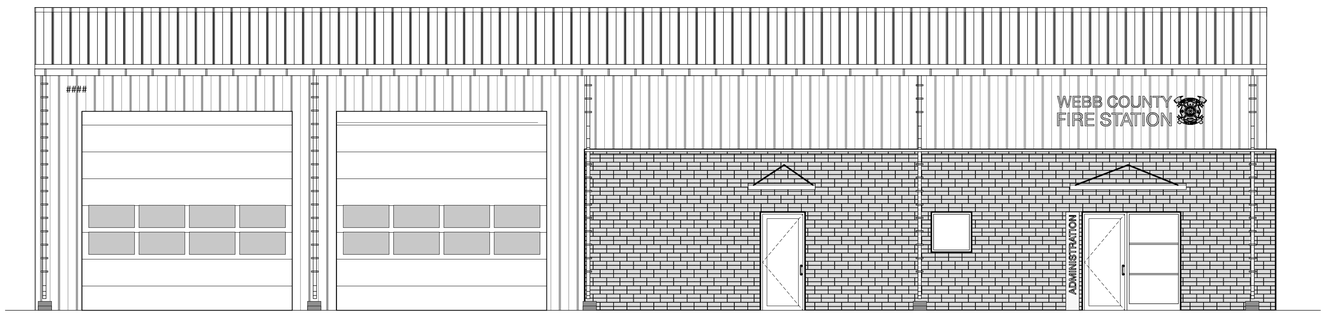
WEBB COUNTY MAIN FIRE STATION AND ADMINISTRATION BUILDING
for
WEBB COUNTY/TEXAS

ABBREVIATIONS

ABV	ABOVE
A/C	AIR CONDITIONING
ACOUS	ACOUSTICAL (AL)
AD	AREA DRAIN
AFF	ABOVE FINISH FLOOR
ALT	ALTERNATE
ALUM	ALUMINUM
ANOD	ANODIZED
AP	ACCESS PANEL
APPROX	APPROXIMATE
AVC	AUDIO VISUAL CONSOLE
BD	BOARD
BLDG	BUILDING
BLKG	BLOCKING
BM	BEAM
BRG	BEARING
BRJ	BRICK RELIEF JOINT
BRZ	BRONZE
BYO	BY OWNER
CAB	CABINET
CAR, CPT	CARPET
CB	CATCH BASIN
CEM	CEMENT
CER	CERAMIC
CHBD	CHALKBOARD
CJ	CONTROL JOINT
CLG	CEILING
CMU	CONCRETE MASONRY UNIT
CLO	CLOSET
CO	CASED OPENING
COL	COLUMN
CONC	CONCRETE
CONT	CONTINUOUS
CONTR	CONTRACT (OR)
CT	CARPET TILE
DET	DETAIL
DECOMP	DECOMPOSED
DF	DRYWALL FURRING
DIM	DIMENSION
DIAM	DIAMETER
DN	DOWN
DP	DRYWALL PARTITION
DR	DOOR
DWG	DRAWING
EA	EACH
EDF	ELECTRIC DRINKING FOUNTAIN
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC	ELECTRICAL
ELEV	ELEVATOR OR ELEVATION
EP	ELECTRICAL PANEL
EQ	EQUAL
EQUIP	EQUIPMENT
EX	EXISTING
EXP	EXPANSION
EXT	EXTERIOR
FD	FLOOR DRAIN
FEC	FIRE EXTINGUISHER CAB
FHC	FIRE HOSE CABINET
FIN	FINISH(ED)
FL	FLOOR
FM	FLOOR MAT
FR	FRAME
FURR	FURRED(IND)
FTVM	FUTURE T.V. MONITOR
GA	GAGE/GAUGE
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GL	GLASS
GR	GROUND ROD ACCESS BOX
GST	GLAZED CERAMIC TILE
GYP	GYPSUM
GWB	GYPSUM WALL BOARD
HC	HANDICAP
HDW	HARDWARE
HM	HOLLOW METAL
HORIZ	HORIZONTAL
HP	HIGH POINT
HT	HEIGHT
ID	INSIDE DIAMETER
INSUL	INSULATION
INT	INTERIOR

INSUL	INSULATION
INT	INTERIOR
JAN	JANITOR
JT	JOINT
JST	JOIST
LAM	LAMINATED
LAV	LAVATORY
LP	LOW POINT
MAX	MAXIMUM
MB	MARKER BOARD
MECH	MECHANICAL
MTL	METAL
MT	METAL THRESHOLD
MFR	MANUFACTURE (OR)
MIN	MINIMUM
MIR	MIRROR
MISC	MISCELLANEOUS
ML	MODULE LINE/MTL LATH
MO	MASONRY OPENING
MOD	MODULE (AR)
MONO	MONOLITHIC
MP	MASONRY PARTITION
MWP	MEMBRANE WATER PROOFING
NIC	NOT IN CONTACT
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OV	OVERHEAD
OPNG	OPENING
OPP	OPPOSITE
O/	ON TOP OF OR OVER
PL	PLATE
PLAS	PLASTER
PLAM	PLASTIC LAMINATE
PLYWD	PLYWOOD
PS	PROJECTION SCREEN
PTD	PAINTED
PTN	PARTITION
PORC	PORCELAIN
R	RISER
R/A	RETURN AIR
RD	ROOF DRAIN
RE:(REF	REFERENCE
REINF	REINFORCE
RM	ROOM
REQ'D	REQUIRED
SCHED	SCHEDULE (D)
SF	SAND FINISH
SHLVS	SHELVES
SHT	SHEET
SIM	SIMILAR
SK	SINK
SM	SMOOTH
SPEC	SPECIFICATIONS/ SPECIFIED
SQ	SQUARE
SS	SERVICE SINK
STL	STEEL
STD	STANDARD
STOR	STORAGE
STRUCT	STRUCTURE (AL)
SUSP	SUSPENDED
T	TREAD
TA	TOILET ACCESSORY
TB	TACKBOARD
TC	TEACHER CLOSET
TEMP	TEMPERED
THK	THICK
TKBD	TACKBOARD
TRANS	TRANSPARENT
TVM	T.V. MONITOR
TBP	T.V. PROJECTOR
TYP	TYPICAL
U	URINAL
UNFIN	UNFINISHED
UNO	UNLESS NOTED OTHERWISE
UV	UNDERFLOOR VENT
VERT	VERTICAL
VC	VALVE CABINET
VIN	VINYL
VP	VISION PANEL
WC	WATER CLOSET
WD	WOOD
WDW	WINDOW
WP	WATERPROOFING
W/	WITH
W/O	WITHOUT



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OWNER:
WEBB COUNTY
1620 SANTA URSULA, 2ND FLOOR
LAREDO, TX 78040
956-523-4055
CONTACT: LUIS PEREZ GARCIA III, PE., C.F.M.

ARCHITECT:
HICKEY PENA ARCHITECTS
919 VICTORIA
LAREDO, TX 78040
956-722-8186
CONTACT: MARIO A. PENA, AIA

MEP:
NRG ENGINEERING
5656 S STAPLES, SUITE 360
CORPUS CHRISTI, TX 78411
361-852-2727
CONTACT: JOHN RODRIGUEZ

STRUCTURAL ENGINEER:
SYNERGY STRUCTURAL ENGINEERING, INC.
6909 SPRINGFIELD AVE. SUITE: 105
LAREDO, TX 78041
956-753-5860
CONTACT: VICTOR DE ANDA

CIVIL ENGINEER:
PEUA CONSULTING L.L.C.
109 E DEL MAR BLVD #5
LAREDO, TX 78041
210-621-5797
CONTACT: OSCAR CASTILLO P.E.

WEBB COUNTY ENGINEERING DEPARTMENT:

APPROVED
WEBB COUNTY _____DATE:_____
LUIS PEREZ GARCIA III, P.E., C.F.M.

LOCATION MAP

HICKEY | PEÑA ARCHITECTS
919 Victoria
Laredo, TX 78040
P 956.722.8186
F 815.846.1546
hickeypena.com

REGISTERED ARCHITECT MARIO A. PEÑA 24898 STATE OF TEXAS
DIGITALLY SIGNED ON 09/28/15

WEBB COUNTY/TEXAS
WEBB COUNTY MAIN FIRE STATION AND ADMINISTRATION BUILDING
7210 E. SAUNDERS – HWY 59 (UNITS A&B)
LAREDO, TEXAS 78045

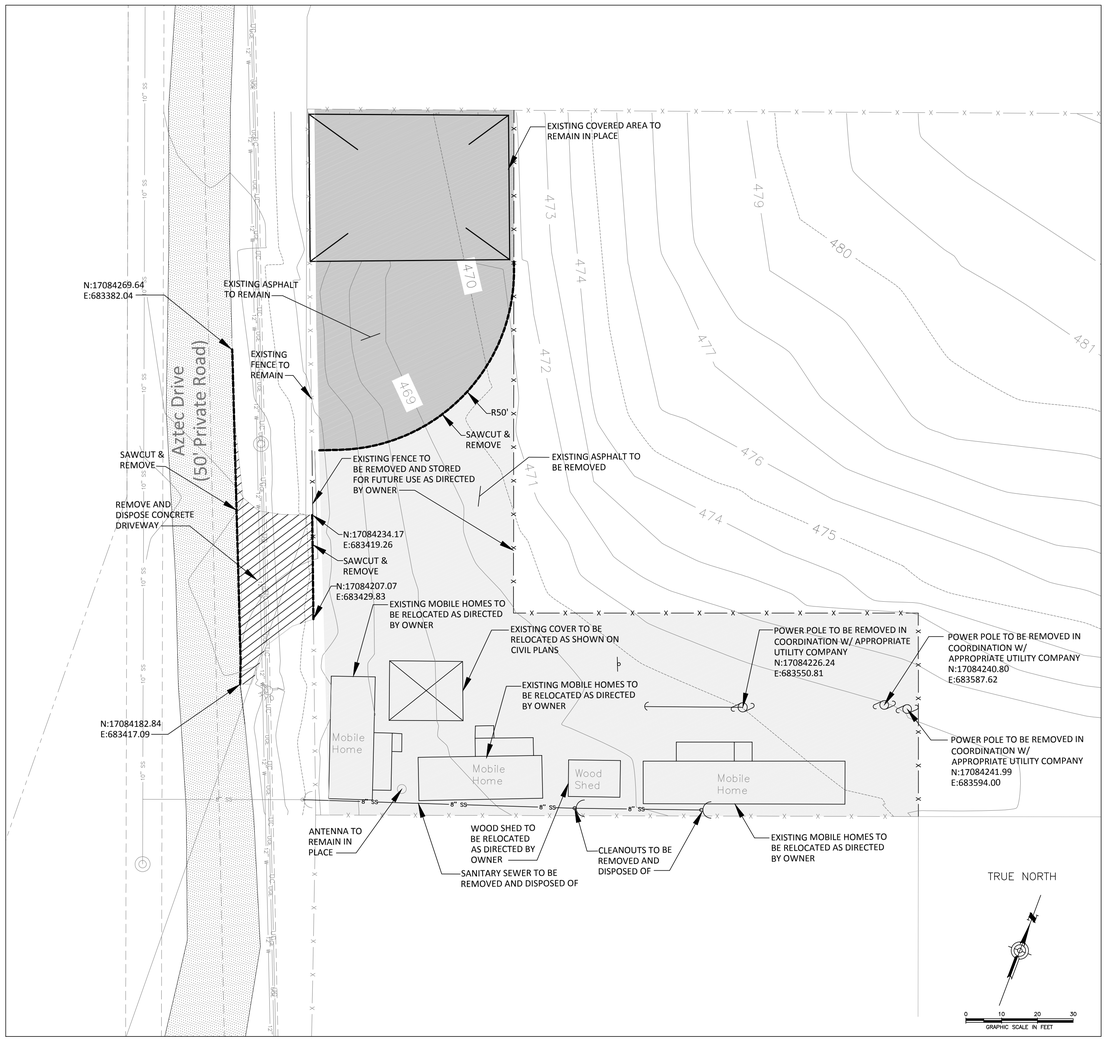
CONSULTANT

PROJECT TITLE SHEET

THESE DRAWINGS AND SPECIFICATIONS ARE AND SHALL REMAIN THE PROPERTY OF THE ARCHITECT. THEY ARE TO BE USED ONLY FOR THIS PROJECT. ALTERED IN ANY WAY WITHOUT PRIOR APPROVAL FROM AND WITH APPROPRIATE COMPENSATION TO THE ARCHITECT.
COPY RIGHT 11/14/14

DATE: 09/28/15
REVISIONS:

SHEET NO.:
T1
JOB NO.: 1312



1 C2.0 **PLAN - DEMOLITION PLAN**
SCALE: 1" = 20'

CONTACT INFORMATION

AEP CONTACT: LINO VILLARREAL OFFICE 956-721-3029 FAX 956-727-2144

AT&T CONTACT: LILY B FARIAS, OFFICE: 956-727-6748, FAX: 956-727-6809.

CENTERPOINT ENERGY CONTACT: ROEL PENA, OFFICE: 956-723-6352.

TIME WARNER CABLE CONTACT: JAVIER EZQUIVEL, OFFICE: 956-235-6318.

LAREDO WATER UTILITIES DEPARTMENT CONTACT: WILLIAM LIM,
OFFICE: 956-721-2000.

CITY OF LAREDO PUBLIC RIGHT OF WAY MANAGER CONTACT:
SANTOS REYES, OFFICE: 956-794-1625.

CITY OF LAREDO TRAFFIC DEPARTMENT (SIGN RELOCATIONS) CONTACT: PETE PAREDES 956-286-6983.

GENERAL DEMOLITION NOTES

1. MATERIAL DISPOSAL - THE CONTRACTOR SHALL NOTIFY THE PUBLIC WORKS DIRECTOR IN WRITING OF PROPOSED MATERIAL DISPOSAL SITES TO BE UTILIZED OUTSIDE OF THE PROJECT LIMITS AND INSIDE THE CITY OF LAREDO.

2. DISPOSAL OF ALL DEMOLISHED MATERIALS IS THE RESPONSIBILITY OF THE CONTRACTOR AND MUST BE OFF-SITE IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL MUNICIPAL REQUIREMENTS.

3. THE CONTRACTOR SHALL PROTECT AND/OR CAP OFF ALL EXISTING ON-SITE UTILITY SERVICES FOUND. SERVICES SHALL BE CAPPED OFF WHERE SAME ENTER THE PERIMETER OF THE PROPERTY LINE.

4. CONTRACTOR SHALL COORDINATE AND GET ALL PERMITS FROM THE CITY OF LAREDO. THIS INCLUDES BUT IS NOT LIMITED TO BUILDING PERMIT, DEMOLITION PERMIT, ROW WORKING PERMIT, AND PLUMBING PERMIT.

5. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AND STRUCTURES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF VARIOUS UTILITY COMPANIES AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THIS INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE LOCATION OF ALL UNDERGROUND UTILITIES AND STRUCTURES SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR MUST CONTACT THE APPROPRIATE UTILITY COMPANY, ANY GOVERNING PERMITTING AUTHORITY, AND "DIG TEST" AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION WORK TO REQUEST EXACT FIELD LOCATION OF UTILITIES INTERFERING WITH THE PROPOSED CONSTRUCTION AND APPROPRIATE REMEDIAL ACTION TAKEN BEFORE PROCEEDING WITH THE WORK. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLAN PER THE APPROPRIATE REMEDIAL ACTION AGREED UPON BY THE ENGINEER.

6. CONTRACTOR SHALL RELOCATE BENCHMARKS AS NECESSARY.

7. CONTRACTOR IS RESPONSIBLE FOR VERIFYING AND LOCATING ALL EXISTING UTILITY LINES AND COORDINATING ALL RELOCATIONS AND REMOVALS WITH EACH UTILITY COMPANY. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES CAUSED BY FAILURE TO LOCATE AND PRESERVE UNDERGROUND UTILITIES.

8. THE CONTRACTOR SHALL REQUEST ALL UTILITIES LINE LOCATION BEFORE PERFORMING ANY EXCAVATION AND SECURE A R.O.W. PERMIT FOR ALL PROPOSED PROJECT IMPROVEMENTS.

9. ALL ELECTRIC, GAS, WATER, STEAM, AND OTHER LINES SHALL BE SHUT OFF, CAPPED OR OTHERWISE CONTROLLED, OUTSIDE THE BUILDING LINE BEFORE DEMOLITION WORK IS STARTED. IN EACH CASE, ANY UTILITY COMPANY WHICH IS INVOLVED SHALL BE NOTIFIED IN ADVANCE.

10. CONTRACTOR SHALL COMPLY WITH OSHA SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION, STANDARD - 29 CFR, 1926.

11. CONTRACTOR SHALL CONTACT UTILITY COMPANIES TO COORDINATE ANY RELOCATION ADJUSTMENT, OR DEMOLITION OF UTILITIES PRIOR TO START ANY WORK.

12. CONTRACTOR SHALL INCLUDE IN HIS BID THE REQUIRED ADJUSTMENTS OF ALL VALVES, VALVE COVERS, MANHOLES LID, FIRE HYDRANTS, CLEANOUTS, TELEPHONE PEDESTALS, PAVEMENT AND SIDEWALK REPLACEMENT, AND ANY OTHER MISC. UTILITY ITEM WHETHER SHOWN ON THESE PLANS OR NOT.

13. CONTRACTOR TO SALVAGE ANY USABLE MATERIALS FOUND ON SITE AND STORE THEM AS DIRECTED BY OWNER.

14. ALL TRAFFIC SIGN RELOCATIONS SHALL BE DONE IN COORDINATION WITH THE CITY OF LAREDO TRAFFIC DEPARTMENT.

15. ANY SIGN RELOCATION SHALL FOLLOW THE LATEST GUIDELINES BY THE CITY OF LAREDO FOR THE SIGN INSTALLATION.

16. ALL THE EXISTING REGULATORY SIGNS MUST BE MAINTAINED AND DISPLAYED AT ALL TIMES.

17. CONTRACTOR IS RESPONSIBLE FOR THE COST INCLUDING INSTALLATION OF PROPOSED OR EXISTING DAMAGED MARKINGS OR SIGNS.

18. CONTRACTOR TO PRESENT TRAFFIC CONTROL PLAN TO ENGINEER AND CITY OF LAREDO OFFICIALS FOR APPROVAL ON SAW CUT AND REMOVAL OF CURB, GUTTER, AND ASPHALT ON ANY PUBLIC STREET.

19. ALL PROPOSED IMPROVEMENTS SHALL FOLLOW THE CITY OF LAREDO STANDARD TECHNICAL SPECIFICATION MANUAL.

LEGEND

- EXISTING PROPERTY BOUNDARY
- EXISTING UTILITY EASEMENT LINE
- EXISTING DRAINAGE EASEMENT LINE
- EXISTING WATER LINE
- EXISTING WATER LINE TO BE REMOVED
- EXISTING STORM DRAIN LINE
- EXISTING SANITARY SEWER LINE
- EXISTING SANITARY SEWER LINE
- EXISTING GAS LINE
- EXISTING TELEPHONE BURIED CABLE
- EXISTING CONTOUR
- EXISTING CHAIN LINK FENCE TO BE REMOVED
- EXISTING CHAIN LINK FENCE TO REMAIN
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING FIRE HYDRANT
- EXISTING POWER POLE
- EXISTING MANHOLE
- EXISTING TRAFFIC SIGN
- EXISTING WATER VALVE
- EXISTING BOLLARD
- EXISTING FOUNTAIN FAUCET
- EXISTING TRAFFIC LIGHT
- EXISTING GAS MARKER
- REMOVE AND DISPOSE
- SAW CUT AND REMOVE

NOTE:
1. CONTRACTOR SHALL VERIFY EXISTING CONDITIONS TO VERIFY DEMOLITION SCOPE AND ADJUST AS NEEDED PRIOR TO DO BID.

CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST 48 HOURS NOTICE BEFORE YOU DIG, DRILL, OR BLAST-STOP, CALL!

TEXAS ONE CALL SYSTEM 1-800-245-4545
AT&T AT 1-800-828-5127
THE LONE STAR NOTIFICATION CENTER 1-800-669-8344
TEXAS EXCAVATION SAFETY SYSTEM 1-800-344-8377

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STATE OF TEXAS
OSCAR CASTILLO
95620
LICENSED PROFESSIONAL ENGINEER
01/28/16

WEBB COUNTY/TEXAS
WEBB COUNTY MAIN FIRE
ADMINISTRATION BUILDING
7210 E. SAUNDERS - HWY 59 (UNITS A & B)
LAREDO, TEXAS 78045

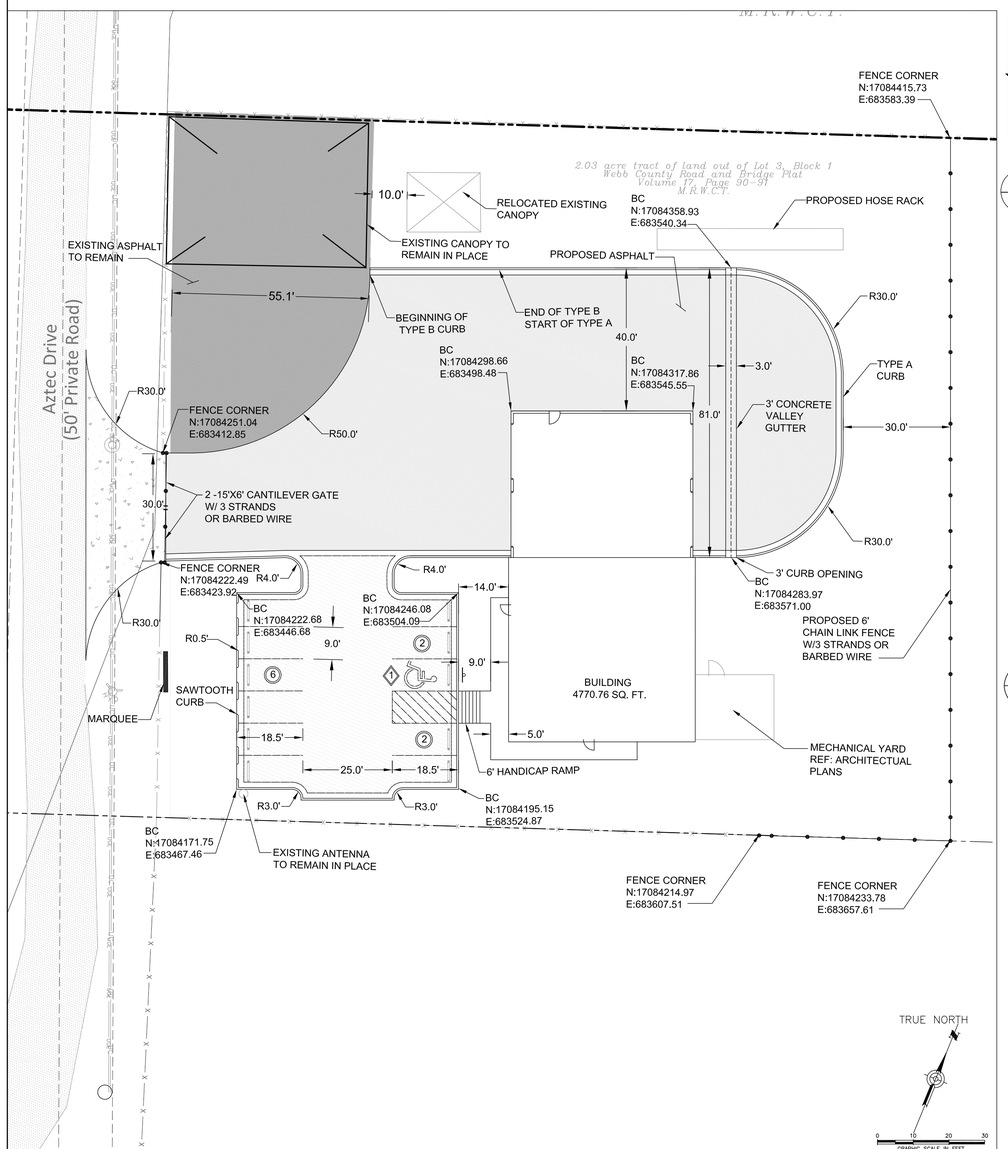
pena consulting llc
Registration Number F-14954
600 San Bernardo, Suite 902
Laredo, Texas 78040
(956) 6433-2205 tel.

Webb County, Texas
Webb County Main Fire Station
and Administration Building
Laredo, Texas

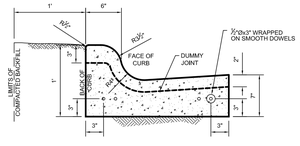
DATE: 09/23/15
REVISIONS:

DEMOLITION

SHEET NO.:
C1.0
JOB NO.: 2014.008

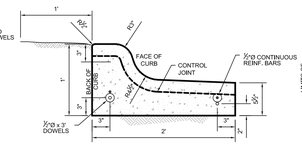


1 PLAN - SITE PLAN
SCALE: 1" = 20'

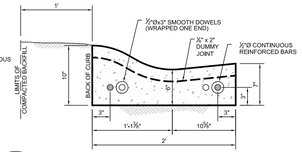


2 TYPE "A" CURB & GUTTER
SCALE: NOT TO SCALE

&



TYPE "A" REVERSE CURB & GUTTER
SCALE: NOT TO SCALE



3 TYPE "B" ROLL OVER CURB & GUTTER
SCALE: NOT TO SCALE

RAMP NOTES:
1. SIDEWALKS ARE TO BE CONSTRUCTED AS PER PLAN SPECIFICATIONS AGAINST THE BACK CURB, EXCEPT WHERE A DETOUR AROUND A NON RE-LOCATABLE OBJECT IS REQUIRED
2. SIDEWALKS ARE TO BE CONSTRUCTED 4-INCHES THICK WITH 6"X6" D5.0xD5.0 W.W.F. REINFORCEMENT.
3. CONCRETE SHALL BE CLASS "A" (3000 PSI)
4. ONE-HALF (½) INCH THICK MINIMUM, PRE-FORMED BITUMINOUS EXPANSION JOINT MATERIAL SET ¾" BELOW FINISHED SURFACE, SHALL BE INSTALLED AT EXPANSION JOINTS
5. DOWELS SHALL BE PLAIN BARS AND SHALL HAVE ONE-HALF (½) THE BAR WRAPPED WITH 2 LAYERS OF ROOFING FELT
6. 6" x 6" No. 6 WIRE MESH SHALL BE USED AS REINFORCEMENT (ALT. 2 LAYER 6" x 6" No. 10 ACCEPTABLE)
7. THE FINISH SHALL BE SEMI-SMOOTH WITH A STIFF BROOM OR BRUSH FINISH
8. CONTRACTION JOINTS SHALL BE SCORED AT SPACING EQUAL TO WIDTH OF SIDEWALK
9. EXPANSION JOINT AT MAX. 80' WITH FOUR 18" SMOOTH DOWEL AND ½" MIN. PRE-FORMED BITUMINOUS EXPANSION JOINT MATERIAL
10. USE FULL DEPTH FORMS TO THE DIMENSIONS SPECIFIED

NOTES:

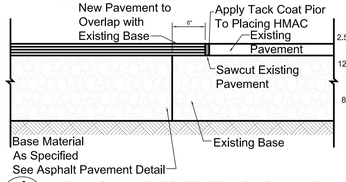
1. ALL DIMENSIONS ARE TO THE BACK OF CURB UNLESS STATED OTHERWISE ON THE PLANS.

2. PROPERTY LINES INFORMATION TAKEN FROM SURVEY MAP COMPLETED ON SEPTEMBER 16, 2015 BY BLUE TOP LAND SURVEYING (956) 724-8423.

3. CONTRACTOR SHALL ADJUST ACCESSIBLE ROUTE BETWEEN BUILDING AND ROW TO COMPLY WITH ADA REQUIREMENTS.

4. ALL PAVEMENT STRIPING SHALL BE 4" WIDE SOLID YELLOW PAINT STRIPE, UNLESS NOTED OTHERWISE.

5. ALL THE EXISTING REGULATORY TRAFFIC SIGNS MUST BE MAINTAIN DISPLAYED AT ALL TIMES.



4 NEW ASPHALT TO EXISTING ASPHALT
SCALE: NOT TO SCALE

REINFORCED CONCRETE
Reinforced concrete should have a minimum 28-day design compressive strength of 4,000 psi. The concrete should be properly cured in accordance with American Concrete Institute (ACI) recommended procedures and vehicular traffic should not be allowed for at least three (3) days (light traffic) or seven (7) days (heavy traffic).

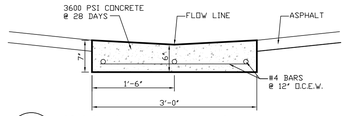
MOISTURE CONDITIONED SUBGRADE
The subgrade should be scarified to a depth of at least eight (8) inches and moisture conditioned at moisture contents ranging between minus two (-2) to plus three (+3) percentage points of the optimum moisture content. The subgrade should then be compacted to at least 95 percent of the maximum dry density determined in accordance with ASTM D-698, *The subgrade should be moisture conditioned just prior to fill placement in order that the subgrade maintains its compaction moisture levels and does not dry out.*

FLEXIBLE BASE COURSE
Base material may be composed of crushed stone base meeting all of the requirements of 2014 TxDOT Standard Specification manual item 247, Type "A", Grades 1 - 2. As an alternate to the Type "A" base material, caliche (treated with lime or cement) should meet the requirements for item 247, Type "B", Grades 1 through 3 as specified in the 2014 TxDOT Standard Specifications manual. In addition the percentage passing No.200 sieve should not exceed 20 percent.

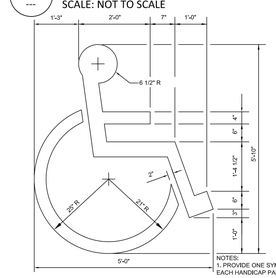
HOT MIX ASPHALTIC CONCRETE (HMAC)
We recommend that the asphaltic concrete surface course should meet 2014 TxDOT Standard Specificiations Item 341 and Item SS 3224 (2011), Type "C" or "D" and its specific criteria for the Job Mix Formula (JMF). The Super Pave Gyratory, design number of revolutions (Nesv) for the asphaltic mix should be in accordance with TEX-241-F. The Performance Graded (PG) binders should be PG 64-22 for the traffic light, or should be at least PG 70-22 for the truck areaas and high traffic volume, These binders provide 98 percent reliability against rutting and 98 percent reliability against low temperature thermal cracking to accommodate slow moving, to prevent rutting because of the turning movements and stop and go traffic.
The mix should be compacted to between 91 and 95 percent of the maximum theoretical density as measured by TEX-207-F and TEX-227-F, The asphalt cement content by percent of total mixture weight should fall within a tolerance of ± 0.3 percent asphalt cement from the specific mix. Aggregates known for stripping should not be used unless measures are taken to address this concern. Typically, this includes the use of an anti-strip agent. The mix should have at least 70 percent strength retention when tested in accordance with TEX-531-C.

NOTE TO THE CONTRACTOR
Contractor to refer to Geotechnical Engineering Study Pavement Design for Webb County Main Fire Station and Administration Building, Laredo, Texas prepared on, September 09, 2015 by Castle Engineering & Testing LLC Report No. 15Q047.

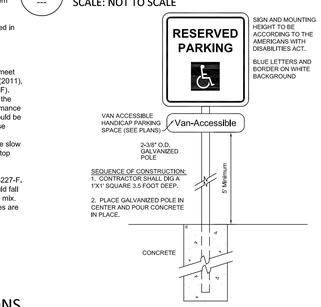
6 CONCRETE PAVEMENT SECTIONS
SCALE: NOT TO SCALE



5 3' CONCRETE VALLEY GUTTER
SCALE: NOT TO SCALE



8 PAINTED ACCESSIBLE PARKING SYMBOL
SCALE: NOT TO SCALE



SEQUENCE OF CONSTRUCTION:
1. CONTRACTOR SHALL DIG A 1'X1' SQUARE 3.5 FOOT DEEP.

2. PLACE GALVANIZED POLE IN CENTER AND POUR CONCRETE IN PLACE.

7 TYPICAL SIDEWALK SECTION
SCALE: NOT TO SCALE

9 HANDICAP PARKING SIGN
SCALE: NOT TO SCALE

CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTEPARTS REQUEST
48 HOURS NOTICE BEFORE YOU DIG, DRILL, OR BLAST-STOP, CALL!

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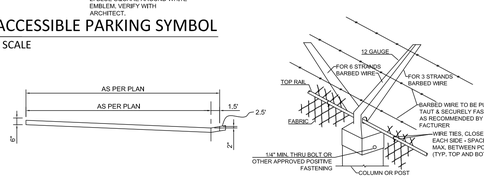
THE LONE STAR NOTIFICATION CENTER 1-800-669-8344
TEXAS EXCAVATION SAFETY SYSTEM 1-800-344-8377

LEGEND

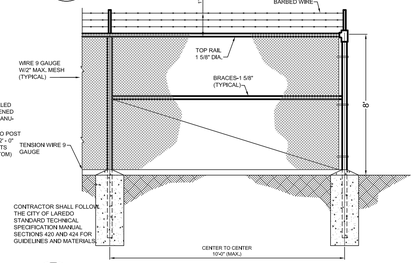
- EXISTING PROPERTY BOUNDARY
- EXISTING RIGHT-OF-WAY LINE
- EXISTING LOT LINE
- EXISTING BUILDING SETBACK
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING FIRE HYDRANT
- EXISTING FIRE HYDRANT
- EXISTING POWER POLE
- EXISTING SIGN
- EXISTING CHAIN LINK FENCE
- PROPOSED BOUNDARY LINE
- PROPOSED BUILDING SETBACK
- PROPOSED FIRE LANE STRIPING
- PROPOSED TYPE "A" CURB AND GUTTER
- PROPOSED WHEEL STOP
- PROPOSED SIGN
- PROPOSED CONCRETE PAVEMENT
- NEW ASPHALT
- EXISTING ASPHALT
- BLK — BLOCK
- BC — BACK OF CURB
- (1) — DESIGNATION NUMBER OF REGULAR PARKING SPACES
- (2) — DESIGNATION NUMBER OF HANDICAP PARKING SPACES

PARKING SPACES COUNT

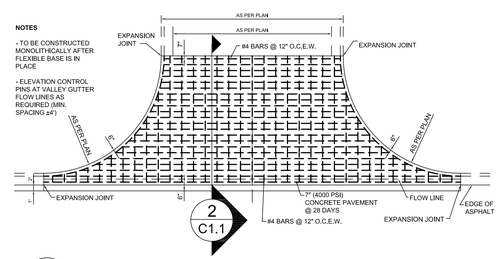
REGULAR	10
HANDICAP	1
TOTAL:	11

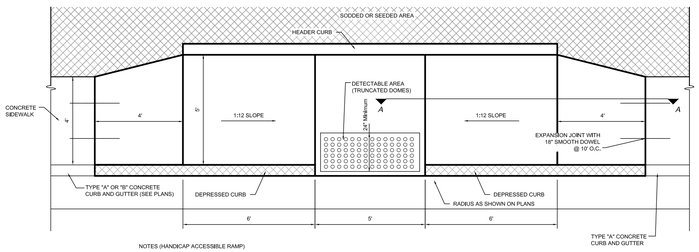


10 TYPICAL CONCRETE CURB AND VALLEY GUTTER
SCALE: 1" = 10'



11 TYPICAL CHAIN LINK FENCE
SCALE: NOT TO SCALE



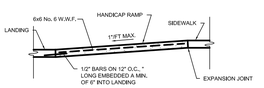


NOTES (HANDICAP ACCESSIBLE RAMP)

- FULL DEPTH COLORED CONCRETE SHALL BE USED AT ALL RAMPS. THE CONCRETE SHALL BE MIXED INTO THE PAINT PRIOR TO POURING. THE COLOR SHALL BE AS DIRECTED BY THE CITY OF LAREDO ENGINEERING DEPARTMENT. A FINISHED TEXTURE IN COMPLIANCE WITH TDLR REQUIREMENTS SHALL BE USED AT ALL RAMPS.

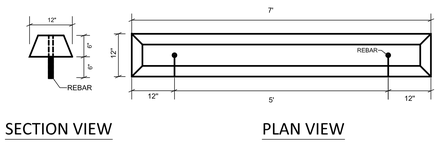
- DURING CONSTRUCTION, THE LOCATION OF THE CONCRETE ACCESS RAMP MAY BE SHIFTED FROM THE PROPOSED LOCATION DUE TO UNFORESEEN EXISTING CONDITIONS WITH ENGINEER APPROVAL.

