progress.

B. Install mats near the time of substantial completion of the projects.

C. All mating shall lie flat for a minimum of 24 hours at room temperature before installation.

D. Field measurements: Check actual openings for ststems by accurate field measurements

E. For recessed applications coordinate frame installation with finish floor construction to

ensure recess and frame anchorage is correct. Defer frame installation until building enclosure and related interior finish work is in progress.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Entrance Mating: Powerlinks

By Spacelinks International, Youngstown, Ohio 1-800-233-4571
www.spacelinks1.com
Distributed/Installed by Matworks 1-603-429-2800 Larry Schwartz

2.02 MATERIALS

A. Powerlinks Frame: Supplied by manufacturer, anodized extruded aluminum 6063-T5 Fastened to floor using expandable anchor bolts supplied by manuf. Framing shall be predrilled for ease of installation as offered by manuf. Frame color shall be clear anodized aluminum.
B. Powerlinks Mating: ½" thick, Cut to length in field, Color: see plans

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that floor openings are ready to receive work.

B. Verify field measurements are as shown on shop drawings.

C. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

A. Manufacturer shall offer assistance and guidance to ensure proper installation.

A. Verify size of floor recesses before fabricating mats.

B. Vacuum clean the floor recesses before installing mats.

3.03 INSTALLATION

A. Install the work of this section in strict accordance with manufacturer's recommendations.

B. Coordinate top of matting/frame surfaces with bottom of swinging doors to provide ample clearance between door and matting/frame.

C. Layout matting system onto designated flooring surface. Framing and matting shall be divided in 36" square panels. Dry fit the system to ensure correct length and width. Anchor framing per manufacturer's recommendations.

D. Locate, align and level frame members with top of frame flush with finished floor.

E. Install mats in floor recesses with top surface of matting flush with finished floor after final cleaning of the finished floor.

3.03 CLEANING

A. Clean matting surface and frame surface and recessed well with wet/dry vacuum and mopping as frequently as possible to reduce the effects of accumulated soil that may hinder performance and lifetime.

3.04 TOLERANCES

A. Maximum gap between recessed frame and mat: 1/8 inch.

3.05 PROTECTION

A. Upon completion of frame installation and concrete work, install temporary filler of plywood or fiberboard in mat recesses, and protect frames with plywood sheets. Maintain this protection until final cleaning of the finished floor and installation of the mats.

B. Protect installed mats from construction traffic.

END OF SECTION

SECTION 15011

MECHANICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Briefly and without force and effect on contract documents, mechanical work consists of providing labor, equipment and materials to provide complete and operable systems described on the drawings and as specified in Division 15 sections, including this section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 15 - Mechanical, all Sections

B. Division 16 - Electrical

1.03 QUALITY ASSURANCE

A. Provide materials and equipment that are manufacturer's standard products. Products shall have been in satisfactory commercial use for a minimum of 2 years prior to the Bid opening. The phrase satisfactory commercial use shall include applications of equipment and materials under similar scope, application and size.

B. Equipment items shall be supported by service organizations. Submit a list of qualified service organizations for support of the equipment or materials. Include with the list of service organizations the addresses, telephone numbers and qualifications. These service organizations shall be reasonably convenient to the equipment or material installation and shall be able to render satisfactory service on a scheduled or emergency basis during the warranty period of the Contract.

C. Each piece of equipment shall have a nameplate bearing the manufacturer's name, address, model number and serial number securely affixed in a conspicuous place.

1.04 DELIVERY, STORAGE AND HANDLING

A. Handle, store and protect equipment and materials to prevent damage before and during installation. Protect elastomeric and plastic products from direct sunlight. Replace damaged or defective items.

1.05 SITE VISIT

A. The Contractor shall visit the site to become familiar with existing conditions affecting his/her work. No claim will be recognized for extra compensation due to failure of the Contractor to familiarize himself/herself with the conditions and extent of work.

1.06 SAFETY REQUIREMENTS

A. Provide positive means of locking out equipment so that equipment cannot be accidentally started during maintenance procedures. High-temperature or pressure equipment and piping located as to endanger personnel or create a fire hazard shall be properly guarded or covered with insulation

of the type specified. Ensure that access openings leading to equipment are large enough to carry through routine maintenance items such as filters and tools.

B. Provide permanent warning sign or placard at the entrance to confined spaces contained in the equipment. The sign shall warn personnel not to enter the space until the atmosphere has been tested and found satisfactory for entry and that systems have been fully de-energized.

C. Provide appropriate lockout devices for energy isolating valves and for machines and equipment to prevent unexpected start-up or release of stored electrical, mechanical hydraulic, pneumatic, chemical, thermal or other energy in accordance with 29 CFR 1910.147. Lockout devices for valves shall provide a means of attachment to which, or through which, a lock can be affixed or shall have a locking mechanism built into it so that the valve cannot be moved from the lockout position until the lock is removed. Electrical isolation of machines or other equipment shall be in accordance with requirements of Division 16 “Electrical”.

1.07 ELECTRICAL REQUIREMENTS

A. Provide internal wiring and control components for packaged equipment as an integral part of the equipment. Extended voltage range motors will not be permitted. Controllers and contactors shall have a maximum of 120 volt control circuits and shall have auxiliary contacts for use with the controls provided. When motors and equipment provided are larger than sizes indicated, the cost of additional electrical service and related work shall be included under the section that specified that motor or equipment. Power wiring and conduit for field installation and connection shall be provided under and conform to the requirements of Division 16 “Electrical”.

B. Provide electrical components of mechanical equipment such as, but not limited to, motors, motor starters, control or push-button stations, float or pressure switches, solenoid valves, transformers, integral disconnects, thermostats, sensors and other devices functioning to control mechanical equipment. Interconnecting power wiring and conduit and power cicuits shall be provided under Division 16 “Electrical”, except internal wiring of components of package equipment shall be provided as an integral part of the equipment.

C. Provide automatic temperature control wiring, conduit and devices.

D. Provide high efficiency single phase and poly-phase motors in accordance with NEMA MG 11 and MG10 standards respectively.

1.08 INSTRUCTION TO PERSONNEL

A. Provide the Owner’s personnel with 16 man-hours of instruction, in two 8 man-hour periods, on the operation, maintenance and repair and pertinent safety requirements of each system provided under Division 15. Instruction shall be given during the first regular week of operation after the issuance of the Certificate of Substantial Completion.

PART 2 - PRODUCTS

(Not used)

PART 3 - EXECUTION

3.1 PAINTING OF EQUIPMENT:

A. Provide manufacturer’s standard factory painting systems for all new equipment.

B. Clean, pre-treat, prime and shop paint metal, except aluminum. Paint items and devices not factory painted but exposed to the elements or in view in finished areas. Do not paint concealed surfaces or surfaces covered with insulation.

END OF SECTION

SECTION 15012

OPERATING AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Compile and provide operating and maintenance data as described herein.

B. Provide the data packages as specified in each section of Division 15.

1.02 RELATED WORK SPECIFIED ELSEWHERE **(Specifier Note: Edit this paragraph to suit project)**

A. Section 15011 - Mechanical General Requirements

B. Section 15250 - Mechanical Insulation

C. Section 15300 – Special Piping Systems

D. Section 15400 – Plumbing

E. Section 15450 – Plumbing Fixtures and Trim

F. Section 15500 - Fire Extinguishing Sprinkler System

G. Section 15600 – Power or Heat Generation

H. Section 15850 – Testing, Adjusting and Balancing

I. Section 15900 – Automatic Temperature Controls

J. Division 16 - Electrical

1.03 SUBMISSION OF OPERATION AND MAINTENANCE DATA

A. Provide operation and maintenance (O&M) data/manuals which are specific to each section under Division 15 of this project. Each manual shall contain “as-built” drawings and the required data packages specified in its respective section. Each manual shall be complete and a concise depiction of the provided equipment or product. Provide a Table of Contents for every volume identifying the material with-in.

B. Submit two on CD-Rom’s, with system descriptions and/ or manufacturer’s O&M information specified, in the required data packages, for the components, assemblies, subassemblies, attachments, and accessories.

1.04 TYPE OF INFORMATION REQUIRED IN O&M DATA PACKAGES

A. Operating Instructions:

1. List personnel hazards and equipment or product safety precautions for all operating conditions.

2. Provide a description for each operating procedure including control sequences.

3. Provide a description of normal operating procedures. Include control diagrams with data to explain operation and control of systems equipment.

4. Provide a description of emergency procedures to permit a short period of operation and to safely shut-down the system to prevent further damage to equipment. Include emergency shut-down procedures for fire, explosion or other contingencies.

5. Provide instructions for services to be performed by maintenance personnel, such as lubrication, adjustment, inspection and reading of gages.

6. List environmental conditions such as temperature and humidity limits for equipment.

7. Provide a preventive maintenance plan and schedule. Include lubrication data, filter types and sizes for each piece of equipment.

8. Provide instruction for correcting problems and making repairs. Provide troubleshooting and diagnostic techniques.

9. Provide wiring diagrams, control diagrams, valve charts and list damper settings. Provide locations of each control device, valve and damper.

10. Provide a list of special tools and testing equipment required to troubleshoot, diagnose and service each piece of equipment or product.

11. Provide a spare parts list for maintenance and repair of each piece of equipment. The list shall include name, address and telephone number of nearest dealer and replacement part number.

12. Provide a supplies list for consummable products such as filters. The list shall include the name, address and telephone number of the nearest dealer where products made be purchased. Include part number and where applicable sizes, efficiencies, etc.

13. Provide warranty information. Include the names, addresses, and telephone numbers of equipment manufacturers, dealers and service organizations (closest to the project) for equipment or product provided.

14. Provide the name, address and telephone numbers of the installing subcontractor for each system installed. Provide the name, address and telephone number of the project's General Contractor.

15. Provide a copy submittals, shop drawings and "as-built" drawings for each system installed. Provide dimensioned locations for concealed items and piping below slab.

1.05 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

A. Provide the O&M data package specified in the individual sections of Division 15.

B. Data Package 1

1. Safety precautions

2. Maintenance and repair procedures

3. Warranty information

4. Contractor information

C. Data Package 2

1. Safety precautions
2. Normal operations
3. Environmental conditions
4. Lubrication data
5. Preventive maintenance plan and schedule
6. Maintenance and repair procedures
7. Removal and replacement instructions
8. Spare parts and supply lists
9. Parts identification
10. Warranty information
11. Contractor information

D. Data Package 3

1. Safety precautions
2. Normal operations
3. Emergency operations
4. Environmental conditions
5. Lubrication data
6. Preventive maintenance plan and schedule
7. Troubleshooting guides and diagnostic techniques
8. Wiring diagrams and control diagrams
9. Maintenance and repair procedures
10. Removal and replacement instructions
11. Spare parts and supply lists
12. Parts identification
13. Warranty information

14. Testing equipment and/or special tools information
15. Contractor information

E. Data Package 4

1. Safety precautions
2. Pre-start, start-up, shutdown and post shutdown procedures
3. Normal operations
4. Emergency operations
5. Operator service requirements
6. Environmental conditions
7. Lubrication data
8. Preventive maintenance plan and schedule
9. Troubleshooting guides and diagnostic techniques
10. Wiring diagrams and control diagrams
11. Maintenance and repair procedures
12. Removal and replacement instructions
13. Spare parts and supply lists
14. Corrective maintenance procedures
15. Parts identification
16. Warranty information
17. Personnel training requirements
18. Testing equipment and/or special tools information
19. Contractor information

F. Data Package 5

1. Safety precautions
2. Environmental conditions
3. Preventive maintenance plan and schedule
4. Troubleshooting guide and diagnostic techniques
5. Wiring diagrams and control diagrams

6. Maintenance and repair procedures

7. Spare parts and supply lists

8. Warranty information

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

SECTION 15050

BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Summary: Briefly and without force and effect on contract documents, mechanical work can be generally summarized as (but is not necessarily limited to) the following to the work described in this section.

B. General Work: General work associated with mechanical systems and equipment, and to be performed as mechanical work, includes excavating, backfill and compaction of sub-grade piping, hvac equipment, materials, pipe sleeves, pipe supports, ductwork supports, anchors, meters, gages, electrical disconnects, motor starters, vibration isolation, sound isolation, drip pans, access panels, welding, identification, coordination drawings, record drawings, installation permits, tests, inspection, mechanical work of certain temporary facilities, cutting-and-patching work, utility connections, start-up of systems, training of Owner's operating personnel, operating and maintenance manuals, operating permits, final cleaning and lubricating of mechanical work, continued operation of certain equipment for specified periods after Owner's acceptance or occupancy, and similar work. All work must be in conformance with all state and local codes.

C. The HVAC Contractor and Plumbing Contractor shall be responsible for notifying and coordinating with the Testing, Adjusting and Balancing (TAB) Contractor for pre-balancing inspections. The inspections shall be timed when the installation is nearing completion and before any work is concealed behind ceilings or inaccessible spaces. The inspection will look for flex duct conditions; for the completeness of balancing and volume dampers; diffuser, register and grille installation; the installation of hydronic control valves and pumps where applicable. Work found to be deficient as a result of the inspections shall be corrected before testing, adjusting and balancing work commences. When the installation is complete and ready for testing, adjusting and balancing, the HVAC Contractor and the Plumbing Contractor shall notify, in writing, HBC’s Construction Project Manager that testing adjusting and balancing work can commence and be completed. Any deficiency of work found after testing, adjusting and balancing work begins shall be corrected. If the deficiency of the work delays the completion of testing, adjusting and balancing work the responsible trade Contractor shall be back charged all additional charges encumbered by the Owner.

1.02 HEATING, VENTILATING, AND AIR CONDITIONING

A. Provide H.V.A.C. items as indicated on plans and in the specifications. Installation shall be according to Manufacturer's recommendations and in conformance to applicable codes.

B. Clean ductwork exterior and seal all joints using Hardcast 550 or equivalent.

C. Exhaust hood systems serving the deli areas.

D. Exhaust systems as indicated on the drawings and in the specifications.

E. Gas fired heating system as defined in the plans serving the storage area.

F. Automatic Temperature Controls will be interfaced with Owner's automatic control system by the Controls Contractor. The Mechanical Contractor shall provide damper actuators for motor operated dampers and control valves for hydronic and plumbing equipment requiring control valves. The Controls Contractor shall wire damper actuators and control valves.

G. Pre-start-up meeting, scheduling of start-up, and performing the start-up with all involved crafts (Refrigeration, Electrical, Mechanical, Test and Balance personnel, and HBC representative to be present.)

H. Assist the Testing, Adjusting and Balancing (TAB) Contractor in testing, adjusting, and balancing systems. Testing, adjusting and balancing is specified in section 15850, "Testing, Adjusting and Balancing". The Mechanical Contractor shall be responsible for replacing roof top equipment air filters used during construction with clean unused filters at the time balancing commences. The Mechanical Contractor shall be responsible for changing fan sheaves, for belt driven equipment, including equipment furnished by the Owner, as required to obtain proper air flows.

1.03 PLUMBING

A. Perform work as indicated on Plans and in the Specifications, and in conformance to all applicable codes. Any waste materials must be removed and disposed of legally. Furnish and install components to make a fully functional system.

B. Provide the Domestic water system, including water softening system, make any additions including pipe, valves, backflow preventers, pressure gauges; and pressure reducing valve when necessary. All required aquastats, thermometers, and circulators not included in the Mechanical Center are the responsibility of this contractor. Provide electric tracing of water piping drops in or on exterior walls.

C. A gas piping system serving, heating, cooking, and emergency power systems. Including pressure reducers and automatic shut-off valves as indicated on the plans. The Gas piping is to be tested at 50 times working pressure, and be leak tight for a period of 1 hour. Written certification to be given to owners construction project manager.

D. Provide the sanitary drainage system constructed of NSF approved materials, including both direct and indirect waste systems. Sump pits and grease traps are included where necessary. Building traps are to be included where they are required.

E. The roof drain system to collect rain water and carry it outside the building to the site storm drainage system. An electric tracing system for the front canopy gutter and drains is part of the installation.

F. Condensate piping for air conditioners, coolers, and freezers. Including insulation and electrical tracing.

G. Design, furnish, and install a sprinkler systems to furnish a complete installation including installation of a fire pump and reservoir if indicated by local conditions.

1.04 ACCESSIBILITY

A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.

B. Extend all grease fittings to an accessible location.

1.05 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be installed.

1.06 OWNER FURNISHED EQUIPMENT

A. Rough-in, install and make final connections to Owner furnished plumbing fixtures and Owner furnished equipment.

B. Verify final locations for rough-ins with field measurements and with the requirements of the actual fixtures and equipment to be installed.

1.07 COORDINATION

A. The Contractor shall acquaint himself with space requirements of other trades and call to the Architect/Engineer's attention any conflicts noted prior to performing any work. If work is started without notice to the Architect/Engineer, Contractor assumes responsibility for any work that has to be done over.

B. Contractor shall have materials on the job and erected in conformance with building work schedule and in full coordination with other trades. Coordination with the electrical contractor to assure proper power supply to each component is the responsibility of the mechanical contractor.

C. Coordinate installation of mechanical equipment and materials with all other building components.

D. Verify all dimensions by field measurements.

E. Arrange for chases, slots, and openings in other building components to allow for mechanical installations.

F. Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.

G. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible consistent with being serviceable.

H. Install mechanical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

I. Coordinate the installation of mechanical materials and equipment above ceiling with suspension system, light fixtures, and other installations.

J. Coordinate connections of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

1.08 CONTRACT DRAWINGS

A. Contract drawings are in part diagrammatic, intended to convey the scope of work and indicated general arrangements of equipment, ducts, piping, and approximate sizes and locations of equipment and outlets. Contractor shall familiarize himself with all conditions affecting his work and shall verify spaces in which his work will be installed.

B. Where job conditions require reasonable changes in indicated locations and arrangement, make such changes without extra cost to Owner.

C. The Contractor shall carefully study and compare all contract drawings, specifications, and other instructions and shall at once report to the Architect/Engineer any error, inconsistency, deviation from actual conditions, or omission which he may discover.

1.09 CUTTING AND PATCHING

A. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
1. Uncover Work to provide for installation of ill-timed Work;
2. Remove and replace defective Work;
3. Remove and replace Work not conforming to requirements of the Contract Documents;
4. Install equipment and materials in existing structures;
5. Upon written instructions from the Architect/Engineer, uncover and restore work to provide for Architect/Engineer observation of concealed Work.

B. Do not endanger or damage installed Work through procedures and processes of cutting and patching.

C. Arrange for repairs required to restore other Work, because of damage caused as a result of mechanical installations.

D. No additional compensation will be authorized for cutting and patching Work that is necessitated by ill-timed, defective, or non-conforming installations.

E. Cut, remove and legally dispose of any indicated mechanical equipment, components, and materials as required.

F. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

G. Provide and maintain any required temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

H. Locate, identify, and protect mechanical and electrical services passing through remodeling or demolition area and serving other areas required to be maintained operational.

1.10 SUBMITTALS

A. Submit shop drawings and product data as indicated.

B. Within 15 days after award of contract, submit and complete submittal schedule for approval by the Architect/Engineer.

C. Mark dimensions and values in units to match those specified.

1.11 OPERATION AND MAINTENANCE DATA

A. Preparation and submittal of operation and maintenance manuals is required before completion of the contract.

1.12 SEQUENCING AND SCHEDULING

A. Construct work in sequence under the provisions of Section 01010.

A. All concealed piping conveying greasey waste, sanitary waste, condensate, vent, rain water, domestic water or hydronic water shall be fully charged and leak-tested prior to completion of the wall or ceiling enclosures. The cost of repairing damages to other Work during charging and leak testing shall be the responsibility of the Mechanical Contractor. If permanent site water is not available at this time, temporary water shall be used to complete this testing.

B. Concealed gas piping shall be leak-tested in accordance with NFPA 54, “The National Fuel Gas Code” prior to completion of the wall or ceiling enclosures. The cost of repairing damages to other Work during leak testing shall be the responsibility of the Mechanical Contractor.

1.13 NAMEPLATE DATA

A. Provide a permanent nameplate on each item of power operated mechanical equipment, indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliance’s, and similar essential data. Locate nameplates in an accessible location.

1.14 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for district identifications; adequately packaged and protected to prevent damage during shipment, storage and handling.

B. Store and protect products in accordance with Section 01600.

1.15 RECORD DOCUMENTS

A. Maintain record documents in accordance with requirements. Record documents shall be available for inspections and reference at any time during construction.

B. Mark a set of drawings to indicate any revisions to piping, size and location both exterior and interior; including locations of control devices, filters, and similar units requiring periodic maintenance of repair; actual equipment locations, dimensioned for column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned to column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, tanks, etc.); and Change Orders.

C. Mark Specifications to indicate approved substitutions; Change Orders; actual equipment and materials used.

1.16 MECHANICAL IDENTIFICATION

A. Equipment: Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with plastic tags.

B. Valves: Identify valves in main and branch piping with tags.

C. Piping: Identify piping, concealed or exposed, with plastic pipe markers or plastic tape pipe markers. Tags may be used on small diameter piping. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet between markings on straight runs including risers and drops, adjacent to each valve and "T", at each side of penetration of structure or enclosure, and at each obstruction.

D. Ductwork: Identify ductwork with plastic nameplates. Identify as to air handling unit number, and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

1.17 VALVE CHART AND SCHEDULE

A. Provide valve chart and schedule in aluminum frame with clear plastic shield. Install at location as directed.

END OF SECTION

SECTION 15200

NOISE VIBRATION AND SEISMIC CONTROL

STANDARDS AND CODES

"Seismic Restraint Guidelines for Mechanical Systems"-SMACNA
Applicable State and Local regulations
BOCA
NFPA

PART 1 PIPE HANGERS

A. Except where otherwise shown, specified or required, hangers, supports, guides, anchors and concrete inserts shall be the standard types as manufactured by Grinnell Company or approved equal.

B. Hangers and supports shall be adequate to maintain the pipelines, apparatus, and equipment in proper position and alignment under all conditions. Where required, they shall be screw adjustable after installation. Supporting devices shall be designed in accordance with the best practice and conform to requirements of applicable codes. Hangers will be attached to the top chine of beams or bar joists.

C. Explosive driven studs such as "Ramset" and the like are prohibited.

D. Where concentrations of valves, fittings and equipment occur, closer spacing of supports will be required. In no case shall any total hanger load (weight of piping, insulation and contents) exceed the load carrying capacities for hot rolled steel rod as specified in ASTM A576.

E. Anchors shall be provided where shown or required, for holding the pipelines and equipment in position or alignment. Anchors shall be designed for rigid fastening to the structures, either directly or through brackets. The design of anchors shall be subject to approval by the Engineer.

F. Pipe anchors and alignment guides, at expansion loops or joints, shall be provided to control pipe movement. Anchors and guides shall be securely attached to the building construction. Anchors shall be clamped to the pipes. Alignment guides shall be Flexonics Pipe Alignment Guides or may be constructed of structural steel shapes. Insulation shall be protected by an 18 gauge, 12 inch long sheet metal sleeve.

G. Piping on walls shall be properly supported by hangers securely anchored into the wall construction. Risers shall be supported with split ring clamps spaced not greater than 6 feet on centers. Domestic water piping running in outside walls shall be supported from structural members of the interior wall face, hangers shall not be secured directly to outside walls.

H. Galvanized and cast iron pipe inside the structure shall be supported at intervals as follows with Clevis Hangers, rod sizes as follows, double nuts on clevis hangers and on beam clips.

Pipe Size (Inches)	Hanger Intervals Black & Galvanized (Feet)	Hanger Intervals Cast Iron (Feet)	Rod Size
¾ & 1	6	-	3/8
1-1/4	8	-	3/8
1-1/2	9	-	3/8
2	10	-	3/8
2-1/2	11	-	1/2
3	12	11	1/2
4	14	13	5/8
5	16	14	5/8
6	17	15	3/4
8	19	15	7/8

I. Copper tubing shall be supported at intervals as follows, with copper plated clevis hangers, rod sizes as follows, double nuts on clevis hangers and on beam clips.

Copper Tube Size (Inches)	Hanger Intervals (Feet)	Rod Sizes (inches)
1/2	5	3/8
3/4	5	3/8
1	6	3/8
1-1/4	7	3/8
1-1/2	8	3/8
2	8	3/8
2-1/2	9	1/2
3	10	1/2
4	12	1/2

J. PVC and CPVC pipe inside the structure shall be supported at intervals as follows with Clevis Hangers, rod sizes as follows, double nuts on clevis hangers and on beam clips.

Pipe Size (Inches)	Hanger Intervals (Feet)	Rod Size (inches)
CPVC 1 or less	3	3/8
CPVC 1 ¼ up	4	3/8
PVC all sizes	4	3/8

K. All pipe hangers shall be placed directly on O.D. of pipe unless otherwise required due to insulation.

L. Vertical lines shall be supported at their bases with a hanger placed in the horizontal line near the riser, or with a base-type fitting set on a pedestal foundation or support. All concealed vertical lines extending through any floor levels shall be supported at each floor with riser clamps. Riser clamps shall be Grinnell Figure 261, or equal.

M. All vent lines through the roof will be securely supported and clamped at the bar joist closest to penetration of the roof deck.

N. All rooftop units shall be anchored to the building steel using 1/4" SS cable and the lifting lug attachment points on the unit.

PART 2 DUCT HANGERS

A. All main and branch ducts must be supported and braced to meet the SMCNA guidelines, particularly for seismic restraint (3 dimensional bracing).

B. Duct hangers must conform to the print detail for all exposed ductwork. For ductwork concealed over ceilings and behind soffits duct hangers conforming to SMACNA guidelines will be acceptable.

PART 3 DUCT LINER

A. Flexible glass fiber; ASTM C1071, Type I; Conductance 'C' value of 0.25 BTU per hr-sf-°F at 75° F, 1.5 lb/cu ft minimum density; coated air stream side for maximum 6,000 ft/min air velocity. Surface burning characteristics in accordance with ASTM E84 not to exceed 25 flame spread; 50 smoke developed. Liner shall be Johns Manville Linacoustic RC or Knauf Duct Liner M.

B. For noise attenuation install liner in the ducts as indicated on the prints (generally the first 20ft of supply and return duct).