- CONTRACTOR SHALL BLOCK AND POUR RAMP SEPARATE FROM SIDEWALK AND RAMP WINGS.



SECTION "A-A" (TYP.)

13 TYPICAL SINGLE ACCESS HC RAMP
SCALE: NOT TO SCALE



SECTION VIEW PLAN VIEW

12 TYPICAL WHEEL STOP
SCALE: NOT TO SCALE

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LICENSED PROFESSIONAL ENGINEER
9/28/15

WEBB COUNTY/TEXAS
WEBB COUNTY MAIN FIRE
ADMINISTRATION BUILDING
7210 E. SAUNDERS - HWY 59 (UNITS A & B)
LAREDO, TEXAS 78045

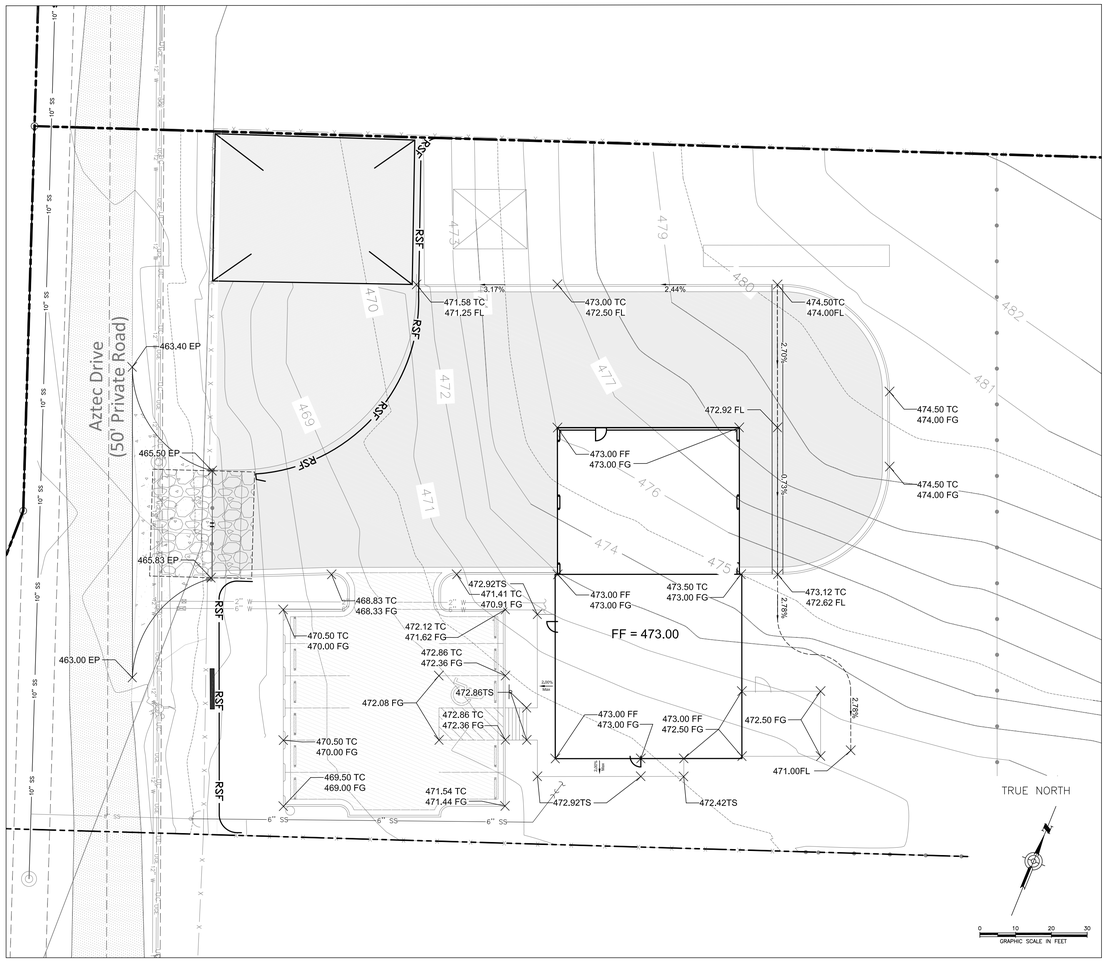
CONSULTANT
peuca consulting llc
Registration Number F-14954
600 San Bernardo, Suite 902
Laredo, Texas 78040
(956) 6433-2205 tel.

Webb County Texas
Webb County Main Fire Station
and Administration Building
Laredo, Texas

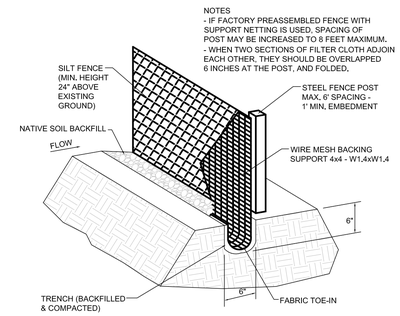
DATE: 09/23/15
REVISIONS:

SITE PLAN

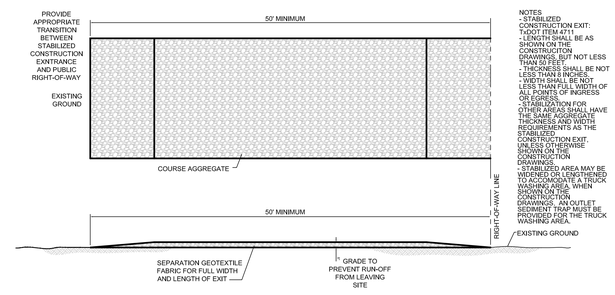
SHEET NO.:
C2.0
JOB NO.: 2014.008



1 PLAN - GRADING & SWPP PLAN
SCALE: 1" = 20'



2 REINFORCED SILT FENCE
SCALE: NOT TO SCALE



3 TYPICAL STABILIZED CONSTRUCTION EXIT
SCALE: NOT TO SCALE

LEGEND

OH	EXISTING OVERHEAD LINE
G	EXISTING GAS LINE
UBC	EXISTING AT&T LINE
W	EXISTING WATER LINE
SS	EXISTING SANITARY SEWER
	EXISTING WATER SERVICE
	EXISTING SS SERVICE
SS	PROPOSED SANITARY SEWER
WL	PROPOSED WATER LINE
	EXISTING CONTOUR
	EXISTING HALF-CONTOUR
435	PROPOSED CONTOUR
RSF	PROPOSED REINFORCED SILT FENCE
	PROPOSED ROCK RIP-RAP
	PROPOSED BOUNDARY
	PROPOSED RIGHT OF WAY
	FLOW ARROW
	EXISTING FIRE HYDRANT
	EXISTING POWER POLE
	EXISTING MANHOLE
	EXISTING TRAFFIC SIGN
	EXISTING WATER VALVE
	EXISTING BOLLARD
	EXISTING FOUNTAIN FAUCET
	EXISTING TRAFFIC LIGHT
	EXISTING CONCRETE

LEGEND

TC:	Top of Curb
FL:	Flow Line
TW:	Top of Retaining Wall
TS:	Top of Sidewalk
FG:	Finish Grade
FF:	Finish Floor
EP:	Edge of Pavement
	Flow Line Path
	Grade Change
	Flow Arrow
	Existing Contour
	Existing Half-Contour

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48 HOURS NOTICE BEFORE YOU DIG, DRILL, OR BLAST-STOP, CALL!

TEXAS ONE CALL SYSTEM 1-800-245-4545
AT&T AT 1-800-828-5127
THE LONE STAR NOTIFICATION CENTER 1-800-669-8344
TEXAS EXCAVATION SAFETY SYSTEM 1-800-344-8377

STORMWATER POLLUTION PREVENTION NOTES:

Permit Filing
Contractor must complete and file TCEQ forms as required by the General Permit No. TXR150000 associated with construction activity coverage under the TPDES General Permit for storm water discharges associated with construction activity in compliance with EPA requirements.

Sequence of Construction
The general order of activities will be as follows:
1. Clear and grub for perimeter control (silt fences).
2. Install all perimeter controls, downstream of any construction activity.
3. Install construction entrances and exits to be used while working in the area at the locations shown on the plan, or as approved by the Engineer.
4. General site grading; stabilize disturbed areas and stockpiles within seven (7) days.
5. General project construction; site grading, excavation, and filling construction of amenities.
6. When all construction is complete and is stabilized and approved by the Project Engineer, remove temporary structural controls and regrade any areas disturbed by their removal.

Storm Water Management
Storm water drainage will be through curb and gutter flow, into an underground storm drainage system, that connects to the City Drainage System.

General Notes
1. Contractor shall follow the requirements for temporary and permanent erosion control as outlined on the plans and specifications.
2. A copy of the storm water pollution prevention plan (SWPPP) shall be kept on the construction site at all times.
3. Silt fence and gravel entrances must be installed prior to proceeding with any construction.
4. After inlets are installed, they shall be protected by either silt fence or gravel filter (as detailed) until the completion of the project, and maintained until the project site is stabilized.
5. Gravel entrance as shown may be relocated if approved by the Engineer.

TRENCH EXCAVATION PROTECTION
CONTRACTOR AND/OR CONTRACTORS INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/GEOTECHNICAL/SAFETY/EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND ANY AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITE(S) WITHIN THE PROJECT WORK AREA IN ORDER TO DEVELOP THE CONTRACTOR'S PLANS TO IMPLEMENT THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S PLANS SHALL PROVIDE FOR ADEQUATE TRENCH SAFETY SYSTEMS THAT COMPLY WITH MINIMUM OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR OF CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL DEVELOP AND IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.

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WEBB COUNTY/TEXAS
WEBB COUNTY MAIN FIRE ADMINISTRATION BUILDING

7210 E. SAUNDERS - HWY 59 (UNITS A & B)
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peuci consulting llc
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(956) 6433-2205 tel.

Webb County Texas
Webb County Main Fire Station
and Administration Building
Laredo, Texas

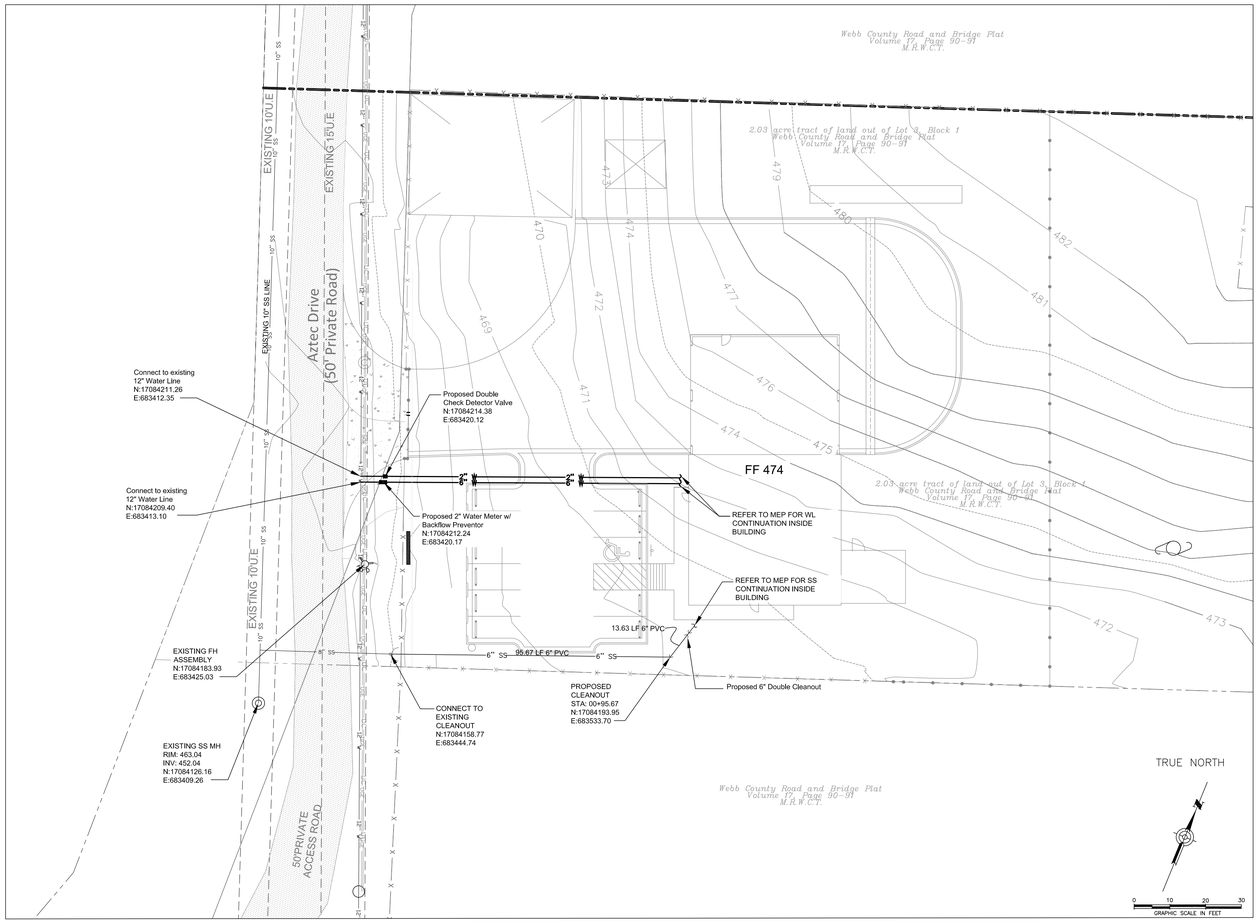
DATE: 09/23/15
REVISIONS:

GRADING & SWPP PLAN

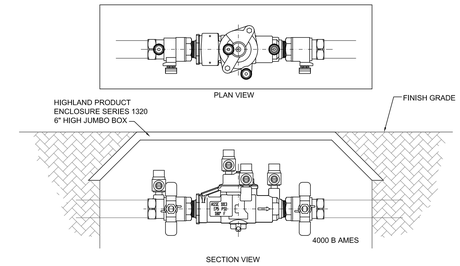
SHEET NO.:
C3.0
JOB NO.: 2014.008

LEGEND

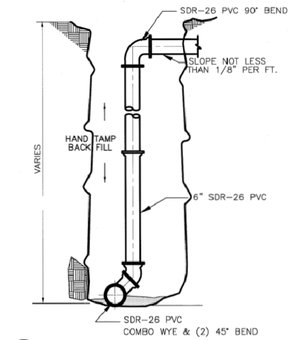
OH	EXISTING OVERHEAD LINE
G	EXISTING GAS LINE
ATT	EXISTING AT&T LINE
6" W	EXISTING WATER LINE
10" W	EXISTING SANITARY SEWER
415.0'	EXISTING CONTOUR
	EXISTING FIRE HYDRANT
	EXISTING TRAFFIC LIGHT
2"W	PROPOSED 2" WATER LINE
6" W	PROPOSED 6" WATER LINE
435	PROPOSED CONTOUR
	PROPOSED BOUNDARY LINE



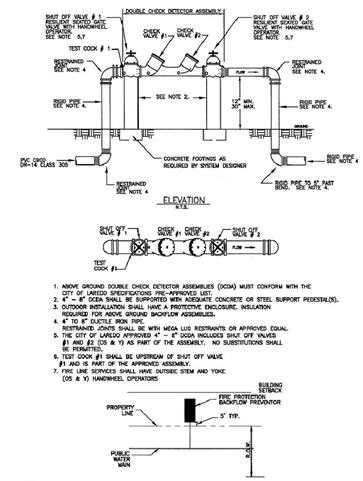
1 - PLAN - UTILITIES PLAN
SCALE: 1" = 20'



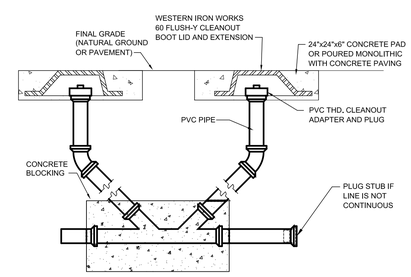
1 - BACKFLOW PREVENTOR
SCALE: NOT TO SCALE



2 - STACKED BRANCH SEWER SERVICE
SCALE: NOT TO SCALE



3 - 6" DOUBLE CHECK DETECTOR ASSEMBLY
SCALE: NOT TO SCALE



4 - DOUBLE CLEANOUT
SCALE: NOT TO SCALE

NOTES:
1. REFER TO MEP PLANS FOR WATER AND SS SERVICE CONNECTIONS BETWEEN R.O.W. AND BUILDING.

2. SITE CONTRACTOR TO COORDINATE WITH MEP CONTRACTOR(S) FOR ALL UTILITY CONNECTIONS INCLUDING BUT NOT LIMITED TO GAS, TELEPHONE COMMUNICATION, AND POWER PRIOR TO STARTING CONSTRUCTION.

UTILITIES, GENERAL NOTES

1. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AND STRUCTURES AS SHOWN ON THESE PLANS IS BASED ON RECORDS FROM VARIOUS UTILITY COMPANIES AND WHERE POSSIBLE, MEASUREMENTS TAKEN ON THE FIELD. THIS INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE LOCATION OF ALL UNDERGROUND UTILITIES AND STRUCTURES SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR MUST CONTACT THE APPROPRIATE UTILITY COMPANY, ANY GOVERNING PERMITTING AUTHORITY, AND "DIG TEST" AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION WORK TO REQUEST EXACT FIELD LOCATION OF UTILITIES INTERFERING WITH THE PROPOSED CONSTRUCTION AND APPROPRIATE REMEDIAL ACTION TAKEN BEFORE PROCEEDING WITH THE WORK. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLAN PER THE APPROPRIATE REMEDIAL ACTION AGREED UPON BY THE ENGINEER.

2. A MINIMUM OF 10-FOOT HORIZONTAL CLEARANCE SHALL BE MAINTAINED BETWEEN SANITARY SEWER MAINS AND WATER MAINS, WHENEVER CONDITIONS PREVENT A LATERAL SEPARATION OF 10 FEET TO A WATER MAIN, THE WATER MAIN SHALL BE LAID IN A SEPARATE TRENCH AND THE ELEVATION OF THE CROWN OF THE SEWER SHALL BE AT LEAST 18 INCHES BELOW THE INVERT OF THE WATER MAIN.

3. ALL WATER MAIN AND SEWER MAIN APPURTENANCES, MATERIALS, METHODS OF INSTALLATION AND TESTING REQUIREMENTS, SHALL MEET OR EXCEED THE CITY OF LAREDO, STANDARD TECHNICAL SPECIFICATION MANUAL.

4. THE CONTRACTOR SHALL REQUEST ALL UTILITIES LINE LOCATION BEFORE PERFORMING ANY EXCAVATION, AND SECURE A R.O.W. PERMIT FOR ALL PROPOSED PROJECT IMPROVEMENTS.

5. ALL EXISTING VALVES, FIRE HYDRANTS, WATER SERVICES, METER BOXES, MANHOLES, CLEAN OUTS, SHALL BE ADJUSTED TO NEW FINISH GRADE ON THE R.O.W.

6. THE CONTRACTOR SHALL PROTECT AND/OR CAP OFF ALL EXISTING ON-SITE UTILITY SERVICES DESIGNATED ON THESE DRAWINGS. SERVICES SHALL BE CAPPED OFF WHERE SAME ENTER THE PERIMETER OF THE PROPERTY LINE.

7. WHERE A STATE OR LOCAL MUNICIPAL STANDARD DETAIL DUPLICATES A DETAIL SHOWN IN THE PLANS, THE MORE STRINGENT DETAIL, AS DETERMINED BY THE REVIEWING AGENCY, SHALL APPLY.

8. CONTRACTOR SHALL RELOCATE BENCHMARKS AS NECESSARY.

9. CONTRACTOR IS RESPONSIBLE FOR VERIFYING AND LOCATING ALL EXISTING UTILITY LINES AND COORDINATING ALL RELOCATIONS AND REMOVALS WITH EACH UTILITY COMPANY. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES CAUSED BY FAILURE TO LOCATE AND PRESERVE UNDERGROUND UTILITIES.

10. REFER TO MEP PLANS FOR THE UTILITY TRENCHING DETAIL FOR ALL UTILITIES WITH IN THE SITE.

11. THE BACKFLOW PREVENTION FOR ANY PROPOSED IRRIGATION SYSTEM SHALL BE A RPBA ASSEMBLY AMES 4000 SS OR APPROVED EQUAL.

12. ALL PROPOSED IMPROVEMENTS SHALL FOLLOW THE CITY OF LAREDO STANDARD TECHNICAL SPECIFICATION MANUAL.

WATER

1. DOMESTIC WATER SERVICE SHALL BE INSTALLED WITH APPROPRIATELY SIZED GATE VALVE(S), AND FITTINGS AS PER CITY OF LAREDO REQUIREMENTS.

2. DUCTILE IRON PIPE OR CONCRETE ENCASEMENT IS REQUIRED AT ALL STORM SEWER CROSSINGS.

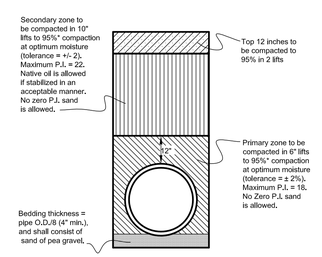
3. WATER LINES SHALL BE ROUTED AROUND STORM DRAIN INLETS WITH A MINIMUM OF 12" CLEARANCE.

4. ALL BACK FLOW PREVENTORS SHALL MEET OR EXCEED REQUIREMENTS FROM THE CITY OF LAREDO WATER UTILITIES DEPARTMENT.

SEWER

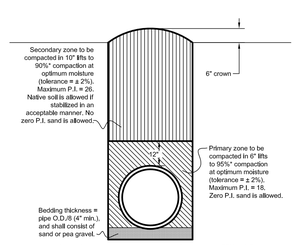
1. ALL SANITARY SEWER PIPE SHALL BE SDR-26 PVC (ASTM D-3034) OR (ASTM F 789) FOLLOWING SECTION 202, PVC SEWER PIPE OF THE CITY OF LAREDO, STANDARD TECHNICAL SPECIFICATION MANUAL.

CONTACTS
1. AEP CONTACT: LINO VILLARREAL OFFICE 956-721-3029 FAX 956-727-2144
2. AT&T CONTACT: LILY B. FARIAS, OFFICE: 956-727-6748, FAX: 956-727-6809.
3. CENTERPOINT ENERGY CONTACT: ROEL PEÑA, OFFICE: 956-723-8352.
4. TIME WARNER CABLE CONTACT: JAVIER EZQUIVEL, OFFICE: 956-235-6318.
5. LAREDO WATER UTILITIES DEPARTMENT CONTACT: MARCO GUTIERREZ. OFFICE: 956-721-2000.
6. CITY OF LAREDO PUBLIC RIGHT OF WAY MANAGER CONTACT: SANTOS REYES, OFFICE: 956-794-1625.
7. CITY OF LAREDO TRAFFIC DEPARTMENT (SIGN RELOCATIONS) CONTACT: PETE PAREDES 956-286-6983



*Note: All compaction testing shall be performed as per TEX-113-E.
All backfill material shall be free of rocks in excess of 3" in any direction.

5 - UTILITY TRENCH CONDITION "A" WITHIN PAVED AREAS
SCALE: NOT TO SCALE



*Note: All compaction testing shall be performed as per TEX-113-E.
All backfill material shall be free of rocks in excess of 3" in any direction.

6 - UTILITY TRENCH CONDITION "B" WITHIN THE R.O.W. OUTSIDE OF PAVED AREA
SCALE: NOT TO SCALE

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WEBB COUNTY/TEXAS
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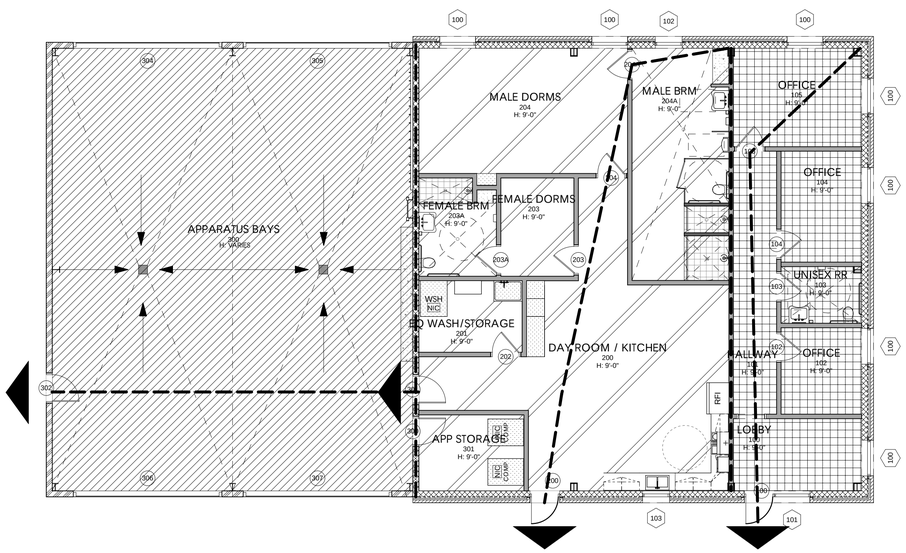

1 CODE REVIEW

SCALE: 1/8" = 1'-0"

APPLICABLE CODE: 2012 INTERNATIONAL BUILDING CODE REVIEW SUMMARY

TOTAL GROSS BUILDING AREA..... 4771 SQ FT

OCCUPANCY CLASSIFICATION
RESIDENTIAL/ADMINISTRATION BUILDING AS PER SECTIONS 304., 310.3, AND 311.2.....
MIXED USE B, R1, & S1

ALLOWABLE BUILDING HEIGHTS AND AREAS AS PER TABLE 503
TYPE II B = 16,000 S.F. PER FLOOR
AS PER SECTION 506
$A=\{A_t+(A_t \times L_t) + (A_t \times L_t)\}$
$A=\{A_t+(A_t \times L_t) + (A_t \times L_t)\} = 60{,}000$ SF PER FLOOR

TOTAL OCCUPANT LOAD..... 106 OCCUPANTS

CONSTRUCTION TYPE.....TYPE II
AS PER TABLE 601 SECTION 602.4

FIRE SPRINKLER SYSTEM .....SPRINKLED

AS PER SECTION 903.2.1.3 OF IBC CODE, THE BUILDING IS NOT REQUIRED TO BE SPRINKLED.
AS PER CITY OF LAREDO FIRE CODE AMENDMENT, THE BUILDING IS REQUIRED TO BE SPRINKLED

FIRE SEPARATION ..... ½ HR RATING
AS PER SECTION 708.3 R1

EGRESS WIDTH .....57.6"
AS PER SECTION 1005.3.2
288 OCCUPANTS X 0.2IN = 69.2"

FIRE CORRIDOR REQUIREMENTS..... 0 HOUR
AS PER TABLE 1018.1

FIRE ALARM REQUIREMENT..... PROVIDED
AS PER SECTION 907.2
PROVIDED AS AN ACCESSORY TO AUTOMATIC SPRINKLERS

FIRE EXTINGUISHERS..... CLASS "A"
AS PER ABLE 906.3
MAX TRAVEL DISTANCE =75'
MAX S.F. = 11,250 S.F.

PLUMBING FIXTURES
A_M 29 OCCUPANTS / 125 = 0.232 MALE WATER CLOSET
A_F 29 OCCUPANTS / 125 = 0.232 FEMALE WATER CLOSET
B_M 8.5 OCCUPANTS / 25 = 0.34 MALE WATER CLOSET
B_F 8.5 OCCUPANTS / 25 = 0.34 FEMALE WATER CLOSET
ADMINISTRATION AREA REQUIRED TOTAL= 1 FEMALE AND 1 MALE
S & R_M 11 OCCUPANTS / 10 = 2 MALE WATER CLOSET - (4 PROVIDED)
S & R_F 2 OCCUPANTS / 10 = 1 FEMALE WATER CLOSET -(1 PROVIDED)
109 OCCUPANTS / 500 = 1 DRINKING FOUNTAIN
MAX TRAVEL DISTANCE = 500' AS PER 2902.3.2

FUNCTION OF SPACE OCCUPANT LOADS AND LEGEND
AS PER TABLE 1004.1.2

ACCESSORY STORAGE AND MECH AREAS..... 290 SQ FT / 300 = 1 OCCUPANTS

APPARATUS AREAS1 ..... 1,996 SQ FT = 15 OCCUPANTS
AS PER SECTION 1004.1.2 EXCEPTION: WHERE APPROVED BY THE BUILDING OFFICIAL, THE ACTUAL NUMBER OF OCCUPANTS FOR WHOM EACH OCCUPIED SPACE, FLOOR OR BUILDING IS DESIGNED, ALTHOUGH LESS THAN THOSE DETERMINED BY CALCULATION, SHALL BE PERMITTED TO BE USED IN THE DETERMINATION OF THE DESIGN OCCUPANT LOAD.

BUSINESS AREAS (OFFICES) B..... 712 SQ FT/ 50= 14 OCCUPANTS

RESIDENTIAL R1..... 1,716 SQ FT/ 200 = 9 OCCUPANTS

TOTAL..... 39 OCCUPANTS

½ FIRE RATE WALL

EGRSS DIRECTION LENGTH

EGRESS PATH EXIT DOOR

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Laredo, TX 78040
P 956.722.8186
F 815.846.1546
hickeypena.com

REGISTERED ARCHITECT MARIO A. PEÑA 24018 STATE OF TEXAS
DIGITALLY SIGNED ON 09/28/15

WEBB COUNTY/TEXAS
WEBB COUNTY MAIN FIRE STATION
AND ADMINISTRATION BUILDING
7210 E. SAUNDERS – HWY 59 (UNITS A&B)
LAREDO, TEXAS 78045

CONSULTANT

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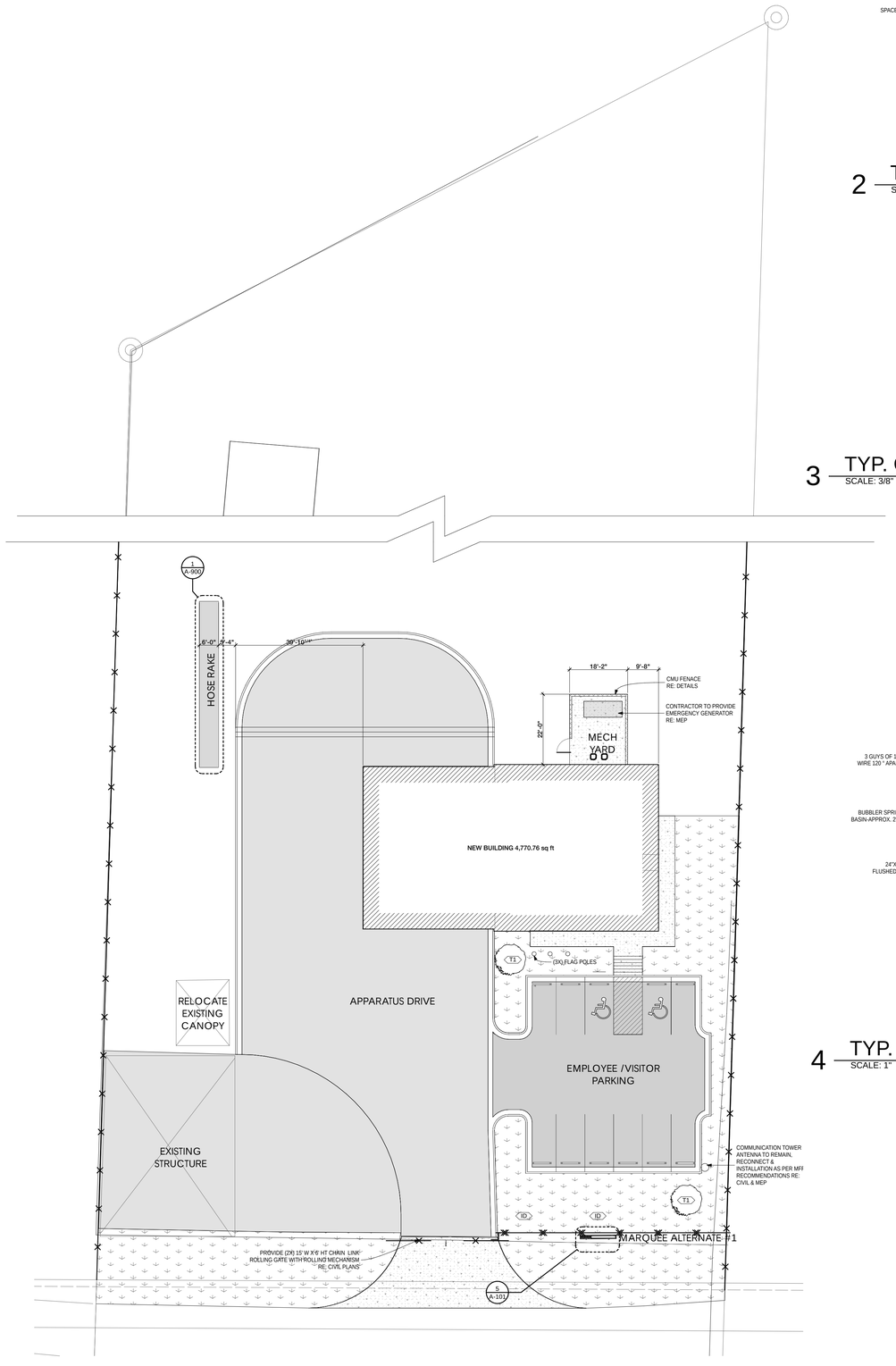
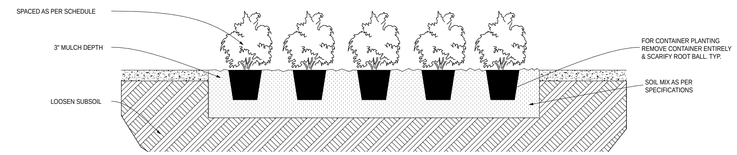
DATE: 09/28/15
REVISIONS:

CODE REVIEW

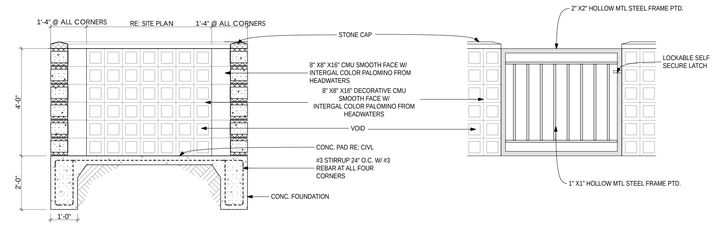
SHEET NO.:
A-0.1
JOB NO.: 1312



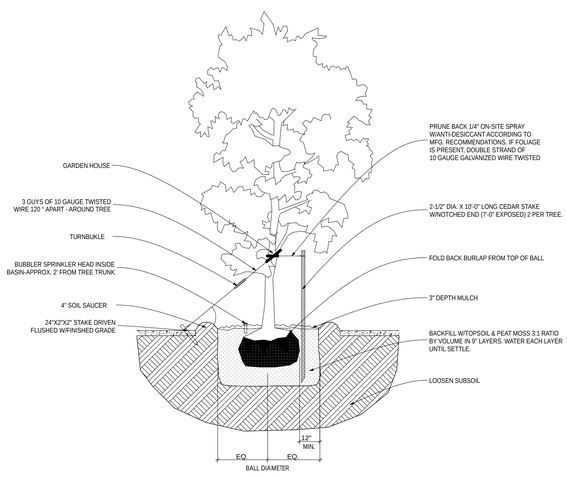
1 SITE PLAN
SCALE: 1" = 20'



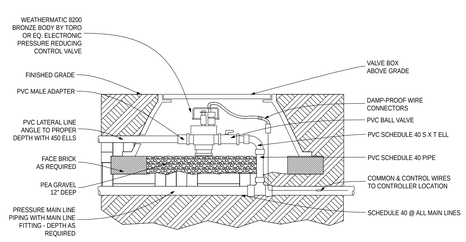
2 TYP. SHRUB PLANTING DETAIL
SCALE: 1" = 1'-0"



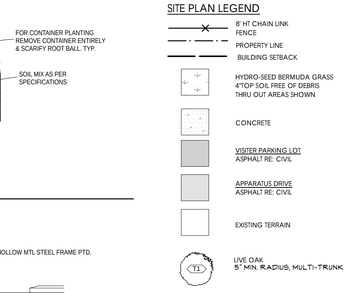
3 TYP. CMU WALL @ MECHANICAL YARD
SCALE: 3/8" = 1'-0"



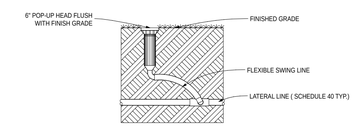
4 TYP. TREE PLANTING DETAIL
SCALE: 1" = 1'-0"



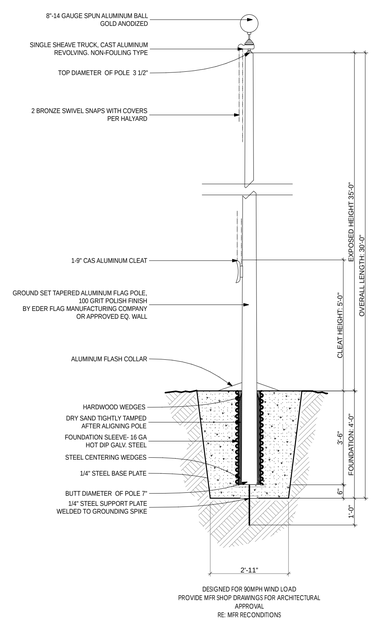
5 TYP. CONTROL VALVE DETAIL
SCALE: 1" = 1'-0"



SITE PLAN LEGEND



6 TYP. SPRINKLER HEAD DETAIL
SCALE: 1" = 1'-0"



7 FLAG POLE DETAIL
SCALE: 3/8" = 1'-0"

PROJECT GENERAL NOTES:

1. CONTRACTOR TO REMOVE ANY ABANDONED UTILITY LINES THROUGHOUT SITE.
2. ALL EXISTING TRAFFIC SIGNAGE TO REMAIN; PROTECT DURING DEMOLITION OPERATIONS. IF DAMAGED BY DEMOLITION OPERATIONS, REPLACE AS REQUIRED BY THE CITY OF LAREDO, TEXAS.
3. PROVIDE BARRICADES/ FENCING AT LIMITS OF WORK AREA TO PREVENT UNAUTHORIZED ACCESS TO WORK SITE.
4. CONTRACTOR TO CONNECT ALL NECESSARY TEMPORARY AND PERMANENT UTILITIES AT CONTRACTOR'S EXPENSE.
5. ALL PROPOSED "EQUAL" SUBSTITUTIONS FOR PRODUCTS CALLED OUT BY BRAND OR MFR. MUST BE SUBMITTED FOR APPROVAL TO ARCHITECT AT LEAST 7 DAYS PRIOR TO BID OPENING.
7. CONTRACTOR SHALL IDENTIFY THE LOCATION OF ALL EXISTING UNDER GROUND LINES & STRUCTURES PRIOR TO ANY EXCAVATION.
8. CONTRACTOR TO ISOLATE ANY NEW CONSTRUCTION FROM EXISTING UNDERGROUND UTILITIES AS PER THE AFFECTED UTILITY OWNER'S INSTRUCTIONS. IF MODIFICATIONS TO NEW UNDERGROUND STRUCTURES ARE REQUIRED, CONTRACTOR TO SUBMIT MODIFICATIONS FOR APPROVAL BY ARCHITECT/ENGINEER.
9. CONTRACTOR TO PAINT ALL EXPOSED CONDUITS AND STRUCTURAL STEEL, COORDINATE WITH ARCHITECT FOR COLOR.
10. ALL EXISTING OFF-SITE IMPROVEMENTS, PUBLIC STREETS, CURVE AND GUTTER, SIDEWALKS, SIGNAGE, UTILITIES, ETC. TO REMAIN; PROTECT DURING DEMOLITION OPERATIONS. IF DAMAGED, REPAIR AS REQUIRED BY AUTHORITY HAVING JURISDICTION.
11. SEE CIVIL PLANS FOR ELEVATIONS, EXISTING CONDITIONS COORDINATION, AND EXTERIOR IMPROVEMENTS CONSTRUCTION DETAILS AND CONTROL JOINTS REQ.
12. COORDINATE WITH MEP LOCATIONS AND TYPES OF LIGHT POLES.
13. IF CONTRACTOR ENCOUNTERS ANYTHING THAT IT CONSIDERS TO IMPACT THE COST OF CONSTRUCTION AND/OR SCOPE OF WORK, HE/SHE SHALL NOTIFY THE OWNER IMMEDIATELY AND PRIOR TO THE EXECUTION OF ANY ADDITIONAL WORK. FAILURE TO DO SO DEEMS THE CONTRACTOR RESPONSIBLE FOR THE COST OF SUCH WORK.
14. ARCHITECT HAS ARRANGED THE DRAWINGS AND SPECIFICATIONS INTO DESIGNATED SECTIONS AND DIVISIONS FOR CONVENIENCE OF REFERENCE ONLY. SUCH ARRANGEMENT IS NOT TO BE CONSIDERED AS A COMPLETE SEGREGATION OF ALL THE WORK REQUIRED TO BE PERFORMED, OR MATERIALS TO BE FURNISHED BY A GIVEN CONTRACTOR, SUB-CONTRACTOR OR MATERIAL MAN. EACH CONTRACTOR, SUB CONTRACTOR OR MATERIAL MAN, MUST REVIEW AND CONSIDER THE CONTRACT DOCUMENTS IN THEIR ENTIRETY
15. IN GENERAL, THE DRAWINGS WILL INDICATE DIMENSIONS, POSITIONS, AND KIND OF CONSTRUCTION. WORK NOT PARTICULARLY DETAILED, MARKED, OR SPECIFIED SHALL BE THE SAME AS SIMILAR PARTS THAT ARE DETAILED, MARKED OR SPECIFIED
16. ALL PRODUCTS SPECIFIED BY ARCHITECT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH CURRENT MANUFACTURER'S INSTALLATION INSTRUCTIONS. MANUFACTURER INSTALLATION INSTRUCTIONS IN CONFLICT WITH CONSTRUCTION DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT PRIOR TO START OF WORK. PRODUCTS NOT PROVIDED WITH INSTALLATION INSTRUCTIONS SHALL BE INSTALLED IN ACCORDANCE WITH BEST TRADE PRACTICES OF THE INDUSTRY. ALL INSTALLATIONS SHALL BE PERFORMED BY EXPERIENCED + SKILLED WORKERS.
17. THERE SHALL BE NO DEVIATIONS FROM THESE CONSTRUCTION DOCUMENTS WITHOUT PRIOR WRITTEN APPROVAL FROM ARCHITECT AND CONSULTANTS, IF APPICABLE. APPROVAL BY THE CITY INSPECTOR DOES NOT CONSTITUTE AUTHORITY TO DEVIATE FROM THE CONSTRUCTION DOCUMENTS. THE ARCHITECT SHALL BE NOTIFIED IMMEDIATELY BY THE CONTRACTOR SHOULD ANY DISCREPANCY OR OTHER QUESTIONS ARISE PERTAINING TO THE CONSTRUCTION DOCUMENTS PRIOR TO START OF WORK.
18. THE CONTRACTOR SHALL SUBMIT SUBSTITUTION REQUESTS FOR SPECIFIED MATERIALS WITH COMPLETE DATA, DRAWINGS + SAMPLES AS NECESSARY FOR REVIEW BY ARCHITECT + OWNER. CONTRACTOR SHALL ALLOW SUFFICIENT TIME FOR INVESTIGATION BEFORE A DECISION MUST BE MADE. IF A SUBSTITUTION IS APPROVED BY THE ARCHITECT , IT IS THE UNDERSTANDING THAT THE CONTRACTOR GUARANTEES THE SUBSTITUTED MATERIAL TO BE EQUAL OR BETTER THAN THE ORIGINAL SPECIFICATION. ALL CHANGES TO THE CONTRACT SHALL BE BY CHANGE ORDER.
19. ALLOWANCES HAVE BEEN PROVIDED FOR MATERIALS NOT YET SPECIFIED BY THE ARCHITECT. REFER TO ALLOWANCE SCHEDULE FOR ALLOWANCE INFORMATION. ITEMS PAYBLE BY ALLOWANCE ACCOUNTS INCLUDE ONLY THE MATERIALS LISTED, TRANSPORTATION OF THESE ITEMS, TAXES, AND STORAGE. ACCESSORIES AND ADHESIVES REQUIRED FOR INSTALLATION ARE NOT PAYABLE FROM THE ALLOWANCE AMOUNT.
20. IN PREPARING THER PROPOSAL THE CONTRACTOR IS PRESUMED TO HAVE VISITED THE SITE. EVALUATED EXISTING CONDITIONS AFFECTING THE WORK TO BE PERFORMED. CAREFULLY EXAMINED THE CONSTRUCTION DOCUMENTS + DETERMINED TO THEIR SATISFACTION THE MEANS + METHODS OF REMOVAL + STORAGE OF MATERIAL. THE SEQUENCING OF CONSTRUCTION OPERATIONS + THE PROBLEMS HERETO. NO ALLOWANCE WILL BE MADE SUBSEQUENTLY TO THE CONTRACTOR FOR ANY ERROR THROUGH NEGLIGENCE IN OBSERVING THE SITE CONDITIONS.
21. CONTRACTOR SHALL PROVIDE ALL LABOR + MATERIALS + TRANSPORTATION SERVICE + EQUIPMENT REQUIRED FOR THE EXECUTION + COMPLETION OF WORK SHOWN IN THE CONSTRUCTION DOCUMENTS OR REQUIRED BY GOVERNING CODES.
22. CONTRACTOR SHALL VERIFY ALL DRAWING DIMENSIONS + CONDITIONS AT THE JOB SITE WITH ACTUAL FIELD CONDITIONS PRIOR TO THE START OF CONSTRUCTION. INSPECT RELATED WORK + ADJACENT SURFACES + PROTECT ANY ADJOINING PROPERTIES FROM ANY DAMAGE CAUSED BY THE CONSTRUCTION.
23. MATERIALS + WORKMANSHIP SHALL CONFORM TO THE BUILDING CODES + ALL APPLICABLE ORDINANCES. ALL MATERIALS USED ON THE JOB SHALL BE NEW, UNUSED (UNLESS NOTED OTHERWISE), CLEAN + FREE FROM DEFECTS.
24. IF CONTRACTOR REQUIRES AN ONSITE SECURE STORAGE YARD DURING CONSTRUCTION, CONTRACTOR MAY ADD, AT ITS EXPENSE, SUCH YARD IN THE AREA DESIGNATED IN THE SITE PLAN. COORDINATE WITH OWNER IF ALTERNATE LOCATION IS NEEDED.

LANDSCAPE NOTES:

1. PROVIDE 4" OF TOPSOIL AT ALL PLANTERS, ISLANDS, AND GRASSY AREAS. RE: SPEC
2. ALL AREAS FOR PLANTING AND TREES LICENSED DESIGNED FULLY AUTOMATIC IRRIGATION SYSTEM TO PROVIDE 100% COVERAGE.
3. EVERY TREE SHALL HAVE BUBBLER WITH PROPER PLANTING SET-UP.
4. PROVIDE FOR ARCHITECT'S REVIEW AND APPROVAL, COMPLETE SHOP DRAWINGS, CUT SHEETS AND DETAILED LAYOUT OF PROPOSED LINE SYSTEM. SYSTEM SHALL BE DESIGNED FOR COMMERCIAL APPLICATIONS.
5. PROVIDE AN IRRIGATION WATER METER AND PAY ALL FEES, FOR PERMIT, METERS AND DEMAND AS PER CITY REQUIREMENTS.
6. REFER TO THE CIVIL DRAWINGS FOR NEW SERVICE LINES PROPOSED FOR PROJECT, COORDINATE EARLY ON, WITH UTILITY CONTRACTOR FOR PROPOSED LOCATIONS FOR TAPS TO ALLOW EASY CONNECTIONS AT END OF PROJECT.
7. PROVIDE PROFESSIONAL LANDSCAPING PLASTIC EDGING (COMMERCIAL GRADE) @EDGES OF DIFFERING PLANTING MATERIALS, INCLUDING BUT NOT LIMITED TO HYDRO-SEED BERMUDA GRASS, DECOMPOSED GRANITE, CONCRETE, AND RIVER ROCK. FINAL GRADE TO BE FREE OF DEBRIS AND HAVE A SOIL M COMPOSITION AS RECOMMENDED BY HYDRO-SEED PROVIDER.
10. COORDINATE W/ ARCHITECT FOR FINAL LOCATION OF LANDSCAPING LIGHTS.
11. ALL PLANTS TO BE PRESENTED ON SITE PRIOR TO PLANTING FOR FINAL LOCATION APPROVAL BY ARCHITECT.
12. FINAL GRADE TO BE FREE OF DEBRIS AND HAVE A SOIL COMPOSITION AS RECOMMENDED BY PLANT PROVIDER.
13. COMPACT ALL NEW & EX SOIL AS REQUIRED BY STRUCTURAL DWGS.

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REGISTERED ARCHITECT MARIO A. PEÑA 24198 STATE OF TEXAS
DIGITALLY SIGNED ON 09/28/15

WEBB COUNTY/TEXAS
WEBB COUNTY MAIN FIRE STATION
AND ADMINISTRATION BUILDING
7210 E. SAUNDERS – HWY 59 (UNITS A&B)
LAREDO, TEXAS 78045

CONSULTANT

SITE/LANDSCAPING PLAN

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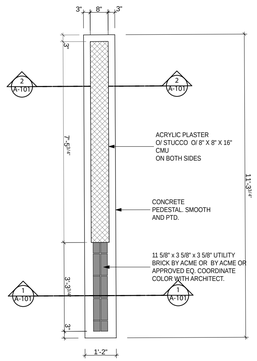
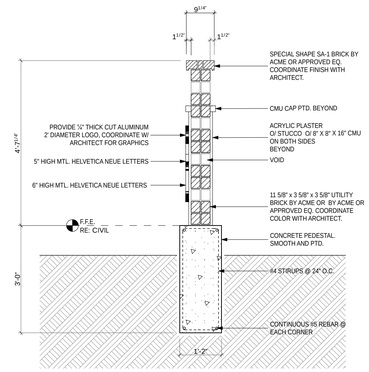
DATE: 09/28/15
REVISIONS:

SHEET NO.:
A-100
JOB NO.: 1312



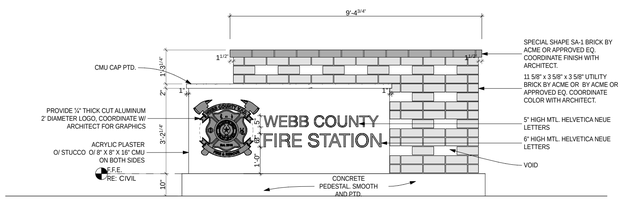
5 SITE MARQUEE FLOOR PLAN
SCALE: 3/8" = 1'-0"



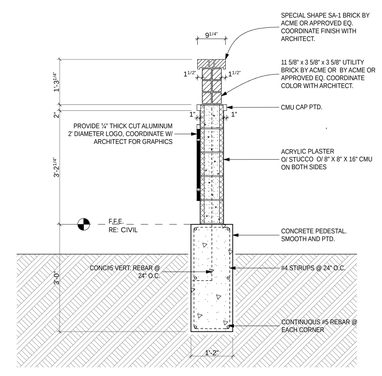
1 MARQUEE SECTION
SCALE: 1/2" = 1'-0"

MARQUEE NOTES

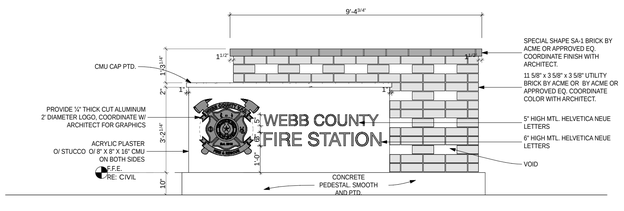
1. ACRYLIC PLASTER FINISH SHALL MATCH BUILDING STUCCO FACADE COORDINATE W/ ARCHITECT
2. ALL EXPOSED CONC. TO BE SMOOTH AND PAINTED. MATCH FINISH COLOR TO BUILDING STUCCO FACADE.
3. COORDINATE BRICK COLOR W/ ARCHITECT



3 SITE MARQUEE ELEVATION
SCALE: 3/8" = 1'-0"



2 MARQUEE SECTION 2
SCALE: 1/2" = 1'-0"



4 SITE MARQUEE ELEVATION
SCALE: 3/8" = 1'-0"

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SITE MARQUEE-ALTERNATE #1

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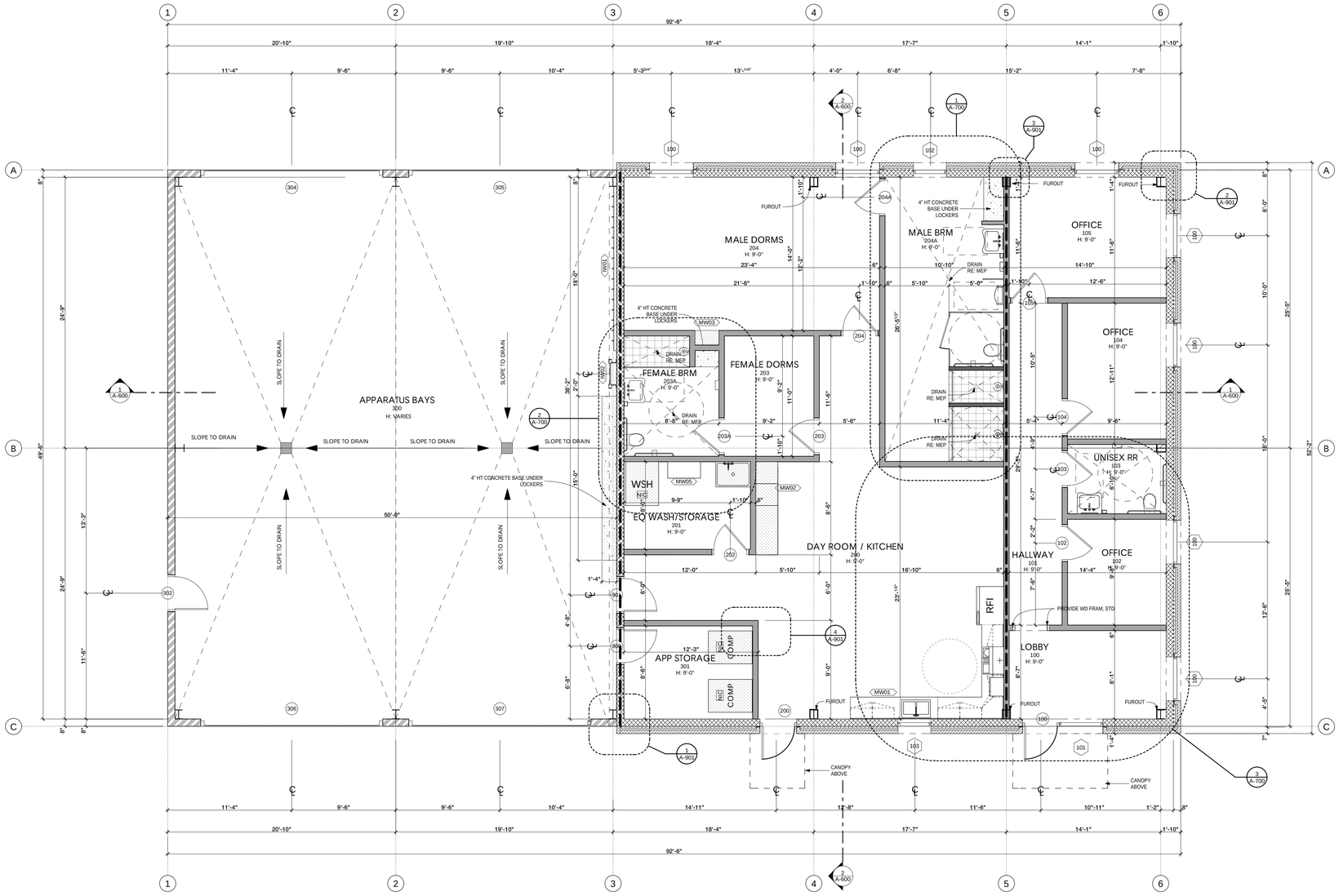
DATE: 09/28/15
REVISIONS:

SHEET NO.:
A-101
JOB NO.: 1312



1 FIRST FLOOR

SCALE: 3/16" = 1'-0"

MILLWORK & MTL WORK SCHEDULE		
ID	DESCRIPTION	INTERIOR ELEV.
IW01	HANGING MLT RACK	A-800
IW02	OSHA COMPLIANT METAL LADDER W/ SLIP RESISTANT BARS	A-800
MW01	WALL MOUNTED KITCHEN CABINETS	A-801
MW02	FIXED WORKSTATION AND STORAGE FOR EMERGENCY RADIO STATION	A-801
MW03	SHELVES @ MALE DORMS	A-801
MW05	SHELVES @ MALE DORMS @ EQ WASH & STORAGE CONTRACTOR TO PROVIDE BRACKET MOUNTED 18" DEEP X 3' LONG SHELF W/ FIVE SLOT MOP AND BROOM HOLDER	A-801

MILLWORK NOTES:

1. PLASTIC LAMINATE FINISH ON ALL EXPOSED COUNTER TOP SURFACES
2. PAINT ALL WD. SURFACES AS PER SPECS.
3. CABINET CONSTRUCTION TO BE 3/4" PLYWOOD AT TOP, BOTTOM & SIDES W/ 1/4" PLYWOOD BACK
4. COORDINATE W/ ARCHITECT FOR PLASTIC LAM. FINISH
5. ALL CABINETS TO BE ADA COMPLIANT, PROVIDED & INSTALLED BY CONTRACTOR,
6. ALL SHELVES, DRAWER FRONTS, & DOOR FRONTS TO BE CABINET GRADE WOOD PAINTED AS PER SPECS
7. APPLY SOLID WD. EDGE MOLDING @ ALL EXPOSED PLYWD. EDGES.

FLOOR PLAN LEGEND

- 1/2 HOUR FIRE RATED WALL
- OVERHEAD ELEMENT
- MTL. WALL PANELS, DESIGNER SERIES-FLAT BY MBCI OR APPROVED EQUAL INSTALL AS PER MFR RECOMMENDATIONS O/ DAMPPROOFING
- O/ VINYL BACK INSULATION R-19 8" X 8" X 16" CMU PTD. W/ MASONRY WALL INSULATION FORM F.F.E. UP TO DECK
- 11 5/8" x 3 5/8" x 3 5/8" UTILITY BRICK BY ACME OR APPROVED EQ. COORDINATE COLOR WITH ARCHITECT. O/ 2" RIGID INSULATION O/DAMP-PROOFING O/ 8" X 8" X 16" CMU
- 5/8" GYP BD TAPE, FLOAT, TEXT, & PTD ON 6" MTL STUD WALL
- 5/8" GYP BD TAPE, FLOAT, TEXT, & PTD ON 4" MTL STUD WALL
- DWG. NO. / SHEET NO. — SECTION MARKER
- DWG. NO. / SHEET NO. — ELEVATION MARKER
- ROOM NAME / ROOM NO. / TYPE / ROOM HT — ROOM MARKERS
- GRID
- STOREFRONT MARKER
- MW## — MILLWORK MARKER
- IW## — METAL WORK
- DOOR MARKER
- DETAIL MARKER

PROJECT GENERAL NOTES:

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2. ALL EXISTING TRAFFIC SIGNAGE TO REMAIN; PROTECT DURING DEMOLITION OPERATIONS. IF DAMAGED BY DEMOLITION OPERATIONS, REPLACE AS REQUIRED BY THE CITY OF LAREDO, TEXAS.
3. PROVIDE BARRICADES/ FENCING AT LIMITS OF WORK AREA TO PREVENT UNAUTHORIZED ACCESS TO WORK SITE.
4. CONTRACTOR TO CONNECT ALL NECESSARY TEMPORARY AND PERMANENT UTILITIES AT CONTRACTOR'S EXPENSE.
5. ALL PROPOSED "EQUAL" SUBSTITUTIONS FOR PRODUCTS CALLED OUT BY BRAND OR MFR. MUST BE SUBMITTED FOR APPROVAL TO ARCHITECT AT LEAST 7 DAYS PRIOR TO BID OPENING.
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9. CONTRACTOR TO PAIN' ALL EXPOSED CONDUITS AND STRUCTURAL STEEL, COORDINATE WITH ARCHITECT FOR COLOR.
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24. IF CONTRACTOR REQUIRES AN ONSITE SECURE STORAGE YARD DURING CONSTRUCTION, CONTRACTOR MAY ADD, AT ITS EXPENSE, SUCH YARD IN THE AREA DESIGNATED IN THE SITE PLAN. COORDINATE WITH OWNER IF ALTERNATE LOCATION IS NEEDED.

CMU GENERAL NOTES:

1. PROVIDE WEEP HOLES @ 36 OC AT ALL BRICK LUGS AND EXTERIOR LINTELS. WEEP HOLES TO CONTINUE THROUGH EFS SYSTEM
2. ALL INTERIOR EXPOSED CMU WALL CORNERS TO HAVE FACTORY-MADE 1" RADIUS BULLNOSE CMU.

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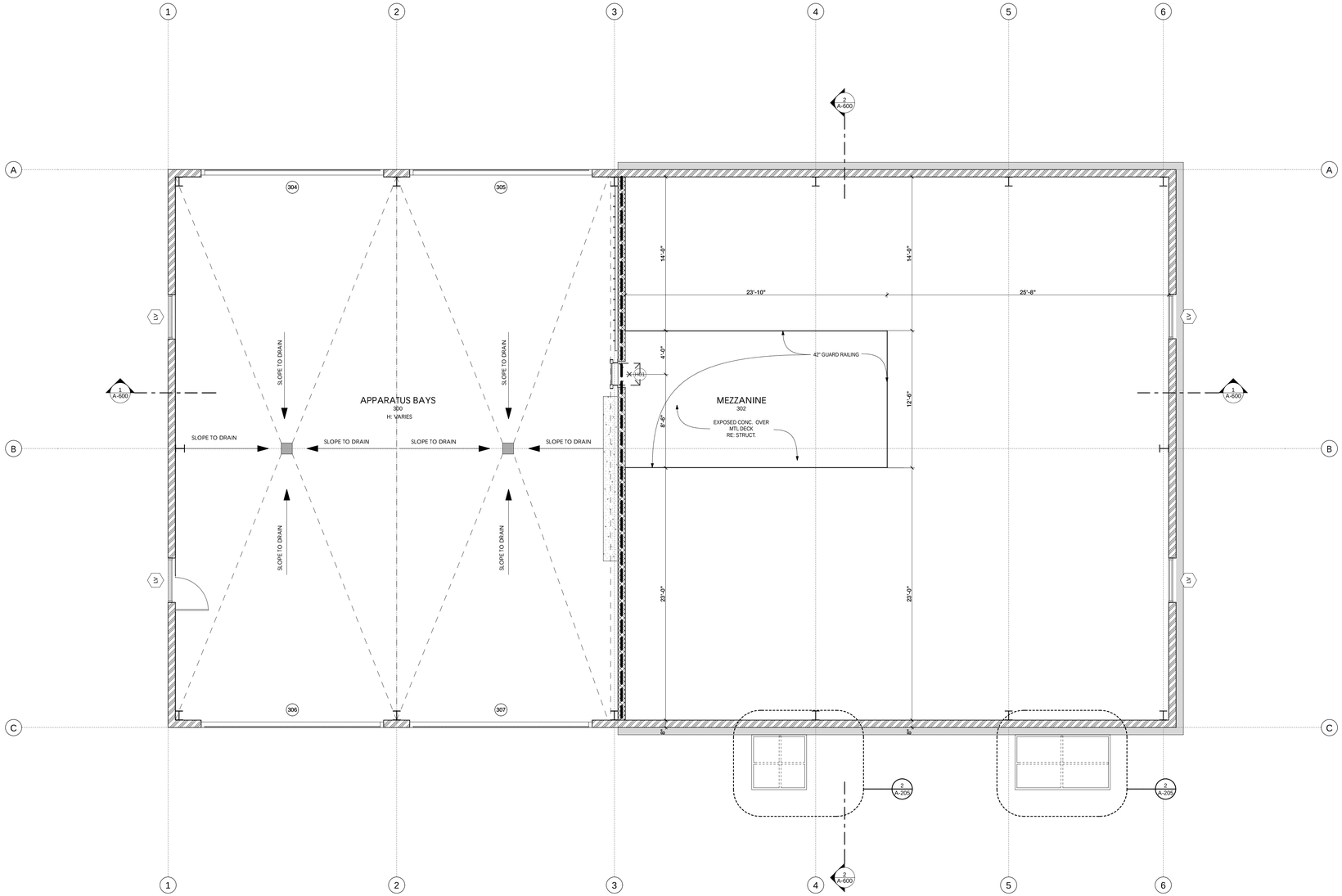
DATE: 09/28/15

REVISIONS:

FLOOR PLAN

SHEET NO.: A-200

JOB NO.: 1312



1 MEZZANINE FLOOR PLAN

SCALE: 3/16" = 1'-0"

FLOOR PLAN LEGEND

- 1/2 HOUR FIRE RATED WALL
- OVERHEAD ELEMENT
- MTL. WALL PANELS, DESIGNER SERIES-FLAT BY MBCI OR APPROVED EQUAL INSTALL AS PER MFR RECOMMENDATIONS O/ DAMPPROOFING O/ VINYL BACK INSULATION R-19 8" X 8" X 16" CMU PTD. W/ MASONRY WALL INSULATION FORM F.F.E. UP TO DECK
- 11 5/8" x 3 5/8" x 3 5/8" UTILITY BRICK BY ACME OR APPROVED EQ. COORDINATE COLOR WITH ARCHITECT. O/ 2" RIGID INSULATION O/DAMP-PROOFING O/ 8" X 8" X 16" CMU
- 5/8" GYP BD TAPE, FLOAT, TEXT, & PTD ON 6" MTL STUD WALL
- 5/8" GYP BD TAPE, FLOAT, TEXT, & PTD ON 4" MTL STUD WALL
- DWG. NO. / SHEET NO. — SECTION MARKER
- DWG. NO. / SHEET NO. — ELEVATION MARKER
- ROOM NAME / ROOM NO. / TYPE / ROOM HT — ROOM MARKERS
- GRID
- STOREFRONT MARKER
- MW## — MILLWORK MARKER
- IW## — METAL WORK
- DOOR MARKER
- DETAIL MARKER

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REGISTERED ARCHITECT MARIO A. PEÑA 24198 STATE OF TEXAS

DIGITALLY SIGNED ON 09/28/15

WEBB COUNTY/TEXAS
WEBB COUNTY MAIN FIRE STATION
AND ADMINISTRATION BUILDING
7210 E. SAUNDERS – HWY 59 (UNITS A&B)
LAREDO, TEXAS 78045

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FLOOR PLAN - MEZZANINE

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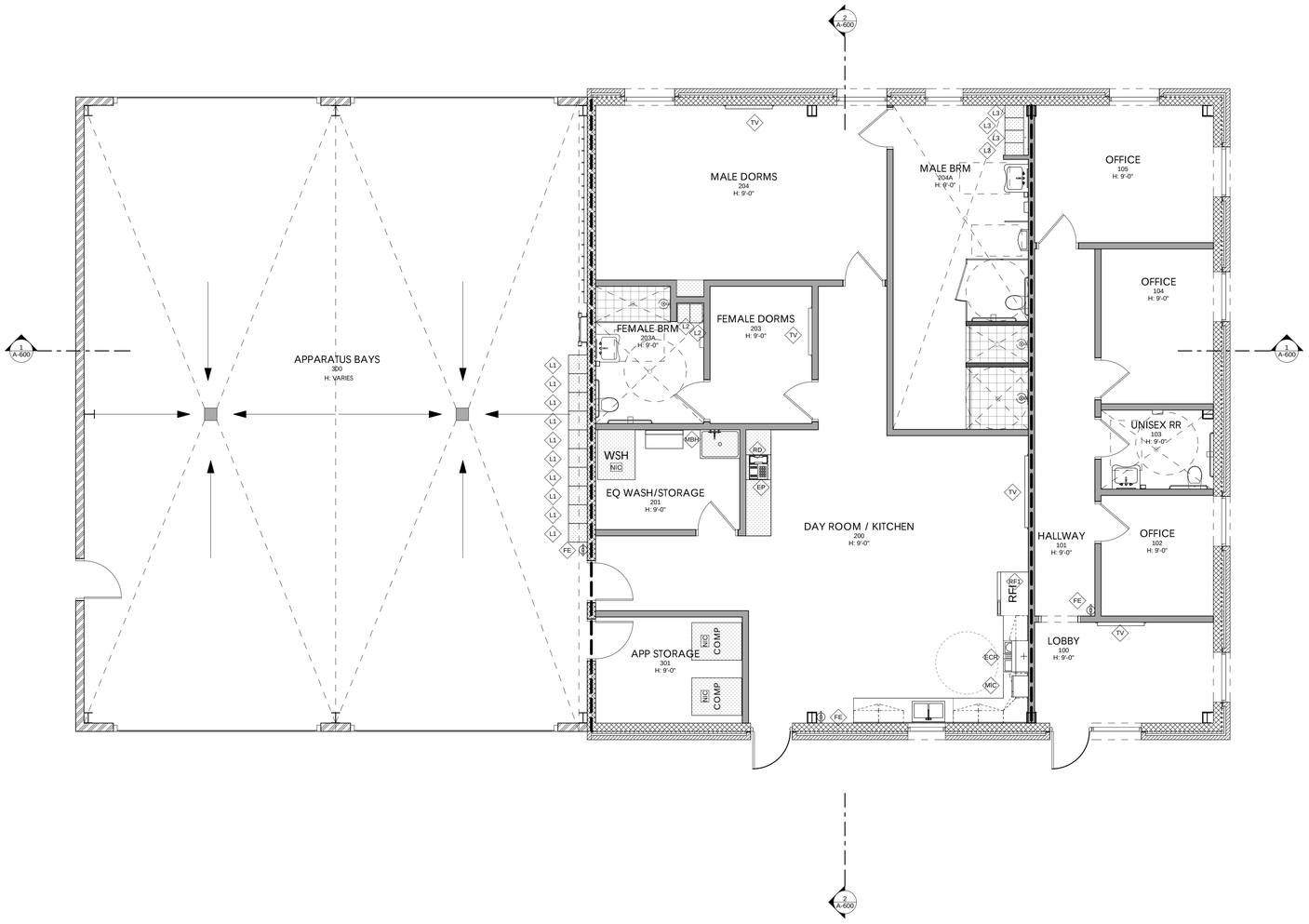

2 SPECIAL SYSTEM PLAN

SCALE: 3/16" = 1'-0"

SPECIAL SYSTEMS & EQUIPMENT						
GROUP TYPE	ID	ITEM NAME	QTY	NOTES AND REMARKS	PROVIDED BY	INSTALLED BY
LOCKERS	L3	12"X 18" X 72" FOUR TIER LOCKER, TUFFTEC INDUSTRIAL LOCKERS BY SCRANTON PRODUCTS OR APPROVED EQ.	4	CONTRACTOR TO ASSEMBLE AND INSTALL AS PER MFR RECOMMENDATIONS. LOCKERS SHALL INCLUDE: HORIZONTAL VENTING STYLE/SLOPE TOP/ PADLOCK/ METAL J-HOOK/END PANELS AND LEVELER PLATE	CONTRACTOR	CONTRACTOR TO ASSEMBLE AND INSTALL AS PER MFR RECOMMENDATIONS.
LOCKERS	L2	12"X 18" X 72"DOUBLE TIER LOCKER, TUFFTEC INDUSTRIAL LOCKERS BY SCRANTON PRODUCTS OR APPROVED EQ.	2	CONTRACTOR TO ASSEMBLE AND INSTALL AS PER MFR RECOMMENDATIONS. LOCKERS SHALL INCLUDE: HORIZONTAL VENTING STYLE/SLOPE TOP/ PADLOCK/ METAL J-HOOK/END PANELS AND LEVELER PLATE	CONTRACTOR	CONTRACTOR TO ASSEMBLE AND INSTALL AS PER MFR RECOMMENDATIONS.
LOCKERS	L1	18"X 18" X 72"SINGLE TIER LOCKER, TUFFTEC EMERGENCY LOCKERS W/ DOOR BY SCRANTON PRODUCTS OR APPROVED EQ.	10	LOCKERS SHALL INCLUDE: HORIZONTAL VENTING STYLE/ SLOPE TOP/ PADLOCK/ METAL J-HOOK/END PANELS AND LEVELER PLATE	CONTRACTOR	CONTRACTOR TO ASSEMBLE AND INSTALL AS PER MFR RECOMMENDATIONS.
FIRE EXTINGUISHER	FE	FIRE EXTINGUISHER	3		CONTRACTOR	CONTRACTOR
EQUIPMENT	TV	TELEVISION	4		OWNER	CONTRACTOR TO RELOCATE EXISTING EQUIPMENT AND INSTALL MOUNTING BRACKETS.
EQUIPMENT	RF1	24.6 CU. FT. REFRIGERATOR IN STAINLESS STEEL/MODEL #CZS25TSE BY GE APPLIANCES OR APPROVED EQ.	1			
EQUIPMENT	RD	HAND RADIO STATION	1	RE: INTERIOR ELEVATION FOR CONTRACTOR TO PROVIDE CONNECTIONS FOR SYSTEM, AS SPECIFIED IN INTERIOR ELEVATION	OWNER	CONTRACTOR TO RELOCATE EXISTING EQUIPMENT: PORTIBLE RADIO, RADIO CHARGER, BATTERY CHARGER, AND PORTABLE RADIOS
EQUIPMENT	MIC	1.1 CU. FT. MID-SIZE COUNTER TOP MICROWAVE - STAINLESS STEEL MODEL # MG11H2020CT BY SAMSUNG OR APPROVED EQ.	1		CONTRACTOR	CONTRACTOR
EQUIPMENT	EP	EMPERGENCY CALL IN PHONE	1		CONTRACTOR	CONTRACTOR
EQUIPMENT	ECR	ADA COMPLIANT ELECTRIC CONVECTION RANGE W/BACKGUARD ACCESSORY - STAINLESS-STEEL MODEL # JS630SFSS BY GE APPLIANCES OR APPROVED EQ.	1		CONTRACTOR	CONTACTOR
ACCESSORIES	MBH	MOP AND BROOM HOLDER W/ SHELF(MODEL B-224 X 36 BY BOBRICK OR EQ.	1		CONTRACTOR	CONTRACTOR

GENERAL SYSTEMS NOTES

1. CONTRACTOR TO PROVIDE DATA CONDUITS FOR ALL DEVICES SHOWN PLUS ALL OTHER DEVICES, ACCESSORIES AND EQUIPMENT SHOWN ELSEWHERE. ALL CONDUITS SHALL BE INSTALLED AS PER MEP RECOMMENDATIONS.