C. Clean surfaces for adhesives.

D. Install materials in accordance with manufacturer's instructions.

E. Provide insulation with vapor barrier when air conveyed may be below ambient temperature.

END OF SECTION

SECTION 15250

MECHANICAL INSULATION

PART 1 GENERAL

A. Insulate piping and ducts as specified.

B. Provide electrical heat tracing for condensate lines located in the meat cooler and all freezers. Provide electrical heat tracing for rain leaders and gutters in the front canopy. Provide heat tracing for domestic water piping drops located in or on outside walls. The systems shall consist of a heating element, controls, components and mounting hardware. The systems shall be UL listed and approved by FM for this specific type of duty.

C. Insulation of refrigeration system piping described on drawings R1 and R2 by the Refrigeration Contractor.

1.01 WORK INCLUDED

A. Piping insulation.

B. Jackets and accessories.

C. Ductwork insulation.

D. Insulation jackets.

E. Electric Tracing - Condensate drains, gutters, and roof drains

1.02 REFERENCES

A. Applicable ANSI/ASTM standards.

B. Applicable UL listings and tests.

C. BOCA.

D. Any State or Local Codes or requirements.

1.03 QUALITY ASSURANCE

A. Applicator: company specializing in insulation application with three years minimum experience.

B. Materials: Flame spread/fuel contributed/smoke developed rating of 25/50/50/ in accordance with UL 723.

1.04 SUBMITTALS FOR ENGINEER'S REVIEW AND APPROVAL

A. Submit product data including product description, list of materials and thickness for each service, and location.

B. Submit manufacturer's installation instructions.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS
PIPING AND DUCTS

A. Armacell, LLC

B. Owens/Corning Fiberglas Corp.

C. Certainteed Corporation

D. Manville Corporation

TRACING

A. RAYCHEM

2.02 INSULATION

PIPE

A. Type A: Glass fiber insulation; ANSI/ASTM C547; Johns-Manville, Knauf, 'k' value of 0.24 btu-in per hr-sf-°F at 75° F, noncombustible.

B. Type B: Uni-Cellular foam; ASTM C534, Type I (tube), Type II (sheet), Armacell, LLC AP/Armaflex, only, no others permitted, flexible, 'k' value of 0.27 btu-in per hr-sf-°F at 75° F.

DUCT

A. Type A: Flexible glass fiber; ANSI/ASTM C553; commercial grade; 'k' value of 0.30 btu-in per hr-sf-°F at 75° F, faced for air conditioning ducts, no facing for heating and venting ducts.

B. Type B: Rigid glass fiber; ANSI/ASTM C612, Class 1; 'k' value of 0.24 btu-in per hr-sf-°F at 75° F, 0.002 inch foil scrim facing for air conditioning ducts, no facing for heating and venting ducts.

C. For type C, duct liner, refer to Section 15200 Noise and vibration.

2.03 JACKETS

A. Interior Applications:
1. Vapor Barrier Jackets: Kraft reinforced foil vapor barrier with self-sealing adhesive joints.
2. PVC jackets: One piece, premolded type.
3. Canvas Jackets: UL listed treated cotton fabric, 6 oz/sq yd.

B. Exterior Applications:

1. Aluminum Jackets: ASTM B209, 0.020 inch thick; smooth finish.

2.04 ACCESSORIES

A. Provide bands, staples, adhesives, cements and other accessories as recommended by the insulation manufacturer for the applications indicated.

2.05 ELECTRICAL TRACING

A. The tracing shall be self regulating and have the following construction. The heating element shall be two 16 AWG tinned copper bus wires embedded in parallel in a self regulating polymer core that varies its power output to respond to temperature along its length, allowing the heater to be crossed over itself without overheating, to be used with wood, plastic, and other building materials, and to be cut to length in the field. For energy conservation the self-regulating heater shall have a maximum power output of 10 watts per foot where it contacts cold, and 5 watts per foot in air. The heater shall be covered by a polyolefin dielectric jacket and protected by a tinned-copper braid and an outer jacket of polyolefin which has been uv stabilized, Outer jacket may be omitted in freezer or meat cooler applications.

B. The heater shall operate on 208 or 277 volts without the use of transformers.

C. The heater shall be UL listed for this specific application and be as manufactured by Raychem Corp.

D. Power connection, end seal, splice, outer jacket repairs, and installation devices shall all be field installed.

E. The system shall be controlled by the building control system. The BCS shall activate a **contactor** of the appropriate rating **(supplied by this contractor)** to furnish power to the element. The power shall be supplied using a GFCI breaker with a 30 milliamp trip.

PART 3 EXECUTION

PIPING

A. Install materials in accordance with manufacturer's instructions.

B. Continue insulation, with vapor barrier, through penetrations (both wall and slab).

C. On exposed piping, locate insulation and cover seams in least visible locations. All interior exposed piping shall have White PVC Jacketing. All exterior exposed piping shall have aluminum jacketing.

D. On insulated piping with vapor barrier, insulate fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.

E. On insulated piping without vapor barrier and piping conveying fluids 140° F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation at such locations.

F. Provide an insert, not less than 6 inches long, of same thickness and contour as adjoining insulation, between support shield and piping, but under the finish jacket on piping 2 inches diameter or larger to prevent insulation from sagging at support points. Inserts shall be cork or other heavy density insulating material suitable for the planned temperature range. Factory fabricated inserts may be used.

G. Neatly finish insulation at supports, protrusions, and interruptions.

H. Jackets:

1. Indoor, Concealed Applications: Insulated pipes conveying fluids above ambient temperature shall have standard jackets, with or without vapor barrier, factory-applied or field-applied. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass cloth and adhesive. PVC jackets may be used.
2. Indoor, Concealed Applications: Insulated dual-temperature pipes or pipes conveying fluids below ambient temperature shall have vapor barrier jackets, factory-applied or field-applied. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe, and finish with like material and thickness as adjacent pipe, and finish with glass cloth and vapor barrier adhesive.
3. Indoor, Exposed Applications: For pipe exposed in mechanical equipment rooms or in finished spaces, insulate as for concealed applications. Finish with PVC jacket.
4. Exterior Applications: Provide vapor barrier jackets. Cover with aluminum jacketing with seams located on bottom side of horizontal piping. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement.

PIPE SIZE INSULATION SCHEDULE

PIPING	TYPE	(INCHES)	THICKNESS-INCHES
Hydronic Heating piping	A	ALL	2
Domestic Hot Water Supply	A	ALL	1*
Domestic Hot Water Recirculating	A	ALL	1
Domestic Hot Water Storage	A,B		1 1/2
Domestic Cold Water	A	ALL	1*
Filtered Water	A	ALL	1
Roof Drains (interior only)	A or B	ALL	1
Cold Condensate Drains	B	ALL	1
HVAC Refrigerant piping	B	ALL	3/4
Cooler Waste Lines (above floor)	B	ALL	1

* 1-1/2" for 2" and larger, Double insulate any piping located in cavities where the uninsulated outside wall forms part of the cavity. Refer to hanger mounting comments and detail as shown on prints. All seams must be sealed on insulation. Underslab piping must be insulated with insulation carried through slab penetrations.

DUCTWORK

A. Exterior Insulation (Type A or Type B) Application:
   1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
   2. Secure insulation without vapor barrier with staples, tape, or wires.
   3. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
   4. Rooftop Applications: Provide vapor barrier jackets. Cover with aluminum jacketing with seams located on the bottom side of ductwork.

B. Liner (type C) Application: Applied to supply and return for approximately first 20 ft air handler.
   1. Adhere insulation with adhesive for 100 percent coverage. In addition, secure insulation with mechanical fasteners on 15 inch centers maximum on top and side of ductwork with dimension exceeding 20 inches. Seal and smooth joints. Do not use nail-type fasteners. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
   2. Ductwork dimensions indicated are net inside dimensions required for air flow. Increase ductwork to allow for insulation thickness.

C. Continue insulation with vapor barrier through penetrations.

DUCTWORK INSULATION SCHEDULE

DUCTWORK	TYPE	THICKNESS-INCHES
Exhaust Ducts within 10 ft of exterior openings and exhaust ducts exposed to outdoor air	A	2
Outside air intake ducts	A	2
Supply Ducts	A	1-1/2
Supply and Return ducts in unheated spaces	A	2X1-1/2 (2 layers)
Internal Acoustic Lining (as shown on plans)	C	1

ELECTRIC TRACING

A. The tracing shall be attached to the piping and tubing by appropriate means and covered by the insulation jacket.

B. Protect the heater from physical damage.

C. Install in accordance with all manufacturers instructions.

D. Tracing used in gutters and downspouts shall be extended down the leaders to below the surface of the ground, or until the leader goes inside the insulation envelope.

E. Electric tracing used for freezers and meat cooler shall be extended along the riser to the floor drain connection. There shall be two separate tracings per condensate riser.

F. Tracing for domestic water piping drops in or on outside walls shall orginate in a warm space and shall extend to the fixture(s) being served.

TESTS

After installation, test the dielectric jacket's insulation resistance and continuity with a 2500 vdc megger. Insulation resistance from the conductors to the shield shall be between 20 and 1000 megohms.

END OF SECTION

SECTION 15300

SPECIAL PIPING SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide a complete and operable **natural** gas piping system with valves, regulators, drip legs and flexible connections to equipment. Rough-in and make final connections to equipment and appliances furnished by the Owner.

B. Provide a complete and operating water filtration system with piping, valves, pipe insulation and filtration equipment specified below. Rough-in and make final connections to equipment furnished by the Owner.

C. Provide interconnecting HVAC refrigerant piping, refrigeration specialties and pipe insulation between split system condensing units and air handler units, where split systems are specified.

1.02 REFERENCE STANDARDS

A. Applicable ASTM Standards

B. AWWA Standard Methods for the Examination of Water and Waste Water.

C. NFPA Codes

D. BOCA.

E. State and Local Codes and Requirements

1.03 SUBMITTALS FOR ENGINEER'S REVIEW AND APPROVAL

A. Submit shop drawings and product data including dimension drawings indicating components and connections to other equipment and piping and indicate pump type, capacity, power requirements, and affected adjacent construction.

B. Submit certified performance characteristics of system operating points.

C. Submit catalogue sheets for controls to be used.

D. Submit operating and maintenance manuals as specified in Section 15012, “Operating and Maintenance Data”. Provide Data Package 5 for the Water Filtration System.

PART 2 PRODUCTS

2.01 GAS PIPING, BURIED

A. Steel Pipe: ASTM A53 or A120, Schedule 40 black (schedule 80 black for LPG). Fittings: ASTM A234, forged steel welding type, with ANSI/AWWA C105 polyethylene

jacket or double layer, half lapped 10 mil polyethylene tape. Joints: ANSI/AWS D1.1, welded.

2.02 GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53 or A120, Schedule 40 black (schedule 40 black for LPG). Fittings: **CAST IRON NOT ALLOWED,** malleable iron, or ASTM A234, forged steel welding type. Joints: Threaded for pipe two inches and under; ANSI/ASW D1.1, welded, for pipe over two inches.

B. Flexible tubing unit connection: Fittings and Joints must be mechanical connections only. Tubing must be AGA approved device for unit connection. Infra-Red unit heaters must not be connected to the gas piping with rigid pipe.

C. Exposed gas piping on the roof shall be painted the OSHA color standard for the fuel involved.

2.03 GAS COCKS - **Plastic handles on valves used for gas shut-off will not be allowed.**

A. Gas cocks or ball valves shall be AGA and UL listed for the service intended.

B. Up to 2 inches: Bronze body, bronze tapered plug. Non-lubricated, Teflon packing, threaded ends.

C. Over 2 inches: Cast iron body and plug, non lubricated, Teflon packing, flanged ends.

2.04 SAFETY GAS VALVES

A. Valve shall be designed for use as a gas safety shut off valve for the pressure present in the line. The valve shall be 120 volt operation and coil rated for continuous duty. Operation is normally closed, open when energized.

2.05 GAS PRESSURE REGULATOR

A. A pressure regulator by Maxitrol, Fisher, or equivalent, which is properly sized for the flow rate and for the inlet pressure encountered shall be provided for each fuel burning appliance. The outlet pressure shall be set in accordance with pressure requirements of each appliance served. Proper venting to the exterior, when required, is to be included. Minimum 3/8" type "K" copper tubing.

2.06 FILTERED WATER PIPING SYSTEM

A. CPVC pipe schedule 40 ASTM D2846, ASTM F441, ASTM F442. Fittings: CPVC. Joints solvent welded. Solvent specifications ASTM F493.

2.07 FILTERED WATER FILTER SYSTEMS

A. The water treatment system shall be sized for a flow rate of 12 gpm with a daily flow of 800 gallons. The system shall filter, soften and UV irradiate the water supplied to equipment indicated on the drawings. The system will automatically backwash and regenerate when required.

B. Filter equipment, one required; Culligan Hi-Flo 2 model PV12-D, multimedia automatic backwash filter. Peak flow rate of 12 gpm. Pressure drop of 4 psig. Backwash rate of 10 gpm. Inlet/outlet pipe size 1 ½ inches. Drain pipe size ¾ inch. Media volume 1.5 cubic feet. Filter operation is controlled by a motor-driven, piston type automatic control valve. Positive positioning of the piston permits the three cycles of backwash, downflow rinse and service. Additional 1 ½ inch hydraulically-operated Flo-Pak valves of cast iron construction are directly mounted to the tank to handle normal service flow rates at a pressure loss of 3 psig or less. The filter tank control is equipped with a self-adjusting flow control to properly control the backwash and rinse rates. The valve will automatically adjust to prevent mineral loss and restrict wastewater discharge regardless of pressure when operating in the range of 30 to 100 psig. The automatic valve will include a timeclock for initiating backwash on a calendar clock basis. It shall be adjustable for any time of day or night and any day of the week. It shall permit adjustment to the length of cycle for both the backwash and rinse to accommodate water requirements. Operation is on 120v-1ph power.

C. Softening equipment, one set required; Culligan Hi-Flo 2 model PV-90A with brine tank. Resin tank shall be equipped with a removable opening in the top for media replacement. The softener tank shall be equipped with a soft water collector and backwash water distributor. The softener tank shall be equipped with an upper distributor to ensure maximum water softening capacity. The softening media shall be solid, of the proper particle size (4% or lees passing a 40 mesh U.S. standard screen, wet screening) without agglomerates, shells, plates or shapes that interfere with the water softener function. The softening media resin shall comply with food additive regulations of the Food and Drug Administration. The brine tank shall be equipped with an elevated salt plate for brine collection, and a chamber to house the brine valve assembly. The brine valve opens automatically to admit brine to the resin tank during eduction and closes automatically to prevent introduction of air into the resin tank. During refill, the brine valve shall regulate the flow of soft water into the brine tank, working with the timed refill feature of the softener control valve. Together these components admit the correct volume of water to the brine tank in accordance with the salt dosage settings on the control valve. The brine valve shall include a float operated safety shut-off valve, as a back-up to the time refill valve on the control, to prevent brine tank overflow. The main control valve shall be a 4 position motor-driven piston type to positively locate the internal valve piston routing water flow through the softener during service, backwash, brine draw/brine rinse and fast rinse/brine refill. The valve will contain fixed and self-adjusting flow controls to control water flow through the valve during backwash, brine and slow rinse, and fast rinse, with water pressures between 30 and 80 psig. The internal piston and seal assembly shall be of the modular cartridge design. The control shall be fully tested at the factory before shipment. Regeneration frequency shall be controlled by a 7 day calendar clock permitting regeneration at any time of day or night, on any day or every day of the week. The timer shall permit adjustment of the backwash time and fast rinse/refill time. A manual means of regeneration at any time shall be provided. The timer control shall be UL listed. Operation is on 120v-1ph power.

D. Ultra-violet irradiation equipment, one required; Culligan model DW-8. Flow capacity of 10 gpm. Pressure drop less than 2 psig. Inlet/outlet size ¾ inch male NPT. Power requirement is 61 watts at 120v-1ph-60Hz.

2.08 HVAC REFRIGERANT PIPING

A. Provide ASTM B280 copper ACR tubing with brazed joints for interconnecting piping between split system condensing units and air handlers. Provide wrought copper fittings and packless valves. ACR tubing shall be nitrogen purged and capped for shipping to and storage at the project site.

B. Provide refrigerant specialties, where not furnished with equipment, filter-drier, sight gauge, Sporlan thermostatic expansion valve, external equalizer, bulb sensor, solenoid valve and pop-type relief safety valve with synthetic rubber seat.**]**

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Gas piping installation shall be in accordance with NFPA 54, “The Fuel Gas Code” and local building codes.

B. Provide non-conducting dielectric connections wherever joining dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Slope gas piping a minimum of ¼ inch per 15 feet in accordance with NFPA 54, “The National Fuel Gas Code”.

D. Install piping to conserve building space and not interfere with use of space. Avoid diagonal runs whenever possible.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Provide clearance for installation of insulation and access to valves and fittings.

H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.

I. Slope filtered water piping and arrange to drain at low points. Minimum piping slope shall be 1 inch per 20 feet. Provide ball valve shut-off valves for each piece of equipment. Insulate piping after testing. Insulate piping to prevent formation of condensation. Insulation is specified in Section 15250, “Mechanical Insulation”.

J. Establish elevations of buried piping outside the building to ensure there is enough cover to meet code requirements.

K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

L. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting. Refer to Section 09900.

M. Install ball valves or gas cocks for shut-off and to isolate equipment, part of system, or vertical risers.

N. Provide one plug cock wrench for every ten plug cocks sized 2 inches and smaller, minimum of one. Provide each plug cock sized 2-1/2 inches and larger with a wrench with set screw.

O. Provide regulators (Maxitrol Series or Fisher) on each gas line servicing atmospheric burner type appliances. Vent to the outside as required by applicable code. Adjust regulators to provide the required manifold gas pressure for each appliance served.

P. Provide an automatic gas valve (Minneapolis Honeywell V88 A or J series or ASCO 8042 series if required for pressure) as indicated on the plans.

Q. Install ball valves for shut-off and equipment isolation on the filtered water system.

R. Install water treatment system in accordance with the manufacturer's written instructions.

S. Refrigerant piping shall slope in the direction of refrigerant flow a minimum of ½ inch per 10 feet. Provide required support for piping. Provide flexible connections or canted pipe loops to minimize vibration. Insulate piping after testing. Insulation is specified in Section 15250, "Mechanical Insulation".

3.03 TESTING AND INSPECTION

A. All plumbing work under this contract shall be inspected and tested in accordance with state and local codes as follows:

1. Water piping shall be tested and proven tight under a water pressure of 100 psi. The water used for the tests shall be obtained from a potable source of supply
2. Gas piping shall be tested in accordance with NFPA-54 and applicable local codes. Pressure test the installed gas line to 50 times the working pressure. Minimum 1 hour with no leakage. **Do not use oxygen for testing.** The pressure test shall be witnessed by a Hannaford Bros. representative. Notify Hannaford Bros.'s Construction Project Manager 48 hours in advance of the test.
3. **[**Test the vacuum condensate piping for air and liquid leaks.**]**
4. Test the ACR piping for leaks prior to insulating the piping or charging the system with refrigerant. Evacuate the piping system with a vacuum pump, charge it with refrigerant to 10 psig and then admit dry nitrogen until the piping system pressure is 150 psig. The piping system shall hold this pressure with no pressure drop for four (4) hours. Where pressure drops occur during this time check piping for leaks by coating the piping with a soap solution and observing for bubbles. Repair leaks and retest using the procedure above. **Do use air for testing.** Do not allow refrigerant to escape to the atmosphere. Recover refrigerant used for the test in accordance with Federal Environmental regulations.

B. **[**Adjust the operation and correct deficiencies discovered during commissioning of the condensate vacuum system.**]**

END OF SECTION

SECTION 15400

PLUMBING SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Sanitary sewer piping system.

B. Domestic water piping system.

C. Storm water piping system.

D. Pipe fittings.

E. Valves.

F. Roof and floor drains.

G. Gutters and downspouts.

H. Cleanouts.

I. Backflow preventers.

J. Water hammer arrestors.

K. Hose bibbs/hydrants.

L. Thermometers.

M. Thermometer wells.

N. Pressure gauges.

O. Pressure gauge cocks.

P. Test plugs.

Q. Domestic hot water recirculation pump

R. Rough-in and make final connections to equipment or fixtures furnished by the Owner and installed by the Contractor.

S. Insulation of piping systems, (cold water, hot water and hot water return), and water storage tanks, (cold water storage tanks and hot water storage tanks, not provided with the mechanical/electrical center). Insulation is specified in Section 15250, “Mechanical Insulation”.

1.02 REFERENCE STANDARDS

A. ANSI/ASME Standards

B. ANSI/ASTM Standards.

C. ANSI/ASW Standards.

D. ANSI/AWWA Standards.

E. ASTM Standards.

F. PDI Standards.

G. State and Local Plumbing and Health codes.

H. BOCA

1.03 QUALITY ASSURANCE

A. Valves: Manufacturer's name and pressure treating marked on valve body.

B. Welding Materials and Procedures: Conform to applicable AWS Standards.

C. Piping Materials and Products: Comply with all applicable portions of the applicable codes and standards listed above.

1.04 SUBMITTALS FOR ENGINEER'S REVIEW AND APPROVAL

A. Submit product data including data on pipe materials, pipe fittings, pipe supports, valves and accessories, and solder materials.

B. Provide operating and maintenance manuals in accordance with Section 15012, “Operating and Maintenance Data”. Provide Data Package 1 for Backflow Preventers and Tempering Valves. Provide Data Package 3 for the Grease Interceptor. Provide Data Package 1 for the Domestic Hot Water Circulation Pump.

PART 2 PRODUCTS

2.01 SANITARY SEWER PIPING, BELOW SLAB, must be NSF Approved.
(PVC is Preferred if codes permit its use)

A. Cast Iron Pipe: ASTM A74 service weight. Fittings: Cast iron, Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.

B. PVC Pipe: Schedule 40 ASTM D2729. Fittings: PVC Joints solvent weld per ASTM D2855.

2.02 SANITARY SEWER AND VENT PIPING, ABOVE GRADE, must be NSF Approved.
(PVC is Preferred if codes permit its use)

A. Cast Iron Pipe: ASTM A74, service weight. Fittings: Cast iron. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.

B. Cast Iron Pipe: CISPI 301, Hubless, service weight. Fittings: Cast iron. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. Copper Pipe: ASTM B306, DWV. Fittings: ANSI/ASME B16.3, cast bronze, or ANSI/ASME B16.29, wrought copper. Joints: ANSI/ASTM B32, solder, Grade 50B.

D. PVC Pipe: ASTM D2729. Fittings: PVC. Joints: ASTM D2855, solvent weld.

2.03 DOMESTIC WATER PIPING, EXTERIOR AND BURIED

A. Copper Tubing: ASTM B88, Type K soft-annealed. Fittings: ANSI/ASME B16.29, wrought copper. Joints: 95-5 tin-antimony, SILVABRITE 100 solder, or other approved lead-free solder.

B. PEX tubing, NSF approved, below interior slabs to island cases requiring water. ASTM F876/F877/F1960/F1807; PEX tubing shall be Wirsbo Aquapex with ProPex fittings.

2.04 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tubing: ASTM B88, Type L, hard drawn. Fittings: ANSI/ASME B16.29, wrought copper. Joints: 95-5 tin-antimony, SILVABRITE 100 solder, or other approved lead-free solder.

B. PEX tubing, NSF approved, above suspended ceilings and in concealed spaces only. ASTM F876/F877/F1960/F1807; PEX tubing shall be Wirsbo Aquapex with ProPex fittings.

2.05 STORM WATER PIPING, BURIED
(PVC is preferred if its use is permitted by Code.)

A. Cast Iron Pipe: ASTM A74 service weight. Fittings: Cast iron. Joints: Hub-and Spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.

B. PVC Pipe: Schedule 80 ASTM D2729. Fittings: PVC: Joints solvent weld per ASTM D2855.

2.06 STORM WATER PIPING, ABOVE GRADE (PVC is preferred if its use is permitted by Code.)

A. Cast Iron Pipe: ASTM a74 service weight. Fittings: Cast iron. Joints: Hub and spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.

B. Cast Iron Pipe: CISPI 301, Hubless, service weight. Fittings: Cast iron. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. PVC Pipe: Astm D2729. Fittings: PVC. Joints: ASTM D2855, solvent cleaned and welded.

2.07 ACCEPTABLE MANUFACTURERS - GATE VALVES

A. NIBCO

B. Jenkins

C. Hammond

2.08 GATE VALVES

A. (2" or less, ball valves required) Bronze body, rising stem and handwheel, inside screw, solid wedge disc, threaded ends.

B. Over 2 Inches: Iron body, bronze trim, rising stem and handwheel, OS&Y, solid wedge, flanged ends.

2.09 ACCEPTABLE MANUFACTURERS - BALL VALVES

A. NIBCO Inc.

B. Watts

C. Apollo

2.10 BALL VALVES

A. Up to 2 Inches: (Gate valves for over 2inches) Bronze body, full ported, Teflon seats and flat lever handle, threaded or sweat ends.

2.11 ACCEPTABLE MANUFACTURERS - SWING CHECK VALVES

A. NIBCO, Inc.

2.12 SWING CHECK VALVES

A. Up to 2 Inches: Bronze Teflon disc, screwed ends.

B. Over 2 Inches: Iron body, bronze trim, renewable disc and seat, flanged ends.

2.13 ACCEPTABLE MANUFACTURERS - WATER PRESSURE REDUCING VALVES (NO OTHERS PERMITTED)

A. Watts Regulator - Model No. LP223S.

2.14 WATER PRESSURE REDUCING VALVES

A. Cast iron body, bronze strainer.

2.15 ACCEPTABLE MANUFACTURERS - RELIEF VALVES (NO OTHERS PERMITTED)

A. Watts Regulator - Model 40XL.

2.16 RELIEF VALVES

A. Bronze body, combined pressure/temperature relief valve, 125 psi rated, capacities ASTM certified and labeled.

2.17 ACCEPTABLE MANUFACTURERS - TEMPERING VALVES (NO OTHER PERMITTED)

A. Leonard TA series, for lavatories, sinks and sanitizers. Anti-scald rated. Combination checkstops on inlets, sweat connections, rough bronze finish for cabinet units, chrome plated finish where exposed to view in finish areas. Set tempering valve for 110° F outlet temperature and lock in place to prevent changing of the temperature by unqualified persons or store personnel. Adjustable temperature range 100° F to 130° F.

B. Leonard TA-300-IT for emergency eye/face wash units. Rough bronze finish in Receiving and Storage rooms. Chrome plated finish where exposed in finished areas. Set tempering valve for 85° F outlet temperature and lock in place to prevent changing of the temperature by unqualified persons.