2.REFER TO PLANS FOR LOCATION OF ALL SYSTEM PANELS. COORDINATE LOCATIONS OF ALL PANELS BETWEEN ELECTRICIAN, AND INDIVIDUAL SYSTEM PROVIDERS/INSTALLERS. SCHEDULE A PRE-INSTALLATION MEETING WITH ALL SYSTEM PROVIDERS/INSTALLERS PRESENT PRIOR TO COMMENCEMENT OF ELECTRICAL AND CONDUIT WORK FOR SYSTEM PANELS.

3. THE WORK CALLED FOR IN THIS PLAN SHALL BE COMPLEMENTARY AND/OR IN ADDITION TO ANY WORK FOUND ELSEWHERE IN THE CONSTRUCTION DOCUMENTS.

4. ALL PROVIDERS FOR TURNKEY SYSTEMS ARE REQUIRED TO RESPOND TO SERVICE AND WARRANTY REPAIR ORDERS WITHIN 48 HOURS.

CAMERA SURVEILLANCE SYSTEM NOTES

1.CONTRACTOR TO PROVIDE ALL DATA DROPS FOR CAMARA AND SURVEILLANCE SYSTEM

2. CONTRACTOR TO PROVIDE ALL CONDUITS AND ACCESSORIES AT EACH DEVICE SHOWN HEREIN AS PER MEP RECOMMENDATIONS AND POWER AS PER MEP RECOMMENDATIONS.

3. EQUIPMENT TO BE PROVIDED BY OWNER.

COMMUNICATIONS, COMPUTER, & DATA SYSTEM NOTES

1. SYSTEM DEVICES, EQUIPMENT AND DATA WIRING TO BE PROVIDED BY OWNER.

2. CONTRACTOR TO PROVIDE ALL CONDUITS, POWER, AND ACCESSORIES AS PER MEP RECOMMENDATIONS AND PLANS.

INTRUSION DETECTION SYSTEM NOTES (IDS)

1. CONTRACTOR SHALL PROVIDE A TURNKEY, FULLY FUNCTIONING IDS BY DIGITAL MONITORING PRODUCTS, INC.
2500 N. PARTNERSHIP BLVD.
SPRINGFIELD, MO 65803
PHONE: 800.641.4282.
SUBSTITUTIONS SHALL ONLY BE CONSIDERED AT LEAST 10 DAYS PRIOR TO BID DUE DATE.

2. PROVIDE INTRUSION DETECTION DEVICES AT ALL EXTERIOR OPENINGS AND "GLASS BREAK" DETECTION DEVICES FOR ALL EXTERIOR GLASS ASSEMBLIES AND WINDOWS.

3. PROVIDE MOTION DETECTION DEVICES TO COVER ALL ENTRANCES, HALLWAYS, WAREHOUSE, STAGING AREA, WORKSHOPS.

4. POVIDE OVER LAPING MOTION DETECTION DEVICES AT THE APPARATUS BAYS A MINIMUM OF 4 MOTION DETECTION DEVICES SHALL BE PROVIDED.

AUTOMATIC FIRE SUPPRESSION SYSTEM & ALARM

1. CONTRACTOR TO FURNISH A FULLY AUTOMATIC FIRE SPRINKLER SYSTEM WITH INTEGRATED ALARM DESIGNED AND INSTALLED BY A PROVIDER LICENSED TO DO SO IN THE STATE OF TEXAS.

2. PROVIDE LICENSED PROVIDER'S PLAN FOR FIRE SPRINKLER SYSTEM FOR REVIEW PRIOR TO COMMENCEMENT OF THE WORK.

3. SYSTEM DESIGN SHALL COMPLY WITH ALL APPLICABLE CODES AND ORDINANCES. CONTRACTOR TO COORDINATE FIRE ALARM REQUIREMENTS WITH FIRE ALARM INSTALLER AND ANY OTHER TRADES IMPACTED BY THE INSTALLATION OF ALARM SYSTEM AND SPRINKLER SYSTEM. REFER TO MEP PLANS FOR FURTHER INSTRUCTIONS AND SPECIFICATIONS.

4. PROVIDE ALL CIVIL PORTIONS OF THE SPRINKLER SYSTEM. BACK FLOOR PREVENTED, VALVES AND SPRINKLER SYSTEM SHALL BE PART OF ALTERNATE #1.

COMPRESSED AIR SYSTEM

1. CONTRACTOR TO PROVIDE HIGH PRESSURE LINES. RE: MEP AND SPECS FOR ALL DESIGN CRITERIA.

2. COORDINATE WITH OWNER EARLY ON TO VERIFY FINAL LOCATION OF LINE DROPS.

3. OWNER TO PROVIDE COMPRESSORS

COMMUNICATION SYSTEM

1. SYSTEM DEVICES AND DATA WIRING TO BE PROVIDED BY OWNER.

2. CONTRACTOR TO PROVIDE ALL POWER AND CONDUITS AS PER MEP PLANS.

3. CONTRACTOR TO PROVIDE 50 FT POLE, RE: MEP.

EMPLOYEE TIME TRACKING SYSTEM

1. SYSTEM DEVICES AND DATA WIRING TO BE PROVIDED BY OWNER.

2. CONTRACTOR TO PROVIDE ALL CONDUITS AND ACCESSORES AT EACH DEVICE SHOWN HEREIN AS PER MEP RECOMMENDATIONS AND POWER AS PER MEP PLANS.

IT SYSTEM

1. CONTRACTOR TO PROVIDE DATA DROPS.

FIRE EMERGENCY ALERT SYSTEM

1. SYSTEM PROVIDED BY OWNER.

2. CONTRACTOR TO PROVIDE CONDUITS AND POWER

AUDIO AND VIDEO SYSTEM

1.CONTRACTOR TO PROVIDE ALL DATA DROPS FOR SYSTEM

2. CONTRACTOR TO PROVIDE ALL CONDUITS AND ACCESSORES AT EACH DEVICE SHOWN HEREIN AS PER MEP RECOMMENDATIONS AND POWER AS PER MEP RECOMMENDATIONS.

3. EQUIPMENT TO BE PROVIDED BY OWNER.

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DIGITALLY SIGNED ON 09/28/15

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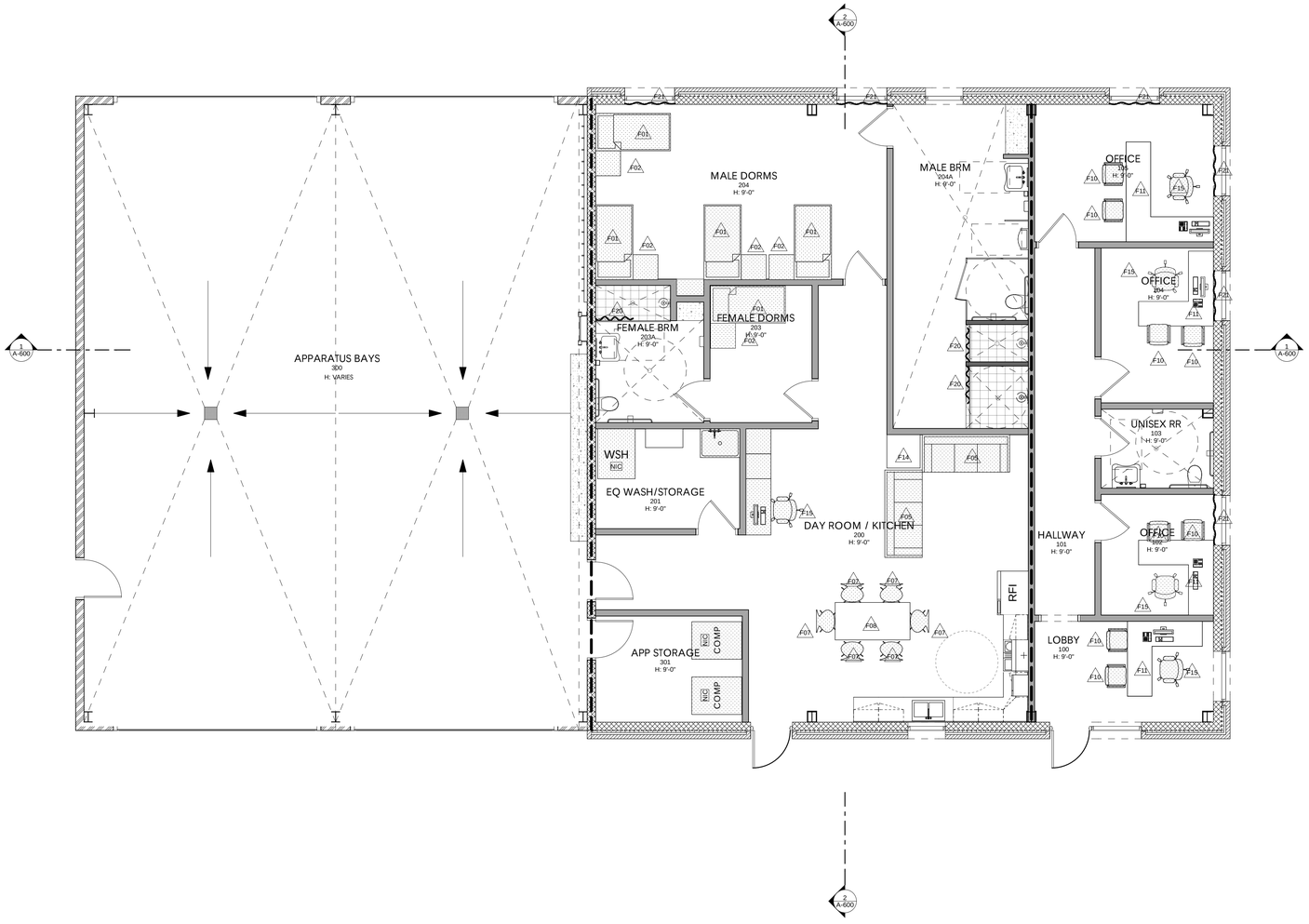

1 FURNITURE PLAN
SCALE: 3/16" = 1'-0"

FURNITURE LEGEND		
ID	ITEM NAME	QTY
F01	BEDS BUNKS	5
F02	NIGHT STAND	5
F05	SOFA	2
F07	DINING CHAIR	6
F08	DINNING TABLE	1
F10	OFFICE CHAIR	8
F11	L SHAPED DESK WITH FILE DRAWERS AND UPPER STORAGE	4
F14	SIDE TABLE	1
F15	TASK CHAIR	5
F20	SHOWER CURTAINS	3
F21	MINI BLINDS	6

FURNITURE NOTES:

1. U.N.O. FURNITURE BY OTHERS
2. U.N.O. FITNESS EQUIPMENT BY OWNER

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DATE: 09/28/15
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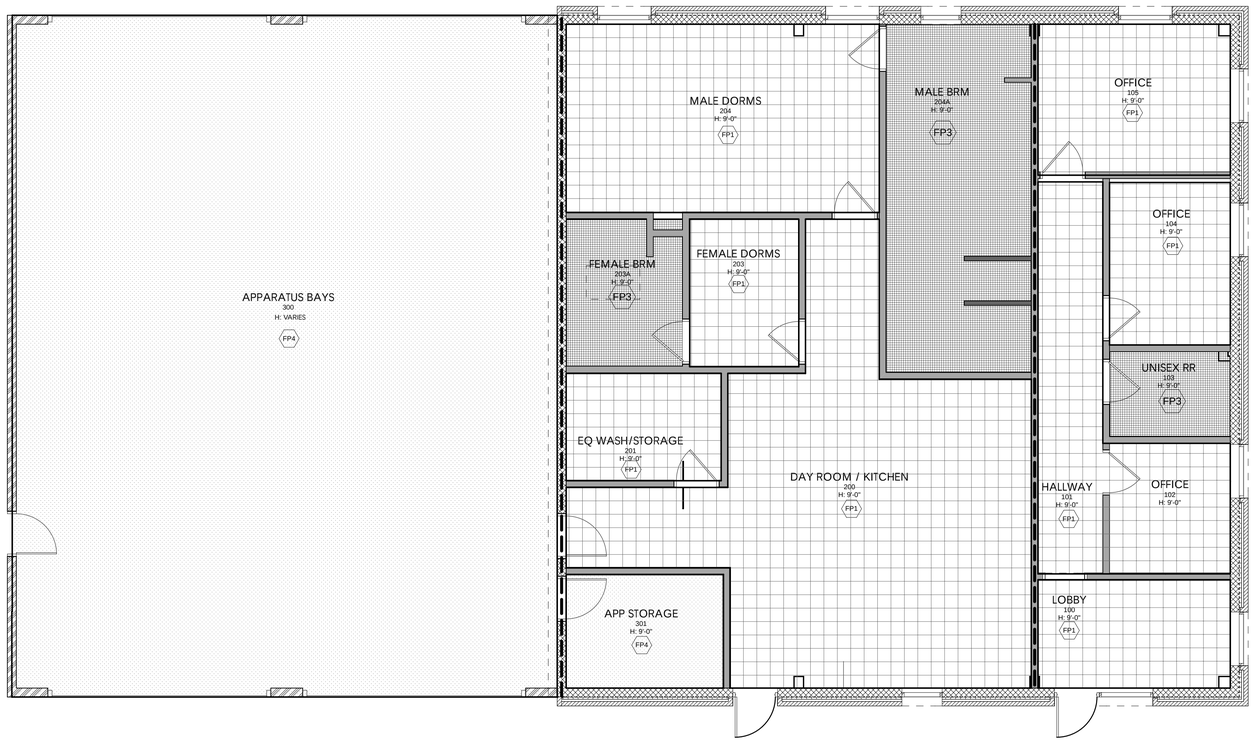
FURNITURE PLAN

SHEET NO.:
A-203
JOB NO.: 1312



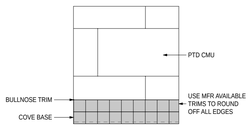
1 FINISHES PLAN
SCALE: 3/16" = 1'-0"

ROOM FINISH							
ZONE	RM NO.	RM NAME PER PLAN	BASE	FLOOR	CEILING TYPE	HT	WALL
A	100	LOBBY	4" VINYL BASE	VCT	24" X 48" A.C.T.	9'-0"	PAINTED CMU & GYP BD TEXT, TAPE, FLOAT, AND EPOXY PAINT
A	101	HALLWAY	4" VINYL BASE	VCT	24" X 48" A.C.T.	9'-0"	PAINTED CMU & GYP BD TEXT, TAPE, FLOAT, AND EPOXY PAINT
A	102	OFFICE	4" VINYL BASE	VCT	24" X 48" A.C.T.	9'-0"	PAINTED CMU & GYP BD TEXT, TAPE, FLOAT, AND EPOXY PAINT
A	103	UNISEX RR	4" COVE BASE	PORCELAIN TILE	MOISTURE RESISTANT GYP BD TEXT, TAPE, FLOAT, AND EPOXY PAINT	9'-0"	EPOXY PAINTED CMU & WALL TILE
A	104	OFFICE	4" VINYL BASE	VCT	24" X 48" A.C.T.	9'-0"	PAINTED CMU & GYP BD TEXT, TAPE, FLOAT, AND EPOXY PAINT
A	105	OFFICE	4" VINYL BASE	VCT	24" X 48" A.C.T.	9'-0"	PAINTED CMU & GYP BD TEXT, TAPE, FLOAT, AND EPOXY PAINT
B	200	DAY ROOM / KITCHEN	4" VINYL BASE	VCT	24" X 48" A.C.T.	9'-0"	PAINTED CMU & GYP BD TEXT, TAPE, FLOAT, AND EPOXY PAINT
B	201	EQ WASH/ STORAGE	4" VINYL BASE	VCT	24" X 48" A.C.T.	9'-0"	EPOXY PAINTED CMU & GYP BD TEXT, TAPE, FLOAT, AND EPOXY PAINT
B	203	FEMALE DORMS	4" VINYL BASE	VCT	24" X 48" A.C.T.	9'-0"	PAINTED CMU & GYP BD TEXT, TAPE, FLOAT, AND EPOXY PAINT
B	203A	FEMALE BRM	4" COVE BASE	PORCELAIN TILE	MOISTURE RESISTANT GYP BD TEXT, TAPE, FLOAT, AND EPOXY PAINT	9'-0"	EPOXY PAINTED CMU & WALL TILE
B	204	MALE DORMS	4" VINYL BASE	VCT	24" X 48" A.C.T.	9'-0"	PAINTED CMU & GYP BD TEXT, TAPE, FLOAT, AND EPOXY PAINT
B	204A	MALE BRM	4" COVE BASE	PORCELAIN TILE	MOISTURE RESISTANT GYP BD TEXT, TAPE, FLOAT, AND EPOXY PAINT	9'-0"	EPOXY PAINTED CMU & WALL TILE
C	300	APPARATUS BAYS	--	EXPOSED CONC.	EXPOSED STRUCTURE PTD	9'-0"	PAINTED CMU & EXPOSED STRUCTURE SHALL BE PAINTED
C	301	APP STORAGE	4" VINYL BASE	EXPOSED CONC.	MOISTURE RESISTANT GYP BD TEXT, TAPE, FLOAT, AND EPOXY PAINT	9'-0"	PAINTED CMU & GYP BD TEXT, TAPE, FLOAT, AND EPOXY PAINT
C	302	MEZZANINE	--	EXPOSED CONC.	EXPOSED STRUCTURE PTD	9'-0"	EXPOSED STRUCTURAL

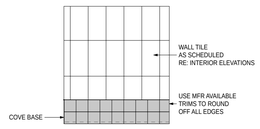
FLOOR FINISH LEGEND		
ID	FINISH	SYMBOL
FP1	12" x 12" VCT TILE BY ARMSTRONG OR APPROVED EQ, COORDINATE FINISH W/ ARCHITECT	
FP3	2" x 2" MOSAIC PORCELAIN TILE -CC PORCELAIN / TAUPE BY ROCA TILE GROUP OR APPROVED EQ.	
FP4	LUMA-HARD MICRO-LITHIUM PERMANENT CONC. HARDENER, SEALER, AND DENSIFIER. APPLY SEALER PRIOR TO COMMENCEMENT OF ALL OTHER WORK TO BE DONE ON BLDG. SLAB.	

IMPORTANT FINISHES NOTES:

1. COORDINATE W/ ARCHITECT ALL FINISHES, TYPES, PATTERNS, AND SIZES.
2. PROVIDE LATICRETE BLUE 92 ANTI-FRACTURE MEMBRANE OR EQUAL WHERE PORCELAIN TILE MFR RECOMMENDS.
3. EXPOSED CONC FLOORS: PROVIDE LUMA-HARD MICRO-LITHIUM PERMANENT CONC. HARDENER, SEALER, AND DENSIFIER. APPLY SEALER PRIOR TO COMMENCEMENT OF ALL OTHER WORK TO BE DONE ON BLDG. SLAB.
4. PROVIDE A.D.A. COMPLIANT ALUMINUM TRANSITIONAL STRIPS AT ALL FLOOR MATERIAL TRANSITIONS.
5. CHIP-OUT CONCRETE & RE-LEVEL SLAB AS REQUIRED WHEREVER NEW PORCELAIN TILE IS INSTALLED @ EXISTING BUILDING.
6. ALL INTERIOR WALLS TO BE PAINTED SW 7647 CRUSHED ICE BY SHERWIN WILLIAMS
7. ALL 4" VINYLE BASE TO BE COTTON W BY JOHNSONITE OR APPROVED EQ.
8. ALL 4" COVE BASE TO BE 2" x 2" MOSAIC PORCELAIN TILE COVE BASE -CC PORCELAIN / TAUPE BY ROCA TILE GROUP OR APPROVED EQ. RE: DETAILS A-2/203 & A-3/203.
9. PAINT ALL STRUCTURAL COLUMNS YELLOW 5'-0" FROM FFE.
11. ALL EXPOSED METAL TO BE PAINTED SW7016 MINDFUL GRAY.
12. ALL GYB BD CEILING TO BE PAINTED SW 7647 CRUSHED ICE BY SHERWIN WILLIAMS
13. ALL WOOD STAIN TO BE SW 3133-B RUSTIC GRAY BY SHERWIN WILLIAMS
14. ALL PLASTIC LAMINATE DOORS TO BE 7960K-18 STUDIO TEAK BY WILSON-ART
15. ALL PLASTIC LAMINATE COUNTERTOPS TO BE CARBON MESH FINE VELVET TEXTURE 4880-38 BY WILSON-ART.
16. RE: INTERIOR ELEVATIONS FOR SPECIFIED FINISHES



2 COVE BASE DETAIL
SCALE: 1" = 1'-0"



3 COVE BASE DETAIL
SCALE: 1" = 1'-0"

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DATE: 09/28/15
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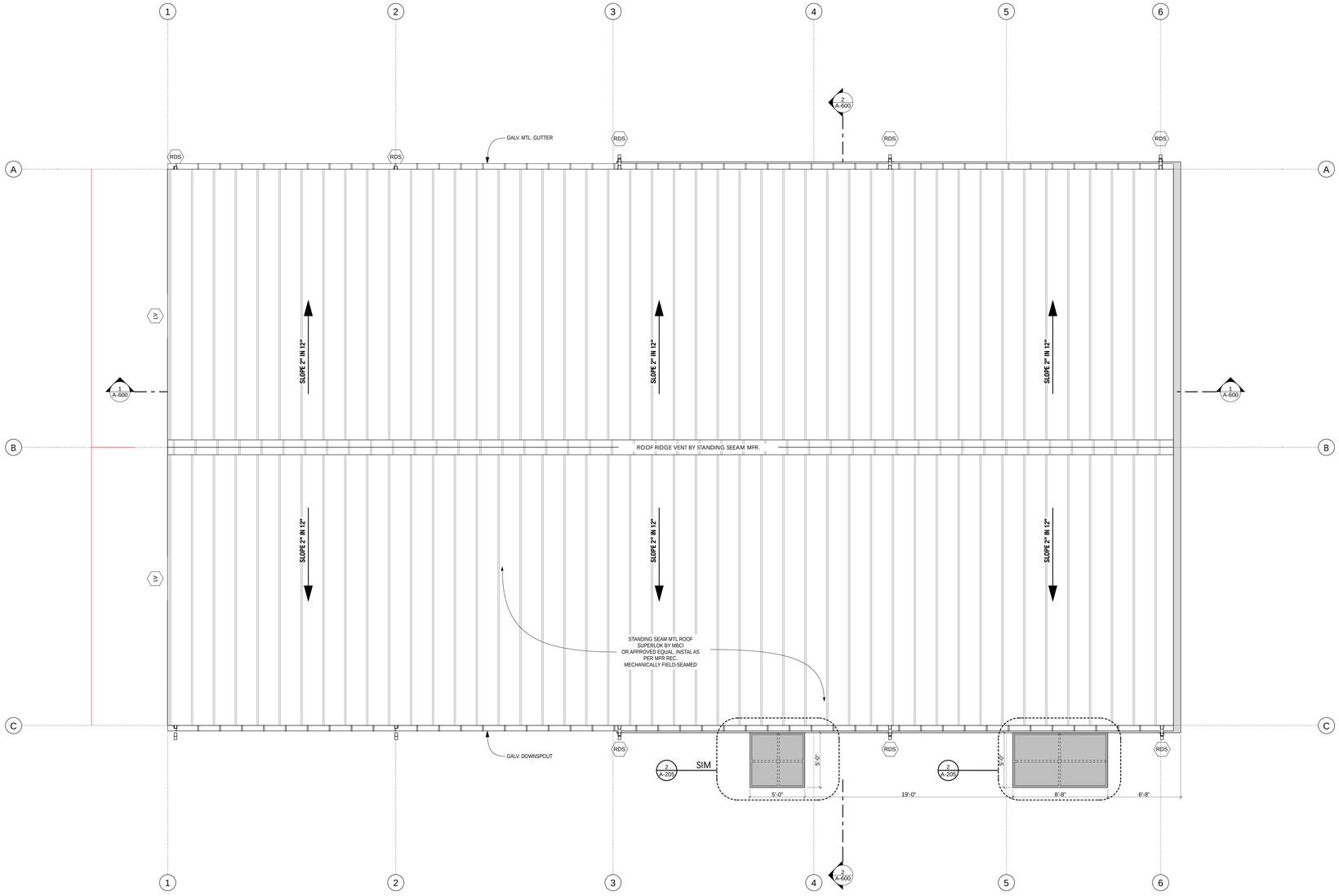
FINISHES PLAN

SHEET NO.:
A-204
JOB NO.: 1312



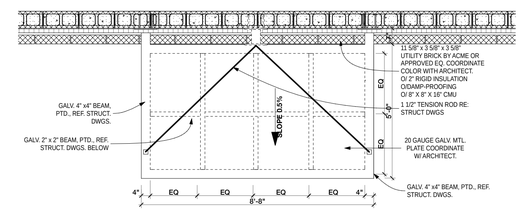
1 ROOF PLAN
SCALE: 3/16" = 1'-0"

ROOF PLAN LEGEND

- CANOPY RE DETAIL
- STANDING SEAM MTL ROOF SUPERLOK BY MBCI OR APPROVED EQUAL. INSTAL AS PER MFR REC. MECHANICALLY FIELD-SEAMED
- GALC. MTL COPING
- RDS — GALV. DOWNSPOUT PROVIDE CONC. SPLASH BLOCK
- 6" GALV. MTL. GUTTER

ROOF NOTES

1. SEE DIVISION 7 SPEC. FOR DAMPROOFING INSTRUCTIONS AND PRODUCTS.
2. CONTRACTOR TO ALLOW FOR DAMPROOFING INSPECTIONS PRIOR TO COVERING DAMPROOFING SYSTEM.
3. PROVIDE ALL DETAILS, CONNECTIONS, ANCHORS, & PARTS AS PER MFR. RECOMMENDATIONS
4. DOWNSPOUT -CONNECT TO UNDERGROUND STORM COLLECTION RE: CIVIL
5. CONTRACTOR TO PROVIDE GALV. METAL COPING AT ALL PARAPET WALLS U.O.N.
6. SEE DIVISION 7 SPEC. FOR DAMPROOFING INSTRUCTIONS AND PRODUCTS.
7. CONTRACTOR TO ALLOW FOR DAMPROOFING INSPECTIONS PRIOR TO COVERING DAMPROOFING SYSTEM.
8. ALL GUTTERS, FLASHING, DOWNSPOUTS , AND METAL COPING TO BE FINISHED WITH A KYNAR COLOR FINISH COORDINATE WITH ARCHITECT.



2 CANOPY DETAIL
SCALE: 3/8" = 1'-0"

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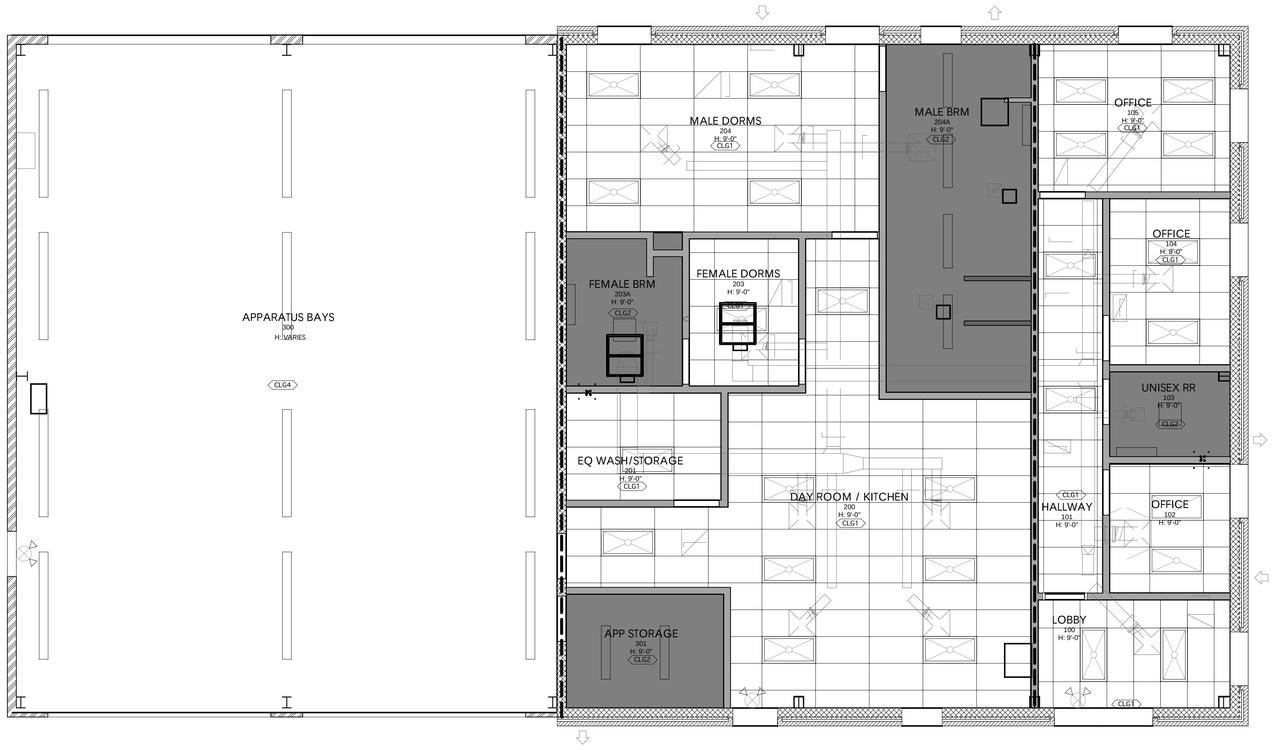
DATE: 09/28/15
REVISIONS:

ROOF PLAN

SHEET NO.:
A-205
JOB NO.: 1312

RCP LEGEND		
SYMBOLE	ID	TYPE
	CLG1	24" X 48" A.C.T.
	CLG2	5/8" MOISTURE RESISTANT GYP BD PTD TAPE, FLAT, TEXT, PTD
	CLG4	EXPOSED STRUCTURE PTD

RE: MEP FOR ALL LIGHTING SPECIFICATIONS



1 REFLECTED CEILING PLAN
SCALE: 3/16" = 1'-0"

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REFLECTED CEILING PLAN

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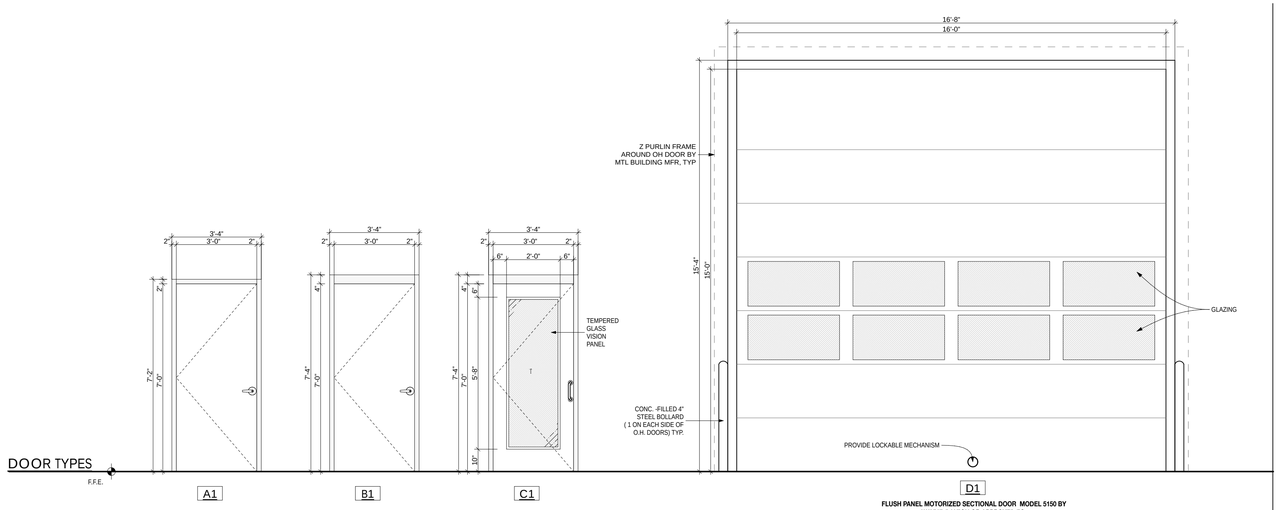
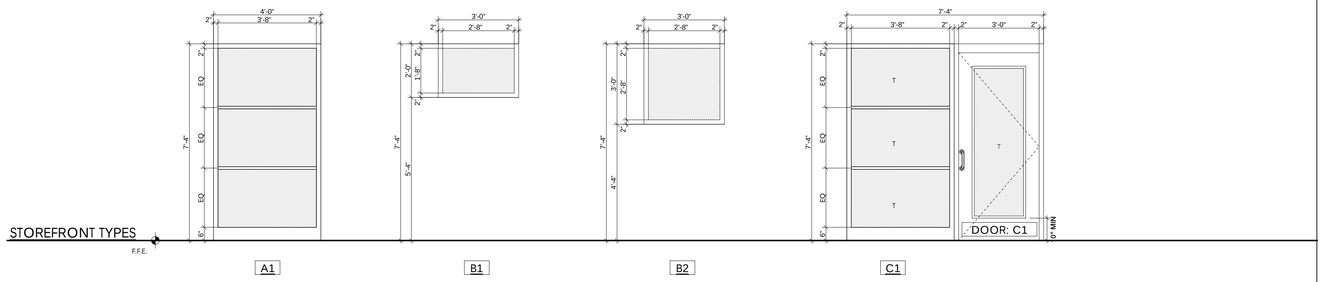
A-300
JOB NO.: 1312

DOOR SCHEDULE											
ID	TYPE	WIDTH	HEIGHT	CONST. TYPE / FINISH	FRAME MATERIAL	GLAZING	HEADER DETAIL A-401	JAMB DETAIL A-401	THRESHOLD A-401	FIRE RATING	INT. / EXT.
100	C1	3'-0"	7'-2"	ALUM STOREFRONT	ALUM STOREFRONT	TEMPERED GLASS	AS PER STOREFRONT MFR	AS PER STOREFRONT MFR	AS PER STOREFRONT MFR	NONE	EXT
102	A1	3'-0"	7'-0"	SOLID CORE PLAM	HOLLOW MTL./PTD	--	CH	CJ	T2	NONE	INT
103	A1	3'-0"	7'-0"	SOLID CORE PLAM	HOLLOW MTL./PTD	--	CH	CJ	T2	NONE	INT
104	A1	3'-0"	7'-0"	SOLID CORE PLAM	HOLLOW MTL./PTD	--	CH	CJ	T2	NONE	INT
105	A1	3'-0"	7'-0"	SOLID CORE PLAM	HOLLOW MTL./PTD	--	CH	CJ	T2	NONE	INT
200	C1	3'-0"	7'-2"	ALUM STOREFRONT	ALUM STOREFRONT	TEMPERED GLASS	AS PER STOREFRONT MFR	AS PER STOREFRONT MFR	AS PER STOREFRONT MFR	NONE	EXT
202	A1	3'-0"	7'-0"	SOLID CORE PLAM	HOLLOW MTL./PTD	--	CH	CJ	T2	NONE	INT
203	A1	3'-0"	7'-0"	SOLID CORE PLAM	HOLLOW MTL./PTD	--	CH	CJ	T2	NONE	INT
203A	A1	3'-0"	7'-0"	SOLID CORE PLAM	HOLLOW MTL./PTD	--	CH	CJ	T2	NONE	INT
204	A1	3'-0"	7'-0"	SOLID CORE PLAM	HOLLOW MTL./PTD	--	CH	CJ	T2	NONE	INT
204A	A1	3'-0"	7'-0"	SOLID CORE PLAM	HOLLOW MTL./PTD	--	CH	CJ	T2	NONE	INT
300	B1	3'-0"	7'-0"	HOLLOW MTL PTD	HOLLOW MTL./PTD.	--	BH	BJ	T1	1 1/2 HR	EXT
301	B1	3'-0"	7'-0"	HOLLOW MTL PTD	HOLLOW MTL./PTD.	--	BH	BJ	T1	1 1/2 HR	EXT
302	B1	3'-0"	7'-0"	HOLLOW MTL PTD	HOLLOW MTL./PTD.	--	AS PER MFR	AS PER MFR	AS PER MFR	NONE	EXT
304	D1	16'-0"	15'-0"	24 GAUGE OVERHEAD DOOR RE: SPECS	RE: SPECS	--	AS PER MFR	AS PER MFR	AS PER FMR	NONE	EXT
305	D1	16'-0"	15'-0"	24 GAUGE OVERHEAD DOOR RE: SPECS	RE: SPECS	--	AS PER MFR	AS PER MFR	AS PER FMR	NONE	EXT
306	D1	16'-0"	15'-0"	24 GAUGE OVERHEAD DOOR RE: SPECS	RE: SPECS	--	AS PER MFR	AS PER MFR	AS PER FMR	NONE	EXT
307	D1	16'-0"	15'-0"	24 GAUGE OVERHEAD DOOR RE: SPECS	RE: SPECS	--	AS PER MFR	AS PER MFR	AS PER FMR	NONE	EXT
H01		2'-0"	2'-0"	FD SERIES - 2 HOUR FIRE-RATED INSULATED, FLUSH ACCESS PANELS FOR WALLS BY ACTIVAR INC. CONSTRUCTION PRODUCTS GROUP OR APPORVED EQ.	N/A		AS PER MFR	AS PER MFR	AS PER MFR	1 1/2 HR	

STOREFRONT SCHEDULE						
ID	TYPE	MATERIAL/ FINISH	JAMB A-402	HEADER A-402	SILL A-402	NOTES/REMARKS
100	A1	ALUMINUM	1H	1J	S1	
101	C1	ALUMINUM	1H	1J	S1	
102	B1	ALUMINUM	1H	1J	S2	
103	B2	ALUMINUM	1H	1J	S3	





DOOR NOTES:

1. PROVIDE ACCESSIBLE HARDWARE THAT IS T.A.S/ A.D.A. COMPLIANT.

2. MAXIMUM EFFORT TO OPERATE INTERIOR NON-FIRE RATED DOORS SHALL NOT EXCEED FIVE (5) POUNDS, PUSH OR PULL.

3. HARDWARE FOR PAIRS OF DOORS IS FOR EACH LEAF, UNLESS NOTED.

4. ALL METAL DOORS AND FRAMES TO BE A FACTORY PRIMED AND FIELD PAINTED. APPLY PAINT VIA SPRAY GUN APPROVED BY PAINT SUPPLIER.

5. RE. TO SPECS FOR HARDWARE SCHEDULE

6. T= TEMPERED GLASS

7. FIRE RATING INDICATES REQUIRED RATING FOR ENTIRE OPENING COMPONENTS INCLUDING DOOR, FRAME, HARDWARE, ETC.

STORE FRONT NOTES:

1. PROVIDE MINI BLINDS WHERE NOTED (RE. SPECS) AND VERIFY ALL DIMENSIONS ON SITE.

2. ALL GLASS SHALL MEET A MAX. U-VALUE OF OF .50 AT ALL VERTICAL FENESTRATIONS U.N.O. SKYLIGHT GLASS SHALL SHALL MEET A MAX U-VALUE OF .65 U.N.O. ALL GLASS SHALL MEET A MAX. SHADING COEFFICIENT OF VALUE OF .25

3. ALL STOREFRONTS, CURTAIN WALLS, WINDOWS AND DOORS TO THE EXTERIOR SHALL COMPLY WITH IBC CODE 2012 FOR WIND LOADS.

4. PROVIDER TO VERIFY ALL STOREFRONT AND CURTAIN WALL DIMENSIONS ON SITE

IMPORTANT GLAZING NOTE:

1. ON SOUTH AND WEST FACING WINDOWS, CURTAIN WALLS AND STOREFRONTS: 1" INSULATED GLASS SHALL HAVE TI 36 AGC FLAT GLASS TREATMENT ON INSIDE SURFACE OF EXTERIOR PANE

T = TEMPERED
S = SPANDREL GLASS
O = OPAQUE GLASS

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DOOR & STORE FRONT SCHEDULES /TYPES

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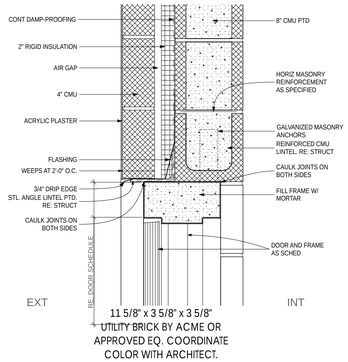
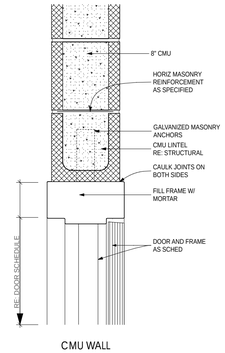


AH DOOR HEADER
SCALE: 1 1/2"= 1'-0"



BH DOOR HEADER
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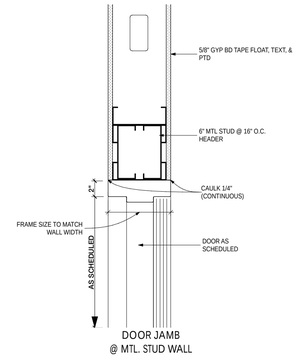
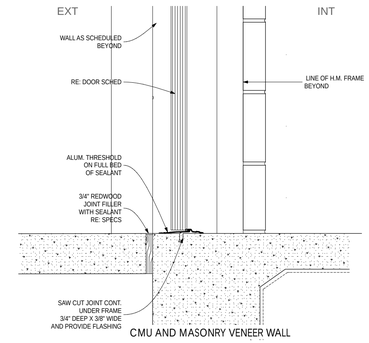
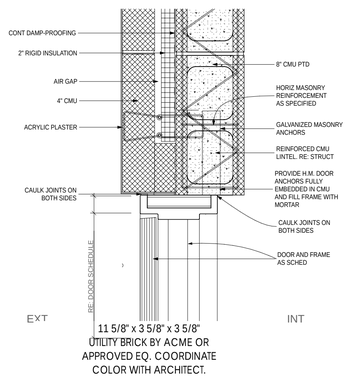


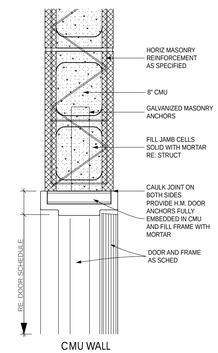
CH DOOR HEADER
SCALE: 1 1/2"= 1'-0"



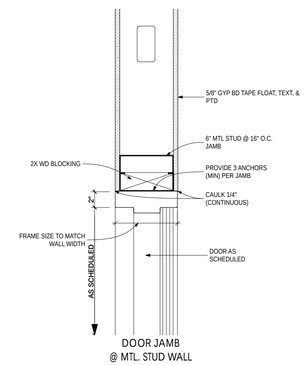
T1 DOOR THRESHOLD
SCALE: 1 1/2"= 1'-0"



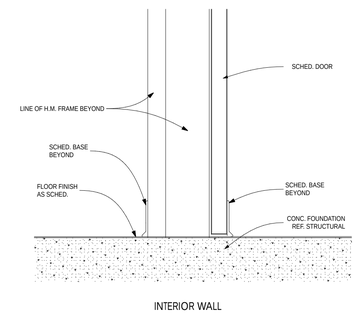
AJ DOOR JAMB
SCALE: 1 1/2"= 1'-0"



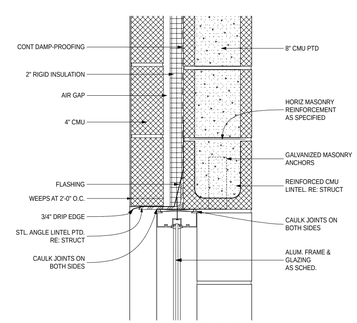
BJ DOOR JAMB
SCALE: 1 1/2"= 1'-0"



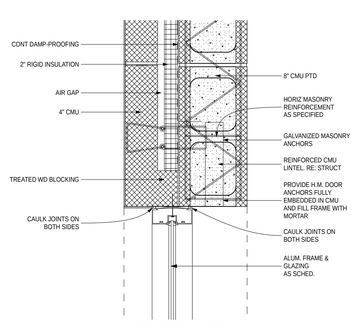
CJ DOOR JAMB
SCALE: 1 1/2"= 1'-0"



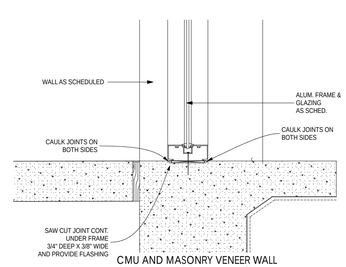
T2 DOOR THRESHOLD
SCALE: 1 1/2"= 1'-0"



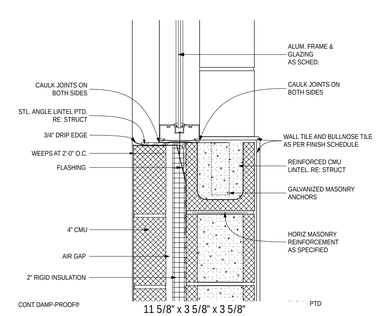
1H WINDOW HEADER
SCALE: 1 1/2"= 1'-0"



1J WINDOW JAMB
SCALE: 1 1/2"= 1'-0"



S1 WINDOW SILL
SCALE: 1 1/2"= 1'-0"



S2 WINDOW SILL
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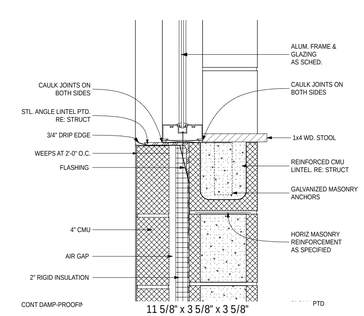

S3 WINDOW SILL
SCALE: 1 1/2"= 1'-0"

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JAMB/HEADER/SILL DETAILS DOORS

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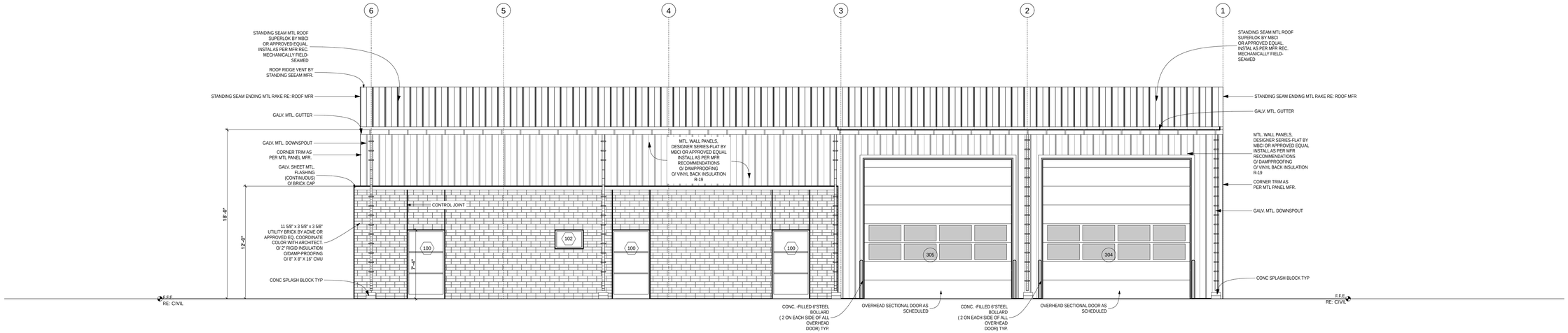
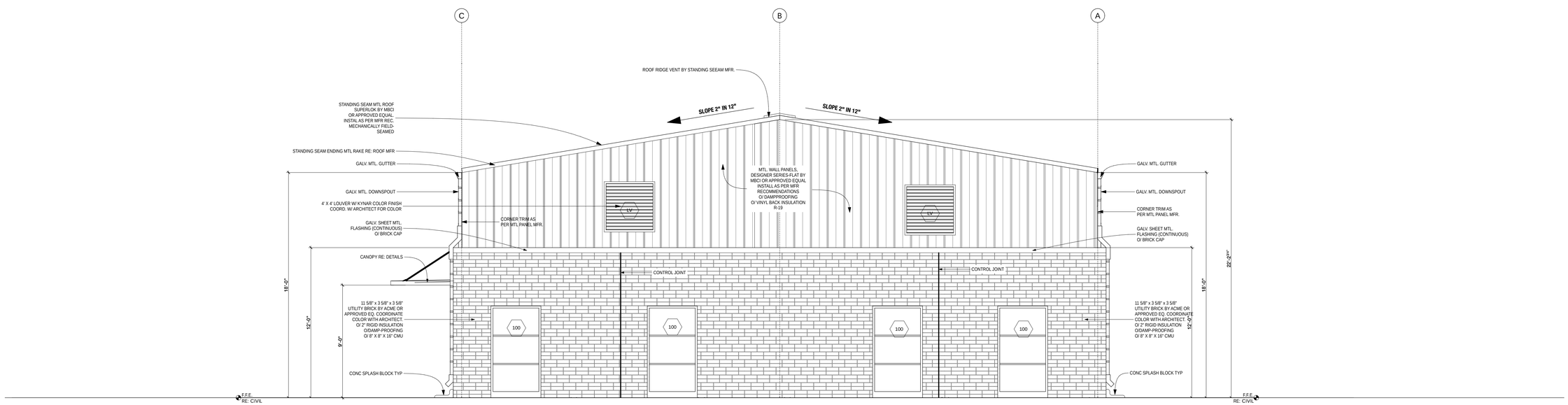


1 WEST ELEVATION

SCALE: 3/16" = 1'-0"



2 SOUTH ELEVATION

SCALE: 1/4" = 1'-0"

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SOUTH & WEST ELEVATIONS

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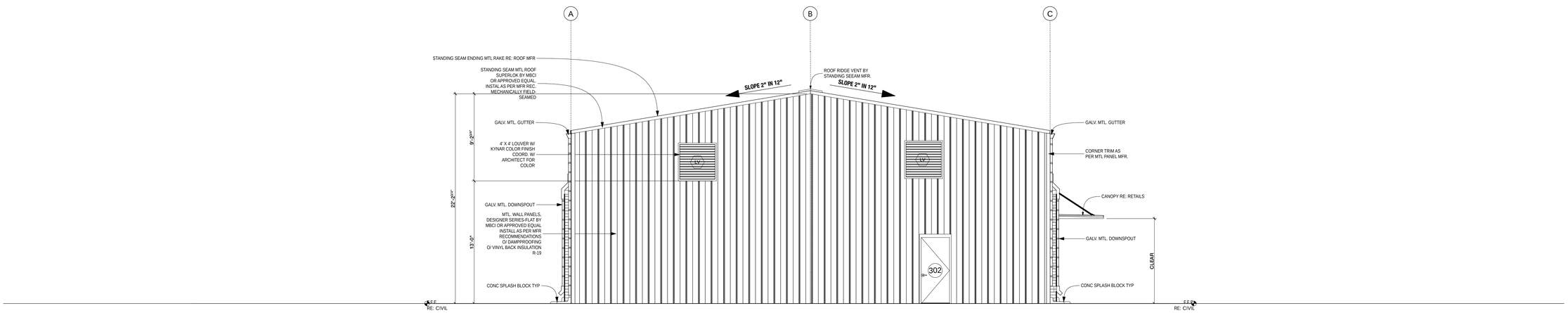
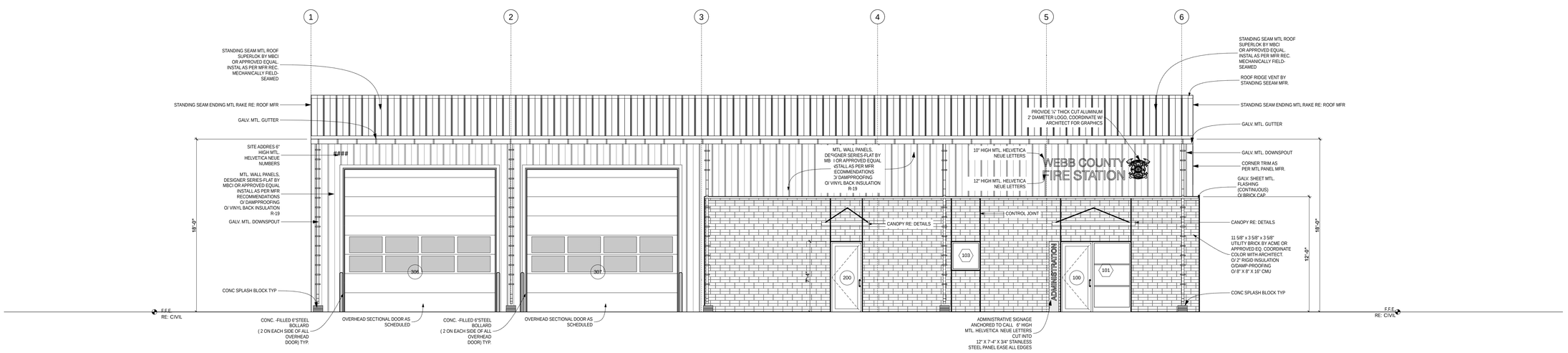


1 NORTH ELEVATION

SCALE: 3/16" = 1'-0"



2 EAST ELEVATION

SCALE: 3/16" = 1'-0"

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NORTH & EAST ELEVATIONS

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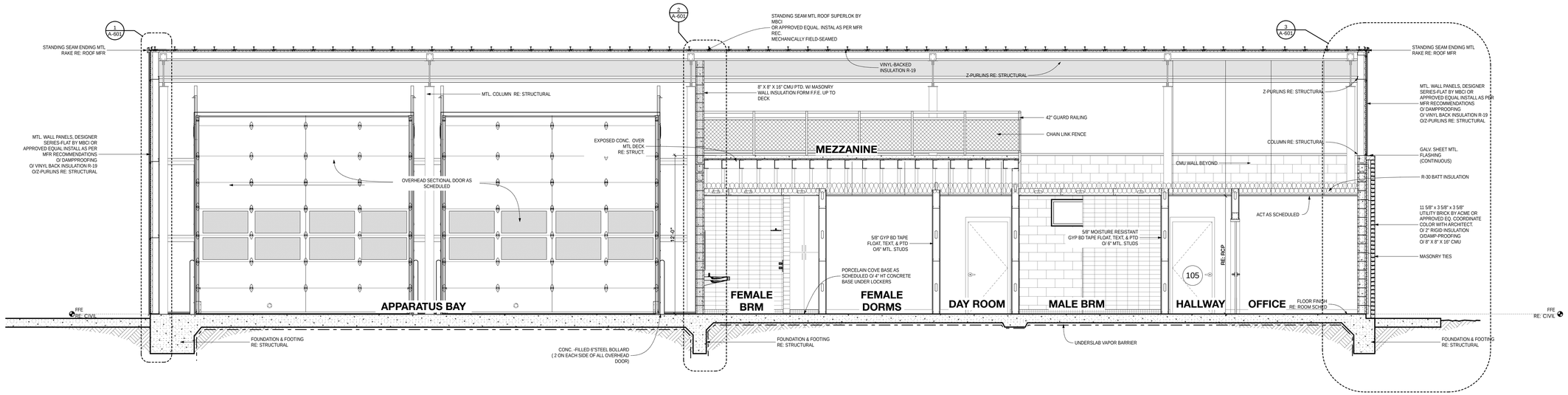
SHEET NO.:

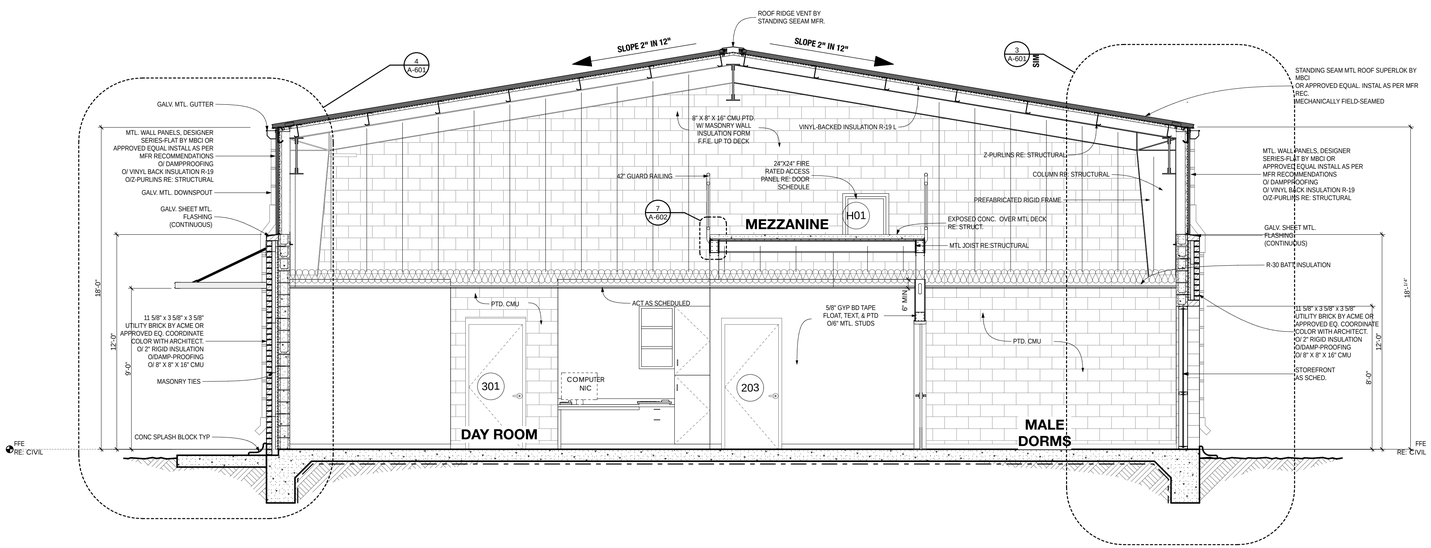
A-501

JOB NO.: 1312



1 BUILDING CROSS SECTION

SCALE: 1/4" = 1'-0"



2 BUILDING SECTION @ DORM & MEZZANINE

SCALE: 1/4" = 1'-0"

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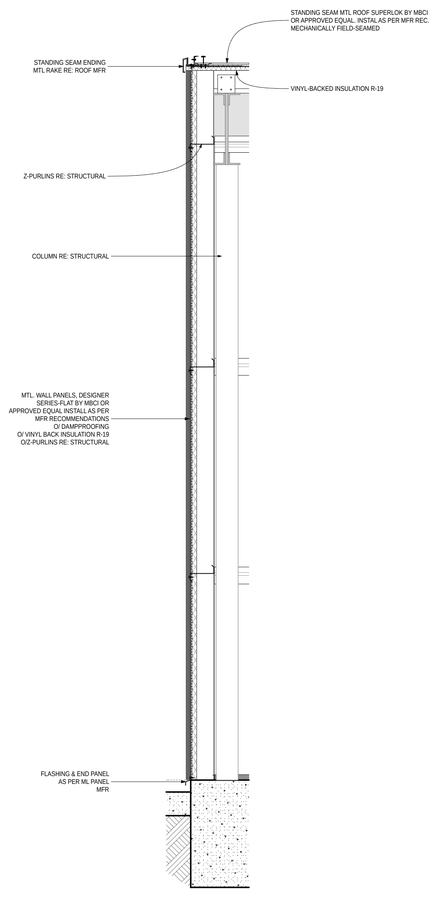
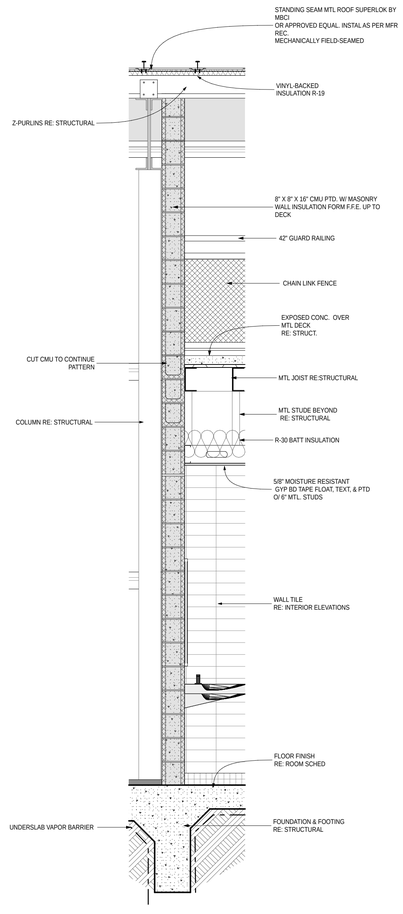
A-600

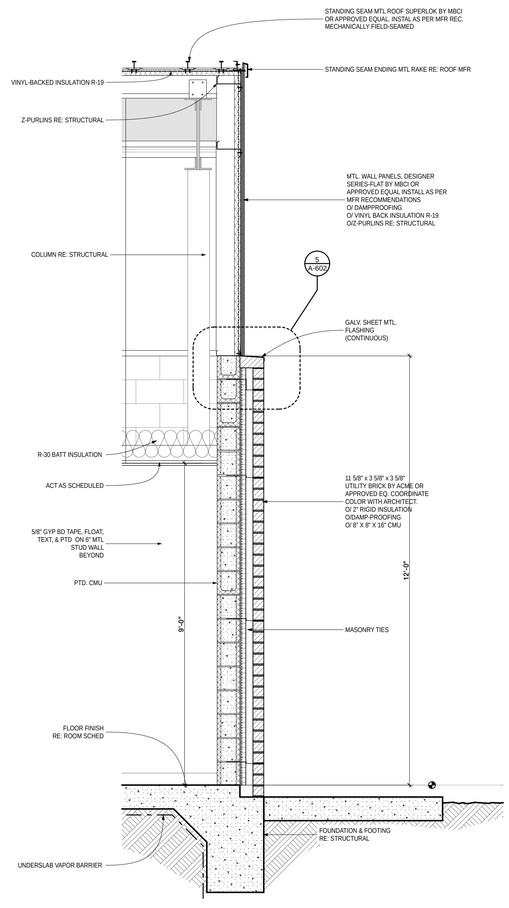
JOB NO.: 1312



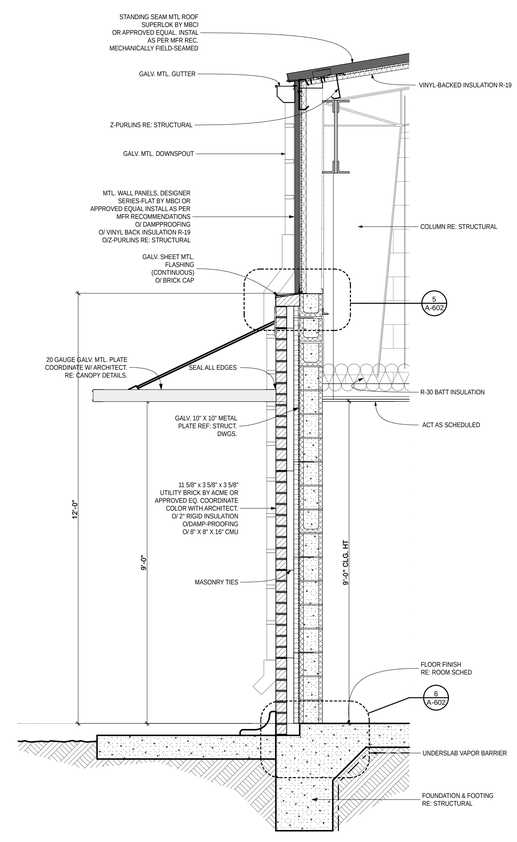
1 TYP. WALL SECTION @ APPARATUS
SCALE: 1/2" = 1'-0"



2 TYP. WALL SECTION @ APPARATUS/ADMIN AREA
SCALE: 1/2" = 1'-0"



3 TYP. WALL SECTION @ ADMIN AREA
SCALE: 1/2" = 1'-0"



4 TYP. WALL SECTION @ DORMS AND ADMIN AREA
SCALE: 1/2" = 1'-0"

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WALL SECTIONS

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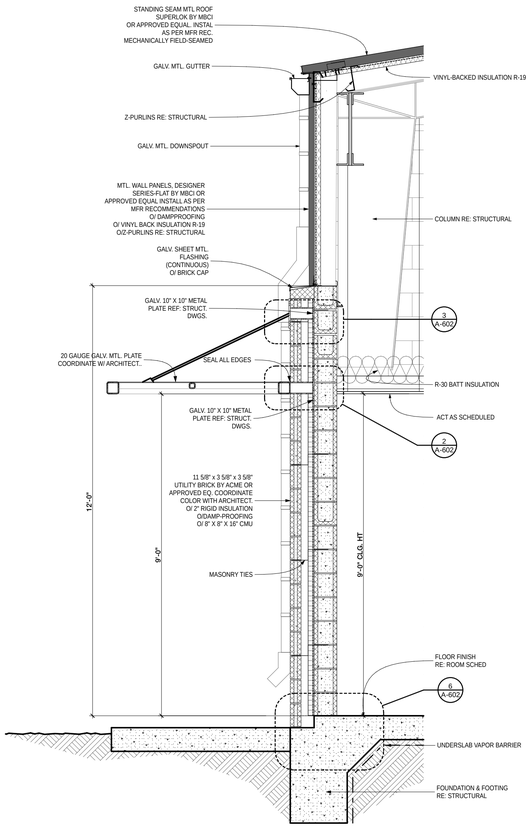
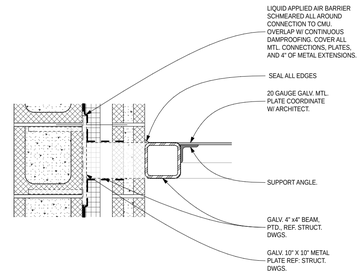
JOB NO.: 1312



1 TYP. WALL SECTION @ DORMS AND ADMIN AREA
SCALE: 1/2" = 1'-0"



2 TYP. WALL SECTION @ CANOPY
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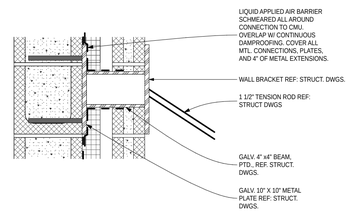

3 TYP. WALL SECTION @ CANOPY
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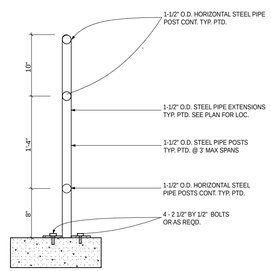
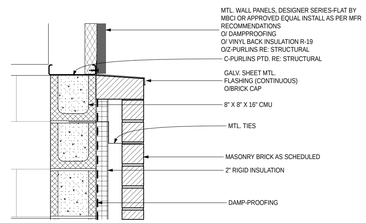
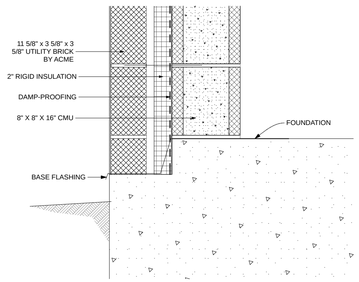


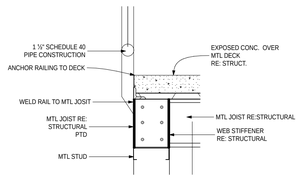
4 TYP. RAILING DETAIL
SCALE: 1" = 1'-0"



5 TYP. WALL DEATIL
SCALE: 1" = 1'-0"



6 TYP. WALL DETAIL
SCALE: 1 1/2"= 1'-0"



7 PRELIMINARY SITE PLAN
SCALE: 1" = 1'-0"

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WEBB COUNTY MAIN FIRE STATION AND ADMINISTRATION BUILDING
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WALL SECTIONS @ CANOPY

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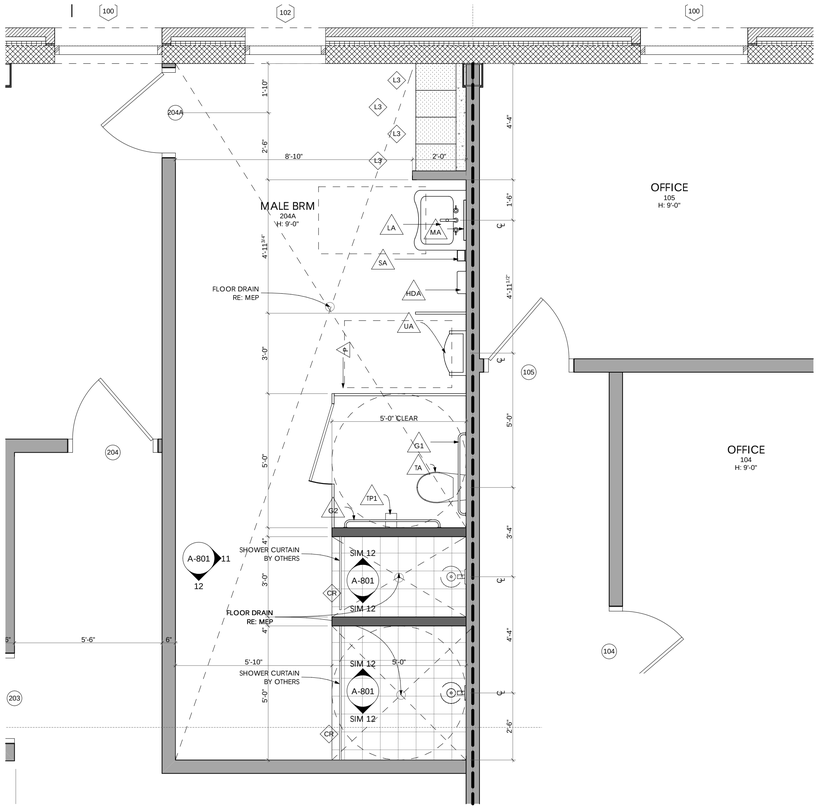
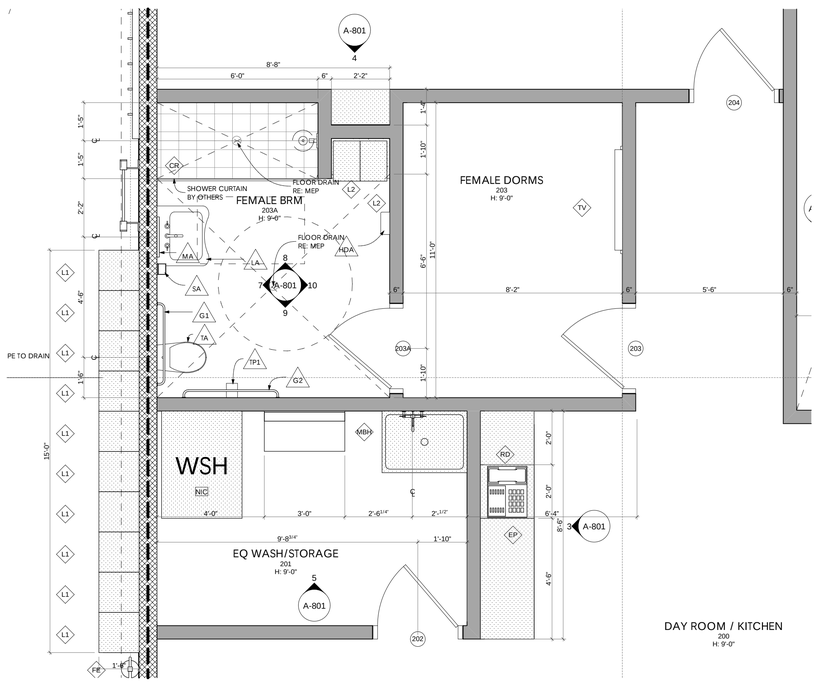