2.18 ACCEPTABLE MANUFACTURERS - ROOF DRAINS (NO OTHER'S PERMITTED)

A. Zurn Industries Inc.

B. Jay R. Smith Mfg. Co.

2.19 ACCEPTABLE MANUFACTURERS - FLOOR DRAIN (NO OTHERS PERMITTED)

A. J.R. Smith Mfg. Co.

B. Zurn Industries, Inc.

C. Josam Manufacturing Co.

2.20 FLOOR DRAINS

A. Floor drains/sink drains/case drains: The following tabular format indicates the drain application and applicable Zurn Specification number. All floor drains and cleanouts to have heavy-duty covers.

Type "A"- Zurn Model ZN-415, HD Type B Strainer, -Y with Sediment bucket.

Type "B"- Zurn Model ZN-415, Type E Strainer, -Y with Sediment bucket.

Type "F"- Zurn Model Z-1750, -YS with Suspended Sediment Bucket.

Type "J"- Zurn Model ZN-415, Type G Strainer and sediment bucket and 10"x10" cover Zurn ZANB-1461

Type "K"- Jay R. Smith Model 2510-V Integral cleanout, sediment bucket and backwater valve. Used in cooler floors and piped to "J" floor drain pits.

Type “T” – Zurn Model Z-897-RFS-Y catch basin with sediment bucket; size 6 inches by 20 inches.

(1) Any device connected to a direct waste line can, if desired, be run through the Grease interceptor line. Consideration must be given to volume effect on separator capacity. This does not apply to urinals and waterclosets.

(2) Freezer coil condensate lines must terminate outside of the freezer, and must be traced and insulated through the freezer wall.
(3) Interior roof leaders shall be connected to an exterior storm drain system.
(4) Cooler floor drains must have backwater valves and run through intermediate indirect waste connection pit.(Type "J" floor drain)
(5) All Floor Drains except types "F" and must have anchor flanges.

2.21 ACCEPTABLE MANUFACTURERS - CLEANOUTS (NO OTHERS PERMITTED)

A. Jay R. Smith Mfg. Co.

B. Zurn Industries, Inc.

2.22 CLEANOUTS

A. Interior Finished Floor Areas: Cast iron, adjustable nickel-bronze strainer, and round scoriated cover equal to Model ZN-1400-HD manufactured by Zurn, with -K anchor flange.

B. Interior Finished Wall Area and Exterior: Line type with round stainless steel access cover secured with machine screw; equal to Model Z-1441 manufactured by Zurn.

C. Interior Unfinished Accessible Areas: Caulked type. Equal to Model Z-1400-HD with -K anchor Flange.

2.23 ACCEPTABLE MANUFACTURERS - BACKFLOW PREVENTERS (NO OTHERS PERMITTED)

A. Wilkins model 975XL at scullery sinks; Watts 909 on water entrance; **[**Watts 009QT on hydronic glycol loops (boiler and heat exchanger) make-up water lines**]**.

2.24 BACKFLOW PREVENTERS

A. Water Entrance, Reduced Pressure Zone Backflow Preventers: Bronze body with bronze and plastic internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; assembled with two gate valves, strainer, and four test cocks; Model 909 manufactured by Watts Regulator Co.

B. Scullery sinks (3 bay and single bay), Double check with air gap Backflow Preventers equivalent to Wilkins Model 975XL reduced pressure backflow preventers will be installed on each scullery sink hot water supply to isolate the sanitization chemical addition system.

C. **[**Hydronic Loops (boiler and heat exchanger), Reduced Pressure Zone Backflow Preventers: Bronze body construction. The assembly shall consist of an internal pressure differential relief valve located in a zone between two positive seating check modules with captured springs and silicone seat discs. Seats and seat discs shall be replaceable in both check modules and the relief valve. The assembly shall include two resilient seated isolation ball valves, four resilient seated test cocks and an air gap drain fitting.**]**

2.25 ACCEPTABLE MANUFACTURERS - WATER HAMMER ARRESTORS (NO OTHERS PERMITTED)

A. Jay R. Smith Mfg. Co.

B. Zurn Industries, Inc.

C. Josam Manufacturing Co.

2.26 WATER HAMMER ARRESTORS

A. Sized in accordance with PDI WH-201, precharged and sealed; equal to Jay R. Smith "Hydrotrol".

2.27 ACCEPTABLE MANUFACTURERS - HOSE BIBBS/HYDRANTS (NO OTHERS PERMITTED)

A. T&S Brass and Bronze Works Inc.

B. Woodford Manufacturing Company

2.28 HOSE BIBBS/HYDRANTS

A. Hose Bibb (H.B.): Sill faucet with built-in vacuum breaker and tee handle. Equal to Model B-720 manufactured by T&S Brass and Bronze Works, Inc.

B. Wall Hydrant (W.H.): Cast-brass box with chrome finish, tee handle key, vacuum breaker, and 3/4 inch hose outlet. Equal to Woodford Manufacturing Company Model 74.

C. Recessed Wall Hydrant (R.W.H.): Cast-brass box and door with chrome finish, tee handle key, vacuum breaker, and 3/4 inch hose outlet. Equal to Woodford Manufacturing Company Model B74.

D. Freeze Proof Wall Hydrant (F.P.W.H.): Cast-brass box and door with chrome finish, automatic drain, tee handle key, vacuum breaker, and 3/4 inch hose outlet. Equal to Woodford Manufacturing Company Model B65.

2.29 THERMOMETERS

A. Thermometers shall be vapor actuated, adjustable angle type, with a 4 inch dial, a 30^{o} F to 240^{o} F scale. Aluminum case with stainless ring and glass window. Movement shall be brass with bronze bushings Bourdon tube shall be phospher bronze with a brass socket. Face shall be white with black figures. Provide brass separable thermowell. Equal to Trerice Model V80445.

2.30 THERMOMETER WELLS

A. Provide separable thermowells for thermometers, where shown on the plans. Wells shall be brass with a 2 inch extension, and shall have a cap nut with chain fastened permanently to the well.

2.31 PRESSURE GAUGES

A. Provide pressure gauges where shown on the plans. Gauges shall be 4 inch dial, drawn steel case, a one piece styrene-acrylonitrile window. Movement shall be brass with bronze Bourdon tube and brass socket. Dial face shall be white corrosion resistant ABS with

black figures and corrosion resistant ABS pointer. 160 psi dial range, and a bottom outlet. Gauges shall be equal to Trerice Model No. 800.

2.32 PRESSURE GAUGE COCKS

A. Provide pressure gauge cocks where required. Cocks shall be equal to Trerice catalog number 865MFG.

2.33 TEST PLUGS

A. Provide test plugs at all locations shown on the plans. Test plugs shall be equal to those manufactured by Trerice with Nordel valve core material suitable for operating temperatures of 35° F to 275° F and a maximum pressure rating of 500 PSIG.

2.34 DOMESTIC HOT WATER CIRCULATION PUMP

A. Provide a TACO model 008B, bronze casing pump. The pump shall deliver the scheduled gpm at the scheduled head. Impeller shall be non-metallic secured to a ceramic shaft. Bearings shall be carbon material. Pump shall have 1 inch flanged connections. The pump shall be rated at 125 psig. The motor shall be of the permanent split capacitor type. The pump shall be 1/25 horsepower. The electrical characteristics shall be 115 volt, 1 phase, 60 Hz.

B. Provide an aquastat, single pole double throw, equal to Honeywell L6006A1145. Set pump on at 130° F and pump off at 140° F.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Coordinate roof and floor construction to receive drains to required invert elevations.

3.02 INSTALLATION

A. Provide non-conducting dielectric connections wherever joining dissimilar metals.

B. Route piping in orderly manner and maintain gradient.

C. Install piping to conserve building space and not interfere with use of space. Avoid diagonal runs whenever possible.

D. Group piping whenever practical at common elevations.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Provide clearance for installation of insulation and access to valves and fittings.

G. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.

H. Slope water piping 1 inch per 20 feet and arrange to drain at low points.

I. Wipe soldered joints of excessive solder. Use non-corrosive fluxes in joint preparation.

J. Establish elevations of buried piping outside the building to ensure not less than adequate cover.

K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

L. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting. Refer to Section 09900.

M. Establish invert elevations, slopes for drainage to 1/8 inch per foot one percent minimum. Maintain gradients.

N. Excavate, backfill and compact backfill for piping below slab. Over excavate by 6 inches in order to provide piping with a sand bed. Compact bedding prior to laying pipe. Backfill may be excavated material which is suitable; otherwise provide granular backfill material passing a 2 inch sieve 100%. Compact backfill material in eight (8) inch layers. Bring backfill up to subgrade, compacted and ready for placing the floor slab. Backfill material and sand bedding shall be compacted to 95% modified density, meeting ASTM D1556 and ASTM D1557.

O. Install bell and spigot pipe with bell end upstream.

P. Install required gaskets in accordance with manufacturer's recommendations.

Q. Clean interior of piping of dirt and other superfluous material as work progresses. maintain swab or drag in line and pull past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops.

R. Install valves with stems upright or horizontal, not inverted. Install check valves and backflow preventers in the horizontal.

S. Provide one plug cock wrench for every ten plug cocks sized 2 inches and smaller, minimum of one. Provide each plug cock sized 2-1/2 inches and larger with a wrench with set screw.

T. Install specialties in accordance with manufacturer's instructions to permit intended performance.

U. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

V. Encase exterior cleanouts in concrete flush with grade.

W. Install water hammer arrestors complete with accessible isolation valve.

X. Openings cut in cooler and freezer panels shall be sealed by the Contractor using Butyl Rubber Caulk on both sides of the panels.

Y. Install water treatment equipment in accordance with manufacturer's instructions.

Z. Coordinate plumbing piping and related equipment installation to achieve an operable system. Rough-in and make final connections to equipment and fixtures furnished by the Owner and installed by the Contractor.

3.03 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.

A. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.

B. Install ball valves for shut-off and to isolate equipment, part of system, or vertical risers.

C. Provide pipe insulation for cold water, hot water and hot water return piping systems. Insulate water storage tanks, cold water and hot water storage. Insulation is specified in Section 15250, “Mechanical Insulation”.

3.04 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, verify system is complete, flushed and clean.

B. Ensure pH of water to be treated is between 7.4 and 7.6 by adding alkali caustic soda or soda ash or acid (Hydrochloric).

C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas throughout system to obtain 50 to 80 mg/L residual.

D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

E. Maintain disinfectant in system for 24 hours.

F. If final disinfectant residual test less than 25 mg/L, repeat treatment.

G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

H. Take samples no sooner than 24 hours after flushing, from 5 percent of outlets and from water entry, and analyze in accordance with AWWA C601.

3.05 SERVICE CONNECTIONS

A. Provide new sanitary and storm sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

B. Provide new water service complete as shown on the drawings. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Caulk enlarged sleeve and made watertight with pliable material. Anchor service main inside to concrete wall. Provide 18 gage galvanized sheet metal sleeve around service main to 6 inches above floor and 6 feet minimum below grade. Size for minimum of 2 inches of loose bat insulation stuffing.

3.06 TESTING AND INSPECTION

A. All plumbing work under this contract shall be inspected and tested in accordance with state and local codes as follows:

1. All soil, storm drain, and vent piping shall be given a hydrostatic test equivalent to filling stacks with water for a minimum of 15 minutes after which time the system shall prove tight at all points.
2. Water piping shall be tested and proven tight under a water pressure of 100 psi. The water used for the tests shall be obtained from a potable source of supply

END OF SECTION

SECTION 15450

PLUMBING FIXTURES AND TRIM

PART 1 GENERAL

1.01 WORK INCLUDED

A. Water closets.

B. Urinals.

C. Lavatories.

D. Sinks.

E. Drinking Fountain.

F. Mop service basins.

G. Hose reels.

H. Eye Wash Fountains.

1.02 QUALITY ASSURANCE

A. Fixtures: By same manufacturer for each product specified throughout.

B. Trim: By same manufacturer for each product specified throughout.

1.03 SUBMITTALS FOR ENGINEER'S REVIEW AND APPROVAL

A. Submit product data including fixtures, sizes, rough-in dimensions, utility sizes, trim and finishes.

1.04 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data including fixture trim exploded view and replacement parts lists.

B. Submit operating and maintenance manuals in accordance with Section 15012, “Operating and Maintenance Data”. Provide Data Package 1 for all fixtures and trim.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - FIXTURES (NO OTHERS PERMITTED)

A. Crane Plumbing/Fiat Products.

B. Elkay Manufacturing Co.

C. F.M.E. Corporation.

D. Aero Manufacturing Company.

E. American Standard

F. Kohler.

2.02 ACCEPTABLE MANUFACTURERS - FIXTURES TRIM (NO OTHERS PERMITTED)

A. Symmons Industries, Inc.

B. Elkay Manufacturing Co.

C. T & S Brass and Bronze Works, Inc.

D. Crane Plumbing/Fiat Products.

2.03 ACCEPTABLE MANUFACTURERS - FLUSH VALVES (NO OTHERS PERMITTED)

A. Sloan Valve Company.

B. Zurn Industries, Inc.

2.04 ACCEPTABLE MANUFACTURERS - WATER CLOSET SEATS (NO OTHERS PERMITTED)

A. Church Seat Company

B. Bemis Mfg. Co.

C. Olsonite.

2.05 ACCEPTABLE MANUFACTURERS - FIXTURES CARRIERS (NO OTHERS PERMITTED)

A. Jay R. Smith Mfg. Co.

B. Josam Mfg. Co.

C. Wade Pipe.

D. Zurn Industries, Inc.

2.06 ACCEPTABLE MANUFACTURERS - DRINKING FOUNTAINS (NO OTHERS PERMITTED)

A. Haws Drinking Faucet Company.

B. Elkay Mfg. Co.

C. Halsey Tayler.

2.07 ACCEPTABLE MANUFACTURER - HOSE REELS (NO OTHERS PERMITTED)

A. T & S Brass and Bronze Works, Inc.

2.08 WATER CLOSET

A. Bowl: Floor mounted, siphon jet, water economy (1-1/2 gal/flush), vitreous china closet bowl, with elongated rim, 1-1/2 inch top spud, china bolt caps; equal to Cadet as manufactured by American Standard.

B. Flush Valve: Exposed, polished and plated brass, oscillating non hold-open handle, Chrome plated Eustachian plate, vacuum breaker, 1-inch ips back-check angle stop equal to Z-6000-WS-1 manufactured by Zurn Industries, Inc.

C. Seat: Solid white plastic, open front, self-sustaining hinge, without cover; equal to products manufactured by Church Seat Company.

2.09 URINAL

A. Urinal: Vitreous china, siphon jet, water economy urinal with shields, integral trap, 3/4 inch top spud, steel supporting hanger; equal to Washbrook as manufactured by American Standard. Overall lip to top dimension must be in excess of 20".

B. Flush Valve: Polished and plated brass, diaphragm type with chrome plated Eustachian plate, Bat handle operator, vacuum breaker, 3/4" IPS Back-Check angle stop, and adjustable tail piece, equal to Sloan Model 186-1 manufactured by Sloan Valve Co.

2.10 LAVATORY (Lav-A)

A. Basin: Vitreous china lavatory, drilled for built-in chair carrier with concealed arms, 20 X 18 inch minimum, with 4-1/2 inch high back, drilled for single 4 inch centerset trim, overflow, and soap depression, 32” to rim; "Declyn" Model 0231.075 manufactured by American Standard.

B. Trim: Single Control Metering Faucet, 4 inch centerset, adjustable time limit stop, rose spray outlet for 0.5 gpm flow rate, vandal proof, grid strainer drain assembly, Symmons model S-60-H. Service valves and tempering valve to be included. Include in-line check valves for hot and cold water inlets.

C. P-Trap: Polished chromium plated cast brass, 1-1/4 X 1-1/2 inch adjustable P-trap with cleanout and escutcheon. Equal to Model 8-5260 manufactured by Crane Plumbing/Fiat Products.

D. Supports: Floor mounted, concealed arm carriers equal to Figure 700 manufactured by Jay R. Smith Mfg. Co.

2.11 LAVATORY (Lav-B)

A. Basin: Wheelchair vitreous china lavatory with low shelf back, drilled for concealed arm carrier, drilling for 4 inch centerset trim, 34 inch height to rim. Equal to Patients Lavatory as manufactured by American Standard.

B. Trim: Single Control Metering Faucet, 4 inch centerset, adjustable time limit stop, rose spray outlet for 0.5 gpm flow rate, vandal proof, grid strainer drain assembly, Symmons

model S-60-H. Service valves and tempering valve to be included. Include in-line check valves on hot and cold water inlets.

C. P-Trap: Polished chromium plated cast brass, 1-1/4 X 1-1/2 inch adjustable offset P-trap with cleanout and escutcheon. Equal to Model 8-5260 manufactured by Crane Plumbing/Fiat Products.

D. Supports: Floor mounted, concealed arm carrier for wheelchair lavatories, equal to Figure 700-27-M31 manufactured by Jay R. Smith Mfg. Co.

2.12 SINK - SKULLERY 3-BAY

A. Three compartment scullery sink, minimum 16 gage stainless steel, coved corners, integral backsplash, 1-1/2 inch stainless basket waste, drilled for two-8 inch center combinations faucets, 16 gage tubular stainless steel legs, adjustable working height, N.S.F. approved. Drainboards and size to be as indicated in sink schedule on prints.

B. Trim:
1. Mixing faucet with 12 inch swing nozzle and lever handles. Equal to Model B-231 manufactured by T&S Brass and Bronze Works, Inc. with B-WH-4 Handles
2. Pre-rinse unit with mixing faucet, spring-action gooseneck, 34 inch high with 15 inch overhand, wall bracket, add-on faucet with 12 inch swing nozzle. Equal to Model B-133 pre-rinse unit with B-WH-4 Handles, Model B-109-1 wall bracket, and Model B-156 add-on-faucet with B-WH-4 Handle, manufactured by T&S Brass and Bronze Works Inc.
3. Pre-rinse hose must be equipped with a backflow preventer T&S Model B-44V9 or approved equal.
4. Service valves must be included on all supply lines.
5. A Wilkins 545 RPZBFP must be included to isolate the sanitizing chemical addition from the domestic hot water system. A check valve, spring type must be placed in the cold water line to prevent backfeed of hot water.

C. Waste Fitting: 1-1/2 inch cast brass continuous connection with lever handles and P-trap as manufactured by Elkay Manufacturing Company. Drain shall be reduced to 1 1/4" before indirect connection to floor drain.

2.13 SINK - PRODUCT PREPARATION 1-BAY

A. Single compartment scullery sink, minimum 16 gage stainless steel, coved corners, integral backsplash, 1-1/2 inch basket waste, drilled for one 8 inch center combination faucet, 16 gage tubular stainless steel legs, adjustable working height, N.S.F. approved. Size as shown in schedule on plan.

B. Trim:
1. Pre-rinse unit with mixing faucet, spring-action gooseneck, 34 inch high with 15 inch overhand, wall bracket, add-on faucet with 12 inch swing nozzle. Equal to Model B-133 pre-rinse unit with B-WH-4 Handles, Model B-109-1 wall bracket, and Model B-156 add-on faucet with B-WH-4 Handle manufactured by T&S Brass and Bronze Works, Inc.
2. Pre-rinse hose must be equipped with backflow preventer T7S Model B-44V9 or approved equal.

3. Service valves must be included on all supply lines. A check valve. Spring type must be included on the cold water line.

C. Waste fitting: 1-1/2 inch cast brass continuous connection with lever handles and P-trap as manufactured by Elkay Manufacturing Company. Drain shall be reduced to 1 1/4" before indirect connection to floor drain.

2.14 SINK – SEAFOOD DRAIN TABLE TRIM (SINK BY OTHERS)

A. Trim:
1. Pre-rinse unit with metering faucet, spring-action gooseneck, 40 inch high. Equal to Model B-0173 pre-rinse unit manufactured by T&S Brass and Bronze Works, Inc.
2. Pre-rinse hose must be equipped with backflow preventer T&S Model B-44V9 or approved equal.
3. Service valves must be included on all supply lines.

2.15 SINK - HANDWASH

A. Pedestal type sink, 14 X 10 X 6-1/2 inch, 302 stainless steel with 3 inch stainless basket strainer, brass tail piece and P-trap, double foot pedal valve, and 6 inch gooseneck faucet. Equal to Model HSK-P-1 manufactured by F.M.E. Corporation. Service valves and a tempering valve (Sparco Aquamix AM-100) with a check valve (Sparco Aquamix AMCV-50) in the cold water side, must be included on all supply lines.

2.16 SINK - EMPLOYEE LOUNGE, PHARMACY, and COFFEE BAR

A. Bowl: Single compartment, 17 X 16 X 7-1/4 inch dimensions, 20 gage, Type 302 stainless steel, self-rimming with undercoating, ledgeback drilled for trim; Model PSR-1716 manufactured by Elkay Manufacturing Company.

B. Trim: Chrome plated rigid gooseneck supply with swing spout, water economy aerator, lever handles, chrome plated 17 gage tailpiece, equal to Model B-1120 with B-WH-4 Handles manufactured by T&S Brass and Bronze Works, Inc. Service valves must be included on all supply lines.

2.17 EYE WASH, WALL AND SINK MOUNTED.

A. Provide Guardian Equipment G5016LC eye wash station outside the janitor's closet and in the rear area of the store. All units shall have isolation valves and be supplied with tempered water. A check valve must be included on the cold water supply at the mixing valve.

B. Provide Guardian Equipment G5022 for use on the hand sinks where indicated. All units shall have isolation valves and be supplied with tempered water. A check valve must be included on the cold water supply at the mixing valve.

2.18 WATER COOLER (DF)

A. Fountain: Type approved for handicap access water cooler with stainless steel top, stainless steel body, automatic stream regulator, and mounting bracket. Equal to Model

HBFC8B-SS manufactured by Haws Drinking Faucet Company. Service valve must be included on all supply lines.

2.19 MOP SERVICE BASIN (MB2)

A. Basin: Molded-stone, 10 inch high walls with 1 inch wide shoulders, stainless steel drain body designed to provide for a lead caulk joint to a 3 inch I.P.S. drain pipe, equal to Fiat Products Model MSB-3624.

B. Trim: Chrome plated faucet with vacuum breaker, 30 inch long heavy duty 5/8 inch rubber hose with wall bracket, and stainless steel mop hangers with 3 tool grips. Equal to Model No. 830-AA (faucet), Model No. 832-AA (hose) and Model No. 889-CC (mop hanger) as manufactured by Fiat Products. Handles must be wrist lever type. Include service valves on supply lines. Installation height 36” above finished floor.

2.20 MOP SERVICE BASIN (MB1)

A. Basin: Field fabricated, see drawings.

B. Trim: Same as MB2.

2.21 HOSE REEL

A. Hose reels shall be Model B-1403 manufactured by T&S Brass and Bronze Works, Inc. Each reel shall be plumbed with a vacuum breaker, mixing valve, shut off, and check valves as indicated on plans.

PART 3 EXECUTION

3.01 INSPECTION

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

B. Verify adjacent construction is ready to receive rough-in work of this Section.

3.02 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Install components level and plumb.

C. Seal fixtures to wall and floor surfaces with sealant color to match fixture.

D. Maintain fixtures to the heights above finished floor as shown on the plans.

3.03 ADJUSTING AND CLEANING

A. Adjust stops or valves for intended water flow rate to fixtures with splashing, noise, or overflow.

B. At completion clean plumbing fixtures and equipment.

END OF SECTION

SECTION 15500

FIRE PROTECTION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Inspect existing conditions, design, and install a complete, automatic sprinkler system to provide coverage for entire building. Where ceilings are removed and not replaced raise the sprinkler piping and heads to the roof deck. Sprinkler criteria drawings (FS) shall convey intent in areas critical to appearance and décor of the store. Where intent may be in conflict with codes, the codes shall take precedence. Plans and calculations are to be submitted to the Authority Having Jurisdiction for Approval and to the Architect/Engineer for Review and Record Purposes only. Specification for density and coverage as shown below:

1. Sales area: 0.18 GPM over an operating area of 3,000 sq.ft. throughout the store with an additional 250 GPM hose allowance. Heads will be 165^{o} F with a low response time index.
2. In the storage area the application rate will be 0.22 GPM over the most distant area of 2650 sq.ft. Maximum of 100 sqft per head. A 250 GPM hose allowance is to be included in both instances. All heads will be 286° F heads in areas without dropped ceilings,
3. 165^{o} F degree semi-recessed low response time heads are to be used in dropped ceilings.
4. There shall be dry heads in any walk-in freezers and the meat cooler. It shall be serviced by a single drop from the general area system centrally located over the freezer/cooler. Where sprinkler piping passes through the meat prep room and produce prep room ceiling plenums it shall be dry with dry heads located in the ceiling.
5. Where required or indicated by good practice other dry pendent or anti-freeze loops will be integrated into the system.
6. Where State or Local codes require, a Glycol loop or dry system for exterior canopies, is to be included.
7. Conduct flow tests and perform hydraulic calculations to determine available flow rates. If the flow is insufficient include a fire pump, and, if necessary, water storage tankage, into the design.
8. Provide a sprinkler head directly over the door to the compactor chute in the storage area.

1.02 QUALITY ASSURANCE

A. Fire protection products shall be manufactured by firms whose products have been in satisfactory use in similar service for not less than 5 years.

B. Install sprinkler systems in compliance with NFPA Standards. Follow SMACNA, BOCA, and NFPA guidelines for seismic restraint.

C. Provide fire protection products in accordance with UL and Factory Mutual standards; provide UL and Factory Mutual labels on each product.

D. Provide entire fire protection installation in accordance with Factory Mutual standards.

E. Comply with all local fire department regulations for sizes, threads, and arrangement of connections for fire department equipment to sprinkler systems.

F. Threaded or cut groove fittings will not be permitted on pipe lighter than schedule 40.

1.03 SUBMITTALS

A. Submit manufacturer's technical product data and installation instructions for the fire protection materials and products.

B. Prepare scaled approval drawings of fire protection systems indicating pipe sizes, pipe locations, fittings, shutoffs, equipment, etc. Submit to agency having jurisdiction for approval. Submit one approved copy bearing stamp and/or signature of agency having jurisdiction to the Architect/Engineer.

C. Prepare hydraulic calculations of fire protection systems. Submit to agency having jurisdiction for approval. Submit one approved copy, bearing stamp and/or signature of agency having jurisdiction to the Architect/Engineer.