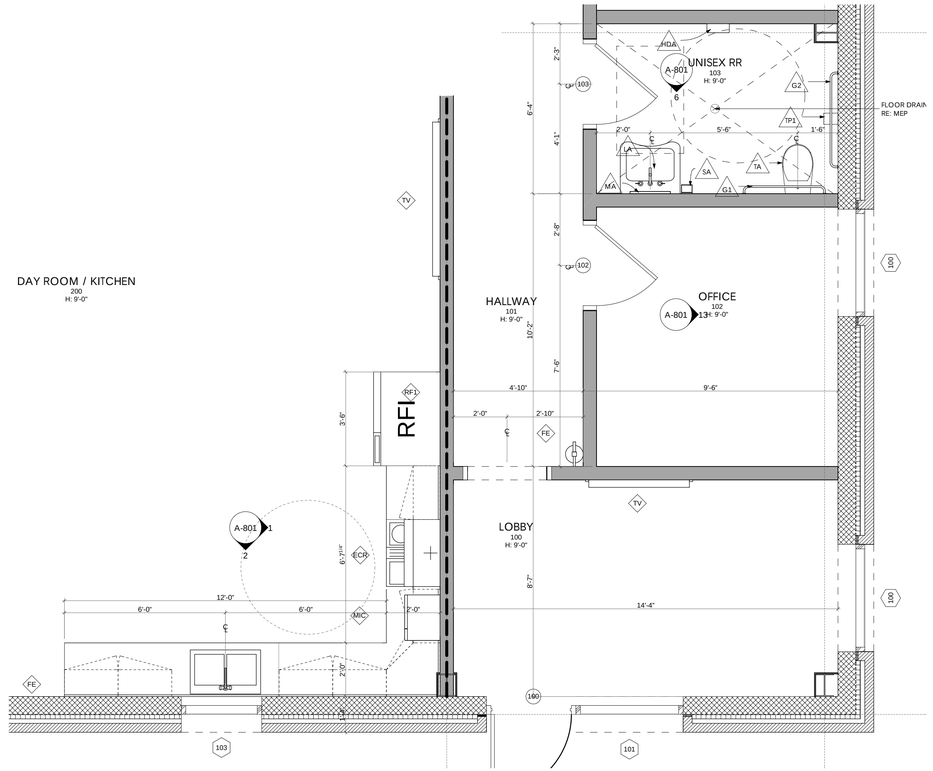
1 PARTIALLY ENLARGED FLOOR PLAN - MALE BRM

SCALE: 3/8" = 1'-0"



2 PARTIALLY ENLARGED FLOOR PLAN - FEMALE BRM

SCALE: 3/8" = 1'-0"



3 PARTIALLY ENLARGED FLOOR PLAN - KITCHEN

SCALE: 3/8" = 1'-0"

ACCESSORIES & FIXTURE DESIGNATIONS SCHEDULE

ID	ITEM	NOTES
G1	HORIZONTAL GRAB BAR (B-6806.99 x 36 BY BORIC OR EQ.)	
G2	HORIZONTAL GRAB BAR (B-6806.99 x 42 BY BORIC OR EQ.)	
G3	HORIZONTAL 2 WALL SHOWER GRAB BAR (B-6806M 24 x 48 BY BORIC OR EQ.)	
HDA	HAND DRYER: ADULT EXTREME AIR HAND DRYER MODEL GXT9-SS WITH RECESS KIT	DIMENSION IS TO THE CENTER OF CONTROL. 4" MAX. DEPTH OVERALL
LA	LAVATORY RE: MEP.	
MA	MIRROR 18"X36" MIRROR (MODEL B-165 1836 BY BORIC OR EQ.)	
MS	MOP SINK RE: MEP.	
SN	SANITARY NAPKIN DISPOSAL MODEL B-270 BY BORIC OR EQ.)	TO BE MOUNTED NEXT TO AND AT SAME HEIGHT AS PAPER TOWEL DISPENSER
SH	SHOWER-HEAD AS PER MEP.	
SA	SOAP DISPENSER: ADULT (MODEL 91180 BY KIMBERLY-CLARK OR EQ.)	
TA	TOILET: ADULT AS PER MEP.	
TP1	TOILET PAPER HOLDER (STD) MODEL 09602 BY KIMBERLY-CLARK OR EQ.)	RE. TO TOILET CLASSIFICATION FOR MOUNTING HEIGHT
TP2	TOILET PAPER HOLDER (ADA) MODEL B-2888 BY BORIC OR EQ.)	RE. TO TOILET CLASSIFICATION FOR MOUNTING HEIGHT
P	TOILET PARTITION	RE. SPECS
UA	URINAL: ADULT AS PER MEP.	
CR	CURTAIN ROD W/ S.S. HOOKS FOR CURTAIN MODEL B-207 BY BORIC OR EQ.	

GENERAL NOTES:

1. REFER TO M.E.P. SECTION FOR ALL PLUMBING FIXTURES
2. ALL RESTROOM ACCESSORIES TO BE STAINLESS STEEL
3. ALL BATHROOM ACCESSORIES ARE TO BE ADA COMPLIANT, PROVIDED & INSTALLED BY CONTRACTOR. RE: SPECS.
4. PROVIDE ADEQUATE BLOCKING AT ALL ACCESSORIES MOUNTING LOCATIONS.
5. PROVIDE ADA COMPLIANT "LAV-GAURDS" AT ALL EXPOSED PLUMBING COMPONENTS UNDER LAVATORIES.

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PARTIALLY ENLARGED FLOOR PLANS

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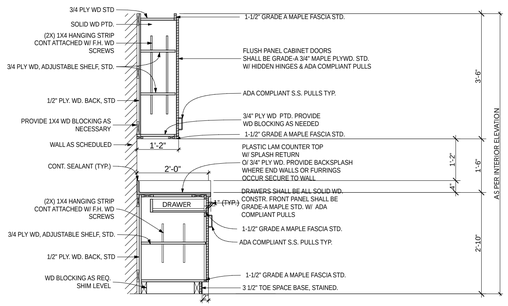
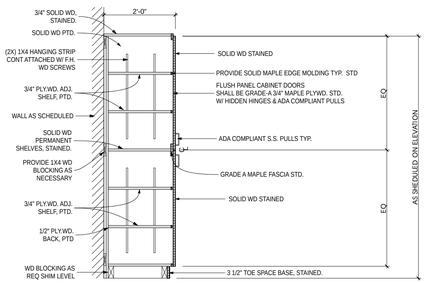


1 TYP. MILLWORK SECTION

SCALE: 1/2" = 1'-0"



2 TYP. MILLWORK SECTION

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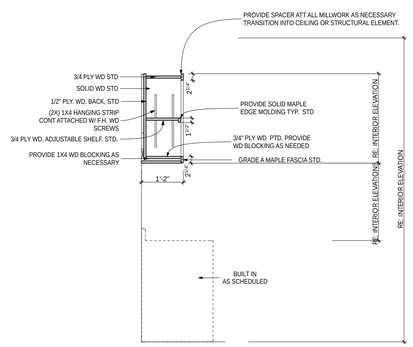
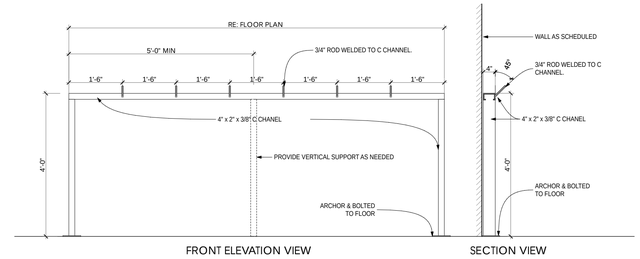


3 TYP. MILLWORK SECTION

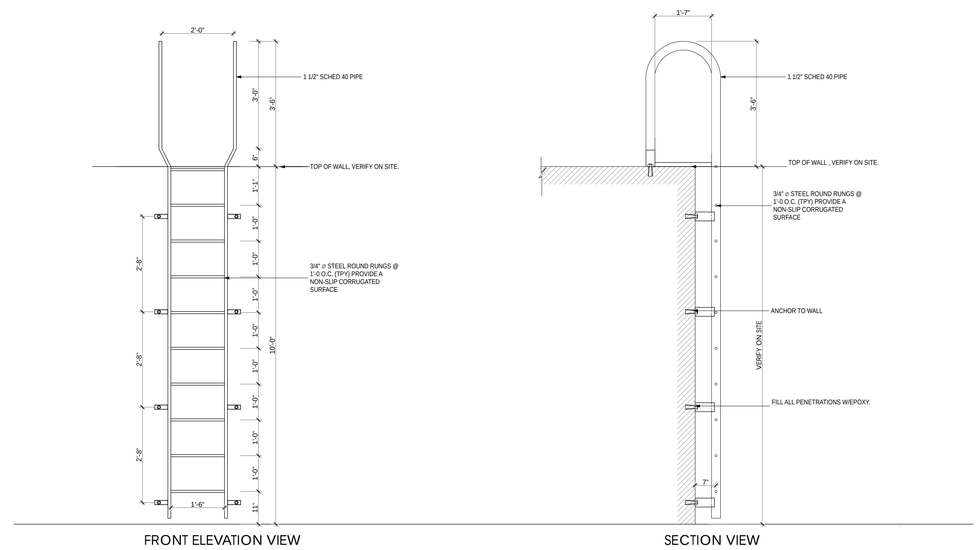
SCALE: 1/2" = 1'-0"

GENERAL NOTES
1. CONTRACTOR TO VERIFY ALL DIMENSIONS ON SITE



4 IW01- HANGERS IN APPARATUS

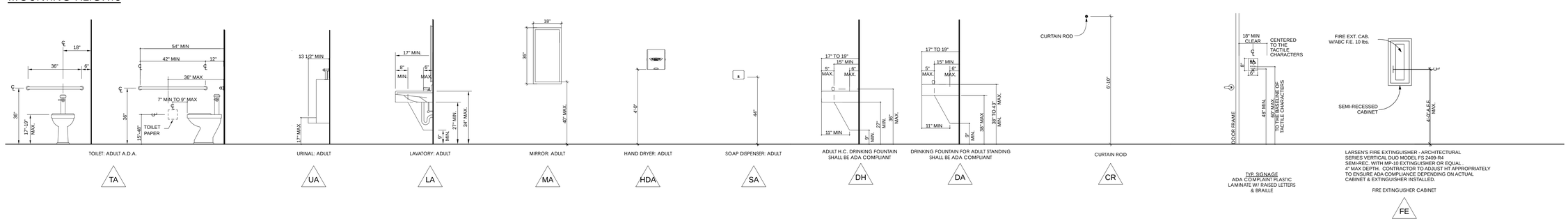
SCALE: 1/2" = 1'-0"



5 IW02-OSHA COMPLIANT STAIRS

SCALE: 1/2" = 1'-0"

MOUNTING HEIGHTS



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ACCESSORIES TYPES & SCHEDULES

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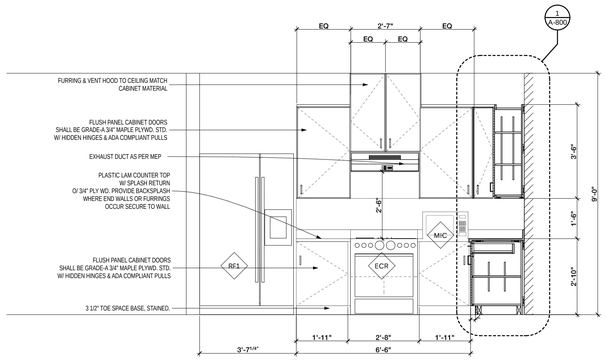
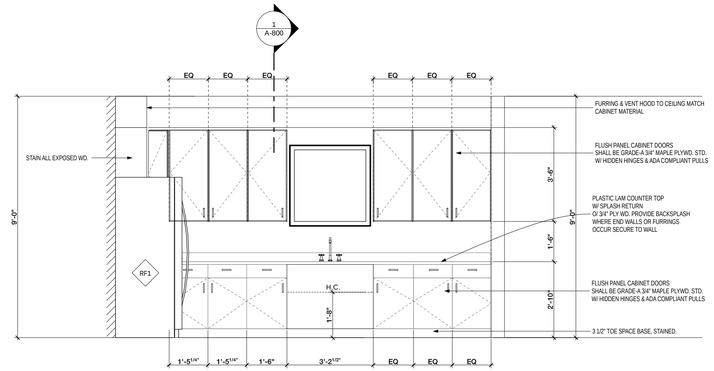
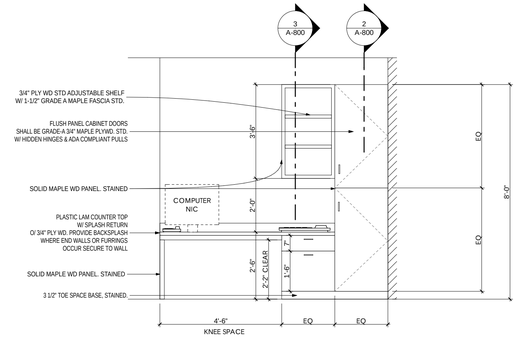


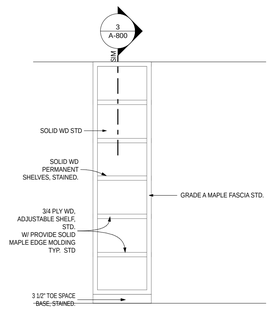
1 MW01: MILLWORK @ KITCHEN
SCALE: 3/8" = 1'-0"



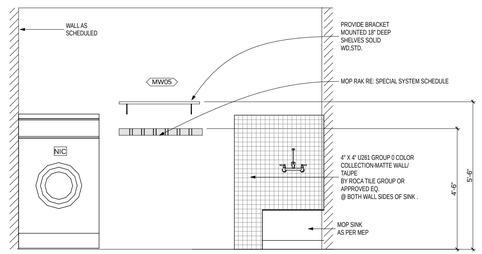
2 MW01: MILLWORK @ KITCHEN
SCALE: 3/8" = 1'-0"



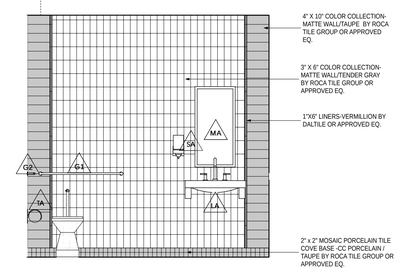
3 MW02: MILLWORK @ DAY ROOM
SCALE: 3/8" = 1'-0"



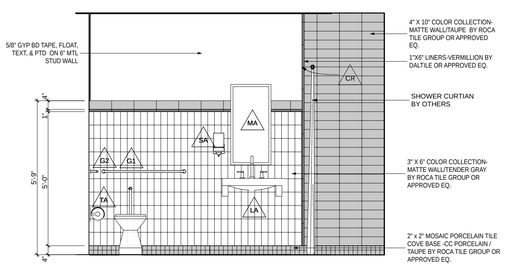
4 MW03: MILLWORK @ MALE DORMS
SCALE: 3/8" = 1'-0"



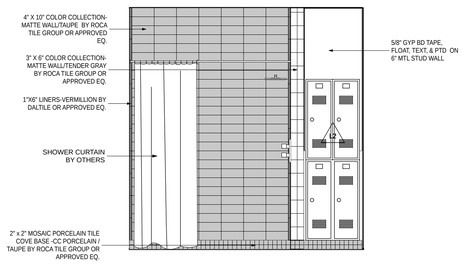
5 MW05: MILLWORK @ EQ WASH/STORAGE
SCALE: 3/8" = 1'-0"



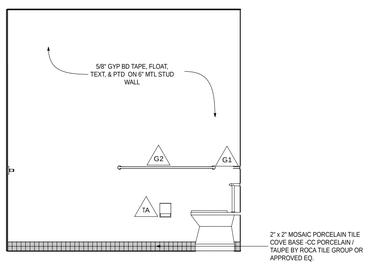
6 INTERIOR ELEVATION @ UNISEX RR
SCALE: 3/8" = 1'-0"



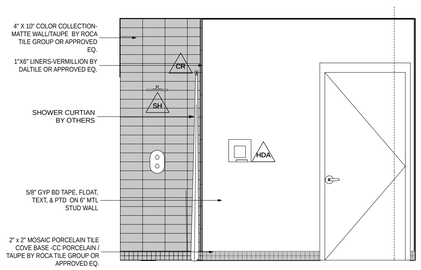
7 INTERIOR ELELV. @ FEMALE BRM
SCALE: 3/8" = 1'-0"



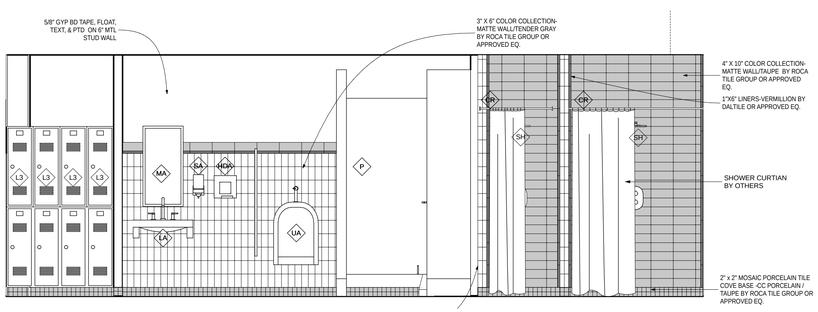
8 INTERIOR ELELV. @ FEMALE BRM
SCALE: 3/8" = 1'-0"



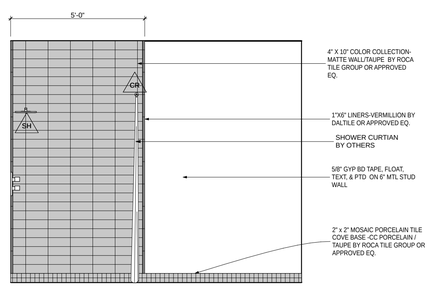
9 INTERIOR ELELV. @ FEMALE BRM
SCALE: 3/8" = 1'-0"



10 INTERIOR ELELV. @ FEMALE BRM
SCALE: 3/8" = 1'-0"



11 INTERIOR ELEVATION @ MALE BRM
SCALE: 3/8" = 1'-0"



12 INTERIOR ELEVATION @ MALE BRM
SCALE: 3/8" = 1'-0"

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INTERIOR ELEVATIONS

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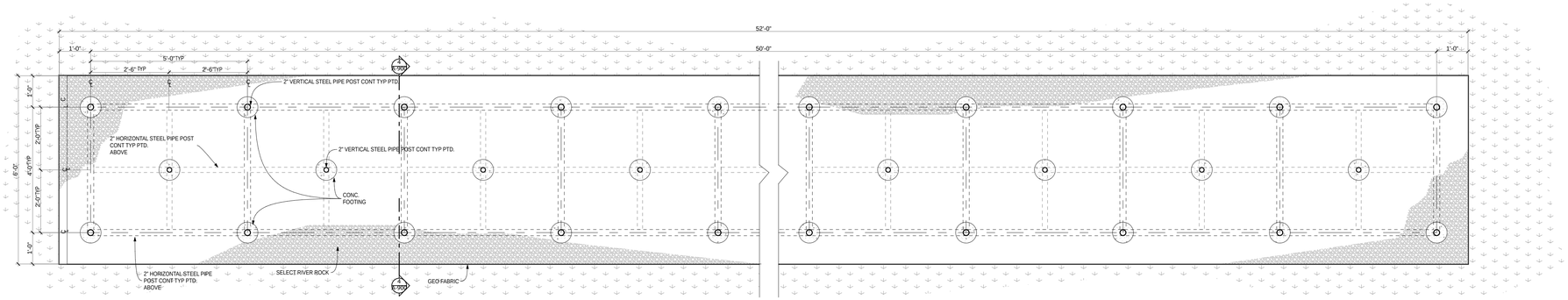
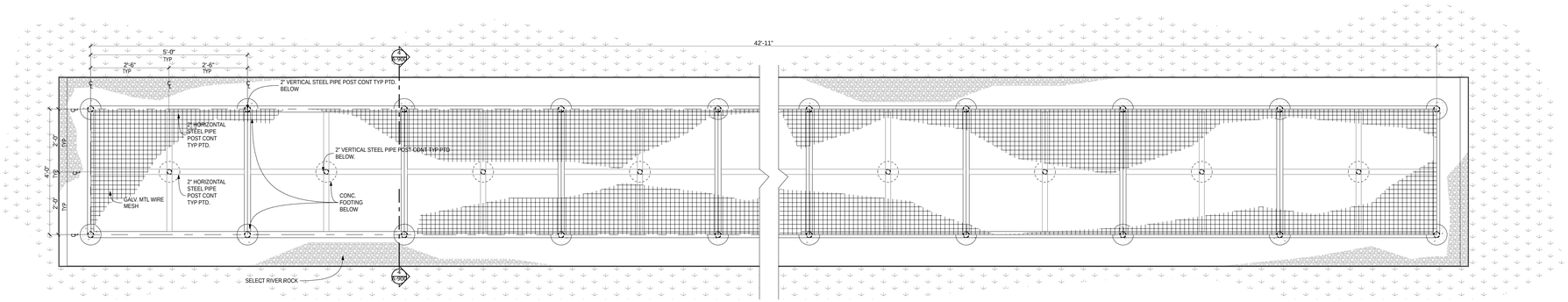


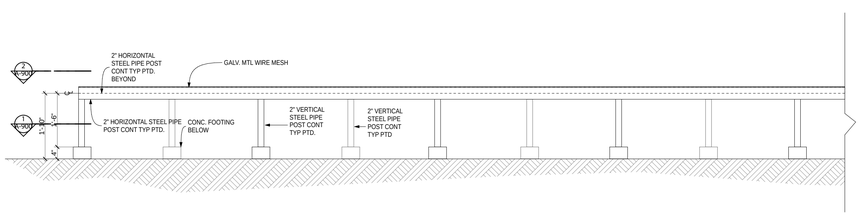
1 HOSE DRYING RACK LOWER PLAN VIEW

NOT TO SCALE



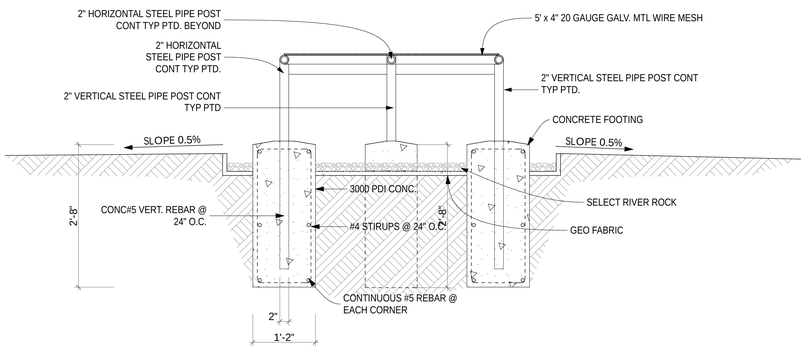
2 HOSE DRYING RACK UPPER PLAN VIEW

NOT TO SCALE



3 PRELIMINARY DRYING SITE PLAN

NOT TO SCALE



4 HOSE DRYING RACK SECTION

NOT TO SCALE

GENERAL NOTES

1.- CONTRACTOR TO CONFIRM ALL DIMENSIONS ON SITE.

2.-CONTRACTOR TO COMPLY WITH ALL OF OSHAS REQUIREMENTS.

3. ALL METAL TO BE GALVANIZED

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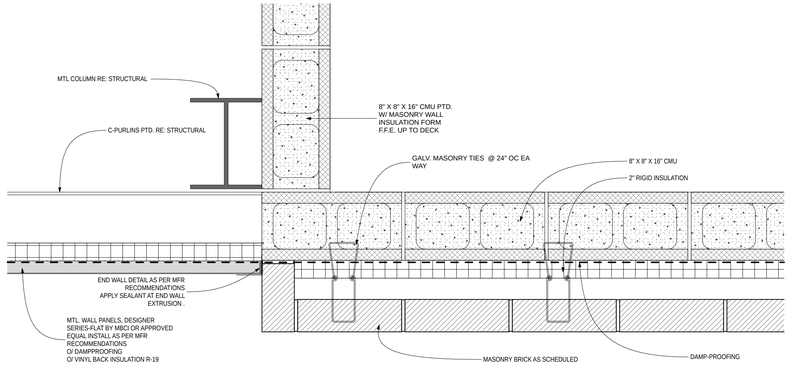
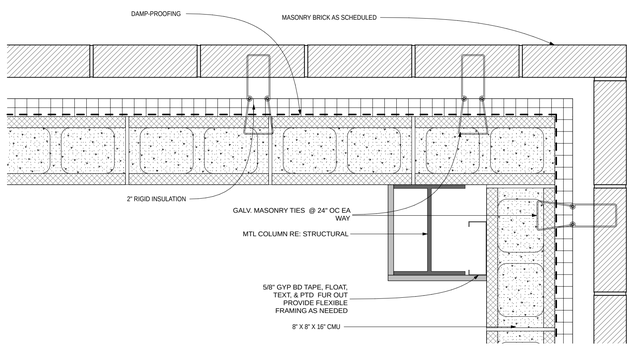
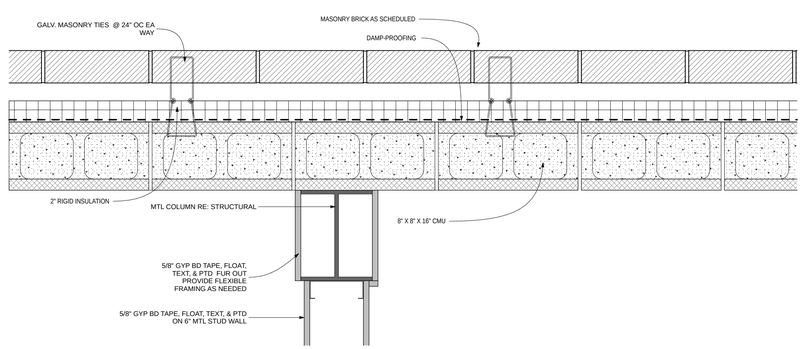


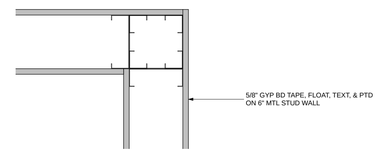
1 TYP. FLOOR PLAN DETAIL
SCALE: 1 1/2"= 1'-0"



2 TYP. FLOOR PLAN DETAIL
SCALE: 1 1/2"= 1'-0"



3 TYP. FLOOR PLAN DETAIL
SCALE: 1 1/2"= 1'-0"



4 TYP. FLOOR PLAN DETAIL
SCALE: 1 1/2"= 1'-0"

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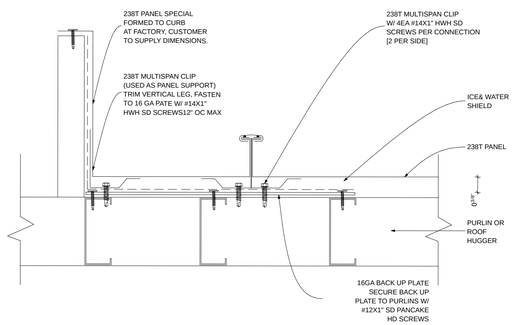
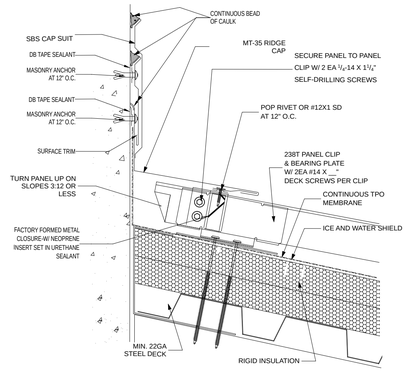
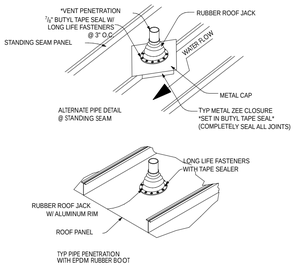


1 TYP MTL ROOF DETAIL
SCALE: 3" = 1'-0"



2 TYP. ROOF DETAIL
SCALE: 3" = 1'-0"



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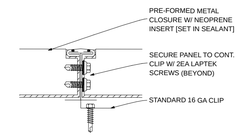
SCALE: 1" = 1'-0"



4 TYP MTL ROOF DETAIL
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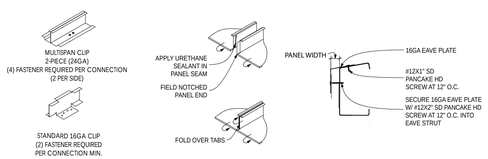
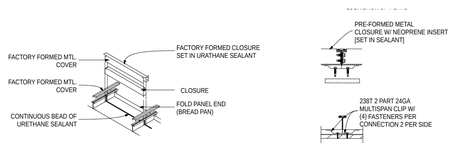
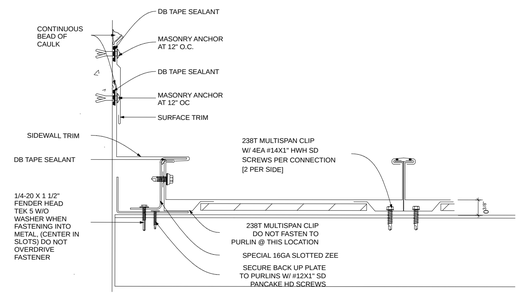


238T STANDING SEAM PANEL FLOATING EAVE-OVER PURLINS W/GUTTER DETAIL

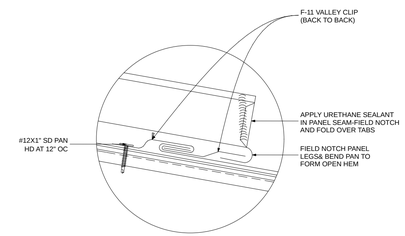


238T STANDING SEAM PANEL W/ FIXED RIDGE OVER PURLINS W/CONT. CLIP DETAILS

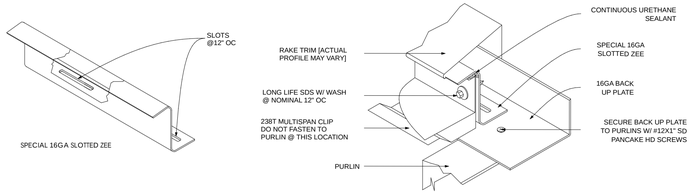
5 TYP MTL ROOF DETAIL
SCALE: 1" = 1'-0"



6 TYP MTL ROOF DETAIL
SCALE: 3" = 1'-0"



7 TYP MTL ROOF DETAILS
SCALE: 3" = 1'-0"



8 TYP MTL ROOF DETAILS
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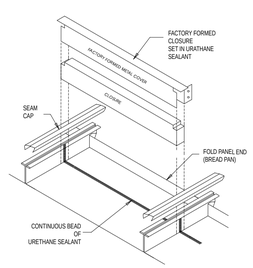
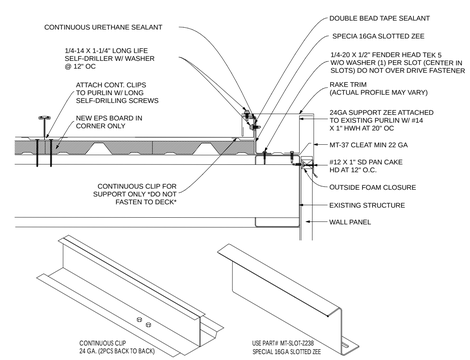


9 TYP MTL ROOF DETAIL
SCALE: 3" = 1'-0"



NOTE:

1. FASTENERS SHOWN IN THIS DETAIL MAY NOT BE THE FASTENERS USED FOR THIS PROJECT. BE SURE TO USE FASTENERS SPECIFIC FOR THIS ROOF APPLICATION. FASTENERS SHOWN ARE A REPRESENTATION OF WHAT MAY BE REQUIRED.

2. ARCHITECTURAL BUILDING COMPONENTS MUST FURNISH SLOTTED RAKE ANGLE ON ALL PROJECTS INVOLVING A WEATHER-TIGHTNESS WARRANTY.

10 FLOATING RAKE-OVER PURINS W/ RETRO CLIP
SCALE: 1 1/2"= 1'-0"

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DIGITALLY SIGNED ON 09/28/15

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WEBB COUNTY MAIN FIRE STATION AND ADMINISTRATION BUILDING
7210 E. SAUNDERS – HWY 59 (UNITS A&B)
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CONSULTANT

STANDING SEAM MTL ROOF DETAILS

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DATE: 09/28/15
REVISIONS:

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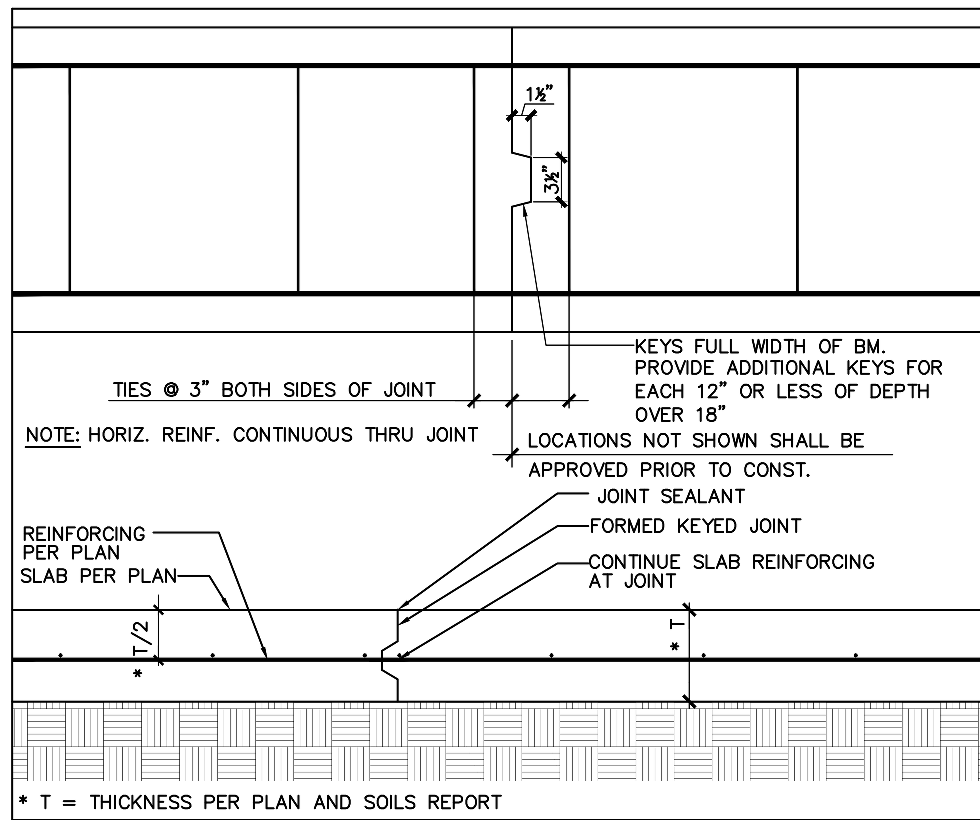
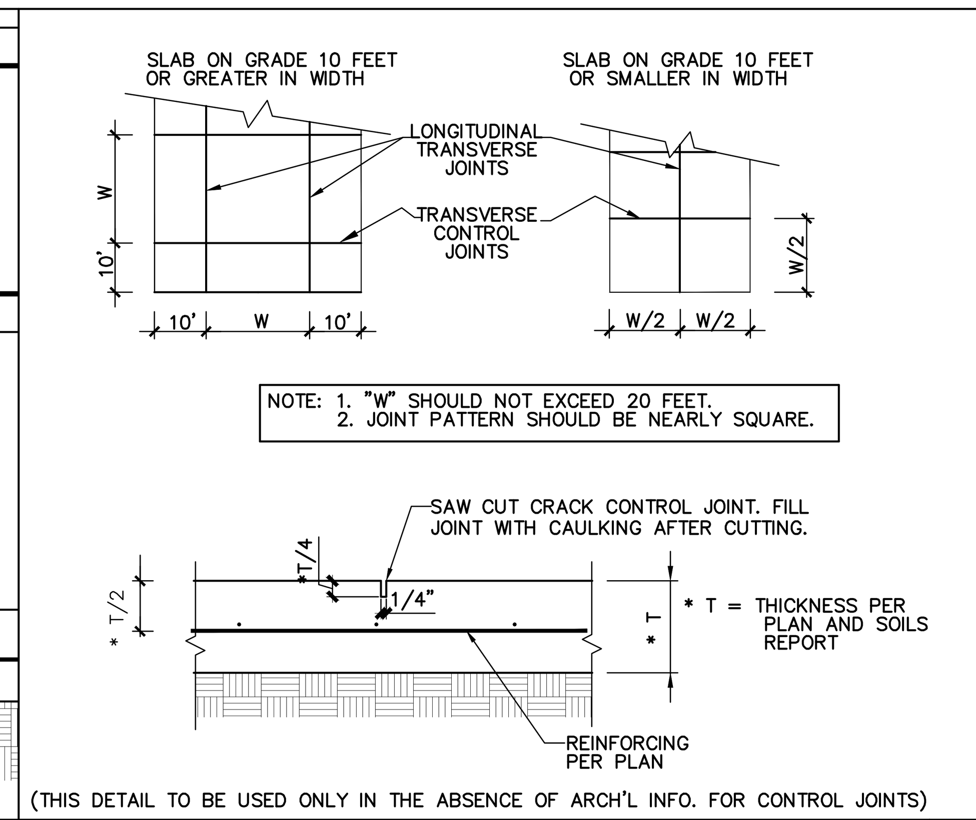
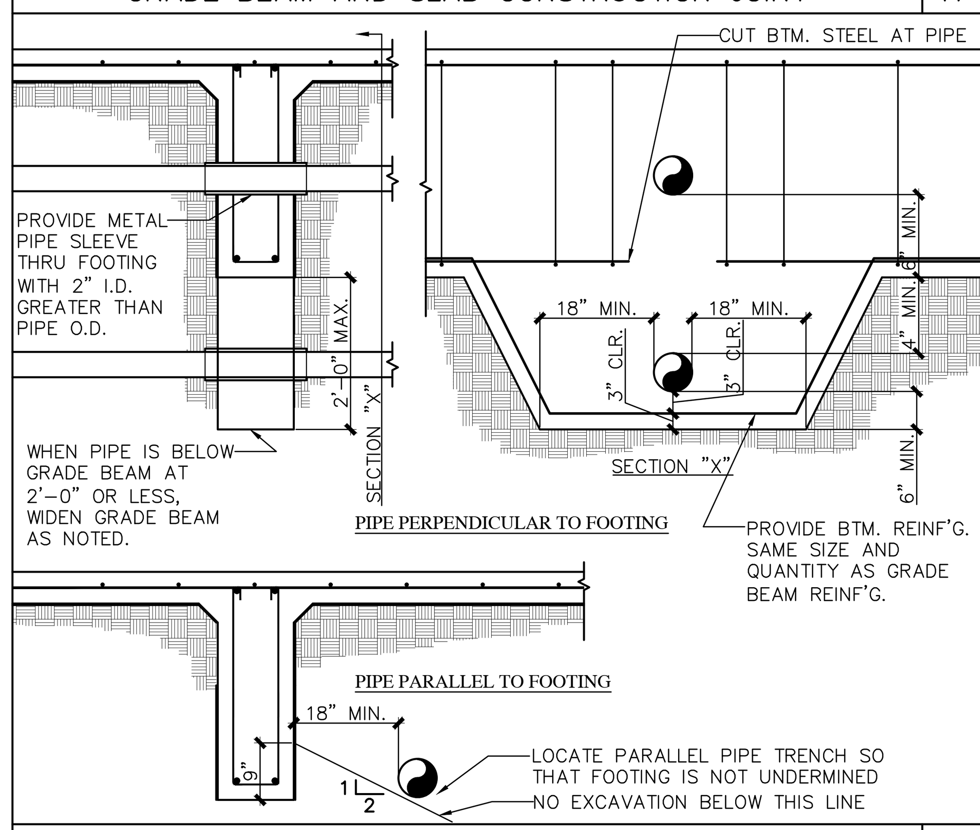
A-903
JOB NO.: 1312



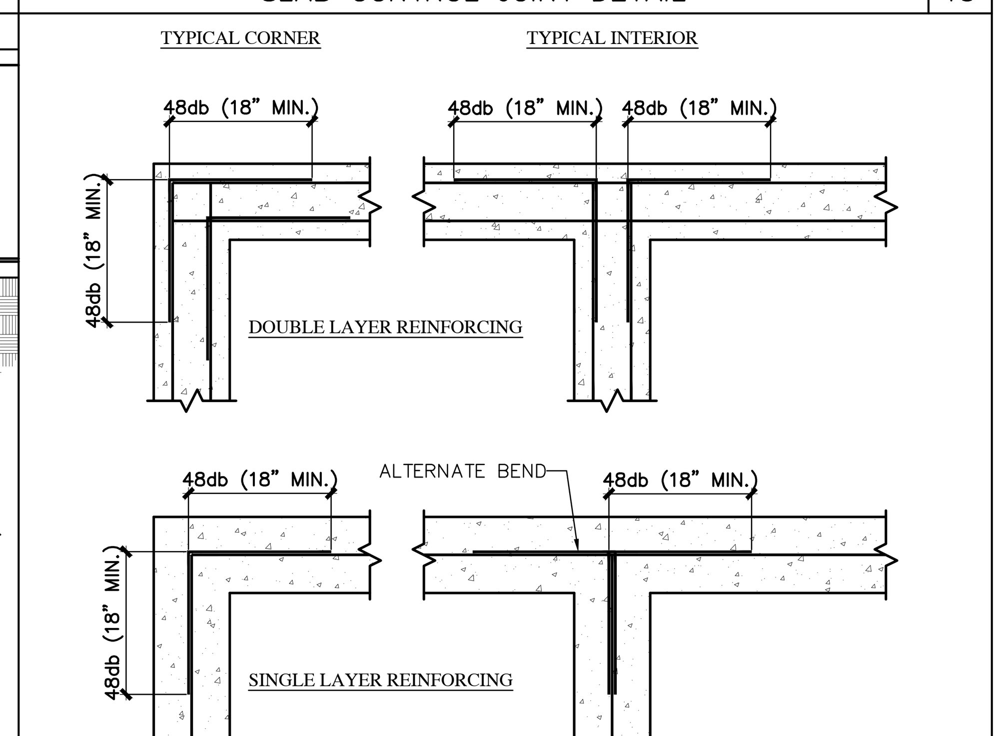
GRADE BEAM AND SLAB CONSTRUCTION JOINT 17



SLAB CONTROL JOINT DETAIL 13



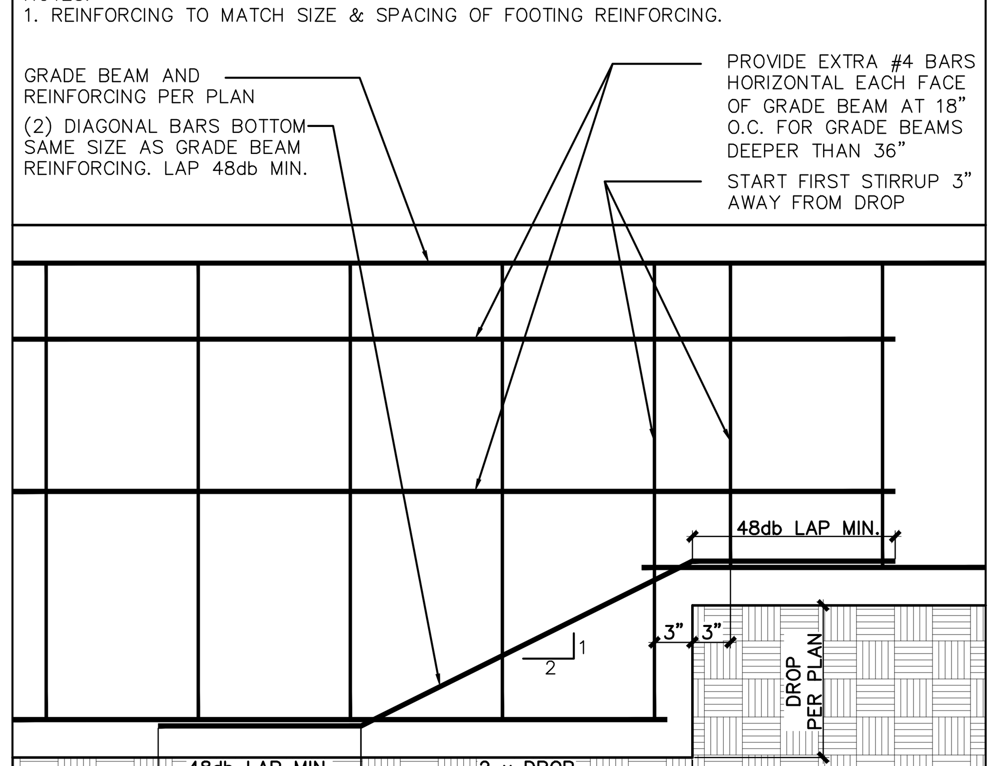
DETAIL OF PIPING SLEEVE AT FOOTING 18



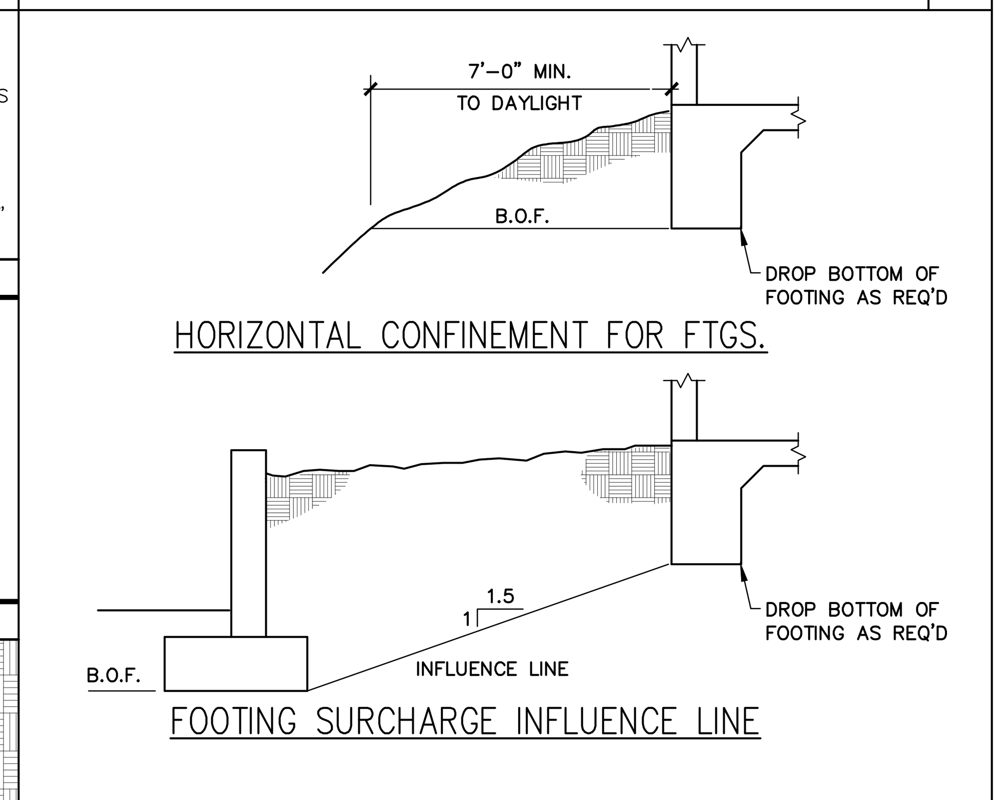
NOTES:
1. THESE CONDITIONS TO APPLY TO PERIMETER AND INTERIOR GRADE BEAM.

TYP. REINFORCING AT INT. OF CONCRETE FOOTINGS 14

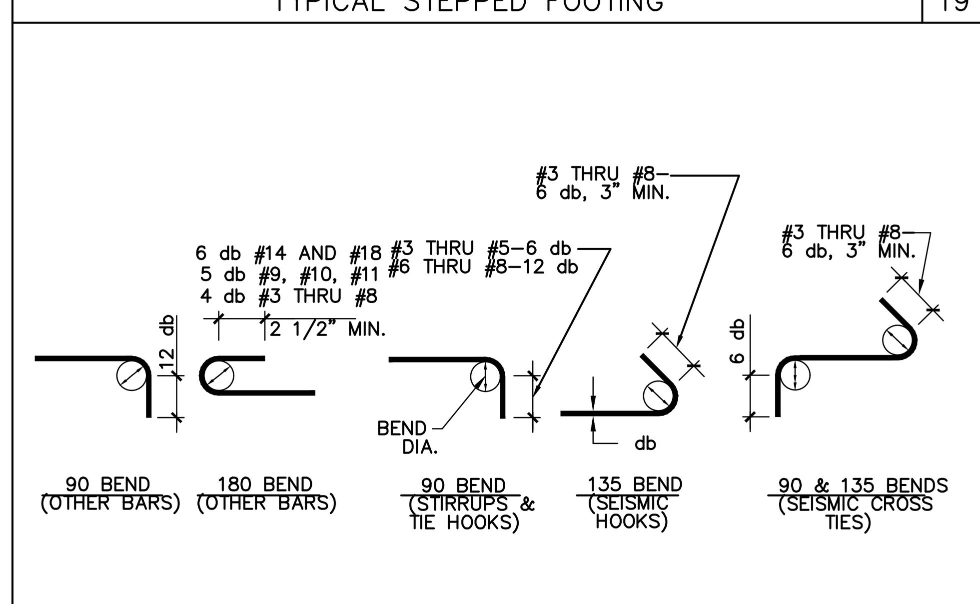
NOTES:
1. REINFORCING TO MATCH SIZE & SPACING OF FOOTING REINFORCING.



TYPICAL STEPPED FOOTING 19

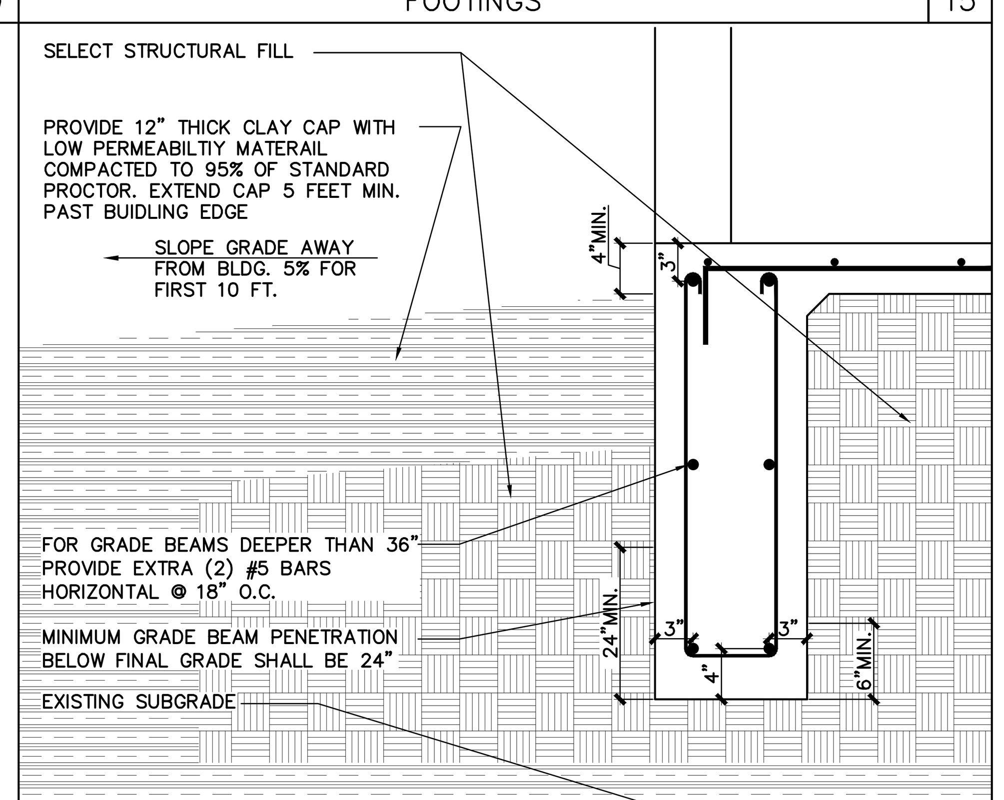


FOOTINGS 15



DIAMETER OF BENDS	
STIRRUPS AND TIES	4 db FOR #3 THRU #5 BARS
	6 db FOR #6 THRU #8 BARS
ALL OTHERS	6 db FOR #3 THRU #8 BARS
	8 db FOR #9 THRU #11 BARS
	10 db FOR #14 THRU #18 BARS

BARS DIAMETER OF BENDS 20



MINIMUM GRADING AT PERIMETER GRADE BEAMS 16

I. STEEL STUDS/JOIST

1. MATERIALS:
2. A. STUDS AND TRACKS: 16 AND 18 GAGE STUDS: ASTM A446 GRADE D, Fy = 50 KSI. SPECIFICATIONS: WELDING PERSONNEL AND PROCEDURES ARE TO BE QUALIFIED PER AWS. DESIGN, FABRICATION AND ERECTION TO BE GOVERNED BY LATEST REVISIONS OF:
A. AISC SPECIFICATION OF THE DESIGN OF COLD FORMED STEEL STRUCTURAL MEMBERS.
B. STRUCTURAL WELDING CODE, AWS D1.3 OF THE AMERICAN WELDING SOCIETY.
PROPERTIES:
A. LIGHTGAGE FRAMING MEMBER SIZES INDICATED ON DRAWINGS SHALL MEET THE FOLLOWING MINIMUM REQUIREMENTS:

DESIGNATION	MEMBER DEPTH	FLANGE WIDTH	GAGE	Ix (IN4)	USE	SPACING OF STUDS	MAXIMUM HEIGHT
362S137-33	3-5/8"	1-3/8"	20	0.484	INTERIOR	16" O.C.	16'-10"
362S137-43	3-5/8"	1-3/8"	18	0.617	INTERIOR	16" O.C.	18'-3"
600S137-33	6"	1-3/8"	20	1.597	INTERIOR	16" O.C.	24'-10"
600S200-54	6"	2"	16	3.321	EXTERIOR	16" O.C.	15'-6"
600S200-68	6"	2"	14	4.099	EXTERIOR	16" O.C.	19'-9"
600S200-97	6"	2"	12	5.655	EXTERIOR	16" O.C.	22'-0"

ALL JOISTS TO BE MANUFACTURED BY DIETRICH INDUSTRIES OR EQUIVALENT EQUAL

3. CONNECTIONS:
A. ALL CONNECTIONS TO BE FIELD BOLTED.
4. FINISH:
A. ALL MATERIALS TO BE GALVANIZED COATED IN ACCORDANCE WITH ASTM A525 G-60.
B. TOUCH UP FIELD WELDS WITH ZINC RICH PAINT.
5. MISCELLANEOUS:
A. SUBMIT SHOP DRAWINGS FOR APPROVAL PRIOR TO FABRICATION.
B. ALL STUDS USED FOR EXTERIOR WALL FRAMING SHALL BE 6" STEEL STUDS, MINIMUM 16 GAGE AT 16" O.C. MAXIMUM, U.N.O. ON PLAN.
C. ALL STUD MEMBERS AND THEIR CONNECTIONS SHALL BE DESIGNED BY THE FABRICATOR FOR A HORIZONTAL WIND LOAD OF AS NOTED IN SECTION B. PROVIDE CALCULATIONS STAMPED BY A REGISTERED STRUCTRAL ENGINEER IN THE STATE OF TEXAS.
D. DEFLECTION LIMIT = L/240 (EXCEPT L/360 AT INTERIOR PLASTER APPLICATION).
E. OPENINGS 10'-0" OR LESS IN WIDTH SHALL BE FRAMED WITH LIGHTGAGE FRAMING MEMBERS. HEADS OR OPENINGS SHALL CONSIST OF STUD OR JOIST SECTIONS SUFFICIENT TO CARRY THE WEIGHT OF THE WALL ABOVE. JAMB SECTIONS SHALL CONSIST OF HEAVIER GAGE STUDS, MULTIPLE STUDS, OR BOTH, AS REQUIRED TO CARRY THE WIND LOAD OF THE ADJACENT OPENING.
F. ALL FIELD CUTTING TO BE PERFORMED WITH A SAW.
G. WELD SIZE TO BE 3/32" WITH AWS TYPE 6013 OR 7014 ROD.
H. TRACKS TO BE SECURELY ANCHORED TO SUPPORTING STRUCTURE WITH WELD AT EACH SIDE OF TRACKS OR POWER DRIVEN FASTENERS.
I. PROVIDE CONTINUOUS HORIZONTAL BRIDGING AT 4'-0" O.C. MAXIMUM FOR WALLS.
J. PROVIDE DOUBLE STUDS UNDER BEAM AND LINTEL BEARING, UNLESS SHOWN OTHERWISE.
K. BRIDGING FOR ROOF JOISTS SHALL BE AT 8'-0" OR MAXIMUM BETWEEN SUPPORTS.

J. WELDING:

1. REFERENCES:
A. AWS D1.1-86 - "STRUCTURAL WELDING CODE - STEEL"
B. AWS D1.3-81 - "STRUCTURAL WELDING CODE - SHEET STEEL"
ALL WELDING BY AWS QUALIFIED OPERATORS.

K. PRE-MANUFACTURED SUPERSTRUCTURE

1. PRE-ENGINEERED METAL BUILDING SHALL BE DESIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF TEXAS AND HAVING THREE (3) OR MORE YEARS EXPERIENCE IN THE DESIGN OF THE TYPE OF THE BUILDING INDICATED ON THE CONTRACT DOCUMENTS.
2. THE METAL BUILDING AND COMPONENTS SHALL BE DESIGNED TO CARRY ITS OWN WEIGHT PLUS ALL SUPERIMPOSED DEAD AND LIVE LOADS INCLUDING WIND LOADS FROM ALL DIRECTIONS AND INCLUDING ALL MECHANICAL, ELECTRICAL AND ARCHITECTURAL LOADS. VERIFY ALL LOADS WITH MECHANICAL, ELECTRICAL AND ARCHITECTURAL PLANS.

PROVIDE A COLLATERAL DEAD LOAD OF 5 PSF FOR WAREHOUSE AREA & 10 PSF FOR OFFICE AREA.

3. VERIFY ALL DIMENSIONS AND SITE CONDITIONS PRIOR TO DESIGN, FABRICATION OR ERECTION OF PRE-ENGINEERED BUILDINGS.
4. PRE-ENGINEERED BUILDING FRAMES AND THE CONNECTION OF SAME TO THE FOUNDATION IS TO BE DESIGNED BY OTHERS AND IS NOT THE RESPONSIBILITY OF THE ENGINEER OF RECORD CONTRACTOR SHALL COORDINATE THE CONNECTION OF THE BUILDING FRAME WITH THE SUPPLIER PRIOR TO CONSTRUCTION.
5. THIS FOUNDATION HAS BEEN DESIGNED USING ASSUMED REACTIONS FROM THE PRE-ENGINEERED BUILDING COMPONENTS AND IS FOR BID PURPOSES ONLY. THE CONTRACTOR SHALL SUBMIT BASE CONNECTION DETAILS (SIZE AND THICKNESS BASE PLATE AND DIAMETER AND LENGTH OF ANCHOR BOLTS) AND REACTIONS OF THE BUILDING FRAMES TO THE ENGINEER OF RECORD PRIOR TO CONSTRUCTION SO THE DESIGN ASSUMPTIONS CAN BE VERIFIED.
6. METAL BUILDING SUPPLIER SHALL PROVIDE AND SUBMIT FOR REVIEW ALL DESIGN CALCULATIONS AND DRAWINGS. ALLOW TWO (2) WEEKS FOR REVIEW OF SHOP DRAWINGS.
7. ANY ADDITIONAL COST OF FOUNDATION WORK REQUIRED BY REVISIONS OF THE FOUNDATION DESIGN AFTER PRE-ENGINEERED BUILDING REACTIONS ARE SUBMITTED SHALL BE BY OTHERS.
8. METAL ROOF DOES NOT PROVIDE LATERAL BRACING FOR THE PURLINS, BRIDGING SHALL BE DESIGNED AND SUPPLIED BY THE PURLIN MANUFACTURER.
9. REFER TO MECHANICAL DRAWINGS FOR ROOF SUPPORTED HVAC UNITS AND PROVIDE SUPPORT FOR ADDITIONAL LOADS AS REQUIRED.
10. MAXIMUM PURLIN SPACING SHALL BE 5'-0" O.C. WITH A MAXIMUM ALLOWABLE DEFLECTION OF : DL + LL LL
SUPPORTING BRITTLE FINISH : 240 360
SUPPORTING FLEXIBLE FINISH : 180 240
11. PRE-ENGINEERED BUILDING MANUFACTURER SHALL PROVIDE ADDITIONAL FRAMING REQUIRED TO SUPPORT THE WEIGHT OF AND TO PROVIDE PROPER SERVICEABILITY OF SUSPENDED MECHANICAL UNITS, MECHANICAL DUCTWORK, LIGHT FIXTURES, AND ALL OTHER SUSPENDED ITEMS.
12. METAL BUILDING MANUFACTURES IS RESPONSIBLE FOR DESIGNING PURLINS AND THEIR CONNECTIONS WITH RAFTERS FOR LATERAL LOAD SUPPORT OF CMU WALLS (IF APPLICABLE).
13. DETAILS SHALL BE INCLUDED WHICH CLEARLY DETAIL RIGID FRAME BASE, HAUNCH, RIDGE PLATE CONNECTIONS AND OTHER MEMBER-TO-MEMBER CONNECTIONS.
14. WIND LOAD DESIGN SHALL INDICATE METHOD OF TRANSFERRING FORCES TO;
A. ENDWALL WIND LOAD TO SIDE WALL FOUNDATIONS.
B. AT END BAY SIDE WALL WIND LOAD TO ENDWALL FOUNDATIONS, CALCULATIONS SHALL SHOW HOW WIND LOAD IS TRANSFERRED TO EAVE STRUT.
15. PORTAL MOMENT FRAMES SHALL BE USED TO RESIST HORIZONTAL WIND FORCES. DESIGN OF ALL CONNECTIONS SHALL BE CLEARLY INDICATED.
16. DESIGN OF HORIZONTAL CROSS-BRACING IN PLANE OF ROOF FRAMING SHALL BE COMPLETE AND SHALL INDICATE METHOD OF TRANSFERRING TRIBUTARY WIND LOAD TO RIGID FRAMES OR THE SIDE WALL PORTAL FRAMES.
17. ALL COLUMN BASE PLATES SHALL BE SET AND GROUTED UNDER FOR FULL CONTACT BEARING.
18. ALL BASES FOR THE COLUMNS SHALL BE "PINNED" AND NOT ASSUMED AS FIXED. NO MOMENT FORCES SHALL BE TRANSFERRED INTO THE BUILDING FOUNDATION.
19. PROVIDE BUILDING CROSS SECTIONS AND ELEVATIONS WHICH CLEARLY SHOW THE PRIMARY STRUCTURAL RIGID MOMENT FRAME, PORTAL MOMENT FRAME, END WALL POST AND BEAMS, INTERIOR COLUMNS, AND OTHER STRUCTURAL MEMBERS THAT ARE TO BE USED ON THE SUBMITTED BUILDING. SIZE OF ALL STANDARD AISC MEMBERS AND OF ALL WEB AND FLANGE SECTIONS USED IN BUILT UP MEMBER SHALL BE NOTED AS WELL AS ALL BOLTS AND WELDING.
20. THE METAL BUILDING AND COMPONENTS SHALL BE DESIGNED AS PER IBC 2012 UNLESS LOCAL CODES REQUIRE STRICTER LIMITATIONS. MINIMUM REQUIREMENTS SHALL BE AS FOLLOWS:
BASIC WIND SPEED SEE SECTION B
BUILDING DRIFT
WITH METAL SIDING H/180
WITH MASONRY VENEER H/360
GIRT DEFLECTION
METAL SIDING H/180
MASONRY VENEER H/360
21. DESIGN AND MEMBERS FOR FRAMED OPENINGS SHALL BE PROVIDE AS PART OF THE METAL BUILDING DESIGN
22. MAX. COLUMN SIZES TO BE DETERMINED BY THE PRE-MANUF. BUILDING SUPPLIER AND SHALL BE ABLE TO FIT IN THE AREAS OR FUR-OUTS THE ARCHITECT HAS PROVIDED.

E. MASONRY

1. MATERIALS:
A. CONCRETE BLOCK: LIGHTWEIGHT ASTM C90 (HOLLOW) ASTM C145 (SOLID) f'm=1,900 PSI
B. MORTAR: ASTM C270 TYPE S, MINIMUM COMPRESSIVE STRENGTH: 1,800 PSI (PROPERTY SPECIFICATIONS) MORTAR TITE AS MANUFACTURED BY ADDIMENT.
C. BOND BEAM AND CORE FILL: ASTM C476, COARSE TYPE f'c=2,000 PSI
D. JOINT REINFORCING: MILL GALVANIZED FINISH, 9 GAGE MINIMUM SIDE WIRES AND CROSS WIRES (LADUR TYPE) (DUR-O-WALL).
E. BAR REINFORCING: ASTM A615, GRADE 60 (UNLESS NOTED OTHERWISE).
2. REINFORCED MASONRY, WHERE VERTICAL BARS ARE TO BE GROUTED INTO CORES, THE FOLLOWING REQUIREMENTS APPLY:
A. PROVIDE DOWELS FROM WALL, SAME SIZE AND SPACING AS WALL BARS. LAP 48 DIAMETERS MINIMUM WITH WALL BAR.
B. PROVIDE A CONTINUOUS VERTICAL CAVITY, AT LEAST 2" X 3" IN SIZE, FREE OF MORTAR DROPPINGS.
C. PROVIDE REBAR ALIGNMENT DEVICES AT A MAXIMUM SPACING OF 96 BAR DIAMETERS (MINIMUM OF 2 PER BAR).
D. AT SPLICES IN VERTICAL BARS, PROVIDE MECHANICAL COUPLERS OR 48 DIAMETER LAP.
E. ALL REINFORCEMENT MUST BE INSTALLED AND SECURELY ANCHORED IN PLACE PRIOR TO PLACEMENT OF GROUT.
F. MAXIMUM HEIGHT OF GROUT LIFT = 4'-0". UNLESS HIGH LIFT GROUTING PROCEDURES ARE EMPLOYED IN ACCORDANCE WITH ASI 530-99
3. MISCELLANEOUS:
A. FILL CORE SOLID AROUND ANCHOR BOLTS.
B. PROVIDE 100% SOLID BLOCKS OR SOLIDLY FILLED HOLLOW BLOCKS AT ALL EXPANSION BOLT LOCATIONS.
C. SET WELD PLATES IN BOND BEAMS AFTER THE GROUT IS PLACED, BUT WHILE IT IS STILL PLASTIC.
D. HOLLOW MASONRY UNITS TO BE LAID WITH FULL MORTAR COVERAGE ON HORIZONTAL AND VERTICAL FACE SHELLS. WEBS SHALL ALSO BE BEDDED IN ALL COURSES OF PIERS, COLUMNS, AND PILASTERS, AND IN THE STARTING COURSE ON FOOTINGS, AND WHEN ADJACENT TO CELLS OR CAVITIES TO BE REINFORCED OR FILLED WITH CONCRETE OR GROUT. SOLID UNITS TO BE LAID WITH FULL HEAD AND BED JOINTS.
E. PROVIDE JOINT REINFORCING AT 16 INCHES, EXCEPT AS NOTED.
F. LAP JOINT REINFORCING 6 INCHES FOR STANDARD, 15 INCHES FOR HEAVY WEIGHT.
G. VERTICAL CONTROL JOINTS SHALL BE PROVIDED FULL JHEIGHT OF MASONRY WALLS AS LOCATED ON THE DRAWINGS. THE JOINT SHALL BE PROVIDED AS A CONTINUOUS HEAD JOINT WITH MORTAR RAKED BACK 3/4" AT BOTH FACES AND 50% OF THE HORIZONTAL JOINT REINFORCING CUT AT THE JOINT. BOND BEAM REINFORCING AND GROUT SHALL CONTINUE THROUGH THE JOINT. AFTER THE MORTAR IS SET, THE JOINT SHALL BE CAULKED WITH A FLEXIBLE MASTIC.
H. FILL ALL VOIDS AND CELLS WITHIN 12" EITHER SIDE OF CENTERLINE OF BEAM AND/OR COLUMN BEARING LOCATIONS WITH A #4 REINFORCING BAR AND GROUT U.N.O.

F. LINTELS:

1. PROVIDE LINTELS OVER ALL OPENINGS IN WALLS. REFER TO ARCHITECTURAL AND HVAC DRAWINGS FOR LOCATION, NUMBER AND SIZES OF OPENINGS NOT SHOWN ON STRUCTRAL SHEETS.