D. Upon completion of fire protection piping work, submit certificate which indicated that work has been tested in accordance with NFPA 13 and that the systems are operational, complete, and free from defects.

E. Submit maintenance data and parts lists for all materials and products as specified in Section 15012, “Operation and Maintenance Data”. Provide Data Package 1 as specified in Section 15012 for system components, except for fire pumps. Provide Data Package 3 for fire pumps and their controllers.

F. At project close-out, assemble all the above items and final record drawings into a maintenance manual and submit to owner.

PART 2 PRODUCTS

2.01 PIPING

A. All pipe, tubing, and fittings shall comply with the specifications in NFPA 13.

2.02 VALVES

A. General: Provide valves UL/FM listed, in accordance with NFPA 13, and acceptable to the authority having jurisdiction.

B. Alarm Check Valve: Provide cast iron water flow alarm check valve listed by UL/FM.

C. Backflow Preventer: Provide UL/FM listed backflow preventer of the reduced pressure zone double check type.

2.03 SPECIALTIES

A. Fire Department Connection: Provide UL/FM listed, cast iron fire department connection of the size and end type required by the local fire department.

B. Water Flow Indicators: Provide UL/FM listed valve switches where required.

C. Pressure Switch: Provide UL/FM listed pressure type flow switches where required.

D. Water Motor and Gong: Provide 10 inch; red water motor and gong suitable for outside installation, listed by UL/FM.

2.04 AUTOMATIC SPRINKLERS

A. General: Provide UL/FM listed sprinklers with chrome finish for public areas and cast brass finish for storage and utility areas. Provide 165° F fusible links in areas with ceilings, except in cooking areas provide 212° F fusible links. Provide 3 extra heads of each type used with a wrench located in a box in the sprinkler riser room.

B. Types: Provide sprinklers of the following types:
1. Pendent or upright: Storage and sales areas with no ceilings.
2. Dry Pendent: Coolers, outside areas.
3. Semi Recessed: with 2 piece escutcheon plate for areas with ceilings.

2.05 ANTI-FREEZE LOOP

A. General; Provide suitable glycol - water mixture in piping systems subject to freezing temperatures. Mixture shall be in conformity with all state and local health regulations. The loop shall be equipped to prevent loss through backflow of the mixture.

B. Maintenance and Inspection Chart: Provide a labeled single line antifreeze loop diagram, framed with a glass front, for mounting near the area requiring the antifreeze loop. Also include a typed copy of the following annual maintenance and inspection procedure:

ANNUAL MAINTENANCE AND INSPECTION PROCEDURE

Before the heating season commences, perform the following inspection of the antifreeze solution:
1. Close the water supply valve to the anti-freeze loop.
2. Open the Inspector's test valve, and drain valve. Let the anti-freeze solution drain into a clean container.
3. After the system is drained, open the upper solution test valve and drain off any remaining solution.
4. With a hydrometer, test solution and bring to proper specific gravity by the addition of the concentrated solution of the same anti-freeze used originally.
5. Close the drain valve.
6. Refill the system; close the upper solution test valve when the fluid reaches that level. Continue to fill until solution overflows the Inspector's test valve.
7. Close Inspector's test valve.
8. Open water supply valve.
9. Check for leaks; make necessary repairs and refill the system.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which fire protection systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.02 INSTALLATION

A. Prepare and install all materials and products in accordance with NFPA 13, and in accordance with recognized industry practices to insure that piping systems comply with requirements and serve intended purposes.

B. Provide drain valves at main shut-off valves and at low points of piping and apparatus.

C. Coordinate installation with other work including plumbing piping and ductwork. Areas under the Office mezzanine are especially critical.

D. Furnish all wiring requirements to electrical installer.

E. Label all valves with normal position and provide locks.

3.03 FLUSHING AND TESTING

A. Flushing: Prior to connecting sprinkler risers for flushing, flush water feed mains, lead-in connections and control portions of sprinkler piping. After fire sprinkler piping installation has been completed and before piping is placed in service, flush entire sprinkler system, as required to remove foreign substances, under pressure as specified in NFPA 13. Continue flushing until water is clear, and check to ensure that debris has not clogged sprinklers or the backflow preventer.

B. Hydrostatic Testing: After flushing system, test fire sprinkler piping hydrostatically, for period of 2 hours, at not less than 200 psi, or at 50 psi in excess in maximum static pressure when maximum static pressure is in excess of 150 psi. Check system for leakage of joints. Measure hydrostatic pressure at low point of each system or zone being tested.

C. Repair or replace piping system as required to eliminate leakage in accordance with NFPA standards for "no leakage" and retest as specified to demonstrate compliance.

END OF SECTION

SECTION 15600
POWER OR HEAT GENERATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufactured double wall chimneys for fuel fired equipment.

B. Draft inducers.

C. Gas fired unit heaters.

D. Gas fired roof-top heaters.

E. Gas fired roof-top duct furnaces.

F. Infrared heaters.

G. Tubular infrared heaters.

H. Rooftop Units, gas/electric.

I. Rooftop Air Handler

J. Indoor Evaporator Unit (Fan Coils).

K. Split system condensing units.

1.02 REFERENCE STANDARDS

A. Applicable ANSI/ASTM Standards

B. Applicable ASHRAE Standards

C. Applicable NFPA Standards.

D. Applicable UL Listing, Standards, and Tests

E. Applicable ANSI/ASHRAE Standards and Tests.

F. Applicable NFPA Standards and Codes.

1.03 DESIGN REQUIREMENTS

A. Factory built chimneys used for venting fuel burning appliances shall comply with applicable NFPA standards and be UL listed and labeled.

1.04 SUBMITTALS FOR ENGINEER'S REVIEW AND APPROVAL

A. Submit shop drawings including dimensional details of components and flue caps.

B. Submit manufacturer's installation instructions.

1.05 OPERATING AND MAINTENANCE DATA

A. Submit manufacturer’s installation, maintenance and operating instruction in bound volumes as specified in Section 15012, “Operating and Maintenance Data”.

1. Provide Data Package 5 for draft inducers;
2. Provide Data Package 5 for gas fired unit heaters and gas fired roof-top heaters;
3. Provide Data Package 5 for infrared and tubular infrared heaters;
4. Provide Data Package 3 for gas/electric roof-top units;
5. Provide Data Package 5 for fan coil units
6. Provide Data Package 5 for split system condensing units.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in the manufacture of products specified in this Section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 FLUE COMPONENTS MANUFACTURERS

A. American Metal Products Co., Inc.

C. Hart & Cooley Mfg. Co.

D. Selkirk Metalbestos.

E. Tjernlund Products, Inc.

2.02 TYPE B DOUBLE WALL GAS VENTS (This applies to gravity vents and atmospheric burners)

A. Fabricate inner pipe of sheet aluminum, and outer pipe of galvanized sheet, tested in compliance with UL 44.

B. Provide UL-labeled tees, elbows, increasers, draft hood connectors, metal cap with bird barrier, adjustable roof flashing storm collar, support assembly, thimbles, fire stop spacers, and fasteners.

2.03 DOUBLE WALL METAL STACKS (This applies to forced draft burners and equipment with draft inducers or power vents)

A. Provide double wall metal stacks, UL listed, for use with building heating equipment, in compliance with applicable NFPA Standards and be suitable for use under positive pressure.

B. Fabricate with 1 inch minimum air space between walls. Construct inner jacket of 20 gage ANSI/ASTM A167 Type 304 or 316 stainless steel. Construct outer jacket of aluminum coated Type 304 or 316 stainless steel.

C. Provide accessories each bearing factory applied UL label.

1. Ventilated Roof Thimble: consists of roof penetration, vent flashing and spacers and storm collar.
2. Stack Cap: Consists of conical rainshield with inverted cone for partial rain protection with low flow resistance.

2.04 DRAFT INDUCERS

A. Induced draft type: Provide in-line draft inducer equal to Tjernlund Auto-Draft Model D-3, 110V-60 cycle.

2.05 GAS FIRED UNIT HEATERS

A. Manufacturers:

1. Reznor, Inc.
2. Trane.

B. Propeller fan type, 80% thermal efficient and power vented. Unit heaters shall be suitable for natural gas and 120 volt power supply.

C. The heat exchanger shall be type 409 stainless steel. Burner shall be die-formed aluminized steel and include flared ports and stainless steel inserts.

D. The unit shall be provided with a single stage regulated combination redundant gas valve and intermittent spark pilot with electronic flame supervision.

E. The propeller fan motor shall be open dip-proof type with internal overloads and safety fan guard. The front of the unit shall be provided with horizontal louvers to direct air flow.

F. Provide a 24 volt control transformer. Provide limit and safety controls, including a combustion air pressure switch to verify proper vent flow prior to gas valve operation. The Temperature Controls Contractor shall provide space thermostats and control wiring.

G. Units shall be ceiling suspended with threaded hangers. Provide hanger kits.

2.06 GAS FIRED ROOF TOP HEATERS

A. Manufacturers, provide one of the three listed, all others will be rejected:
1. Trane
2. Hastings Industries.
3. Reznor Inc.

B. Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heat exchanger, burner, coil case, Dx coil, downturn plenum,roof curb, and controls.

C. Performance Ratings: Seasonal efficiency to ANSI/ASHRAE 103, and conforming to state and federal energy codes.

D. Capacity: As shown on the drawings.

E. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors, glass fiber insulation and reflective liner.

F. Heat Exchanger and Burner: Type 409 stainless steel construction.

G. Supply Fan Centrifugal type with belt drive and variable pitch motor pulley or propeller type depending on the size of the unit.

H. Burner:
1. Gas Burner: Atmospheric type with power vent and adjustable combustion air supply, staged gas valve, as indicated on the drawings, and a pressure regulator, incorporate manual shut-off, pilot valve, automatic 100 percent shut-off and thermo-couple pilot safety device, electronic pilot ignition, automatic power vent.
2. Gas Burner Safety Controls: Thermo-couple sensor prevents opening of solenoid gas valve until pilot flame is proven and stops gas flow on ignition failure.

I. Burner Operating Controls:
1. Room thermostat stages the burner to maintain space temperature setpoint.
2. High Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on high bonnet temperature and re-energizes when temperature drops to lower value.
3. Fan Control: Bonnet thermostat independent of burner controls, cycles supply fan, with manual switch for continuous fan operation. Building Automation System to enable unit and cycle burner to maintain space temperature. Fan runs continuously when unit is enabled.

J. Accessories:

1. Intertwined Dx coil, full face width, 5 rows of ½ inch tubes. 10 fins per inch, two (2) full face refrigerant circuits with separate distributors and suction stubs. Coil face velocity shall not exceed 500 fpm. Capacity shall be as indicated on the drawings. Construction is to be configured aluminum fins mechanical bonded to copper tubes. Each refrigerant circuit shall be provided with the following refrigeration specialties:
   a. liquid and suction ball valves,
   b. liquid sight glass,
   c. liquid stop solenoid valve,
   d. Tx valve sized for tonnage and refrigerant,
   e. Schrader valve and test port on each suction line.

   The Dx coil shall be housed in a coil section of the unit cabinet, located downstream of the furnace section.

2.07 GAS FIRED ROOF-TOP DUCT FURNACES

A. Acceptable manufacturers are Trane and Reznor, all others will be rejected.

B. Units shall be completely factory assembled, piped, wired and tested. Furnaces shall be AGA certified and conform with the latest ANSI standards and be in compliance with FM requirements. Units shall be base rail mounted.

C. Units shall have orifices select for operation on natural gas.

D. Standard control relays shall be mounted with terminal block connections. Control wiring shall terminate at terminal strips.

E. Unit casing shall be 18 gage die formed galvanized steel panels with manufacturer's standard finish. Service and access panels shall be provided.

F. The heat exchanger tubes, headers, burner and flue collector construction shall be 20 gage type 409 stainless steel.

G. Provide 2 stage gas valves where indicated. Intermittent spark ignition.

H. Provide electronic modulating (100% to 40%) gas valve as indicated. Electronic modulating valve shall have 0 to 10 vdc input as follows. With 0 volt input the valve shall be 100% open. With 10 volt input the valve shall be closed.

I. Provide control transformer to step down from primary 460 volts to control voltage.

J. Provide high temperature limit switches.

K. Provide redundant gas valves.

L. Provide airflow proving switch for each furnace.

2.08 INFRARED HEATERS

A. Manufacturers:
1. Aitken Products.
2. Detroit Radiant Products Company.
3. Perfection Schwank.
4. Solaronics.

B. Units: Self-contained, packaged, factory assembled, prewired unit consisting of cabinet, heat exchanger, burner, reflector and controls.

C. Heating Capacity: As shown on the plans.

D. Cabinet: Galvanized steel with baked enamel finish.

E. Ceramic Emitter: Assembly of high temperature ceramic tiles with polished aluminum reflectors.

F. Gas Burner: Atmospheric type with adjustable combustion air supply, gas valve and pressure regulator, incorporate manual shut-off, pilot valve, automatic 100 percent shut-off and thermo-couple pilot safety device, electronic pilot ignition, with power vent.

G. Gas Burner Safety Controls: Thermo-couple sensor prevents opening of solenoid gas valve until pilot flame is proven and stops gas flow on ignition failure.

2.09 TUBULAR INFRARED HEATERS

A. Manufacturers:
   1. Aitken Products.
   2. Detroit Radiant Products Company.
   3. Solaronics.
   4. Perfection Schwank.

B. Units: Packaged, factory assembled, pre-wired unit consisting of cabinet, burner, heat exchanger, radiant tube configured in a "U" shape, reflector, controls.

C. Heating Capacity: As shown on the plans.

D. Cabinet: Galvanized steel with baked enamel finish.

E. Heat Exchanger: Aluminized steel combustion chamber with aluminized steel tube with aluminum reflector.

F. Gas Burner: Forced draft type with adjustable combustion air supply, gas valve and pressure regulator, incorporate manual shut-off, pilot valve, automatic 100 percent shut-off and thermo-couple pilot safety device, electronic pilot ignition.

G. Gas Burner Safety Controls: Thermo-couple sensor prevents opening of solenoid gas valve until pilot flame is proven and stops gas flow on ignition failure.

H. Pressure rated metal flue through roof including roof flashing for membrane roof, storm collar, and suitable termination.

2.10 GAS/ELECTRIC ROOFTOP UNITS - ACCEPTABLE MANUFACTURERS

A. Trane. It is the Owner’s intent to be proprietary with this manufacturer, all others will be rejected.

2.11 MANUFACTURED UNITS

A. Provide roof-mounted units having electric refrigeration and indirect gas heating with capacities and electrical data as shown on the plans.

B. Unit shall be self contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, controls, motor starter, overload protection, air filters, evaporator coil, compressor, condenser coil, and condenser fan. Units with capacities through 7-1/2 tons shall have single refrigeration circuits. Units with capacities 10 tons through 25 tons shall have dual compressors (minimum) with independent refrigeration circuits. 30 ton capacity units shall have three compressors and independent refrigeration circuits. 40 ton or larger capacity units shall have four compressors with multiple tandem refrigeration circuits.

C. Unit **shall not** be equipped with economizers, barometric relief damper or power exhausters. No outside air capability for these units.

B. The unit shall have a fused disconnect furnished by the contractor.

2.12 FABRICATION

A. Cabinet: Galvanized steel with baked enamel finish. Equipped with suitable access doors or removable access panels of a minimum of 20 gage.

B. Insulation: 1 inch thick glass fiber on all surfaces in contact with conditioned air. Protect insulation edges from erosion.

C. Supply Fan: Centrifugal type, resilient mountings, v-belt drive, adjustable pitch motor pulley, rubber isolated hinge mounted motor. Provide high static drives and oversized premium efficiency inverter duty motors for units rated 10 tons or more (4000 cfm or higher). Provide high static drives and oversized high efficiency motors for units rated 7-1/2 tons or less (3000 cfm or less).

D. Air Filters: Throwaway type, Pleated, Minimum 2 inch thick. A full set of extra filters is to be provided for a filter changeout during the test and balance period.

E. Roof Mounting Curb: 12 inch high galvanized steel frame, with gaskets and nailer strips.

F. Supply air discharge and return air safety grates shall be provided for units.

2.13 EVAPORATOR COIL

A. Provide with aluminum fins mechanically bonded to copper tubes. Capacity as indicated on the plans.

B. Multi-circuited refrigeration systems shall have fully interlaced evaporator coils. Sectional coils are not permitted. Muli-circuited systems shall have Tx valves and solenoid valves for each circuit.

2.14 COMPRESSOR

A. Provide high efficiency direct drive hermetic compressor, 3600 rpm maximum, crankcase heater, high and low pressure controls, and motor overload protection. Manufacturer’s standard reciprocating or scroll type compressors are acceptable.

2.15 CONDENSER

A. Condenser coil shall be fabricated of aluminum fins mechanically bonded to copper tubes.

B. Unit shall have direct drive propeller fans, resiliently mounted fan guard, motor overload protection, and control wiring shall start the fan with the compressor.

C. Provide a pressure control to regulate fan speed and enable operation at low ambient conditions.

2.16 GAS FURNACE

A. Provide a high heat, indirect natural gas fired furnace with capacity and burner staging as scheduled on the drawings. Provide a gas pressure regulator to reduce pressure from 2 psig to the required furnace operating pressure. The furnace shall have AGA design certification and be approved for use downstream from the DX coil. Burners shall be stainless steel with direct spark ignition. The burner box shall be completely removable from the side of the unit and shall include a ground joint union to facilitate easy removal.

Provide an induced draft fan with an air proving switch interlocking burner operation with the gas train controls. The induced draft fan shall be capable of withstanding high temperatures associated with flue gases. Provide each unit with a vertical vent extension kit to exhaust flue gases above the unit. The heat exchanger shall be tubular stainless steel. The furnace shall have an electronic flame sensor, automatic gas valve with manual shut-off, gas pressure regulator; redundant automatic gas valve; flame rollout switch, high limit control (overheat), combustion airflow interlocks.

2.17 CONTROLS

A. Provide units with the manufacturer's primary safety controls wired to a terminal strip. Provide anti-short cycle timing and time delay between compressors in the compressor control circuit. Provide manufacturer's conventional thermostat interface board. Temperature controls shall be provided the Temperature Controls Contractor. Provide the unit with a disconnect switch, in a NEMA 3R enclosure. Unit shall be ready for field wiring of field mounted control components and single point power wiring.

2.18 ROOF CURB

A. Provide, locate, and be responsible for level installation of a factory manufactured mounting frame that is a minimum of 12 inches tall, and designed for the unit being installed. Insulation and roofing installation are the responsibility of the General contractor.

2.19 DEHUMIDIFICATION ROOFTOP UNIT - ACCEPTABLE MANUFACTURER

A. CanCoilUSA, only, no other permitted. It is the intent of the Owner to be proprietary with this manufacturer, all other manufacturers will be rejected.

2.20 MANUFACTURED UNITS

A. Provide base rail roof-mounted units having electric refrigeration and electric heating with capacities and electrical data as shown on the plans.

B. Unit shall be self contained, packaged, factory assembled and pre-wired, consisting of cabinet and frame, supply fan, controls, motor starter, overload protection, air filters, evaporator coil, sub-cooling coil and heat reclaim coil (reheat position), compressor, condenser coil, and condenser fan. Horizontal air discharge arrangement.

C. Units shall handle 100% outside.

D. The unit shall have a fused disconnect furnished by this contractor.

2.21 FABRICATION

A. Cabinet: Galvanized steel with baked enamel finish. Equipped with suitable access doors or removable access panels of a minimum of 20 gage.

B. Insulation: 1 inch thick glass fiber on all surfaces in contact with conditioned air. Protect insulation edges from erosion.

C. Supply Fan: Centrifugal type, resilient mountings, v-belt drive, adjustable pitch motor pulley, rubber isolated hinge mounted motor. Provide high static drives and oversized premium efficiency inverter duty motor.

D. Air Filters: Throwaway type, Pleated, Minimum 2 inch thick. Provide three (3) full sets of filters, for each unit; one set for construction use, one set for a filter change out during the test and balance period and one set spare.

2.22 EVAPORATOR COIL

A. Provide manufacturer's standard six (6) row coil with aluminum fins mechanically bonded to copper tubes. Capacity as indicated on the plans.

B. Multi-circuited fully interlaced evaporator coil. Multi-circuited systems shall have Tx valves and solenoid valves for each circuit. One circuit shall have a hot gas by-pass side port on the distributor.

2.23 SUBCOOLER COIL

A. Provide manufacturer's standard two (2) row, two (2) circuit subcooler coil with aluminum corrugated ripple fins mechanically bonded to copper tubes.

B. Locate subcooler coil in a reheat position downstream of the Dx coil and upstream of the reclaim coil.

2.24 RECLAIM COIL

A. Provide manufacturer's standard four (4) row, two (2) circuit reclaim coil with aluminum corrugated ripple fins mechanically bonded to copper tubes. Provide capacity with refrigerant and saturated suction temperature scheduled on the drawings. Refrigeration Contractor shall provide piping from the refrigeration racks to this coil.

B. Locate reclaim coil in the reheat position downstream of the Dx coil and subcooler coil.

2.25 CONTROLS

A. Provide units with the manufacturer's primary safety controls wired to a terminal strip. Provide anti-short cycle timing and time delay between compressors in the compressor control circuit. Provide manufacturer's conventional thermostat interface board. Temperature controls shall be provided the Temperature Controls Contractor. Provide the unit with a fused disconnect switch, in a NEMA 3R enclosure. Provide fuses. Unit shall be ready for field wiring of field mounted control components and single point power wiring.

2.26 DEHUMIDIFIER SPLIT SYSTEM CONDENSING UNIT

A. Manufacturers:

1. CanCoilUSA, only, no other permitted. It is the Owner's intent to be proprietary with this manufacturer.

B. Condensing unit shall be assembled on steel mounting/lifting rails. Unit casing shall be constructed of 18 gage zinc coated steel. Units shall have removable end panels allowing

access to major components and controls. Exterior surfaces shall be cleaned and phosphatized and finished in the manufacturer's standard baked enamel finish. The casing shall provide a weatherproof enclosure.

C. Units shall include the manufacturer's standard hermetic scroll or reciprocating compressor(s). Standard operating range shall be from 115° F to 35° F.

D. Two circuit, dual compressor refrigeration system shall have the capacity scheduled on the drawings. Each compressor shall have an electric unloader providing the unit with four (4) stages, total, of refrigeration capacity. Units shall have two (2) separate and independent refrigeration circuits. Each circuit shall have an integral sub-cooling circuit. Units shall have two direct drive hermetic compressors each with a centrifugal oil pump providing positive lubrication to moving parts. Motors shall be suction gas cooled and shall have a voltage utilization range of plus or minus 10 percent of the nameplate voltage. Crankcase heaters, discharge line thermostats, internal temperature and current-sensitive motor overloads shall provide protection. External high and low pressure cutout devices shall be provided on each refrigeration circuit. Reciprocating compressors shall be mounted on spring vibration isolators. Compressors shall have rotolock suction and discharge connections. One refrigeration circuit shall be equipped with a hot gas by-pass valve and circuit for evaporator frost control.

E. Refrigeration specialties for each refrigeration circuit shall include liquid line filter-drier, liquid line sight glass, liquid line and suction gas line service valves with Schrader gauge ports.

F. Condenser coils shall be internally finned copper tubes to manufacturer's standard diameter mechanically bonded to configured copper fins. Coils shall be pressure and leak tested to 420 psig air pressure.

G. Condenser fans shall be direct drive, statically and dynamically balanced, propeller fans with aluminum blades and electro-coated steel hubs. Fans shall be arranged for draw-thru air flow with vertical discharge. Permanently lubricated totally enclosed motors shall be provided and shall have built-in current and thermal overload protection.

H. Controls shall be factory wired. Control wiring shall be 24 volt control circuit which includes fusing and control transformer. Power wiring shall be brought to a terminal block ready for field wiring. Provide a fused disconnect with fuses for field mounting and wiring.

I. Provide the following accessories:

1. Provide vibration isolation packages for units with reciprocating compressors. The vibration isolation package shall provide flex-spring isolators;
2. anti-short cycle timer;
3. provide time delay relay to prevent simultaneous starting of compressors.

2.27 ROOF TOP AIR HANDLER

A. Manufacturer, Trane. Model T-series Climate Changer. It is the intent of the Owner to be proprietary with this manufacturer, all other manufacturers will be rejected. Reclaim coil shall be manufactured by CanCoil USA.

B. Unit configuration shall consist of return air opening with safety grate; no outside air capability; angle filter section; access module; reclaim heating coil section; fan section and downturn discharge plenum. Unit shall be mounted to a roof curb. Unit shall be furnished without an external piping cabinet. Provide access doors for filter, access module, coil and fan sections.

C. Casing construction shall be double wall with fiberglass insulation in between panels. Exterior panels shall be fabricated from galvanized steel and finished with manufacturer's standard powder coat finish. Maximum casing deflection shall be limited to 0.005 inch at 1.5 times the design static pressure.

D. Unit roof shall be a two piece construction. Inner roof will prevent by-passing of air between components. Outer roof will have a mono-slope of ¼" per foot. Roof shall overhang all walls of the unit by 2" minimum.

E. Access doors shall be double wall construction. Provide automotive style gasketing around full perimeter. Door frame shall be raised and channel waetr away from gasket. Door shall have a full piano style hinge and single handle latch.

F. Fan/motor assembly shall be on a common base spring isolated from the unit frame. Fan/motor assembly shall be factory tested and excessive vibration eliminated before shipping. Fan shall be a backward inclined double width/double inlet keyed to the shaft to prevent slipping. Fan shaft shall be solid and designed so that shaft does not pass through its first critical speed as the unit comes up to rated RPM. Bearings shall be self-aligning with an L-50 life of 200,000 hours. Fan performance shall comply with ARI Standard 430. Fan connection shall be isolated from the unit casing by a flexible canvass connector. Provide extended grease lines for bearings.

G. Drives shall be variable pitch for an adjustment range of ± 5% of specified RPM. Drives shall be selected with a 1.5 service factor.

H. Motor shall be provided with a slide base to adjust belt tension. Motors shall be high efficiency E+ open drip proof, T-framed with electrical characteristics scheduled. Motor shall comply with NEMA MG-1.

I. The heat reclaim coil shall be manufactured by CanCoil USA. The air handler manufacturer shall provide CanCoil with the necessary dimensions and template for coil construction. The air handler manufacturer shall order, receive and install the coil into the unit at the factory. Provide a direct refrigerant, two (2) circuit, multi-row energy recovery coil as manufactured by CanCoil USA, Inc. The multi-row heating coil shall be suitable for direct refrigerant energy recovery with the capacities indicated. Refrigerant type is R-507 with a condensing temperature of 110° F, suction temperature of +15° F and with entering and leaving air temperatures indicated in the schedule. No subcooling is required. Tubeside pressure drop shall not exceed 5 psig. Coil face area shall be the largest permitted by the unit casing to achieve a face velocity between 400 FPM to a maximum face velocity of 650 FPM. Number of feeds shall be determined by the manufacturer. Coil connections shall be same end. Coil construction shall have 16 gage galvanized steel casing with center and end supports. Headers shall be seamless tube copper. Tubes shall be seamless copper bonded to configured aluminum fins. Provide turbulators, where required, in the tubes. Coils shall be pressure proof tested to 450 psig and leak tested at

300 psig. Coil shall be cleaned, dehydrated and sealed with a dry nitrogen charge in the coil.

1. Piping connections and specialties shall be provided by the Refrigeration Contractor.

J. Provide 2 inch pleated filters with an average rated spot dust efficiency of 35% when tested in accordance with ASHRAE 52. Air velocity across the filters shall not exceed 350 fpm. Filter frame shall be constructed of galvanized steel with filler pieces to minimize by-passing air. Provide three (3) complete changes of filter media. One set of filters for construction use, to be changed at the time air balancing commences. The third set shall be left as spare for the Owner's use.

K. Provide a combination starter/line break switch. Package shall include line break switch, H-O-A selector switch, control transformer, overload (factory set for exact motor) and starter with adjustable trip switch. Power wiring from the transformer to the controls, start/stop relay and start/stop wiring to the HOA switch shall be factory wired and tested.

L. Hannaford Bros. Controls contractor shall provide space thermostat and tie into the proprietary Danfoss BAS system.

2.28 FAN COIL MANUFACTURERS

A. First Co.

B. Suburban

2.29 FAN COILS

A. Provide evaporator units of the size and model number shown on the plans. Units to be equipped to integrate into the ceiling. Provide rubber in shear vibration isolation and hangers to suspend units from the roof structure or mezzanine floor structure, as applicable.

B. Provide a filter frame suitable for 1 inch throw away filter media in the return duct as indicated on the drawings.

C. Provide controls where shown on the plans.

D. Provide heating unit as shown (gas fired or hot water coil) on the plans.

2.30 EVAPORATOR UNIT

A. Blower: Blower shall be multi-speed.

B. Evaporator Coil: Coil shall have the performance shown on the plans. Evaporator shall be piped from the refrigeration rack by the Refrigeration Contractor.

1. The evaporator shall be provided with a liquid line filter-drier,
2. liquid line sight glass,

3. solenoid valve,
4. externally equalized thermostatic expansion valve, sized for the tonnage and refrigerant type,
5. distributor shall have a hot gas bypass connection for defrost control,
6. liquid and suction lines shall have Schrader valves and test ports.

C. Heat: Hot water coil of the size indicated on the plans shall be factory installed

1. Provide welded or brazed plate heat exchangers for fan coils. Multiple fan coils may be grouped on one plate heat exchanger. Heat exchangers shall be as manufactured by Flat Plate, Inc., for use in domestic water heating application. The heat exchanger shall be type 316L configured stainless steel plate construction. Plates shall be vacuum brazed together with copper braze material. Design working pressure shall be 450 psi. Heat exchanger rating shall be as indicated on the drawings.
2. Provide for each heat exchanger a TACO model “00B” bronze casing cartridge pump with flow rate and head as indicated on the drawings.
3. Provide a Watts cast bronze 125 psi WSP, wye-pattern strainer with 20 mesh type 304 stainless steel screen. Provide one strainer on the hot inlet to each heat exchanger.

D. Each fan coil unit with a heating coil shall be provided with a First Co., “flow control module”. The flow control module shall consist of a circulating pump, pump relay, check valve, air purge valve and a 6 foot cord and plug.

2.31 SPLIT SYSTEM CONDENSERS

A. Manufacturers:

1. Trane.
2. York
3. Carrier

B. Condensing units shall be assembled on steel mounting/lifting rails. Unit casing shall be constructed of 18 gage zinc coated steel. Units shall have removable end panels allowing access to major components and controls. Exterior surfaces shall be cleaned and phosphatized and finished in the manufacturer’s standard baked enamel finish. The casing shall provide a weatherproof enclosure.

C. Units shall include the manufacturer’s standard hermetic scroll or reciprocating compressor(s). Standard operating range shall be from 115° F to 35° F.

D. Single circuit, single compressor refrigeration systems shall be provided up to and including a nominal capacity of 90 MBH (7-1/2 tons). Units shall be provided with an integral sub-cooling circuit. Units shall have one direct drive hermetic compressor with centrifugal oil pump providing positive lubrication to moving parts. Motor shall be suction gas cooled and shall have a voltage utilization range of plus or minus 10 percent of the nameplate voltage. Crankcase heater, discharge line thermostat, internal temperature and current-sensitive motor overloads shall provide protection. External high and low pressure cutout devices shall be provided. Reciprocating compressors shall be mounted on spring vibration isolators. Compressors shall have rotolock suction and discharge connections.

E. Two circuit, dual compressor refrigeration systems shall be provided for nominal 120 MBH (10 ton) to 240 MBH (20 ton) capacities. Units shall have two (2) separate and independent refrigeration circuits. Each circuit shall have an integral sub-cooling circuit. Units shall have two direct drive hermetic compressors each with a centrifugal oil pump providing positive lubrication to moving parts. Motors shall be suction gas cooled and shall have a voltage utilization range of plus or minus 10 percent of the nameplate voltage. Crankcase heaters, discharge line thermostats, internal temperature and current-sensitive motor overloads shall provide protection. External high and low pressure cutout devices shall be provided on each refrigeration circuit. Reciprocating compressors shall be mounted on spring vibration isolators. Compressors shall have rotolock suction and discharge connections.

F. Refrigeration specialties for each refrigeration circuit shall include liquid line filter-drier, liquid line sight glass, liquid line and suction gas line service valves with Schrader gauge ports.

G. Condenser coils shall be internally finned copper tubes to manufacturer’s standard diameter mechanically bonded to configured aluminum plate fins. Coils shall be pressure and leak tested to 420 psig air pressure.

H. Condenser fans shall be direct drive, statically and dynamically balanced, propeller fans with aluminum blades and electro-coated steel hubs. Fans shall be arranged for draw-thru air flow with vertical discharge. Permanently lubricated totally enclosed motors shall be provided and shall have built-in current and thermal overload protection.

I. Controls shall be factory wired. Control wiring shall be 24 volt control circuit which includes fusing and control transformer. Power wiring shall be brought to a terminal block ready for field wiring. Provide a fused disconnect with fuses for field mounting and wiring.

J. Provide the following accessories:

1. Provide vibration isolation packages for units with reciprocating compressors. The vibration isolation package shall provide flex-spring isolators;
2. hot gas bypass kit for evaporator frost control;
3. anti-short cycle timer;
4. for two compressor units provide time delay relay to prevent simultaneous starting of compressors.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with recommendations of ASHRAE Handbook, Equipment Volume, Chapter "Chimney, Gas, Vent, and Fireplace Systems", and NFPA 54.

C. For Type B double wall gas vents, maintain UL listed minimum clearances from combustible. Assemble pipe and accessories as required for complete installation.

D. Assemble and install stack sections in accordance with NFPA 82, industry practices, and in compliance with UL listing. Join sections with acid-resistant joint cement to ANSI/ASTM C105. Connect base section to foundation using anchor lugs.

E. Plumb chimney and stacks.

F. Clean chimneys and stacks during installation, removing dust and debris.

G. At appliances, provide slip joints permitting removal of appliances without removal or dismantling of chimneys or stacks.

H. Install draft inducers in accordance with appliance manufacturer's recommendations.

I. Verify that space is ready for installation of units and openings are as indicated on shop drawings.

J. Verify that proper power supply is available.

K. Verify that proper fuel supply is available for connection.

L. Verify that the roof is ready to receive the mounting frame and that roof penetrations are as shown on the shop drawings as submitted.

M. Install rooftop units in accordance with manufacturer's instructions. Mount rooftop units on factory built roof mounting frame (curb) providing water tight enclosure to protect ceilings, ductwork and utility services. The contractor is responsible for installation of the roof mounting frame in a level condition. Make sure that top of frame is level so that rooftop unit sits level and ensure drain pan has the proper slope to drain way condensate. Leave unit ready for field connections of ductwork, plumbing, power wiring and control wiring.

N. Install to NFPA 90A AND 54.

O. Install gas fired units to ANSI Z223.1 (NFPA 54).

P. Provide vent connections to ANSI/NFPA 211 AND ASHRAE Guidelines.

Q. Set rooftop dehumidifier unit and condensing unit on dunnage. Make sure that dunnage is level so that dehumidifier and condensing units sit level to ensure drain pan has the proper slope to drain condensate. Install interconnecting refrigerant piping with proper slope to ensure oil return to the compressor crankcase. Leave unit ready for field connections of ductwork, plumbing, power wiring and control wiring.

R. Install dehumidifier unit in accordance with the manufacturer’s instructions. Set up dehumidifier’s refrigeration systems and adjust TXV’s, superheat, suction pressure, head pressure controls, hot gas by-pass valve, etc in accordance with the manufacturer’s requirements for unit operation.

S. Provide for connection to electrical service including furnishing the appropriate fused disconnect.

T. Install refrigeration specialties in accordance with ANSI/ASHRAE 15.

U. Install condensate lines as shown on the plans. Furnish condensate pump if required.

V. Install on dunnage gas fired rooftop heaters and duct furnaces in accordance with manufacturer's installation instructions. Leave units ready for field connections of ductwork, plumbing, power wiring and control wiring.

3.03 CLEANING

A. After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of cabinets.

END OF SECTION

SECTION 15800

AIR DISTRIBUTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roof exhausters.

B. Tube Fans

C. Hoods as shown on the plans, including make-up air fans and exhaust fans.

D. Low pressure rectangular ducts and duct insulation.

E. Round ductwork, and duct insulation.

F. Duct cleaning.

G. Manual balancing dampers.

H. Motor operated control dampers.

I. Flexible duct connections.

J. Duct access doors.

K. Duct test holes.

L. Fire dampers.

M. Diffusers

N. Registers/grilles

O. Louvers

P. Goosenecks

1.02 REFERENCES

A. AMCA Standards.

B. U.L. Standards

C. NFPA Standards and Codes

D. NSF Standards

E. BOCA

F. ASHRAE Standards

G. SMACNA Standards

H. ASTM Standards

I. ADC Standards

J. ARI Standards

1.03 QUALITY ASSURANCE

A. Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.

B. Sound Ratings: AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.

C. Fabrication: Conform to AMCA 99.

D. Install ductwork to NFPA 90A and NFPA 90B and NFPA 96 standards.

E. Construct ductwork in accordance with SMACNA Standards.

1.04 SUBMITTALS FOR ENGINEER'S REVIEW AND APPROVAL

A. Submit product data and manufacturer's installation instructions.

B. Provide shop drawings describing complete hood system including fans, curbs, duct, fire suppression, dimensions, and wiring.

C. Submit factory balance report as part of final testing, adjusting, and balancing report.

D. Approval by State and Local Fire Marshall of installation drawings.

E. Submit scaled duct layout shop drawings of all ductwork and fittings including but not limited to; duct sizes, locations, elevations, slopes of horizontal runs, wall and floor penetrations, all hanger locations, and connections. Show interface and spatial relationships between ductwork and proximate equipment. Show all modifications of indicated requirements made to conform to local shop practice, and indicate how those modifications ensure that free area, materials, rigidity, and system performance are not compromised.

F. Submit a description of the duct hanging system including the upper attachment to the building, the hanger itself, and the lower attachment to the duct.

G. Submit record drawings at project close-out showing all installed ductwork indicating all duct fittings, sheet metal gages, sizes and finished configurations. Specifically identify all modifications of indicated requirements. All modifications must be approved by the Engineer/Owner.

H. Provide operating and maintenance manuals in accordance with Section 15012, “Operating and Maintenance Data”. Provide Data Package 5 for each the following equipment: exhaust fans, hoods, hood supply fans, hood exhaust fans.

PART 2 PRODUCTS

2.01 EXHAUST FANS, ACCEPTABLE MANUFACTURERS (NO OTHERS PERMITTED)

A. Acme Engineering and Manufacturing Co.

B. Penn Ventilator Co. Inc.

C. Greenheck

2.02 ROOF EXHAUSTERS

A. Centrifugal Fan Unit: V-belt or direct driven, with weatherproof spun aluminum housing; resilient mounted motor; 1/2 inch mesh, heavy gage galvanized bird screen. Colors to be equivalent to ACME color DARK TAUPE. Units to be 110V direct drive to 1HP over 1HP 208V belt drive; 5Hp and over 208V - 3 Phase.

B. Roof Curb: 12 inch high roofed-over type with built-in cant strip, 1-1/2 inch insulation and curb bottom, and acoustic liner.

C. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor.

D. Sheaves: Cast iron, dynamically balanced, variable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

E. Fan Wheel: Non-overloading quiet operating, statically and dynamically balanced.

F. Units serving grease laden areas will be equipped with grease drains and suitable motor ventilation.

2.03 TUBE FANS AND DUCTWORK

A. Fans shall be equal to Grainger stock number 4C847. Fans shall deliver 550 cfm at zero inches water column static pressure. Fans shall operate on 115 volt-single phase power.

B. Fans shall sit in a schedule 40 PVC tube as detailed on the drawings.

2.04 HOODS ACCEPTABLE MANUFACTURERS (NO OTHERS PERMITTED)

A. LDI Manufacturing Co. Inc.

B. Captive-Aire Systems, Inc.

C. Greenheck.

2.05 GENERAL

A. Provide exhaust hood systems of the size and model numbers shown on the plans. Systems shall include exhaust and supply (where shown) fans, filters, roof curb, hood, prepiped fire suppression system, grease trough, and all required ductwork. All system components shall be furnished by the hood manufacturer. Air balancing information must be included in owners manuals with testing and balancing report.

2.06 HOODS

A. Hoods shall be not less than 18 gage No. 304 stainless steel, with continuously sealed external seams, full length filter frame, full length grease trough, baffle type grease filter, a fire suppression system meeting NFPA 96, classified by UL #17G4 and approved by NFS #1142. The prepiped fire suppression system should be part of the main sprinkler system if fire Marshall approval can be obtained.

Otherwise, a prepiped wet chemical system by Ansul R-102, or equivalent by Range Guard may be substituted for the Ansul system if prior approval is requested.

2.07 MAKE-UP AIR UNIT AND EXHAUSTER

A. Unit shall be one piece with integral exhaust and supply (where shown), constructed of 20 gage glavannealed iron, with backward inclined belt driven centrifugal up blast type roof exhauster, forward curved supply blower, 9 inch non-combustible roof curb, and 1 inch throw-away filters.

B. Electrical: Supply control panel which includes disconnect, 24V contactor (or starters), and overload protection. Interlock exhaust and make-up air fans so that both operate simultaneously. Fan control shall be one switch mounted on a control panel to operate both fans. Upon Ansul system activation, gas valve shall close, supply fan shall turn off, exhaust fan to remain on.

2.08 HOOD DUCTWORK

A. Ductwork shall be in accordance with NFPA 96, “Vapor Removal from Cooking Equipment”.

B. Exhaust ductwork shall be continuously welded 16 gage sheet metal.

C. Supply duct shall be insulated.

2.09 HVAC DUCTWORK MATERIALS

A. General: Non-combustible or conforming to requirements for Class 1 air duct materials, or UL 181.

B. Steel Ducts: ASTM A525 or ASTM A527 galvanized steel sheet, locking-forming quality, having zinc coating in conformance with ASTM A90.

C. Flexible Ducts: Interlocking spiral of galvanized steel construction; rated to 2 IN-WG positive and 1.5 IN-WG negative for low pressure ducts. Flexible ducts allowed only for connections from ductwork to diffusers and grilles. Maximum length of flexible duct shall

not exceed 60 inches, nor be used in place of elbows. **Flexible duct shall not be permitted for use on the suction side of fans, including exhaust fans.**

D. Fasteners: Rivets, bolts, or sheet metal screws.

E. Sealant: Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic. Ductwork shall be sealed to SMACNA class B standard.

F. Hanger Rod: Steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

G. Ductwork shall be supported at intervals in accordance with SMACNA Duct Construction Standards. Provide straphangers or trapeze hangers as required by the loads imposed.

H. Connect ducts to fan units with double coated flexible material held in place with securely bolted angle iron or by cinch type clamping ring for round openings. Flexible connections shall be Duro-Dyne Glasseal with flame resistant vinyl coating.

2.10 LOW PRESSURE HVAC RECTANGULAR DUCTWORK

A. Fabricate and support in accordance with SMACNA Duct Construction Standards and ASHRAE handbooks. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated. Ductwork longitudinal seams shall be Pittsburgh hammered with sealant in the seam.

B. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by written permission.

D. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide single wall turning vanes of perforated metal with glass fiber insulation. Use air extractors at branch take-offs from duct main. Shop fabricated turning vanes are not permitted.

E. Duct lining specified in Section 15200, “Noise, Vibration and Seismic Control” shall have leading edges protected from airstream erosion with 26 gage galvanized metal “zee” shapes.

F. Decrease duct sizes gradually, not exceeding 15 degrees convergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees: convergence downstream shall not exceed 45 degrees.

G. Provide easements where low pressure ductwork conflicts with piping and structure.

H. Connect flexible ducts to metal ducts with draw bands.

I. Use double nuts and lock washers on threaded rod supports.

2.11 SINGLE WALL SPIRAL-WOUND ROUND

A. Provide factory fabricated single walled spiral wound lock-seam duct and fittings as manufactured by Lindab, Construction to be in accordance with SMACNA Duct Construction Standards. No joint sealing required for Lindab duct system. Any other must be sealed to prevent leakage.

B. Support ductwork in accordance with SMACNA Duct Construction Standards. Additional supports shall be added if necessary to control deflections and to maintain alignment at branch intersections. The support system shall not cause out-of-round shape.

C. Fittings shall be equal to those shown on the plans. Saddle taps are not permitted.

2.12 ACCEPTABLE MANUFACTURERS - MANUAL BALANCING DAMPERS

A. Ruskin.

B. American Warming and Ventilating, Inc.

C. Air Balance Inc.

D. Vermont Heating and Ventilating Co.

2.13 MANUAL BALANCING DAMPERS

A. Provide dampers constructed in accordance with SMACNA Duct Construction Standards.

B. Provide single blade dampers for round ductwork equal to Ruskin Model CDRS25.

C. Provide single or multiblade dampers for rectangular duct equal to Ruskin Model MD35.

2.14 ACCEPTABLE MANUFACTURERS - MOTOR OPERATED CONTROL DAMPERS

A. Ruskin.

B. American Warming and Ventilating, Inc.

C. Air Balance, Inc.

2.15 MOTOR OPERATED CONTROL DAMPERS

A. Provide dampers constructed in accordance with SMACNA Duct Construction Standards of the sizes and blade action type shown on the drawings. Provide motor operators with the dampers.

B. Damper shall have synthetic bearings, heavy gage 6 inch wide 6063 T5 extruded aluminum blades, with hollow vinyl bulb blade seals. In addition to blade seals provide stainless steel jamb seals. The damper allowable leakage shall be 6 CFM/FT^2 at 4 at in. W.G.

C. Damper shall be equal to Ruskin Model CD-50.

D. Provide damper operating motors with sufficient reserve power to provide smooth modulating or 2-position action as specified on the drawings or in the operational

sequence. All motors must have oil filled gear case and be capable of delivering 150 lb/in of force. Failure mode is damper open.

E. Equip operating motors for outdoor locations and for outside air intakes with weather resistant gaskets and equip to permit normal operation at - 40 F.

F. Provide non-spring return operating motors for dampers larger than 25 square inches sized for a running torque rating of 150 pound-inches, and a breakaway torque rating of 300 pound-inches. Size spring-return operating motors for a running torque rating of 150 pound-inches and a breakaway torque rating of 150 pound-inches.

G. Actuators shall operate on 120 volt, 60 Hz.

2.16 ACCEPTABLE MANUFACTURERS - FLEXIBLE DUCT CONNECTIONS

A. Duro Dyne Corp.

B. Flexaust Co.

C. Ventfabrics, Inc.

2.17 FLEXIBLE DUCT CONNECTIONS

A. Fabricated in accordance with SMACNA Duct Construction Standards.

B. UL listed fire-retardant neoprene coated woven glass fiber fabric in accordance with NFPA 90A, approximately 6 inches wide, crimped into metal edging strip.

2.18 ACCEPTABLE MANUFACTURERS - DUCT ACCESS DOORS

A. Air Balance Inc.

B. Ruskin

C. American Warming and Ventilation, Inc.

2.19 DUCT ACCESS DOORS

A. Fabricate in accordance with SMACNA Duct Construction Standards.

B. Review locations prior to fabrication.

C. Fabricate rigid and close-fitting doors of galvanized steel and quick fastening locking devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover.

D. Access doors smaller than 12 inch square may be secured with sash locks.

E. Provide two hinges and two sash locks for sizes up to 18" square, three hinges and two compression latches with outside and inside handles for sizes up to 24 X 48 inches.

F. Access doors with sheet metal screw fasteners are not acceptable

2.20 DUCT TEST HOLES

A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded twist-on metal caps.

B. Permanent test holes shall be factory fabricated, with air tight flange fittings with screw cap. Provide extended neck fittings to clear insulation.

2.21 ACCEPTABLE MANUFACTURERS - FIRE DAMPERS AND SMOKE DAMPERS

A. Ruskin.

B. American Warming and Ventilating, Inc.

C. Air Balance, Inc.

2.22 FIRE DAMPERS

A. Provide fire dampers fabricated in accordance with NFPA 90A and UL 555.

B. Fire dampers shall be curtain type, constructed of galvanized steel with interlocking steel blades. Provide stainless steel closure springs and latches for horizontal installations. Configure dampers with curtain out of the air stream.

C. Fusible links shall be in accordance with UL 33, and shall separate at 160° F.

2.23 SMOKE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555S, and as indicated.

B. Provide factory sleeve for each damper. Install damper operator on exterior of sleeve and link to damper operating shaft.

C. Fabricate with multiple blades with 16 gage galvanized steel frame and blades, stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, concealed linkage, and 1/2 inch actuator shaft.

D. Operators shall be spring return electric type capable of 150 lb/in torque, and suitable to operate on 120 V ac, 60 cycle. Operators shall be UL listed and labeled. All wiring required to interconnect operator with smoke detection system shall be furnished by others.

2.24 ACCEPTABLE MANUFACTURERS - DIFFUSERS AND GRILLES (NO OTHER PERMITTED)

A. Krueger Mfg. Co.

B. Anemostat Products Div.

C. Lindab Industries

2.25 CEILING DIFFUSERS

A. Provide diffusers of the type shown on the drawings to discharge air in the pattern shown on the plans.

B. Provide frame type compatible with the ceiling. Coordination of frame type is the Mechanical Contractor's responsibility.

C. Fabricate of steel with baked enamel off-white finish.

D. Diffusers shall be equal to the models indicated on the plans.

2.26 CEILING RETURN GRILLES

A. Provide surface mount frame compatible with the ceiling.

B. Fabricate of steel with baked enamel off-white finish.

C. Grilles shall be equal to the models indicated on the plans.

2.27 ACCEPTABLE MANUFACTURERS - LOUVERS (NO OTHER PERMITTED)

A. Ruskin

B. American Warming and Ventilating, Inc.

C. Air Balance, Inc.

2.28 LOUVERS

A. Provide 4 inch depth louvers with storm proof, drainable blades, heavy channel frame, bird screen with 1/2 inch square mesh, equal to Model ELF375D manufactured by Ruskin.

B. Fabricate of 6063T5 extruded aluminum, welded assembly, with factory prime coat baked enamel finish. Color selected by Architect.

C. Furnish with extended rain sill.

2.29 GOOSENECKS

A. Fabricate in accordance with SMACNA Duct Construction Standards of galvanized steel. Goosenecks shall be provided with insect screening. Free area shall be adjusted to account for screening.

B. Mount on minimum 14 inch high curb base. Provide weather tight flashings.

C. Use of commercially available gravity type vent is preferred.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instruction.

B. Secure roof exhausters with lag screws to roof curb.

C. Provide motor starters for all motors 3/4 Hp and larger for installation by electrical contractor. Minimum size shall be NEMA 0.

D. Install condensate drains as required on the units.

E. Provide factory balance and inspection after store opening. Notify Engineer at least seven days prior to inspection.

F. All conduit to wall mounted pull stations or control panels shall be concealed.

G. Exhaust stack clearances must meet NFPA requirements.

H. Provide the type of duct as shown on the plans. Rectangular duct shall be used only where specifically shown.

I. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pitot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

J. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

K. Connect terminal units to round ducts directly. Do not use flexible duct.

L. Connect diffusers to low pressure ducts with a maximum of 5 feet of fully extended insulated flexible duct. Hold in place with strap or clamp. Do not substitute flexible duct for elbows, either 45° or 90°.

M. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

N. Install accessories in accordance with manufacturer's instructions.

O. Install balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts, where required for air balancing, and where indicated.

P. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment. Cover connections to medium and high pressure fans with leaded vinyl sheet, held in place with metal straps.

Q. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, and automatic dampers, provide minimum 8 X 8 inch size for hand access, 18 X 18 inch size for shoulder access, and as indicated.

R. Provide duct test holes where required for testing and balancing. purposes.

S. Provide fire dampers and smoke dampers in the locations shown on the drawings, and where required by the authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

T. Demonstrate re-setting of fire dampers to the authorities having jurisdiction and the Owner's representative.

U. Insulate ductwork in concealed spaces, where passing through unconditioned spaces and in the back room. Do not insulate ductwork exposed in finished spaces. Acoustically line ductwork where noted and for the first 20 feet at the fan discharge and at the return inlet. Duct insulation is specified in Section 15250, ”Mechanical Insulation” and acoustic lining is specified in Section 15200, “Noise, Vibration and Seismic Control”.

3.02 ADJUSTING AND CLEANING

A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with temporary filters, or bypass during cleaning.

END OF SECTION

SECTION 15850

TESTING, ADJUSTING, AND BALANCING

PART 1 GENERAL

1.01 MANDATORY CONDITIONS OF THE GENERAL CONTRACT

A. Hannaford Bros. shall require the General Contractor to sign an agreement for Testing, Adjusting and Balancing work with:

Air Systems Analysis
P.O. Box 905
Pelham, NH 03076

B. It is Hannaford Bros. intent to be proprietary with the Testing, Adjusting and Balancing Contractor (TAB Contractor). The TAB Contractor shall be under Contract to the General Contractor only and shall be independent of the Mechanical Contractor, Refrigeration Contractor or Plumbing Contractor.

1.02 SECTION INCLUDES

A. Pre-balancing inspections for air system and domestic hot water systems. The Mechanical and Plumbing Contractors shall coordinate time of inspections with the TAB Contractor.

B. Testing, adjustment, and balancing of air and domestic hot water systems.

C. Measurement of final operating conditions of HVAC systems.

1.03 REFERENCES AND STANDARDS

A. American Air Balance Council (AABC) Standards

B. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Standards

C. National Environmental Balancing Bureau (NEBB) Standards

1.04 WORK OF OTHER TRADES

A. The General Contractor shall provide the TAB Contractor with one set of the following documents:
   1. Within 30 days after approved selection of the Agency:
      a. Contract drawings.
      b. Applicable specifications.
      c. Addenda as required.
   2. As issued.
      a. Change Orders.
   3. Within 30 days after approval of the following documents;
      a. Approved shop drawings.
      b. Approved equipment manufacturer's submitted data.

B. The TAB Contractor shall be provided with:
   1. Reasonable time to complete Testing, Adjusting and Balancing Work prior to the specified completion date.
   2. Completely operable systems.
   3. The right to adjust systems.
   4. Access to system components.

1.05 SUBMITTALS FOR ENGINEER'S REVIEW AND APPROVAL

A. Submit certified test reports for review and approval. Provide reports in soft cover, letter size, complete with index page, with cover identification.

B. The TAB Contractor shall provide final copies to the General Contractor for inclusion in operating and maintenance manuals. Refer to Section 15012, “Operating and Maintenance Data” for O&M manual requirements.

1.06 QUALITY ASSURANCE

A. The TAB Contractor is a company specializing in the testing, adjusting, and balancing of systems with minimum three years documented experience.

B. System balance shall be performed in accordance with AABC National Standards or NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

1.07 REPORT FORMS

A. Submit reports on AABC National Standards for Total System Balance or NEBB forms.

B. Forms shall include the following information:
   1. Title Page:
      a. Company name
      b. Company address
      c. Company telephone number
      d. Project name
      e. Project location
      f. Project Architect
      g. Project Engineer
      h. Project Contractor
      i. Project altitude
      j. Certification numbers
      k. Supervisor’s name
   2. Instrument List:
      a. Instrument
      b. Manufacturer
      c. Model
      d. Serial number
      e. Range
      f. Calibration date
   3. System Diagrams:
      a. Project
      b. Location
      c. System
      d. Schematic diagram, fully labeled and numbered
   4. Air Moving Equipment Test Sheets:

a. Location
b. Manufacturer
c. Model
d. Serial number
e. Air flow, specified and actual
f. Return air flow, specified and actual
g. Outside air flow, specified and actual
h. Return air temperature
i. Outside air temperature
j. Mixed air temperature
k. Outside/return air ratio
l. Total static pressure (total external), specified and actual
m. Inlet pressure
n. Discharge pressure
o. Fan RPM

5. Exhaust Fan Data:
   a. Location
   b. Manufacturer
   c. Model
   d. Serial number
   e. Air flow, specified and actual
   f. Total static pressure (total external), specified and actual
   g. Inlet pressure
   h. Discharge pressure
   i. Fan RPM
6. Exhaust Hood Systems:
   a. Balanced as recommended by hood manufacturer.. Include data in final report.
7. Electric Motors: (Included on Mechanical Equipment Data)
   a. Manufacturer
   b. HP/BHP (show BHP calculations)
   c. Phase, voltage, amperage, nameplate, actual, no load.
   d. RPM
   e. Service factor
8. V-Belt Drive: (Included on mechanical equipment data)
   a. Identification/location
   b. Required driven RPM
   c. Driven sheave, diameter and RPM
   d. Belt, size and quantity
   e. Motor sheave, diameter and RPM
   f. Center to center distance, maximum, minimum, and actual (show diagram)
9. Duct Traverse:
   a. System zone/branch
   b. Duct size
   c. Area
   d. Diagram showing reading locations
   e. Design velocity
   f. Design air flow
   g. Test velocity
   h. Test air flow
   i. Duct static pressure
   j. Air temperature
   k. Air correction factor
10. Air Distribution Test sheet:

a. System schematic (See item 3).
b. Air terminal number
c. Room number/location
d. Terminal type
e. Terminal size
f. Area factor
g. Design velocity
h. Design air flow
i. Test (final) velocity
j. Test (final) air flow
k. Percent of design air flow
l. Building static pressure

11. Cooling Coil Design and Delivered Conditions:
    a. Identification/number
    b. Location
    c. Service
    d. Manufacturer
    e. Rows - Fins per inch
    f. Face area
    g. Air flow, design and actual
    h. Entering air DB temperature, design and actual
    i. Entering air WB temperature, design and actual
    j. Leaving air DB temperature, design and actual
    k. Leaving air WB temperature, design and actual
    l. Air pressure drop, design and actual
    m. Expansion valve/refrigerant
    n. Refrigerant suction pressure
    o. Refrigerant suction temperature
    p. Refrigerant pressure drop
12. Heat Recovery Coil Data:
    a. Identification/number
    b. Location
    c. Service
    d. Manufacturer
    e. Rows - Fins per inch
    f. Face area
    g. Air flow, design and actual
    h. Entering air DB temperature, design and actual
    i. Entering air WB temperature, design and actual
    j. Leaving air DB temperature, design and actual
    k. Leaving air WB temperature, design and actual
    l. Air pressure drop, design and actual
    m. Expansion valve/refrigerant
    n. Refrigerant suction pressure
    o. Refrigerant suction temperature
    p. Refrigerant pressure drop
13. Pump Descriptive Data:
    a. System number
    b. Location served
    c. Impeller size
    d. Pump make
    e. Pump horsepower
14. Pump Design and Delivered Conditions:
    a. Pump rpm
    b. Total developed head

c. GPM

15. Hydronic Coil Design and Delivered Conditions:
    a. Each coil shall be identified as to location and area.
    b. Coil size and number of rows
    c. Coil capacity, in MBH
    d. Entering and leaving water temperatures
    e. GPM
    f. Water pressure drop
    g. Balancing valve setting and pressure drop
    h. Design CFM
    i. Design face velocity
    j. Design air pressure
    k. Final FPM reading
    l. Actual CFM
    m. Actual air pressure drop
    n. Coil manufacturer and type

1.08 MECHANICAL CONTRACTOR EQUIPMENT START-UP DATA

A. The following start-up data will be furnished to the Testing and Balancing Contractor for their use and inclusion in the Testing and Balancing Report.

1. Air Cooled Condenser Report (Package Units and Condensing Units):
    a. Identification/number
    b. Location
    c. Manufacturer
    d. Model and Serial Numbers
    e. Number of compressors
    f. Refrigerant/Lbs.
    g. Low ambient control.
    h. Suction pressure/temperature
    i. Condenser pressure/temperature
    j. Oil pressure/temperature
    k. Voltage/amperage
    l. KW input
    m. Crankcase heater amps
2. Combustion Test:
    a. Burner manufacturer
    b. Model
    c. Firing rate
    d. Overfire draft
    e. Gas meter timing dial size
    f. Gas meter time per revolution
    g. Gas pressure at meter outlet
    h. Gas flow rate
    i. Heat input
    j. Burner manifold gas pressure
    k. Percent carbon monoxide (CO)
    l. Percent carbon dioxide (C02)
    m. Percent oxygen (02)
    n. Percent excess air
    o. Flue gas temperature at outlet
    p. Ambient temperature
    q. Net stack temperature
    r. Percent stack loss

s. Percent combustion efficiency
t. Heat output

PART 2 EXECUTION

2.01 EXAMINATION

A. Before commencing work, verify that systems are complete and operable. Ensure the following:
1. Equipment is operable and in a safe and normal condition.
2. Temperature control systems are installed completed and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Correct fan rotation.
7. Volume dampers are in place and open.
8. Coil fins have been cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage has been minimized.
12. Hydronic systems have been flushed, filled, and vented.
13. Correct pump rotation.
14. Proper strainer baskets are clean and in place.
15. Service and balance valves are open.

B. Report any defects or deficiencies noted during performance of services to Owner.

C. Promptly report abnormal conditions in mechanical systems or conditions which prevent system balance.

D. If, for design reasons, system cannot be properly balanced, report as soon as observed.

2.02 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to owner to facilitate spot checks during testing.

B. Provide additional balancing devices as required.

2.03 INSTALLATION TOLERANCE

A. Adjust air handling systems to plus or minus 10 percent for supply systems and plus or minus 10 percent for return make-up air and exhaust systems from figures indicated.

B. Adjust hydronic systems to plus or minus 10 percent of indicated design conditions.

2.04 ADJUSTING

A. Record data shall represent actually measured, or observed condition.

B. Permanently mark settings of dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not rectified.

D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switches bases, and restoring thermostats to specified settings.

E. At final inspection recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

2.05 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct. Round duct traverses shall be in accordance with NEBB instructions and shall be reported on NEBB report form.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Made allowances for 50 percent loading of filters.

I. Adjust dampers for design conditions.

J. Measure building static pressure and adjust make-up, supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries with exit doors closed.

2.06 HYDRONIC SYSTEM PROCEDURE

A. Adjust hydronic systems to provide required or design flows.

B. Make measurements at pump suction and discharge flanges, make measurements across balancing valves and across control valves. Adjust balancing valves to obtain desired conditions.

C. Adjust hydronic systems to obtain flows free from objectionable and noise.

END OF SECTION

SECTION 15900
CONTROLS AND INSTRUMENTATION

PART 1 GENERAL **(Information only, separate contract with HBC)**

1.01 SECTION INCLUDES

A. Installation of complete automatic building environmental control systems.

B. Controlled and control devices, components wiring and material.

C. Miscellaneous electrical and control wiring.

D. Sequence of operation.

1.02 RELATED WORK

A. The owner shall provide the supermarket control panel and controls for the supermarket refrigeration system.

B. Power supply wiring for power source to power connection on controls and/or unit control panels shall be provided by electrical contractor. See Division 16 sections for this work.

1.03 PRODUCTS FURNISHED BY OWNER FOR INSTALLATION UNDER THIS SECTION

A. The owner shall provide the building control panel (BCS) and the temperature and dewpoint sensors shown on the plans for installation under this section.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Submit manufacturer's technical product data for each control device furnished, indicating dimensions, capacities, performance characteristics, electrical characteristics, finishes of materials, installation instructions, start up instructions, and operation/maintenance instructions.

C. Submit schematic diagrams indicating mechanical system controlled and control system components. Label with settings, adjustable range of control, and control limits. Clearly indicate all required electrical wiring and indicate which portions are factory-installed and which are to be field -installed. Include a written description of sequence of operation.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Johnson Controls, Inc.

B. Barber Colman

C. Honeywell, Inc.

2.02 SYSTEM REQUIREMENTS

A. Provide control systems consisting of control valve actuators, damper operators, thermostats, controllers, transformers, relays, and all other apparatus required to operate mechanical systems. Except as otherwise indicated, provide manufacturer's standard control system components as indicated by published product information, designed and constructed as recommended by the manufacturer.

2.03 CONTROL VALVES ACTUATORS

A. Control valves are provided by the Mechanical Contractor.

B. Control wiring by the Automatic Controls Contractor.

2.04 DAMPER OPERATORS

A. Damper operators are provided by the Mechanical Contractor.

B. Control wiring by the Automatic Controls Contractor.

2.05 PROPORTIONAL CONTROLLERS

A. Proportional discharge air controllers shall be equal to Johnson Controls Catalog Number A80ABA-3. Provide plug in circuit board to provide controller input for actuator equal to Johnson Controls Catalog No. R81JAA-1.

2.06 AIR FLOW SWITCH

A. Air flow switches shall be pressure differential type, multi-purpose SPDT switches rated at 300 VA pilot duty at 125-277 VAC, suitable for an ambient operating range of -40° F to 180° F. Switch shall be equal to Grainger catalog number 2E462 manufactured by Dayton.

2.07 FREEZESTAT

A. Freezestats shall be remote bulb thermostats with SPDT switch action, temperature operating range from -30 to 90 F, bulb size 5 3/4 by 3/8 inch, UL listed, housed NEMA I enclosure and equal to Honeywell Model T6031A.

2.08 TWO-STAGE TEMPERATURE CONTROLLER

A. Two-stage Temperature controllers shall be electronic, remote sensing type with an adjustable to 10° F temperature differential. Equal to gold line model.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which control systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.02 INSTALLATION

A. Install system and materials in accordance with manufacturer's instructions and contract drawings. Install electrical work and use electrical products complying with the requirements of applicable Division-16 sections of these specifications. Mount controllers at convenient locations and heights and as shown on the drawings.

B. Install complete control wiring system for control systems. (The term "control wiring" is defined to include providing of wire (Plenum Grade), conduit, and miscellaneous materials as required for mounting and connecting control devices). Conceal wiring and conduit, except in mechanical rooms and areas where other conduit and piping are exposed. Provide multi-conductor instrument harness (bundle) in place of single conductors where a number of conductors can be run along a common path. Fasten flexible conductors bridging cabinets and doors, neatly along hinge side, and protect against abrasion. Tie and support conductors neatly. Do not splice any control wiring.

C. Number-code or color-code conductors appropriately for future identification and servicing of control systems.

D. Install manual-reset limit controls to be independent of power controllers; automatic duct heater resets may, at the Contractor's option, be installed in the interlock circuit of power controllers.

E. Before the air conditioning installation is accepted, submit a certified statement that the building environmental control system has been inspected and found to properly installed and that all control equipment and systems are functioning properly and in strict accordance with plans and specifications.

F. Provide for complete service of building environmental controls system, including call-backs, for one year running concurrent with connection period. Make a minimum of 2 complete inspections in addition to normal service calls to adjust controls, with reports written and submitted to the Architect/Engineer.

3.03 SEQUENCE OF OPERATION (See Mechanical Drawings)

END OF SECTION

SECTION 16050
BASIC MATERIALS AND METHODS

SUMMARY OF WORK

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Summary: Briefly and without force and effect on contract documents, Electrical Work can be generally summarized (but not necessarily limited to) to the work described in this Section.

B. General Work:
1. Provide and install all equipment fixtures and materials as required to establish a metered service and accomplish the scope of work.
2. Contractor shall verify field conditions and shall coordinate work with Utilities prior to bidding. Prices quoted shall include all equipment, fixtures, material, labor, fees, permits and incidental expenses. No additional bills shall be submitted, except for approved change orders.
3. All work must conform to the latest National Electrical Code, Utility, State and Local regulations.
4. All work must conform to Drawings and Specifications provided.
5. All wiring shall be copper, except where specifically allowed on Drawings. Every feeder and branch circuit shall have dedicated equipment grounding conductor.
6. All wiring shall be concealed in walls, except where specifically allowed on Drawings.
7. All wiring shall be run in conduits (or surface raceway and under floor duct, where indicated on Drawings). Type AC & MC cables and flexible conduits allowed only for branch circuits in concealed spaces to connect fixtures and equipment. Type NM, NMS, NMC not allowed .
8. Emergency feeders and branch circuits including lighting, shall be run in dedicated conduits, separate from normal power.
9. Coordinate final location of boxes, equipment and fixtures with Owner.
10. Submit itemized bid for scope of work showing unit prices and total quantities.

1.02 SCOPE

A. OVERALL:
1. Intent:
a. It is the Owner's intent to build a new Hannaford store as described in the construction documents, Supplied with 480Y/277 volt 3-phase, secondary metered service.
b. All equipment and materials shall be brand new.

B. INTERFACE WITH WORK BY OTHERS
1. Power Service Entrance:
Work done by others:
a. Pad for Utility's pad mounted transformer, line disconnect, meter panel, and empty conduits to inside of building foundation.
b. Mechanical/Electrical center furnished by owner.
Work by Electrical Contractor:

a. Provide and install conduits to service disconnects and meter.
b. Provide, install and connect lateral conductors.
c. Coordinate and comply with all Utility requirements.

2. Telephone System:
Work done by others:
a. Equipment, wiring and outlets.

Work by Electrical Contractor:
a. Provide and install board and cabinets for Telephone Service Entrance.
b. Provide and install Utility conduits to service board,
c. Provide and install conduit system and boxes for units indicated on drawings. Each conduit run shall have "pull" string.

3. Fire and Security Systems:
Work done by others:
a. Equipment, wiring and devices.

4. Other Alarm and Communication Systems: **NOT FIRE AND SECURITY SYSTEMS**
Work done by others:
a. Equipment, wiring and outlets.

Work done by Electrical Contractor:
a. Provide and install conduit system boxes and power for units indicated on drawings. Each conduit run shall have "pull" string.

5. Parking Lighting and Pylon Sign:
Work done by others:
a. Poles, luminaires, conduits and wiring.

Work by Electrical Contractor:
a. Provide and install new conduit from main junction box on site package to corresponding contactors.
b. Provide and install branch circuit wiring from corresponding contactor to above main junction box and connect to existing wiring.
c. Provide and install 1” conduit from inside the building in the security office to a designated light pole in front of the store for CCTV.

6. Computer Systems:
Work done by others:
a. Datachecker System's Communications wiring connections, equipment and outlets.

Work by Electrical Contractor:
a. All other Systems' Communications Wiring connections, equipment and outlets.
b. Provide and install conduits and wiring for communications and power, as specified in drawings. Connect power wiring.
c. Verify with Owner the length of conductors needed at both ends of each run.

7. Electrical Pod (Main Electrical Room):

Work done by others (Pod Manufacturer):

a. Service disconnects, switchboards, panelboards, inverter, circuit-breakers, transformers, luminaires, ventilation, raceways and wiring to equipment within Electrical and Mechanical Pods.

Work by Electrical Contractor:

a. Provide, install, and connect wiring from service transformer to Electrical and Mechanical Center, including any wireways required to transition from conduits to the main switch in the E/M Center.

b. Provide, install and connect wiring for feeders and branch circuits fed from E/M Centers.

8. HVAC, Plumbing and Refrigeration Equipment:
Work done by others:

a. Control equipment and equipment safety disconnect switches.

Work by Electrical Contractor:

a. Provide conduits and wiring for equipment power and control (other than automatic temperature controls) devices.
b. Provide conduits with pull strings for automatic temperature control wiring.
c. Note that electrical power can be run to rooftop units on the roof using gas/refrigeration supports.

9. Architectural Finish Hardware:
Work done by others:

a. Automatic door equipment and sensors.
b. Finish door hardware, electric strikes and closers.

Work by Electrical Contractor:

a. Provide conduits and wiring for equipment power and control devices.

CONDUIT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal conduit.

B. Flexible metal conduit.

C. Liquidtight flexible metal conduit.

D. Electrical metallic tubing.

E. Nonmetallic conduit.

F. Fittings and conduit bodies.

1.02 REFERENCES

A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.

C. ANSI C80.5 - Rigid Aluminum Conduit.

D. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

E. ANSI/NFPA 70 - National Electrical Code.

F. NECA "Standard of Installation."

G. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.

H. NEMA TC 2 - Electrical plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).

I. NEMA TC 3 - PVC fittings for use with Rigid PVC Conduit and tubing.

1.03 DESIGN REQUIREMENTS

A. Conduit Size: ANSI/NFPA 70.

1.04 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 01600.

B. Accept conduit on site. Inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

D. Protect PVC conduit from sunlight.

1.06 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 PRODUCTS

2.01 CONDUIT REQUIREMENTS

A. Minimum Size: 3/4 inch unless otherwise specified.

B. Underground Installations:
Use rigid steel conduit from the service transformer to the transition to the main switch. In or under slab: Use rigid steel conduit, intermediate metal conduit, plastic coated conduit, and thickwall nonmetallic conduit.

C. Outdoor Locations, above grade; Use rigid steel, intermediate metal conduit and electrical metallic tubing.

D. Wet and damp locations; Use rigid steel conduit, intermediate metal conduit and thickwall nonmetallic conduit.

E. Dry Locations: Use rigid steel, intermediate metal conduit, electrical metallic tubing.

2.02 METAL CONDUIT

A. Rigid steel conduit: ANSI C80.1.

B. Intermediate Metal Conduit (IMC): Rigid steel.

C. Fittings and conduit bodies: ANSI/NEMA FB 1; material to match conduit. All steel fittings.

2.03 FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel or aluminum construction.

B. Fittings: ANSI/NEMA FB 1.

2.04 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel or aluminum construction with PVC jacket.

B. Fittings: ANSI/NEMA FB 1.

2.05 ELECTRICAL METALLIC TUBING (EMT)

A. Description: ANSI C80.3; galvanized tubing.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel compression type.

2.06 NONMETALLIC CONDUIT

A. Description: NEMA TC 2; Schedule 40 PVC.

B. Fittings and Conduit Bodies: NEMA TC 3.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install conduit in accordance with NECA "Standard of Installation." Encase in concrete when required by code.

B. Install nonmetallic conduit in accordance with manufacturer's instructions.

C. Arrange supports to prevent misalignment during wiring installation.

D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

E. Group related conduits; support using conduit rack. Construct rack using steel channel.

F. Fasten conduit supports to building structure and surfaces.

G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

H. Do not attach conduit to ceiling support wires.

I. Arrange conduit to maintain headroom and present neat appearance.

J. Use metallic elbows in any conduit that is over a 50ft pull. Adhere to NEC grounding requirements.

K. Route conduit installed above accessible ceilings parallel and perpendicular to walls.

L. Route conduit in and under slab from point-to-point.

M. Do not cross conduits in slab.

N. Maintain adequate clearance between conduit and piping.

O. Maintain 12 inches of clearance between conduit and surfaces with temperatures exceeding 104^{o} F. Maintain 12 inches of clearance between conduit stub-up under cases and refrigeration piping.

P. Cut conduit square using saw or pipe cutter; de-burr cut ends.

Q. Bring conduit to shoulder of fittings; fasten securely.

R. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

S. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations.

T. Install no more than equivalent of three 90 bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams.

U. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

V. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.

W. Provide suitable pull string in each empty conduit except sleeves and nipples.

X. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

Y. Ground and bond conduit.

3.02 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using approved materials and methods.

B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. **DO NOT RUN INSIDE DUCTS.** Coordinate location with roofing installation.

SURFACE RACEWAYS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wireways.

1.02 REFERENCES

A. NECA (National Electrical Contractor's Association) Standard of Installation.

B. NEMA WD 6 - Wiring Device Configurations.

1.03 QUALITY ASSURANCE

A. Perform work in accordance with NECA Standard of Installation.

B. Maintain one copy of document on site.

1.04 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three years documented experience.

1.05 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.01 WIREWAY

A. Description: General purpose type wireway.

B. Knockouts: Manufacturer's standard.

C. Size: As indicated on Drawings.

D. Cover: Hinged.

E. Connector: Slip-in.

F. Finish: Rust inhibiting primer coating with gray enamel finish.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Use flat-head screws, clips, and straps to fasten raceway channel to surfaces. Mount plumb and level.

C. Use suitable insulating bushings and inserts at connections to outlets and corner fittings.

D. Wireway Supports: Provide steel channel support.

E. Close ends of wireway and unused conduit openings.

F. Ground and bond raceway and wireway.

BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall and ceiling outlet boxes.

B. Floor boxes.

1.02 REFERENCES

A. ANSI/NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.

B. ANSI/NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

C. ANSI/NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.

D. ANSI/NFPA 70 - National Electrical Code.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.03 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.04 PROJECT CONDITIONS

A. Verify field measurements are as shown on Drawings.

B. Verify locations of floor boxes and outlets prior to rough-in.

C. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose.

PART 2 PRODUCTS

2.01 OUTLET BOXES

A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, galvanized steel.
1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs were required.

B. Nonmetallic Outlet Boxes: ANSI/NEMA OS 2.

2.02 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Surface-Mounted Cast Metal Box: NEMA 250 flat-flanged, surface-mounted junction box.

1. Material: Cast aluminum.
2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install electrical boxes as shown on Drawings, and as required for splices, tapes, wire pulling equipment connections and compliance with regulatory requirements.

B. Install electrical boxes to maintain headroom and to present neat mechanical appearance.

C. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

D. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

E. Install boxes to preserve fire resistance rating of partitions and other elements.

F. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.

G. Use flush mounting outlet boxes in finished areas.

H. Do not install flush mounting boxes back-to-back in walls; provide minimum 6 inch separation. Provide minimum 24 inches separation in acoustic rated walls.

I. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

J. Use stamped steel bridges to fasten flush mounting outlet box between studs.

K. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

L. Use adjustable steel channel fasteners for hung ceiling outlet box.

M. Do not fasten boxes to ceiling support wires.

N. Support boxes independently of conduit.

O. Do not use gang box where more than one device is mounted together. Do not use sectional box.

P. Use box with plaster ring for single device outlets.

Q. use cast outlet box in exterior locations exposed to weather and wet locations.

R. Large Pull Boxes: Boxes larger than 100 cubic inches in volume or 12 inches in any dimension.
   1. Interior Dry Locations: Use hinged enclosure.
   2. Other Locations: Use surface-mounted cast metal box.

3.02 INTERFACE WITH OTHER PRODUCTS

A. Coordinate mounting heights and locations of outlets mounted above counters, benches and backsplashes.

B. Position outlet boxes to locate luminaires as shown on reflected ceiling plan.

3.03 ADJUSTING

A. Adjust flush-mounting outlets to make front flush with finished wall material.

B. Install knockout closure in unused box opening.

WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Receptacles.

C. Device plates and decorative box covers.

1.02 REFERENCES

A. NEMA WD 1 - General Purpose Wiring Devices.

B. NEMA WD 6 - Wiring Device Configurations.

1.03 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

1.04 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.01 WALL SWITCHES

A. Manufacturers:
1. Arrow-Hart
2. Eagle
3. Pass & Seymour
4. Hubbell
5. General Electric

B. Description: NEMA WD 1, general-duty, AC only general-use snap switch.

C. Device Body: Ivory plastic with toggle handle.

D. Ratings: Match branch circuit and load characteristics.

2.02 RECEPTACLES

A. Manufacturers:

1. Arrow-Hart
2. Eagle
3. Pass & Seymour
4. Hubbell
5. General Electric

B. Description: NEMA WD 1; general-duty general-use receptacle.

C. Device Body: Ivory plastic.

D. Configuration: NEMA WD 6; type as specified and indicated.

E. Convenience Receptacle: Type 5-20.

F. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

2.03 WALL PLATES

A. Decorative Cover Plate: Type 302 brushed stainless steel, minimum plate thickness 0.035 inch.

B. Weatherproof Cover Plate: Gasketed cast metal with hinged gasketed device cover.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify outlets boxes are installed at proper height.

B. Verify wall openings are neatly cut and will be completely covered by wall plates.

C. Verify floor boxes are adjusted properly.

D. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

E. Verify openings in access floor are in proper locations.

3.02 INSTALLATION

A. Install all equipment in accordance with applicable codes.

B. Provide extension rings to bring outlet boxes flush with finished surface.

C. Clean debris from outlet boxes.

D. Install products in accordance with manufacturer's instructions.

E. Install devices plumb and level.

F. Install switches with OFF position down.

G. Install receptacles with grounding pole on top.

H. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.

I. Install decorative plates on switch, receptacle, and blank outlets in finished areas.

J. Connect wiring devices by wrapping conductor around screw terminal.

K. Use jumbo size plates for outlets installed in masonry walls.

L. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.04 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes to obtain mounting heights indicated on Drawings.

B. Install wall switch 48 inches above finished floor.

C. Install convenience receptacle 24 inches above finished floor.

D. Install convenience receptacle 6 inches above counter.

E. Install telephone jack 24 inches above finished floor.

F. Install telephone jack for wall telephone 54 inches above finished floor.

3.05 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.

B. Operate each wall switch with circuit energized and verify proper operation.

C. Verify that each receptacle device is energized.

D. Test each receptacle device for proper polarity.

E. Test each GFCI receptacle device for proper operation.

3.06 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

GROUNDING AND BONDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding electrodes and conductors.

B. Equipment grounding conductors.

C. Bonding.

1.02 GROUNDING ELECTRODE SYSTEM

A. Metal underground water pipe.

B. Metal frame of the building (Structural Steel).

C. Rod electrodes.

1.03 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 5 ohms, maximum.

1.04 SUBMITTALS

A. Test Reports: Indicate overall resistance to ground.

PART 2 PRODUCTS

2.01 ROD ELECTRODE

A. Material: Copper-clad steel.

B. Diameter: 3/4 inch.

C. Length: 10 feet.

2.02 WIRE

A. Material: Stranded copper.

B. Grounding Electrode Conductor: Size to meet NFPA 70 requirements. Ground conductor is bare copper 4/0. Risers to columns shall be appropriately sized and bonded to both the ground electrode and the column.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install additional rod electrodes as required to achieve specified resistance to ground.

C. Equipment Grounding Conductor: provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

3.02 FIELD QUALITY CONTROL

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

B. use suitable test instrument to measure resistance to ground of system. perform testing in accordance with test instrument manufacturer's recommendations using the fall-of-potential method.

SECONDARY GROUNDING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Power system grounding.

B. Communication system grounding.

C. Electrical equipment and raceway grounding and bonding.

1.02 SYSTEM DESCRIPTION

A. Ground the electrical service system neutral at service entrance equipment to metallic water service and to supplementary grounding electrodes.

B. Ground each separately-derived system neutral to nearest effectively grounded building structural steel member.

C. Bond together system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide a separate, insulated equipment grounding conductor in each feeder and branch circuits. Terminate each end on a grounding lug, bus, or bushing.

B. Supplementary Grounding Electrode: Per drawings.

C. Isolated Grounding Systems: Use insulated equipment grounding conductor and connect only to service grounding electrode.

3.02 FIELD QUALITY CONTROL

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

B. Measure ground resistance from system neutral connection at service entrance to convenient ground reference point using suitable ground testing equipment. Resistance shall not exceed 5 ohms.

SUPPORTING DEVICES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Conduit and equipment supports.

B. Fastening hardware.

1.02 QUALITY ASSURANCE

A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 PRODUCTS

2.01 MATERIALS

A. Support Channel: Galvanized or painted steel.

B. Hardware: Corrosion resistant.

PART 3 EXECUTION

3.01 INSTALLATION

A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure.

B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.

C. Do no fasten supports to piping, ductwork, mechanical equipment, or conduit.

D. Do not use power-actuated anchors.

E. Do not drill structural steel members.

F. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to represent a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

G. In wet locations install free-standing electrical equipment on concrete pads.

H. Install surface-mounted cabinets and panelboards with minimum of four anchors. Provide steel channel supports to stand cabinet one inch off wall.

I. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.

ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Nameplates and tape labels.

B. Wire and cable markers.

C. Conduit color coding.

PART 2 PRODUCTS

2.01 MATERIALS

A. Nameplates: Engraved three-layer laminated plastic, white letters on a white background.

B. Tape Labels: Embossed adhesive tape, with 3/16 inch (5 mm) white letter on black background.

C. Wire and Cable Markers: Cloth markers, split sleeve or tubing type.

PART 3 EXECUTION

3.01 INSTALLATION

A. Degrease and clean surfaces to receive nameplates and tape labels.

B. Install nameplates and tape labels parallel to equipment lines.

C. Secure nameplates to equipment fronts using screws, rivets, or adhesive. Secure nameplate to inside face of panel board doors in finished locations.

D. Embossed tape will not be permitted or any application. Use embossed tape only for identification of individual wall switches and receptacles.

3.02 WIRE IDENTIFICATION

A. Provide wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams equipment manufacturer's shop drawings for control wiring.

3.03 NAMEPLATE ENGRAVING SCHEDULE

A. Provide nameplates to identify all electrical distribution and control equipment, and loads served. Letter Height: 1/8 inch for individual switches and loads served, 1/4 inch for distribution and control equipment identification.

3.04 CONDUIT COLOR CODING SCHEDULE

A. 480 Volt, Single and Three Phase System: Blue.

B. 208 Volt, Single and Three Phase System: Black

C. Fire Alarm System: Red.

D. Motor and Other Control Systems: Green.

E. Telephone System: Yellow.

F. Computer/Data Systems: White.

END OF SECTION

SECTION 16200

POWER GENERATION

TEMPORARY POWER

PART 1 GENERAL

1.01 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.

1.02 DESCRIPTION OF WORK

A. Furnish, install and remove the temporary electrical power and lighting systems and pay for all labor, materials and equipment required therefore. All such temporary electrical work shall meet the requirements of the National Electrical Code, of the local utility company, and OSHA.

B. Make all necessary arrangements with the local utility company as to where the temporary electric service can be obtained from.

C. Secure and pay for all required permits, certificates, notarizations, back charges for work performed by others, and other expenses incidental to the installation of the temporary electric service.

D. Provide a temporary 120/208V, 3 ph, 4 wire service to the building as required to provide electric light and power while the building is under construction and until the permanent feeders have been installed and tested. Install and maintain a feeder or feeders of sufficient capacity for the requirements of each floor.
The temporary electric service shall be based on the following:
1. Rooms or spaces under 250 sq. ft. - one (1) 100 watt lamp.
2. Rooms or spaces over 250 sq. ft. and under 500 sq. ft - two (2) 100 watt lamps.
3. Rooms or spaces over 500 sq. ft. - one (1) 200 watt lamp per every 1,000 sq. ft. or fraction thereof.

E. Sufficient wiring outlets and lamps shall be installed to insure proper lighting in stairwells, corridors and passage areas.

F. Temporary power, in addition to the lighting requirements, shall be provided throughout the building for electrically operated tools on a minimum of 0.50 watts per sq. ft. Motors up to and including one hp only shall be provided for.

G. Outlets shall be located at convenient points so that extension cords of not over 50 ft. in length will reach all work requiring light or power.

H. Temporary electric service shall be provided for the offices of the Contractor and of the Clerk-of-Works until such time as the removal of these offices is ordered by Hannaford Bros. Co.

I. Electric service for electric welders is not to be provided, except as reimbursable item as covered below.

1.03 INSTALLATION

A. Provide and have installed all necessary overhead pole lines, transformers, meters, cables, panelboards, switches and accessories required by the temporary light and power installation.

B. Furnish and install all extension cords, lamps, sockets, motors, and accessories as required for their work.
   1. Any temporary wiring of a special nature, other than that specified above, required for their work.
   2. Any temporary wiring of construction offices and buildings used by them, other than the office of Hannaford Bros. Co.

C. All temporary wiring, service equipment, and accessories thereto shall be removed when directed to.

D. All lamps installed in permanent lighting fixtures and used as temporary lights during the construction periods, shall be removed and replaced before completion by the set of lamps required to be furnished and installed under the Contract.

DRY TYPE TRANSFORMERS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Dry type two winding transformers.

B. Dry type isolation transformers.

1.02 REFERENCES

A. ANSI/NEMA - ST 1 - Specialty Transformers.

B. ANSI/NEMA ST 20 - Dry Type Transformers for General Applications.

C. NEMA TP-1 – Guide for Determining Energy Efficiency for Distribution Transformers

D. NEMA TP-2 – Standard Test Method for Measuring the Energy Consumption of Distribution Transformers.

E. UL 1561 – Standard for Dry-Type General Purpose and Power Transformers

1.03 SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Include outline and support point dimensions of enclosures and accessories, unit weight, voltage, KVA, and impedance ratings and characteristics, loss data, efficiently at 25, 50, 75 and 100 percent rated load, sound level, tap configurations, insulation system type, and rated temperature rise.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store in a warm, dry location with uniform temperature. Cover ventilating openings to keep out dust.

B. Handle transformers using only lifting eyes and brackets provided for that purpose. Protect units against entrance of rain, sleet, or snow if handled in inclement weather.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - DRY TYPE TWO WINDING TRANSFORMERS

A. Square "D".

B. General Electric.

C. Heavy-Duty Electric.

2.02 DRY TYPE TWO WINDING TRANSFORMERS

A. Dry Type Transformers: ANSI/NEMA TP 1; factory-assembled, air cooled dry type transformers; ratings as shown on the Drawings. Transformers shall be UL listed. Transformers shall be manufactured and tested in accordance with NEMA ST20. Transformer losses shall conform to NEMA TP-1 requirements. Transformer losses shall be tested in accordance with NEMA TP-2 procedures.

B. Insulation system is to exceed NEMA ST20 standards and average winding temperature rise for rated KVA as follows:

Rating	Class	Rise (degree C)
1-15	185	115
16-500	220	115

C. Case temperature shall not exceed 50 degrees C rise above ambient at its warmest point.

D. Winding Taps, Transformers Less than 15 KVA: Two 5 percent below rated voltage, full capacity taps on primary winding.

E. Winding Taps, Transformers 15 KVA and Larger: ANSI/NEMA ST 20.

F. Impedance, % Z: per schedule on Drawings.

G. Sound Levels: Maximum sound levels are as follows:

KVA Rating	Sound Level
1-10	40 db
15 -50	45 db
51-150	50 db
151-300	55 db

H. Basic Impulse Level: 10 KV for transformers less than 300 KVA, 30 KV for transformers 300 KVA and larger.

I. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap, sized in accordance with applicable UL and NFPA 70 standards.

J. Mounting: Transformers 75 KVA and less shall be suitable for wall, floor, or trapeze mounting; transformers larger than 75 KVA shall be suitable for floor or trapeze mounting.

K. Coil Conductors: Continuous windings with terminations brazed or welded.

L. Enclosure: ANSI/NEMA ST20; NEMA 2, ventilated enclosure. Provide lifting eyes or brackets.

M. Isolate core and coil from enclosure using vibration absorbing mounts.

N. Nameplate: Include transformer connection data and overload capacity based on rated allowable temperature rise.

2.03 DRY TYPE SHIELDED ISOLATION TRANSFORMERS

A. Dry Type Isolation Transformers: ANSI/NEMA TP 1; factory-assembled, air cooled dry type shielded isolation transformers; ratings as shown on the Drawings. Transformers shall be UL listed. Transformers shall be manufactured and tested in accordance with NEMA ST20. Transformer losses shall conform to NEMA TP-1 requirements. Transformer losses shall be tested in accordance with NEMA TP-2 procedures.

B. Insulation system is to exceed NEMA ST20 standards and average winding temperatures rise for rated KVA as follows:

KVA Rating	Insulation Class	Temperature Rise (degree C)
1-9	185	115
10-500	220	115

C. Case temperature shall not exceed 50 degrees C rise above ambient at its warmest point.

D. Winding Taps, Transformers Less than 15 KVA: Two 5 percent below rated voltage, full capacity taps on primary winding.

E. Winding Taps, Transformers 15 KVA and Larger: Two 5 percent below rated voltage, full capacity taps on primary winding.

F. Sound Levels: Maximum sound levels are as follows:

KVA Rating	Sound Level
1-10	40 db

15 -50	45 db
51-150	50 db
151-300	55 db

G. Basic Impulse Level: 10 KV for transformers less than 300 KVA, 30 KV for transformers 300 KVA and Larger.

H. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

I. Provide electrostatic winding shield with separate insulated grounding connection.

J. Mounting: Transformers 75 KVA and less shall be suitable for wall, floor, or trapeze mounting; transformers larger than 75 KVA shall be suitable for floor or trapeze mounting.

K. Coil Conductors: Continuous windings with terminations brazed or welded.

L. Enclosure: ANSI/NEMA ST20; NEMA 2, ventilated enclosure. Provide lifting eyes or brackets.

M. Isolate core and coil from enclosure using vibration absorbing mounts.

N. Nameplate: Include transformer connection data.

O. Acceptable Manufacturer: As shown on Drawings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Set transformer plumb and level.

B. Use flexible conduit, 2 ft minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

C. Mount transformers on vibration isolating pads suitable for isolating the transformer noise from the building structure.

D. Provide seismic restraints.

3.03 DRY TYPE TRANSFORMER SCHEDULE: ON DRAWINGS.

END OF SECTION

SECTION 16300

POWER TRANSMISSION

BUILDING WIRE AND CABLE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Building wire and cable.

B. Nonmetallic - Sheathed cable, not permitted

C. Armored cable.

D. Metal clad cable.

E. Wiring connectors and connections.

1.03 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

1.04 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. All conductor shall be copper, except where specifically allowed on Drawings.

C. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet project conditions.

D. Were wire and cable routing is not shown, and estimation only is indicated, determine exact routing and lengths required.

1.05 COORDINATION

A. Determine required separation between cable and other work.

B. Determine cable routing to avoid interference with other work.

PART 2 PRODUCTS

2.01 BUILDING WIRE AND CABLE

A. Description: Single conductor insulated wire.

B. Conductor: Copper

C. Insulation Voltage Rating: 600.

D. Insulation: ANSI/NFPA 70, Type XHHN, THHW, THWN (75° C) for 100 amps or higher. ANSI/NFPA 70, Type XHHN, THHN (90° C) less than 100 amps.

2.02 NONMETALLIC - SHEATHED CABLE
NOT PERMITTED

2.03 ARMORED CABLE.

A. Description: ANSI/NFPA 70, Type AC.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation Temperature Rating: 75° C.

E. Insulation Material: Thermoplastic.

2.04 METAL CLAD CABLE

A. Description: ANSI/NFPA 70, Type MC.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation Temperature Rating: 70° C.

E. Insulation Material: Thermoplastic.

F. Armor Material: Steel or Aluminum.

G. Armor Design: Interlocked metal tape.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that mechanical work likely to damage wire and cable has been completed.

3.02 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.03 INSTALLATION

A. Install products in accordance with manufacturers instructions.

B. use solid conductor for feeders and branch circuits 10 AWG and smaller if not pulled through conduit.

C. Use stranded conductors for ALL REFRIGERATION and control circuits, and any wire pulled through conduits.

D. Use conductor not smaller than 12 AWG for power and lighting circuits.

E. Use conductor not smaller than 16 AWG for control circuits.

F. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 120 feet. Use 8 AWG conductors for 20 ampere, 120 volt branch circuits longer than 180 feet.

G. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 270 feet.

H. Pull all conductors into raceway at same time.

I. Use suitable wire pulling lubricant for building wire 4 AWG and larger.

J. Protect exposed cable from damage.

K. Support cables above accessible ceiling, using suitable hangers. Do not support wire from the ceiling suspension system. Do not rest cable on ceiling panels.

L. Use suitable cable fittings and connectors.

M. Neatly train and lace wiring inside boxes, equipment, and panelboards.

N. Clean conductor surfaces before installing lugs and connectors.

O. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

P. Use compression connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.

Q. Use solderless pressure connectors with insulating covers for copper conductors splices and taps, 8 AWG and smaller.

R. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

S. Use wiring methods indicated on drawings.

3.04 INTERFACE WITH OTHER PRODUCTS

A. Identify wire and cable.

B. Identify each conductor with its circuit number or other designation indicated on Drawings.

3.05 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 01400.

B. Inspect wire for physical damage and proper connections.

C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.

D. Verify continuity of each branch circuit conductor.

E. Verify using Megohmmeter insulation to ground and phase to phase.

END OF SECTION

SECTION 16400

SERVICE AND DISTRIBUTION

SERVICE ENTRANCE

PART 1 GENERAL

1.01 WORK INCLUDED

A. Arrangement with utility company for permanent electric service including payment of utility company charges for service.

B. Underground service entrance.

1.02 SYSTEM DESCRIPTION

A. Service Entrance: One 480/277 volts, 1200 amp, three phase, four-wire, 60 Hertz.

1.03 QUALITY ASSURANCE

A. Install service entrance in accordance with Utility rules and regulations.

1.04 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

PART 2 PRODUCTS

2.01 METERING EQUIPMENT

A. Meter and enclosure: Per utility requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Make arrangements with utility Company to obtain permanent electric service to the Project.

B. Underground: Install service entrance conduits from line disconnect to transformer pad and through building foundation and lateral conductors from pad-mounted transformer to building service entrance equipment.

PANELBOARDS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Distribution panelboards.

B. Lighting and appliance branch circuit panelboards.

1.02 RELATED WORK

A. Section 16400 – Contactors, specified below

1.03 REFERENCES

A. FS W-C-375 - Circuit Breakers, Molded Case, Branch Circuit and Service.

B. FS W-P-115 - Power Distribution Panel.

C. NEMA AB 1 - Molded Case Circuit Breakers.

D. NEMA PB 1 - Panelboards.

E. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or less.

F. NEMA PB 1.2 - Application Guide for Ground-fault Protective Devices for Equipment.

1.04 SUBMITTALS

A. Submit shop drawings for equipment and component devices under provisions of Section 01300.

B. Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - PANELBOARDS

A. Square "D".

B. Siemens.

C. General Electric.

2.02 DISTRIBUTION PANELBOARDS

A. Panelboards: NEMA PB 1; circuit breaker type, Type I, Class 1.

B. Enclosure: NEMA PB 1; Type 1. Cabinet size shall fit into assigned location.

C. Provide cabinet front with concealed trim clamps, or screw cover, and hinged door with flush lock. Finish in manufacturer’s standard gray enamel.

D. Provide panelboards with copper bus, ratings as scheduled on Drawings. Provide copper ground bus in all panelboards.

E. Minimum Integrated Short Circuit Ratings: 65,000 amperes rms. symmetrical for 240 volt panelboards; 65, 000 amperes rms. symmetrical for 480 volt panelboards, or as otherwise shown on Drawings.

F. Molded Case Circuit Breakers: NEMA AB 1; provide circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.

2.03 BRANCH CIRCUIT PANELBOARDS

A. Lighting and Appliance Branch Circuit Panelboards: NEMA PB 1; circuit breaker type, Type 1, Class 1.

B. Enclosure: NEMA PB 1; Type 1.

C. Cabinet Size: Shall fit into assigned location.

D. Provide cabinet front with concealed trim clamps, concealed hinge and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

E. Provide panelboards with copper bus, ratings as scheduled on Drawings. Provide copper ground bus in all panelboards.

F. Minimum Integrated Short Circuit Rating: 42,000 amperes rms. symmetrical for 240 volt panelboards; 42,000 amperes rms. symmetrical for 480 volt panelboards, or as otherwise shown on Drawings.

G. Molded Case Circuit Breakers: NEMA AB 1; bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled on Drawings.

2.04 AUTOMATED LIGHTING CONTROL PANELBOARD

A. The automated lighting control panelboard shall be an Eaton/Cutler-Hammer Pow-R-Command 100 series only, no others permitted. Panelboards are designated on the drawings.

B. Panelboards shal be UL listed and meet UL 67 standard for panelboard interiors; UL916 standard for energy management equipment andUL50 standard for enclosure. FCC emissions standards, Part 15, Subject J for Class A application.

C. The system shall be operated through the Danfoss EMS through the use of a Danfoss CBGATE2 interface board. The panelboard shall provide on/off control for low voltage switchable circuit breakers.

1. The Cutler Hammer panel shall not include C-H’s standard USC controller. Provide panelboard with pre-wired switchable breakers and chassis for mounting the Danfoss CBGATE2 interface board.
2. Hannaford will furnish the Danfoss CBGATE2 interface board. Hannaford’s controls contractor will install the interface board.

D. The panelboard shall be pre-wired and assembled at Cutler-Hammer and consist of the following modular construction:

1. standard NEMA 1 type enclosure sized to fit into the assigned space, mounting shall be surface;
2. standard NEMA 1 type trim with flush lock;
3. circuit breakers that maybe remotely controlled on or off with Class 2 low voltage;
4. sized to distribution system characteristics, voltage and current requirements, scheduled on the drawings;
5. internal circuit breaker control bus strips;
6. internal Class 2, 120/277 VAC power supply with primary fuse and secondary thermal magnetic on/off protection;
7. Class 2 barrier;

E. All low voltage wiring shall be UL listed as conforming to Class 2 or Class 2P wiring requirements.

F. Minimum short circuit current rating 42,000 RMS symmetrical amperes at 480/277 volts.

G. The panelboard shall be M.L.O. or provided with a Main Circuit Breaker as scheduled on the drawings.

H. Provide one continuous vertical copper bus bar per phase. Each bus bar shall have sequentially phased branch circuit connectors suitable for bolt-on branch circuit breakers. The neutral shall be 200% rated solid copper for non-linear load application and marked for non-linear load applications.

I. Interiors shall provide a Class 2 separation for the panelboard control module with an internal Class 2, 120/277 VAC power supply with primary fuse and secondary thermal magnetic on/off protection to provide power to the panelboard control module.

J. Provide dead-front cover for access to panelboard control module.

K. Branch circuit breakers shall have the following:

1. bolt-on type bus connector;
2. overcenter toggle mechanism
3. thermal and magnetic trip elements in each pole;
4. two and three pole circuit breakers shall have a common trip;
5. two forms of visible trip indication;
6. circuit breakers marked with a “Z” and marked as spare on the panel schedule shall be of the remote controllable latching type;

L. Hardware performance requirements as follows:

1. control power - power from a Class 2 AC power source;
2. memory loss – time schedules, time clock, day/date, panelboard configuration parameters shall be protected from memory loss upon normal power failure;
3. power fail/brown-out recovery – no loss of programmed information when power input drops below normal; upon return of normal power load position changes scheduled during the power failure period shall immediately be updated to current schedule position or load

returned to scheduled load position prior to the power failure;no operator interaction shall be required to return the panelboard to normal;

4. self-powered – networks shall be self-powered from the panelboard, no external power supply shall be required.
5. fault tolerant – the panelboard shall remove itself from the main network should it fail; network “lock-ups” due to failed panelboards shall not be acceptable.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install panelboards plumb and flush with wall finished, in conformance with NEMA PB 1.1.

B. Height: 6ft.

C. Provide filler plates for unused spaces in panelboards.

D. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

E. Stud 5 empty one inch conduits to accessible location above ceiling out of each recessed panelboard.

3.02 FIELD QUALITY CONTROL

A. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 10 percent, rearrange circuits in the panelboard to balance the phase loads within 10 percent. Take care to maintain proper phasing for multi-wire branch circuits.

B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

DISCONNECT SWITCHES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Disconnect switches.

B. Fuses.

C. Enclosures.

1.02 REFERENCES

A. ANSI/UL 198C - High-Intensity Capacity Fuses: Current Limiting Types.

B. ANSI/UL 198E - Class R Fuses.

C. FS W-F-870 - Fuseholders (For Plug and Enclosed Cartridge Fuses).

D. FS W-S-865 - Switch, Box, (Enclosed), Surface-mounted.

E. NEMA KS 1 - Enclosed Switches.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Include outline drawings with dimensions, and equipment ratings for voltage, capacity, horsepower, and short circuit.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - DISCONNECT SWITCHES

A. Square D.

B. Siemens.

C. General Electric.

2.02 DISCONNECT SWITCHES

A. Fusible Switch Assemblies: NEMA KS 1; quick-made, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: Designed to accommodate Class R fuses.

B. Nonfusible Switch Assemblies: NEMA KS 1; Type GD; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

C. Enclosures: NEMA KS 1; Type as indicated on Drawings.

2.03 ACCEPTABLE MANUFACTURERS - FUSES

A. Busman.

2.04 FUSES

A. Fuses 600 Amperes and Less: ANSI/UL 198E, Class RK; dual element, current limiting, time delay, one-time fuse.

B. Interrupting Rating: 200,000 rms. amperes.

C. Furnish to Owner 6 spare fuses of each type and rating installed.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install disconnect switches where indicated on Drawings.

B. Install fuses in fusible disconnect switches.

EQUIPMENT WIRING SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Electrical connections to equipment specified under other Sections.

1.03 REFERENCES

A. FS W-C-596 - Electrical Power Connector, Plug, Receptacle, and Cable Outlet.

B. NEMA WD 1 - General Purpose Wiring Devices.

C. NEMA WD 5 - Specific- Purpose Wiring Devices.

PART 2 PRODUCTS

2.01 CORDS AND CAPS

A. Straight-blade Attachment Plug: NEMA WD 1.

B. Locking-blade Attachment Plug: NEMA WD 5.

C. Attachment Plug Configuration: Match receptacle configuration at outlet provided for equipment.

D. Cord Construction: Oil-resistant thermoset insulated Type SJQW multiconductor flexible cord with identified equipment grounding conductor, suitable for extra hard usage in damp location.

E. Cord Size: Suitable for connected load of equipment and rating of branch circuit overcurrent protection.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 PREPARATION

A. Review equipment submittals prior to installation and electrical rough-in. Verify location, size, and type of connections. Coordinate details of equipment connections with supplier and installer.

3.03 INSTALLATION

A. Use wire and cable with insulation suitable for temperatures and environment encountered in heat producing equipment.

B. Make conduit connections to equipment using flexible conduit. use Liquid tight flexible conduit in damp or wet locations.

C. Install pre-finished cord set where connection with attachment plug is indicated or specified, or use attachment plug with suitable strain-relief clamps.

D. Provide suitable strain-relief clamps for cord connections to outlet boxes and equipment connection boxes.

E. Make wiring connections in control panel or in wiring compartment of pre-wired equipment in accordance with manufacturer's instructions. Provide interconnecting wiring where indicated.

F. Install disconnect switches, controllers, control stations, and control devices such as limit switches and temperature switches as indicated. Connect with conduit and wiring as indicated.

G. Coolers and Freezers: Cut and seal conduit openings in freezer and cooler walls, floor, and ceilings.

ENCLOSED CIRCUIT BREAKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Enclosed molded case circuit breakers.

1.02 REFERENCES

A. FS W-C-375 - Circuit Breakers, Molded Case, Branch Circuit and Service.

B. NEMA AB 1 - Molded Case Circuit Breakers.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Include circuit breaker ratings, trip current curves, outline dimensions, and terminal lug sizes.

1.04 REGULATORY REQUIREMENTS

A. Use circuit breakers listed by Underwriter's Laboratories, Inc., and suitable for specific application.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. As shown on Drawings.

2.02 MOLDED CASE CIRCUIT BREAKER

A. Circuit Breaker: NEMA AB 1.

2.03 RATINGS

A. Ratings: NEMA AB 1; as scheduled.

2.04 TERMINAL LUGS

A. Size: Suitable for scheduled conductors.

2.05 ENCLOSURES

A. Enclosure: NEMA AB 1; 1.

B. Fabricate enclosure from steel.

C. Finish using manufacturer's standard enamel finish.

2.06 ACCESSORIES

A. Provide accessories as scheduled, to NEMA AB 1.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Verify field measurements are as shown on Drawings.

C. Verify that required utilities are available, in proper location, and ready for use.

D. Beginning of installation means installer accepts conditions.

3.02 INSTALLATION

A. Install enclosed circuit breakers where shown on Drawings, in accordance with manufacturer's instructions.

3.03 ADJUSTING: TO OWNER PROVIDED SETTING VALUES.

3.04 FIELD QUALITY CONTROL

A. Perform field inspection and testing.

B. Inspect and test each circuit breaker to NEMA AB 1.

C. Inspect visually and perform several mechanical ON-OFF operations on each circuit breaker.

D. Verify circuit continuity on each pole in closed position.

CONTACTORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Lighting contactors.

1.02 REFERENCES

A. ANSI/NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

B. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.

C. ANSI/NFPA 70 - National Electrical Code.

1.03 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Include dimensions, size, voltage ratings and current ratings.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.04 OPERATION AND MAINTENANCE DATA

A. Maintenance Data: Include instructions for replacing and maintaining coil and contacts.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 5 years experience.

1.06 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc., as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.01 MANUFACTURERS - LIGHTING CONTACTORS

A. Square "D".

B. General Electric.

2.02 LIGHTING CONTACTORS

A. Description: NEMA ICS 2, magnetic lighting contactor.

B. Configuration: Electrically held wire control

C. Coil Voltage: 120 volts, 60 Hertz.

D. Poles: As indicated on Drawings.

E. Contact Rating: As indicated on Drawings.

F. Enclosure: ANSI/NEMA ICS 6 Type 1.

G. Accessories: As shown.

2.03 ACCESSORIES

A. Pushbuttons and Selector Switches: NEMA ICS 2, general duty type.

B. Indicating Lights: NEMA ICS 2, transformer push-to-test type.

C. Auxiliary Contacts: NEMA ICS 2 Class A300.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Verify enclosure size shall fit in locations indicated.

END OF SECTION

SECTION 16500
LIGHTING

LIGHTING FIXTURES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Interior luminaires and accessories.

B. Exterior luminaires and accessories.

C. Lamps.

D. Ballasts.

1.02 REFERENCES

A. ANSI C82.1 - Specification for Fluorescent Lamp Ballasts.

B. ANSI C82.4 - Specifications for High-Intensity-Discharge Lamp Ballasts (Multiple Supply Type.)

C. FS W-F-414 - Fixture, Lighting (Fluorescent, Alternating Current, Pendant Mounting.)

D. NEMA LE 2 - H-I-D Lighting System Noise Criterion (LS-NC) Ratings.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Include outline drawings, lamp and ballast data, support points, weights, and accessory information for each luminaire type.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provision of Section 01600.

PART 2 PRODUCTS: PER SCHEDULE ON DRAWINGS

2.01 INTERIOR LUMINAIRES AND ACCESSORIES

A. Fluorescent Luminaires: FS W-F-414; provide hinged frames with latches, and 0.125 inch thick virgin acrylic lenses.

B. Recessed Fluorescent Luminaires: Provide trim type and accessories required for installation in ceiling system installed. Maximum depth of luminaire, 6 inch, including yokes and bridges.

C. Exit Signs: Translucent face, 6 inch high red letters on white background directional arrows as indicated, mounting type as indicated, battery back-up required.

D. HID Luminaires: Pre-wired, with integral ballast.

2.02 EXTERIOR LUMINAIRES AND ACCESSORIES

A. Enclosures: complete with gaskets to form weatherproof assembly.

B. Provide low temperature ballasts, with reliable starting to -20 degrees F.

2.03 LAMPS

A. General Use Incandescent Lamps: Inside frosted type, rated 125 volts.

B. Incandescent Reflector Lamps: Shape as scheduled, rated 125 volts.

C. Fluorescent Lamps: F32T8/SPX/35 with a CRI equal to 80 or higher.

D. Metal Halide HID Lamps: Phosphor coated.

E. High Pressure Sodium HID Lamps: Coated, suitable for all burning positions.

2.04 ACCEPTABLE MANUFACTURERS - FLUORESCENT BALLASTS

A. Electronic Ballast Technology

B. GE Triad Lighting Products

C. Valmont Electric

2.05 FLUORESCENT BALLASTS

A. Provide high-frequency electronic ballasts suitable for use under installation conditions present for each luminaire and lampholder.

B. Ballasts shall have a sound rating of "A" and shall not exhibit excessive noise during start-up. A contribution of 1db to background noise on the "A" scale will be considered to be defective.

C. Ballasts shall operate on 60 cycle input and 20 to 40 kHz output.

D. Size of the ballast case must be interchangeable with standard and core ballasts and be suitable for mounting in existing fixtures.

E. The ballast shall be marked to indicate the required supply voltage, frequency, RMS current, current surge during startup, input watts, power factor at the design voltage, open circuit voltage, crest factor, and efficacy.

F. The power factor shall not be less than 90%, ballast factor 1.2, crest factor more than 1.6, harmonic distortion not more than 20% of input voltage, flicker less than 5%, and light output shall not vary more that 15% with a plus or minus variation of 10% in voltage from the design voltage.

G. The EMI shall meet applicable FCC regulations.

H. Ballasts shall be rated for 30,000 hours and be unconditionally warranted by the manufacturer for 3 years.

I. Ballasts shall be labeled or listed with UL, CBM, or ETL in the use to which they are applied.

2.06 EMERGENCY LIGHTING FLUORESCENT BALLAST

A. Where scheduled, fixtures, (FxxE), shall have a self-contained emergency lighting fluorescent ballast. Emergency ballast shall be Magnetek Fluor-O-Pac. The unit shall provide a full 90 minutes of emergency lighting in accordance with NFPA 101, “The Life Safety Code”. The unit shall automatically switch to the DC source when there is an AC power failure.

B. The self-contained unit shall have a high temperature nickel-cadmium battery, constant current charger, solid state high frequency electronic circuitry in one ballast housing. The unit shall also have an indicator light and test switch.

C. Input voltage characteristics shall be as scheduled on the drawings. Output voltage shall be suitable for the fixture, i.e. fixtures either 4 feet in length or 8 feet in length and lamp type, T8, number of lamps minimum of two (2).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install lamps in luminaires and lampholders.

B. Support surface-mounted luminaires directly from building structure or from ceiling grid T structure; fasten framing member clips.

C. Install recessed luminaires to permit removal from below. Install grid clips.

D. HID Luminaires: Use hangers rated 500 pounds minimum and provide safety chain between ballast and structure. provide safety chain between reflector and ballast.

3.02 RELAMPING

A. Relamp luminaires which have failed lamps at completion of work.

3.03 ADJUSTING AND CLEANING

A. Align luminaires and clean lenses and diffusers at completion of Work. Clean paint spatters, dirt, and debris from installed luminaires.

B. Touch up luminaire finish at completion of work.

3.04 LUMINAIRE SCHEDULE

A. As indicated on Drawings.

SITE LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior luminaries, furnished and installed under the site package.

B. Poles, furnished and installed under the site package.

C. Wiring and conduit have been furnished and installed under the site package, from pole locations back to the building foundations.

D. The General Contractor's electrical contractor shall extend circuiting within the building to the panelboards indicated by the panel schedules and circuiting on the plans. The General Contractor's electrical contractor shall be responsible for conduit and wiring of a decorative light, furnished and installed by the site contractor, in the sidewalk.

EMERGENCY LIGHTING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Emergency lighting units.

B. Emergency exit signs.

C. Emergency fluorescent lamp power supplies.

1.02 REFERENCES

A. FS W-L-305 - Light Set, General Illumination (Emergency or Auxiliary).

B. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.

C. NEMA WD1 - general-purpose Wiring Devices.

1.03 REGULATORY REQUIREMENTS

A. Conform to local building code and NFPA 101 for installation requirements.

1.04 SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Provide product data on emergency lighting units, exit signs, and emergency fluorescent lamp power supply units.

PART 2 PER SCHEDULE ON DRAWINGS

PART 3 EXECUTION

3.01 INSTALLATION

A. Install units plumb and level.

B. Aim directional lamp heads as directed.

END OF SECTION

SECTION 16600

SPECIAL SYSTEMS

FIRE ALARM AND SMOKE DETECTION SYSTEMS

PART I GENERAL

1.01 SECTION INCLUDES

A. Fire Alarm and Smoke Detection Systems.

B. It is Hannaford Bros. Co.'s intent to be proprietary with the contractor named in the qualifications paragraph below, **no others permitted**.

1.02 REFERENCE STANDARDS

A. NFPA Standards and Codes

B. ADA - Americans with Disabilities Act.

C. State and Local Codes

1.04 REGULATORY REQUIREMENTS

A. System and equipment must be UL and FM listed.

B. In conformance with: NFPA 101 - Life safety Code, State, Local and Federal Regulations.

C. System Design must be approved by F.M.

D. System as supplied must be approved by State and Local Fire Marshall.

E. The System and its installation must conform to applicable building codes such as BOCA.

1.05 SYSTEM DESCRIPTION

A. Fully functional Fire Alarm System Conforming to the referenced NFPA standards and approved by Factory Mutual, having both automatic and manual alarm initiators. Automatic initiators shall be Thermal Rate of Rise, Smoke Detectors, Duct Mounted Smoke Detectors, Alarm Contacts in Cooking Hood Control Panels.

B. System Supervision: Provide Electrical/Electronically Supervised System, with supervised alarm initiating and alarm signaling circuits. Occurrence of single ground or open condition on alarm initiating circuit does not disable that circuit from transmitting in ALARM.

C. Alarm Sequence of Operation: Actuation of Manual or Automatic Initiation device causes the system to enter ALARM, which includes the following operations:
1. Sound and display local fire alarm signaling devices with non-coded signal.

2. Transmit a non-coded signal to remote station equipment (EIL communication to Scarborough Security) and to local municipal fire station circuit if service is required by local fire authorities.
3. Indicate type/location of specific alarm on any remote annunciator panels.
4. Transmit signal to the HVAC systems to shut down all fans.
5. Transmit signal to gas line shut off valves to stop the flow of fuel into the facility except to the emergency generator.

D. Alarm Reset located next to the alarm panel: Key-accessible RESET function to reset duct smoke detectors to out of alarm if the alarm initiating circuits have been cleared.

E. Trouble Sequence of operation: System trouble, including grounding or open circuit of supervised circuits, or power or system failure causes system to enter TROUBLE mode, including the following operations:
1. Visual and audible trouble alarm at annunciator panels.
2. Manual ACKNOWLEDGE function at control panel silences audible trouble alarm; visual alarm is displayed until initiating trouble is cleared.
3. Transmit trouble signal to the remote station(EIL Control package) for transmission to HBC Security.

F. Lamp Test: Manual LAMP TEST function causes ALARM indication at each sensor at fire control panel and at annunciator panels

G. Drill Sequence of Operations: Manual DRILL function causes ALARM mode of operation as follows:
1. Sound And display local fire alarm signaling devices.
2. Transmit ALARM to EIL Panel for transmission to HBC Security.
3. Transmit ALARM to local municipal fire station(if required).

H. Each alarm point is to be individually addressed utilizing popit modules and reported on annunciator panels. Alarm initiator types/points are:

Roof Top Air Handlers	Duct mounted smoke detectors
Sales Area	Smoke detectors
Bakery Deli	Cooking Hood Control
Offices-Main floor	Smoke Detectors
Offices-Mezzanine	Smoke Detectors
Restrooms	Smoke Detectors
Storage Area	Temp Rate of Rise
Sprinkler	Flow sensor on Riser
Sprinkler(Trouble)	Tamper switch

I. The System shall be programmed to transmit a test report once every 24 hours.

J. The System shall be programmable either locally or remotely by a portable programmer or Remote Account Manager (RAMII) software.

K. The system shall be equipped with dual line seizure capability and utilize Modem II format.

1.06 QUALIFICATIONS

A. MANUFACTURER: Company must have been specializing in Smoke Detection and Fire Systems for at least five years.

B. INSTALLER: Company must have been installing and maintaining Smoke and Fire systems for at least five years, and have any required State or Local certification or license.

C. ALLOWED CONTRACTORS (NO OTHERS PERMITTED):
Protection One
Portland Maine 04104
Tony Fournier
207.772.1171

1.07 SUBMITTALS

A. Submit shop drawings and product data for the system.

B. Provide wiring diagrams, data sheets, and equipment ratings, layout, dimensions, and finishes.

C. Submit manufacturers installation instructions.

D. Submit manufacturers certificate that system meets or exceeds any specified requirements.

1.08 PROJECT RECORD DRAWINGS

A. Maintain, on site for submission to H.B.C. at the end of the job, a set of prints indicating the actual as-built conditions.

B. Include location of any non-visible devices.

1.09 OPERATION AND MAINTENANCE DATA

A. End of Job data submitted to H.B.C. shall include operating instructions, repair, and Maintenance instructions.

B. A letter signed by the owner of the installing company certifying that the system is fully installed, tested, and complies with all requirements shall be submitted to the owner at the end of the job.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver, Store, and Protect from Damage all components. Any damage due to improperly stored or handled products are the responsibility of the contractor, and shall incur no additional expense to the owner.

1.11 EXTRA MATERIALS

A. Provide sufficient spare parts to cover the first year of operation. Glass rods for Manual pull stations, two extra smoke detectors of each type, and sufficient keys will be included.

PART 2 PRODUCTS

2.01	MANUFACTURERS		ITEM	MODEL
	A.	BGE	Temperature Monitor	T-180
	B.	Radionics	Smoke Detector	D283
			Duct Smoke Detector	D300
			Detector for Duct Unit	D281
	C	Firelite	Pull Station	NBG-10
			Duct Smoke Detector	DH-400
			Temperature Rise Detector	HD-80
			Horn	GX905-4HCB
			Strobe	GX005-4HCB
	D.	Wheelock	Horn/Strobe-Small Areas	MT Series
	E.	Gentex	Horn/Strobe-Open Areas	SHG
	F.	Radionics	F.A. Control Panel	D9124
			Accessory Module Carrier	D9100
			Annunciator Panel	D1257
			Arming Station	D1255
			Sub-Arming Station	D1255
			Battery Harness	D122
			Batteries	D1218
			Battery Charger	D8132
			Auxiliary Interface (if required)	D184
			Indicating Circuit Supervision	D192
	G.	Sprinkler Sys.	Tamper Proof Device	OSYS-U**
			Waterflow Vane Sensor	VSR-D**
			Valve Supervisory Switch	VVS-1**

**Furnished by this contractor, installed by the sprinkler contractor.

	H.	TBD	Cellular Telephone Unit	TBD

Substitutions from these products will not be allowed without obtaining prior permission from H.B.C. Engineering and Security Departments.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the system in accordance with the manufacturer's instructions.

B. All Wiring must be in conformance with N.F.P.A. and N.E.C. requirements. Any wiring not in conduit must be Plenum grade wire appropriate for the use. Minimum 16 AWG stranded Conductors will be used for fire alarm detection and signal circuits.

C. Install manual station with handle 48 inches above the floor unless local codes or A.D.A. requirements indicate otherwise. Install audible and visual signals at least 90 inches above the floor. Device locations must be coordinated with interior decor and construction.

D. Make Conduit and wiring connections to sprinkler flow switches, valve position switches, fire control panel, and all detection and signaling devices that comprise the total system.

E. Pharmacy section must be completed and tested and accepted by HBC agent as the first step in system certification.

3.02 FIELD QUALITY CONTROL

A. The fire system must be inspected, tested, and certified. Testing must be in accordance with N.F.P.A. 72H, any state or local regulations, and local fire department requirements.

3.03 WARRANTEE AND FIELD SERVICE

A. Provide full coverage for both parts and labor for maintenance and service the first year after turning the system over to the retail operation. Also provide a minimum OD 4 hours of training in operation to a on site personnel before the contract can be considered as complete.

3.04 FIRE ALARM WIRE AND CABLE CODING

A. Install all circuit conductors using an accepted color coding system. All terminations must be numbered and a matching wiring diagram furnished to the owner at the end of the job.

3.05 HORN AND STROBE FREQUENCY

A. Adjust horns and strobes to the proper frequency to comply with N.F.P.A. recommendations. Note the frequencies used on the wiring diagram furnished to the owner.

INTRUSION DETECTION AND SECURITY SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Intrusion detection devices.

B. Alarm control panel.

C. Signaling devices.

D. Security access devices.

E. Access control panel.

1.02 REFERENCE STANDARDS

A. NFPA 72G - Notification appliances for protective signaling systems.

B. NFPA 72H - Guide for test procedures for protective signaling devices.

C. NFPA 70 - National Electrical Code.

1.03 SYSTEM DESCRIPTION

A. Intrusion detection system designed to detect and alarm on any unauthorized entry through Emergency Exits, Receiving Doors, Trash Compactor, Roof Hatch, and also entrance/exit during non-operating hours. Each alarm point is to be individually addressed by utilizing popit modules, and reported on annunciator panels.

B. In store Security and surveillance equipment including fixed cameras, movable cameras, monitors and all associated wiring. This Equipment furnished by others, installed by others.

C. Any alarm signal will be transmitted to the remote station equipment (EIL communication to Scarborough Security)

1.05 QUALITY ASSURANCE

A. Only Manufacturers specializing in intrusion and/or security systems with at least three years of experience will be considered.

B. Installer must be a company specializing in this work and having at least three years of experience to be considered.

1.06 SUBMITTALS

A. Submit under provisions of section 01300.

B. Shop Drawings should indicate layout, wiring diagrams, and dimensions.

C. Provide data sheets for each piece of equipment indicating equipment ratings, power consumption, and finishes.

D. Manufacturers installation and operating instructions.

E. Letter certifying that the system is fully functional to manufacturer's specifications after installation and testing.

PART 2 PRODUCTS

A. Motion Detectors - Detection Systems - DT435, DT450, 8120

B. Monitors - B/W - RM109, RM112 (By Others)

C. Exterior Horn - Moose - MPI-35

D. VCR - Panasonic - AG-6040 (FURNISHED BY OTHERS)

E. Fixed Cameras - Panasonic - WV-BL200 (FURNISHED BY OTHERS)

F. Video Rack Box - Sensormatic - RC20PG (FURNISHED BY OTHERS)

G. Camera, 360 degree - Sensormatic - PT2 (FURNISHED BY OTHERS)

H. Door Contacts - Sentrol - 1078

I. Overhead Door Contacts - 2205AR

J. Arming, Sub Arming, and Annunciator Panel - Radionics - D1255

K. Strobe - System Sensor - MA/SS-121

L. Horn - System Sensor - SS-12

M. Substitutions only with prior approval.

2.02 ALARM PANEL (Use the Fire Alarm Panel where permitted, otherwise furnish an identical Radionics panel for Security and intrusion alarms.)

A. The panel shall be wall mounted and of modular construction.

B. The power supply shall be adequate to serve the control panel, remote detectors, remote annunciators, relays, and alarm signaling devices.

C. The system shall be fully electrically supervised including initiating and signaling circuits. Occurrence of a single ground or open condition in a circuit places the the circuit in alarm mode. Component or power supply failure places the the system in alarm mode. Occurrence of a single ground or open condition on an alarm initiating circuit does not disable that circuit from transmitting in Alarm.

D. Detection circuits shall be a supervised zone module with alarm and trouble indication.

E. Signal circuits shall be sufficient to serve the signal devices connected to the system.

F. Remote Station Signal Transmitter shall be electrically supervised and capable of transmitting alarm and trouble signals over telephone lines to remote station receiver. Supervision of the telephone line will alarm if dial tone is missing for two minutes and dial out on the secondary cellular telephone.

G. Provide sufficient auxiliary relays to handle all accessory function specified.

H. Mini-Sounders shall annunciate individually.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install all equipment in accordance with the manufacturers recommendations.

B. Install all wiring for detection and signal circuits using at least 16 AWG wire with 600volt Plenum Grade insulation.

C. Make all connections to equipment terminals using proper connections to minimize joint resistance.

3.02 FIELD TESTING

A. Test in accordance with NFPA 72H

3.03 FIELD SERVICE

A. Provide service for one year after the start of operations at the facility. Include parts and labor.

B. Include the services of a technician to supervise the installation, adjustment, final connection, and all system testing.

TELEPHONE SERVICE ENTRANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Telephone service entrance raceway.

B. Equipment and terminal backboards.

1.02 QUALITY ASSURANCE

A. Install work in accordance with Telephone Utility rules and regulations.

PART 2 PRODUCTS

2.01 TELEPHONE TERMINATION BACKBOARDS

A. Material: Plywood.

B. Size: 4 X 8 feet, 3/4 inch thick.

2.02 TELEPHONE TERMINATION CABINETS

A. Cabinet Boxes: Galvanized steel with removable endwalls, 36 inches wide, 48 inches high, 6 inches deep. Provide plywood backboard inside cabinet for mounting telephone termination devices.

B. Cabinet Fronts: Steel, surface type with concealed trim clamps screw cover front, concealed hinge, double doors, and flush lock.

C. Finish: Gray baked enamel.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that surfaces are ready to receive work.

B. Verify that field measurements are as shown on Drawings.

C. Beginning of installation means installer accepts existing conditions.

3.02 INSTALLATION

A. Finish paint termination backboards with durable white enamel prior to installation of telephone equipment.

B. Support raceways, backboards, and cabinets under the provisions of Section 16190.

C. Install termination backboards and cabinets plumb and attach securely at each corner.

D. Install polyethylene pulling string in each empty telephone conduit.

E. Mark all backboards and cabinets with the legend "TELEPHONE".

END OF SECTION

SECTION 16900

CONTROLS AND INSTRUMENTATION

ELECTRIC CONTROLS AND RELAYS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Push-button and selector switches.

B. Control panels.

1.02 REFERENCES

A. NEMA ICS 1 - General Standards for Industrial Control Systems.

B. NEMA ICS 2 - Standards for Industrial Control Device, Controllers and Assemblies.

C. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

1.03 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Square "D".

B. Allen Bradley.

C. General Electric.

2.02 CONTROL SWITCHES AND STATIONS: AS SHOWN ON DRAWINGS

2.03 ENCLOSURES

A. Control Station Enclosure: NEMA ICS 6; Type 1.

2.04 FABRICATION

A. Control Panels: Shop fabricate control panels to NEMA ICS 1, using cabinets and terminal blocks.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install devices and equipment in accordance with manufacturer's instructions.

B. Make electrical wiring interconnections as shown on Drawings.

END OF SECTION

SECTION 01045

CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements and limitations for cutting and patching of Work.

1.02 RELATED SECTIONS

A. Section 01300 - Submittals.

B. Section 01600 - Materials and Equipment: Product Options and Substitutions.

C. Individual Product Specification Sections:
1. Cutting and patching incidental to work of the Section.
2. Advance notification to other Sections of openings required in work of those Sections.
3. Limitations on cutting structural members.

1.03 SUBMITTALS

A. Submit written request in advance of cutting or alteration which affects:
1. Structural integrity of any element of Project.
2. Integrity of weather-exposed or moisture-resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate contractor.

B. Include in request:
1. Identification of Project.
2. Location and description of affected work.
3. Necessity for cutting or alteration.
4. Description of proposed work, and products to be used.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor.
7. Written permission of affected separate
8. Date and time work will be executed.

PART 2 PRODUCTS

2.01 MATERIALS

A. Primary Products: Those required for original installation.

B. Product Substitution: For any proposed change in materials, submit request for substitution under provisions of Section 01600.

PART 3 EXECUTION

3.01 EXAMINATION

A. Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

B. After uncovering existing work, inspect conditions affecting performance of work.

C. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

B. Provide protection from elements for areas which may be exposed by uncovering work.

C. Maintain excavations free of water.

3.03 CUTTING AND PATCHING

A. Execute cutting, fitting, and patching including excavation and fill to complete work.

B. Fit products together, to integrate with other work.

C. Uncover work to install ill-timed work.

D. Remove and replace defective or non-conforming work.

E. Remove samples of installed work for testing when requested.

F. Provide openings in the work for penetration of mechanical and electrical work.

3.04 PERFORMANCE

A. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.

B. Employ original installer to perform cutting and patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.

C. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

D. Restore work with new products in accordance with requirements of Contract Documents.

E. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

F. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.

G. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

END OF SECTION