G. STRUCTURAL STEEL

1. MATERIALS:
A. STRUCTURAL STEEL:
W SECTIONS ASTM- A992
HSS SECTIONS ASTM- A500 GRADE B
ALL OTHER SECTIONS ASTM- A36
HIGH STRENGTH BOLTS: ASTM A325 OR A490
ANCHOR BOLTS: ASTM A307 OR A36:
ELECTRODES: SERIES E70
STRUCTURAL PIPES: ASTM A53 OR A501, FY = 42 KSI
EXPANSION BOLTS: HILTI "KWIK BOLTS" OR APPROVED EQUAL.
2. SPECIFICATIONS: WELDING PERSONNEL AND PROCEDURES ARE TO BE QUALIFIED PER AWS D1.1. UNLESS SPECIFICALLY SHOWN OTHERWISE, DESIGN, FABRICATION AND ERECTION TO BE GOVERNED BY
A. AISC SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS LATEST EDITION.
B. AISC CODE OF STANDARD PRACTICE LATEST EDITION.
C. STRUCTURAL WELDING CODE, AWS D1.1-88 OF THE AMERICAN WELDING SOCIETY.
D. SPECIFICATIONS FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS
3. CONNECTIONS:
A. CONNECTIONS TO BE DESIGNED BY THE FABRICATOR TO DEVELOP FULL STRENGTH OF MEMBER. FOLLOW INSTRUCTIONS ON DRAWINGS FOR GENERAL ARRANGEMENT OR PARTICULAR DETAILS. FIELD CONNECTIONS TO BE BOLTED. SHOP CONNECTIONS TO BE WELDED OR BOLTED.
B. FULL PENETRATION AND PARTIAL PENETRATION FIELD WELDS IN MATERIAL OVER 5/16 INCH THICK SHALL BE SUBJECT TO NON-DESTRUCTIVE TESTING (OTHER THAN VISUAL INSPECTION) BY AN INDEPENDENT LABORATORY.
C. ALL BOLTS IN BRACED FRAMES AND BOLTS IN SHEAR CONNECTIONS USED IN CONJUNCTION WITH FULL PENETRATION FLANGE WELDS SHALL BE SLIP CRITICAL (FRICTION) TYPE.
4. PAINT:
A. DO NOT PAINT ANY STEEL WHICH WILL BE CONCEALED FROM VIEW. PAINT ALL VISIBLE STEEL GRAY.
5. GALVANIZING: ALL SHELF ANGLES, LINTELS IN EXTERIOR WALLS, AND ALL EXTERIOR STEEL EXPOSED TO THE ELEMENTS SHALL BE GALVANIZED.
6. MISCELLANEOUS:
A. PROVIDE HOLES FOR OTHERS. IF OPENING IS NOT SHOWN ON THE STRUCTURAL DRAWINGS, OBTAIN PRIOR APPROVAL.
B. STEEL SUPPORTING OR CONNECTED TO HVAC AND OTHER EQUIPMENT AND ROOF OPENINGS AS SHOWN ON THE DRAWINGS IS SHOWN FOR BIDDING PURPOSES ONLY. CONTRACTOR SHALL RECONCILE EXACT SIZE AND LOCATION BEFORE PROCEEDING WITH HIS WORK.
C. GROUT UNDER BEARING PLATES, BASE PLATES, AND SETTING PLATES TO BE NON-SHRINKING TYPE.
D. STEEL BELOW GRADE TO BE PROTECTED BY A MINIMUM OF 3 INCHES OF CONCRETE.
E. PROVIDE 1/4 INCH THICK SETTING PLATES FOR ALL BEAMS BEARING ON MASONRY WHICH DO NOT REQUIRE A BEARING PLATE.
F. PROVIDE SHOP WELDED ANCHORS FOR ATTACHMENTS OF MASONRY. SPACING TO BE 16 INCHES ON COLUMNS AND BEAMS.
G. PROVIDE HEAVY WASHER AT ALL ANCHOR BOLTS.
H. FINISH ENDS OF ALL COLUMNS, STIFFENERS AND ALL OTHER MEMBERS IN DIRECT BEARING.
I. PROVIDE BOLT HOLES FOR JOISTS BOLTED TO BEAMS AND ATTACHMENT FOR JOINING EXTENDED JOIST BOTTOM CHORDS.
J. MINIMUM BEAM BEARING ON MASONRY = 8 INCHES UNLESS NOTED OTHERWISE.
L. EMBEDMENT LENGTH OF EXPANSION BOLTS INTO SOLID MASONRY OR CONCRETE SHALL BE AS FOLLOWS:
1/2 INCH DIAMETER BOLTS --- 3 1/2 INCHES EMBEDMENT
3/4 INCH DIAMETER BOLTS --- 5 INCHES EMBEDMENT

H. STEEL DECK

1. REFERENCE: STEEL DECK INSTITUTE: "DESIGN MANUAL FOR COMPOSITE DECKS, FORM DECKS AND ROOF DECKS: LATEST EDITION."
2. DECK SHALL AS NOTED ON PLANS WITH G60 GALVANIZED FINISH.
3. DECK ENDS MAY BE EITHER BUTTED OR LAPPED OVER SUPPORTS. ON JOIST FRAMING, APPROPRIATE END LAP SHALL OCCUR OVER A TOP CHORD ANGLE FOR PROPER ANCHORAGES.
4. UNLESS NOTED OTHERWISE, ATTACH METAL DECK TO STRUCTURAL STEEL WITH #12 TEK SCREWS AT 6" O.C. AT PERIMETER AND 12" O.C. AT INTERMEDIATE SUPPORTS. FASTEN SIDE LAPS WITH #12 TEK SCREWS AT 6" O.C.

REINFORCEMENT TENSION LAPS AND EMBEDMENT
(fy=60,000 PSI f'c=3,000 PSI)

BAR SIZE	BAR DIA. (IN)	EMBEDMENT AND CLASS A LAP (IN)				CLASS B LAP (IN)			
		TOP BAR		OTHER BARS		TOP BAR		OTHER BARS	
		CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2
#3	3/8	22	32	14	25	28	42	22	32
#4	1/2	29	43	22	33	37	56	29	43
#5	5/8	36	54	28	41	47	74	36	54
#6	3/4	43	64	33	50	56	84	43	64
#7	7/8	63	94	48	72	81	122	63	94
#8	1	72	107	55	82	93	134	72	107
#9	1-1/8	81	121	62	93	105	157	81	121
#10	1-1/4	91	136	70	105	118	177	91	136
#11	1-3/8	101	151	78	116	131	196	101	151

NOTES:
1. TABLE REPRESENTS LENGTHS OF TENSION DEVELOPMENT LENGTHS AND TENSION LAP SPLICES LENGTHS BASED ON AC1 318-08 SECTION 12.2.2.
2. CLASS A LAP LENGTHS APPLY WHEN BARS LAPS ARE STAGGERED TO LAP HALF THE BARS AT THE SAME LOCATION OR WHEN BARS ARE LAPPED AT A LOCATION WHERE THE REINFORCEMENT AREA PROVIDED IS AT LEAST TWICE THAT REQUIRED.
3. CLASS B LAP LENGTHS APPLY WHEN ALL BARS ARE SPLICED AT A LOCATION OF MAXIMUM STRESS IN THE BARS.
4. CASE 1 LENGTHS APPLY TO BEAMS AND COLUMNS WITH CONCRETE COVER EQUAL OR GREATER THAN THE BAR DIAMETER, CLEAR BAR SPACING EQUAL OR GREATER THAN THE BAR DIAMETER AND WITH STIRRUPS OR TIES NOT LESS THAN THE CODE MINIMUM THROUGHOUT THE LENGTH IN THE TABLE, AND FOR OTHER ELEMENTS WITH CONCRETE COVER EQUAL OR GREATER THAN THE BAR DIAMETER AND CLEAR SPACING EQUAL OR GREATER THAN TWO TIMES THE BAR DIAMETER.
5. CASE 2 LENGTHS APPLY TO BEAMS AND COLUMNS WITH CONCRETE COVER LESS THAN THE BAR DIAMETER, AND CLEAR BAR SPACING LESS THAN THE BAR DIAMETER, AND FOR OTHER ELEMENTS WITH CONCRETE COVER LESS THAN THE BAR DIAMETER AND CLEAR BAR SPACING LESS THAN TWO TIMES THE BAR DIAMETER.
6. TOP BARS ARE HORIZONTAL REINFORCEMENT PLACED SO THAT MORE THAN 12 INCHES OF CONCRETE IS CAST BELOW THE REINFORCEMENT.
7. MULTIPLY LENGTHS SHOWN BY 0.87 FOR 4000 PSI CONCRETE.
8. MULTIPLY LENGTHS SHOWN BY 1.3 FOR LIGHTWEIGHT AGGREGATE CONCRETE.
9. MULTIPLY LENGTHS SHOWN BY 1.3 FOR EPOXY-COATED BARS.

A. GENERAL

1. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE BUILDING IS FULLY COMPLETED. IT IS SOLELY THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO INSURE THE SAFETY OF THE BUILDING AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, SHEETING, TEMPORARY BRACING, GUYS OR TIE DOWNS WHICH MIGHT BE NECESSARY. SUCH MATERIAL SHALL REMAIN THE CONTRACTOR'S PROPERTY AFTER THE COMPLETION OF THE PROJECT.
2. IT IS SOLELY THE CONTRACTOR'S RESPONSIBILITY TO FOLLOW ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION.
3. EQUIPMENT FRAMING LOADS, OPENINGS AND STRUCTURE IN ANY WAY RELATED TO HVAC, PLUMBING, OR ELECTRICAL REQUIREMENTS ARE SHOWN FOR BIDDING PURPOSES ONLY. CONTRACTOR SHALL OBTAIN APPROVAL OF THE INVOLVED TRADES BEFORE PROCEEDING WITH SUCH PORTION OF THE WORK. EXCESS COST RELATED TO VARIATION IN THESE REQUIREMENTS TO BE BORNE BY THE APPROPRIATE CONTRACTOR.
4. SHOULD ANY OF THE DETAILED INSTRUCTIONS SHOWN ON THE PLANS CONFLICT WITH THESE STRUCTURAL NOTES, THE SPECIFICATIONS, OR WITH EACH OTHER, THE STRICTEST PROVISION SHALL GOVERN.

B. ENGINEERING DESIGN CRITERIA

BUILDING CODE: INTERNATIONAL BUILDING CODE (IBC) 2012.
SECTION 1603: CONSTRUCTION DOCUMENTS
1603.1.1 FLOOR LIVE LOAD:
A. CLASSROOMS 40 PSF
B. PUBLIC AREAS 100 PSF
C. RESTROOMS, OFFICES 50 PSF
D. CORRIDORS 100 PSF
E. STACK ROOMS 150 PSF
F. MECHANICAL ROOMS 150 PSF
1603.1.2 ROOF LIVE LOAD:
A. MINIMUM ROOF LIVE LOAD = 20 PSF
1603.1.3 ROOF SNOW LOAD:
A. FLAT ROOF SNOW LOAD, Pf= 0 PSF
B. SNOW EXPOSURE FACTOR, Ce= 0.9
C. SNOW LOAD IMPORTANCE FACTOR, I= 1.0
D. THERMAL FACTOR, Ct= 1.0
1603.1.4 WIND DESIGN DATA:
A. ULTIMATE WIND SPEED (3-SECOND GUST), Vult = 120 MPH
NOMINAL DESIGN WIND SPEED (3-SECOND GUST), Vasd = 90 MPH
B. RISK CATEGORY= III
C. WIND EXPOSURE= C
D. INTERNAL PRESSURE COEFFICIENT, GCpi = +/- 0.18
E. COMPONENTS AND CLADDING NET DESIGN WIND PRESSURE (PSF):

ZONE	1	2	3	4	5
	+10.5	+10.5	+10.5	+25.9	+25.9
	-25.9	-43.5	-65.5	-28.1	-34.7

1603.1.5 EARTHQUAKE DESIGN DATA:
A. RISK CATEGORY = III
B. SEISMIC IMPORTANCE FACTOR, Ie = 1.25
C. MAPPED SPECTRAL RESPONSE ACCELERATION, Ss=0.071g AND S1=0.018g
D. SITE CLASS= D
E. SPECTRAL RESPONSE COEFFICIENTS, Sds=0.073g AND Sd1=0.029g
F. SEISMIC DESIGN CATEGORY= A
G. BASIC SEISMIC-FORCE-RESISTING SYSTEM(S)= ORDINARY REINFORCED MASONRY SHEAR WALLS
H. DESIGN BASE SHEAR=
I. SEISMIC RESPONSE COEFFICIENT(S), Cs= XXXXg
J. RESPONSE MODIFICATION FACTOR(S), R= 3.5
K. ANALYSIS PROCEDURE USED= EQUIVALENT LATERAL FORCE PROCEDURE
1603.1.6 GEOTECHNICAL INFORMATION:
A. ALLOWABLE SOIL BEARING CAPACITY= 3,000 PSF TOTAL LOAD ON SELECT FILL
1603.1.7 FLOOD DESIGN DATA:
A. NOT APPLICABLE.
1603.1.8 SPECIAL LOADS:
A. NOT APPLICABLE.
1603.1.9 SYSTEMS AND COMPONENTS REQUIRING SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE:
A. NOT APPLICABLE.

C. GENERAL NOTES FOR SITE PREPARATION

1. REFER TO CIVIL AND ARCHITECTURAL PLANS FOR FINISH FLOOR ELEVATION.
2. BUILDING AREAS TO SUPPORT SELECT FILL SHOULD BE STRIPPED OF ALL EXISTING VEGETATION AND TOPSOIL EXTENDING AT LEAST 3 FT BEYOND BUILDING PERIMETER.
3. NOT USED.
4. SCARIFY THE SUBGRADE AT LEAST (8) EIGHT INCHES AND MOISTURE CONDITION BETWEEN MINUS TWO (-2) TO PLUS THREE (+3) PERCENTAGE POINTS OF THE OPTIMUM MOISTURE CONTENT AND COMPACTED TO A MINUMUM OF 95% OF THE MAXIMUM DRY DENSITY DETERMINED IN ACCORDANCE WITH ASTM D698 (STD. PROCTOR)
5. STRUCTURAL FILL SHALL CONSISTS OF INORGANIC SILTY CLAYS OR SANDY CLAYS WITH A LIQUID LIMIT (LL) OF LESS THAN 35 AND A PLASTICITY INDEX (PI) BETWEEN SEVEN (7) AND FIFTEEN (15). THE FILL SHOULD BE PLACED IN COMPACTED LIFTS NOT TO EXCEED SIX (6) INCHES IN THICKNESS, MOISTURE CONDITIONED BETWEEN MINUS TWO (-2) TO PLUS THREE (+3) PERCENTAGE POINTS OF THE OPTIMUM MOISTURE AND COMPACTED TO A MINIMUM OF 95% OF THE MAXIMUM DRY DENSITY DETERMINED IN ACCORDANCE WITH ASTM D698 (STD. PROCTOR).
6. REFER TO GEOTECHNICAL ENGINEERING REPORT PREPARED BY CASTLE ENGINEERING AND TESTING, LLC PROJECT NUMBER 15G047 DATED SEPTEMBER 28, 2015.
7. THE SOILS ENGINEER SHALL BE THE OWNERS REPRESENTATIVE TO CONTROL THE PLACEMENT OF COMPACTED FILL. THE SOILS ENGINEER SHALL APPROVE THE SUBGRADE PREPARATION, THE FILL MATERIALS, THE METHOD OF PLACEMENT AND COMPACTION, AND SHALL GIVE WRITTEN APPROVAL OF THE COMPLETED FILL.
8. PROVIDE DENSITY TESTING ON THE SUBGRADE SOILS AND THE SELECT FILL AT EVERY LIFT AND FOR EACH 2,500 SF OF SLAB AREA, OR A MINIMUM OF 3 DENSITY TEST PER TESTING INTERVAL, WHICHEVER IS GREATER. ANY AREAS NOT MEETING THE REQUIRED COMPACTION SHOULD BE RECOMPACTED AND RETESTED UNTIL COMPLIANCE IS MET.
9. OBSERVATION OF REINFORCEMENT PLACEMENT WILL NEED TO BE PROVIDED BY SYNERGY STRUCTURAL ENGINEERING, INC. BEFORE CONCRETE POUR. THE FOLLOWING ITEMS WILL NEED TO BE PROVIDED BY CONTRACTOR AND/OR OWNER BEFORE REBAR OBSERVATION:
A. COMPACTION REPORTS OF SUBGRADE AND SUBSEQUENT LIFTS PERFORMED BY AN APPROVED TESTING LABORATORY.
B. COMPACTION AND INSPECTION REPORTS BY AN APPROVED TESTING LABORATORY FOR THE BACKFILLING OF THE TRENCHES OF PLUMBING OR ELECTRICAL LINES.
**FAILING TO PROVIDE COMPACTION REPORTS WILL VOID ANY WARRANTIES AND/OR LIABILITIES DESCRIBED IN THESE PLANS AND/OR PROPOSAL-AGREEMENT BETWEEN OWNER/CONTRACTOR AND SYNERGY STRUCTURAL ENGINEERING, INC.

D. REINFORCED CONCRETE

1. MATERIALS:
A. SPECIFICATIONS: IN GENERAL, COMPLY WITH ACI 301-LATEST EDITION "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS."
B. STRUCTURAL CONCRETE

CONCRETE TYPE	DESIGN STRENGTH	MAXIMUM SLUMP	MAXIMUM AGGREGATE	MAXIMUM W/C RATIO AIR ENTR.	MAXIMUM W/C RATIO NO AIR ENTR.
FOUNDATION	3000 PSI	5"	1-1/2"	0.5	0.6
RETAINING WALL	3000 PSI	5"	1-1/2"	0.5	0.6
COLUMNS ELEV. BEAMS	4000 PSI	5"	1-1/2"	0.5	0.6
DECK FILL	3500 PSI	4"	3/4"	0.4	0.5

* ALL MIXES SHALL HAVE A MINIMUM OF 5 SACKS OF CEMENT PER CUBIC YARD REGARDLESS OF STRENGTH OBTAINED.
C. ALL DEFORMED REINFORCING BARS (ASTM A 615): FY = 60,000
D. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A165-85. (SHEET FORM, NOT ROLLED)
2. FIELD MANUAL: PROVIDE AT LEAST ONE COPY OF THE ACI FIELD REFERENCE MANUAL, SP-15, IN THE FIELD OFFICE AT ALL TIMES.
3. CONTINGENCIES:
A. PROVIDE SUPPORTS AS REQUIRED TO MAINTAIN ALIGNMENT OF SCHEDULED REINFORCING. SUCH SUPPORTS ARE TO BE REFLECTED IN THE BID.
4. FOOTINGS:
A. DOWELS IN FOOTINGS TO MATCH VERTICAL WALL REINFORCING.
B. PROVIDE LEAN CONCRETE (CLASS IV) UNDER FOUNDATIONS FOR ACCIDENTAL OVER-EXCAVATION, SOFT SPOTS AND TRENCHES.
5. SPLICES: UNLESS NOTED OTHERWISE, LAP SPLICES AND EMBEDMENTS SHALL BE AS SHOWN ON TABLE BELOW.
6. CONSTRUCTION JOINTS:
A. CONSTRUCTION JOINTS PERMITTED ONLY WHERE SHOWN OR AS APPROVED BY THE STRUCTURAL ENGINEER. ALL CONSTRUCTION JOINTS ARE TO BE KEYED. KEYWAYS SHALL BE 1-1/2 INCHES DEEP X 1/3 MEMBER THICKNESS.
7. CONCRETE COVER: UNLESS NOTED OTHERWISE, DETAIL REINFORCING TO PROVIDE CONCRETE COVER AS FOLLOWS:
A. CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH: 3 IN.
B. CONCRETE EXPOSED TO EARTH OR WEATHER: #5 BARS AND SMALLER 1 1/2 IN.
OTHERS 2 IN.
C. CONCRETE NOT EXPOSED TO EARTH OR WEATHER: SLABS, WALLS, AND #11 BARS & SMALLER 3/4 IN.
OTHERS 1 1/2 IN.

GENERAL NOTES 4

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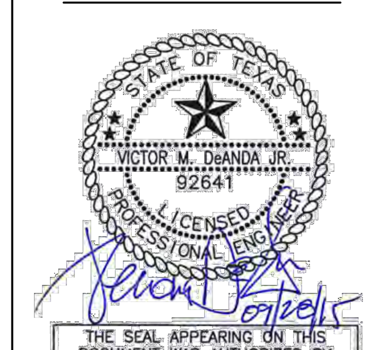
WEBB COUNTY/TEXAS
WEBB COUNTY MAIN FIRE STATION AND ADMINISTRATION BUILDING

BOB BULLOCK LP 20 - RR6078A RD.
LAREDO, TX 78045



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GENERAL NOTES AND TYP. FND. DETAILS

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DATE: 9/28/2015
REVISIONS:

SHEET NO.: S-1.1

JOB NO.: SSE-13-139.1

CMU LINTEL SCHEDULE

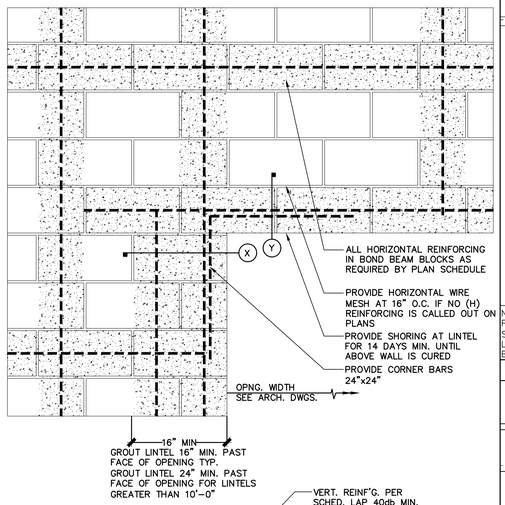
TYPICAL CMU LINTELS AT NON-BEARING WALLS

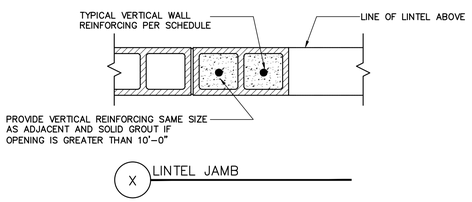
MARK	MAX. CLEAR SPAN	BLOCK WIDTH (IN)	LINTEL DEPTH (IN.)	HORIZONTAL REINFORCING	SHEAR STIRRUPS	REMARKS
LN1	3'-4"	6	8	(1) #5		
LN2	6'-8"	6	16	(1) #5 T&B		
LN3	3'-4"	8	8	(1) #5		
LN4	6'-8"	8	16	(2) #5 T&B		
LN5	8'-0"	8	24	(2) #5 T&B		
LN6	10'-0"	8	24	(2) #6 T&B		
LN7	3'-4"	12	8	(2) #5		
LN8	6'-8"	12	16	(2) #5 T&B		
LN9	8'-0"	12	24	(2) #5 T&B		
LN10	10'-0"	12	24	(2) #6 T&B		

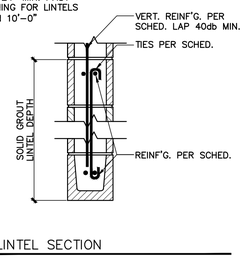
TYPICAL CMU LINTELS AT BEARING WALLS

MARK	MAX. CLEAR SPAN	BLOCK WIDTH (IN)	LINTEL DEPTH (IN.)	HORIZONTAL REINFORCING	SHEAR STIRRUPS	REMARKS
LN11	3'-4"	8	16	(2) #5 T&B	#3 @ 8" O.C.	
LN12	6'-8"	8	16	(2) #5 T&B	#3 @ 8" O.C.	
LN13	8'-0"	8	24	(2) #5 T&B	#3 @ 8" O.C.	
LN14	10'-0"	8	32	(2) #5 EA.	#3 @ 8" O.C.	
LN15	12'-0"	8	40	(2) #5 EA.	#3 @ 8" O.C.	SPECIAL INSPECTION
LN16	14'-0"	8	48	(2) #5 EA.	#3 @ 8" O.C.	SPECIAL INSPECTION
LN17	3'-4"	12	8	(2) #5		
LN18	6'-8"	12	16	(2) #5 T&B		
LN19	8'-0"	12	24	(2) #6 T&B		
LN20	10'-0"	12	32	(4) #6 T&B		2 BARS IN 2 COURSES
LN21	12'-0"	12	40	(4) #6 T&B		2 BARS IN 2 COURSES
LN22	20'-0"	12	48	(4) #6 T&B		2 BARS IN 2 COURSES

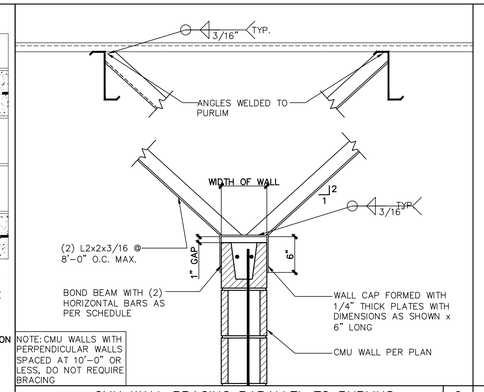
NOTES:
(1) LOCATE FIRST STIRRUP AT 1/2 OF THE REQUIRED SPACING AWAY FROM THE FACE OF WALL SUPPORT. (I.E.: AT 8" O.C. SPACING, LOCATE 1ST STIRRUP NOT FURTHER THAN 4" FROM THE FACE OF WALL).
(2) SPECIAL INSPECTION REQUIRED BY STRUCTURAL ENGINEER OF RECORD AS NOTED ON ON SCHEDULE.
(3) SOLID GROUT FULL DEPTH OF LINTEL AND AT LEAST 8" PAST OPENING FOR LINTELS LESS THAN 8'-0" LONG AND 16" PAST OPENING FOR LINTEL LONGER THAN 8'-0".



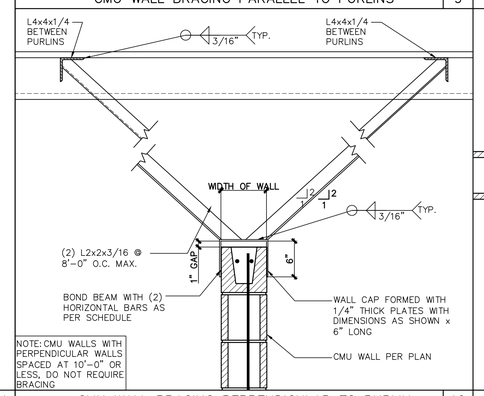




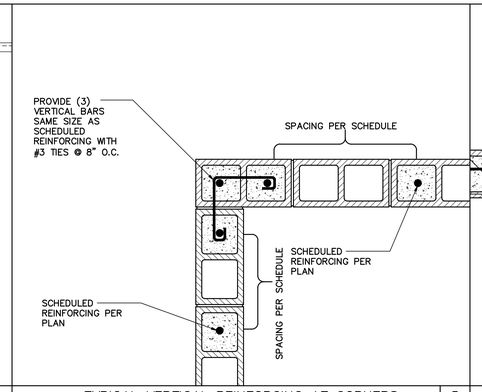
CMU LINTEL SCHEDULE | 14



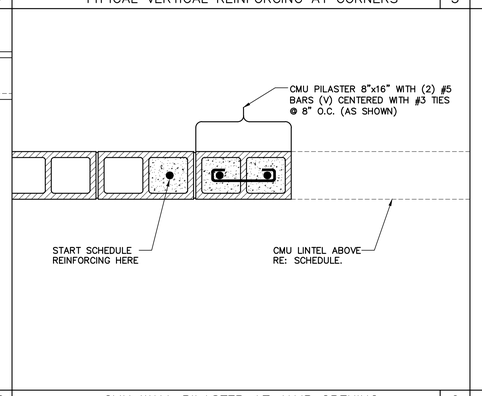
CMU WALL BRACING PARALLEL TO PURLINS | 9



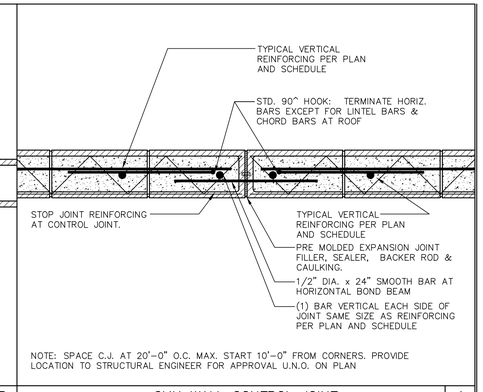
CMU WALL BRACING PERPENDICULAR TO PURLIN | 10



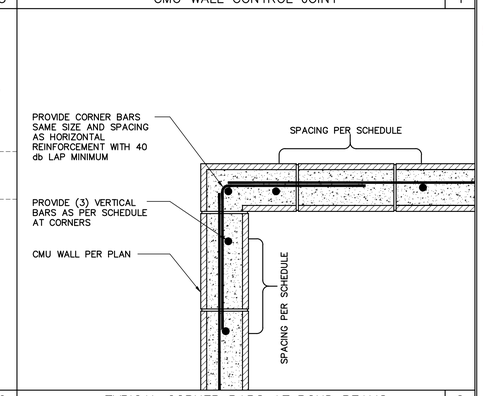
TYPICAL VERTICAL REINFORCING AT CORNERS | 5



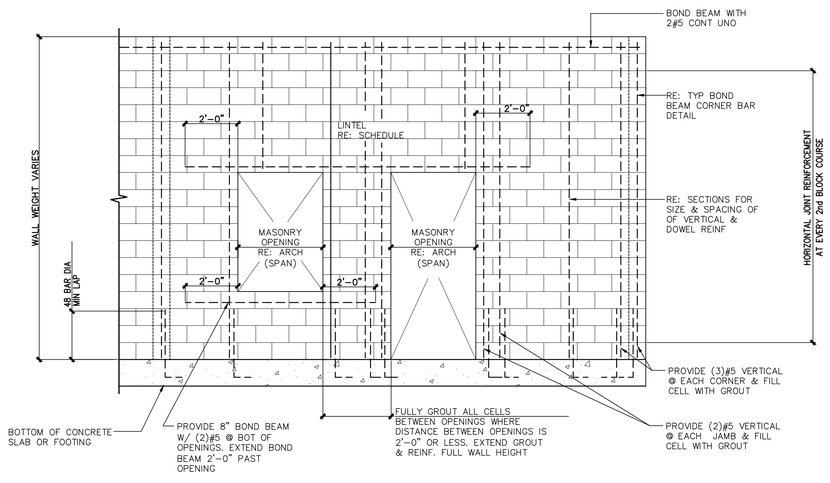
CMU WALL PILASTER AT JAMB OPENING | 6



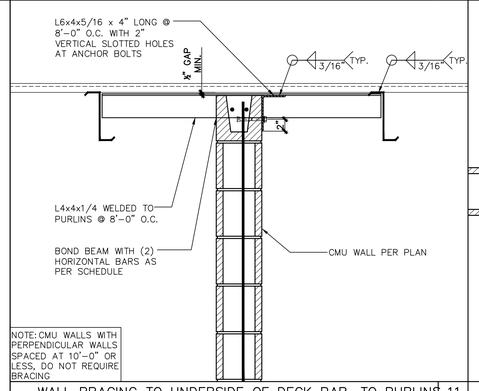
CMU WALL CONTROL JOINT | 1



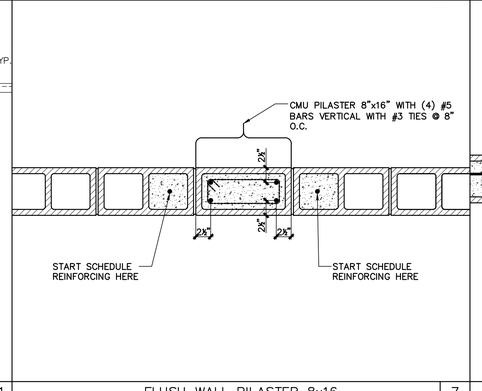
TYPICAL CORNER BARS AT BOND BEAMS | 2



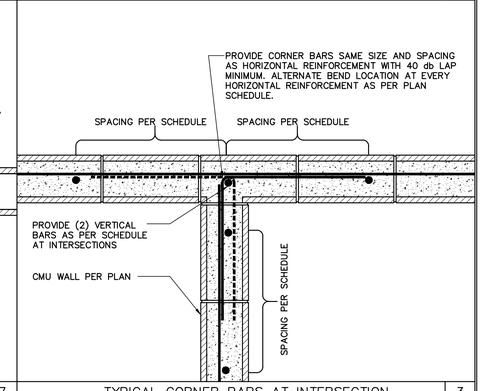
TYPICAL CMU WALL CONSTRUCTION | 16



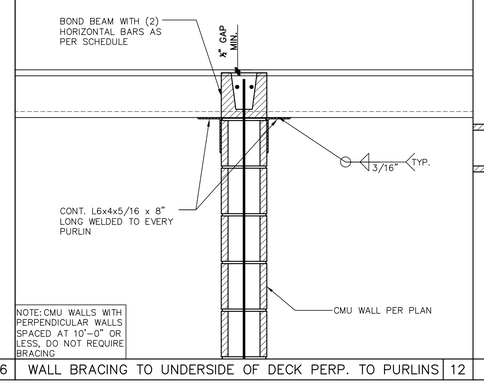
WALL BRACING TO UNDERSIDE OF DECK PAR. TO PURLINS | 11



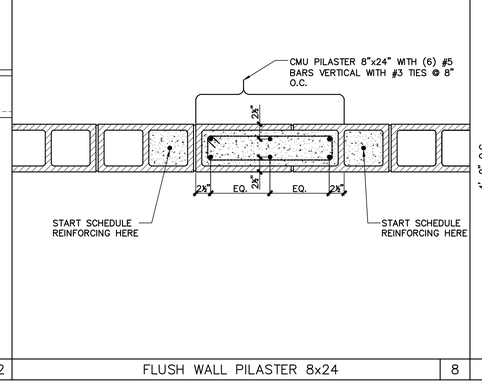
FLUSH WALL PILASTER 8x16 | 7



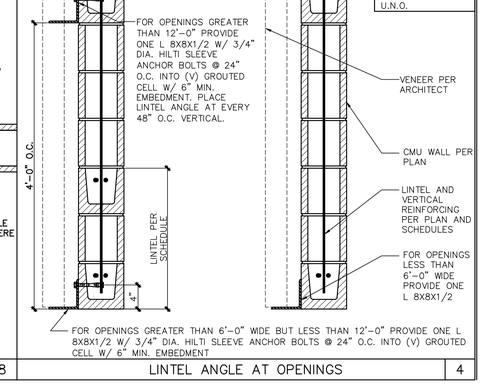
TYPICAL CORNER BARS AT INTERSECTION | 3



WALL BRACING TO UNDERSIDE OF DECK PERP. TO PURLINS | 12



FLUSH WALL PILASTER 8x24 | 8



LINTEL ANGLE AT OPENINGS | 4

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STATE OF TEXAS
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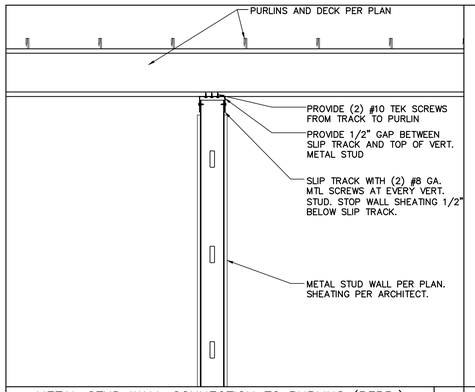
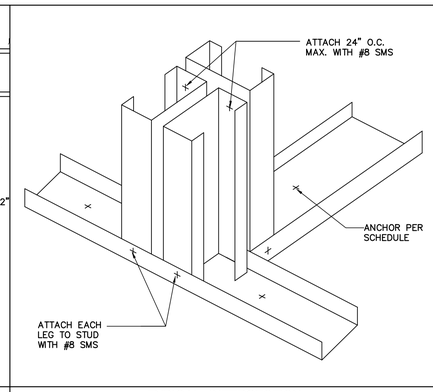
TYPICAL CMU WALL DETAILS

DATE: 9/28/2015
REVISIONS:

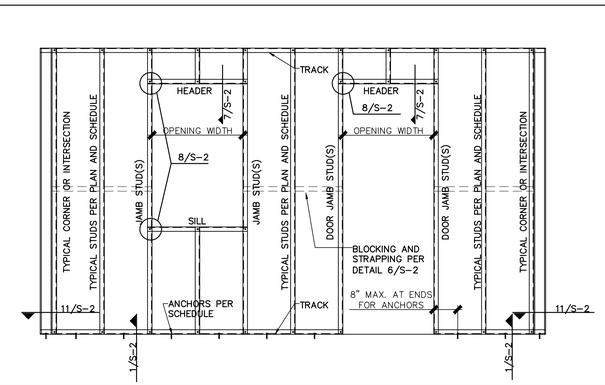
SHEET NO.:
S-1.2
JOB NO.: SSE-13-139.1



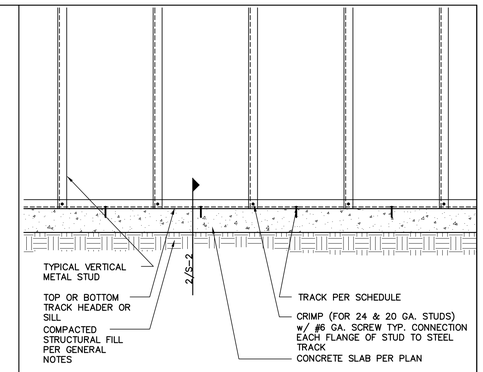
METAL STUD WALL CONNECTION TO PURLINS (PERP.) | 17



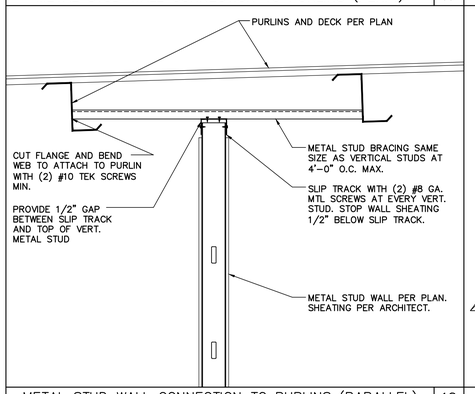
TYPICAL INTERSECTION | 13



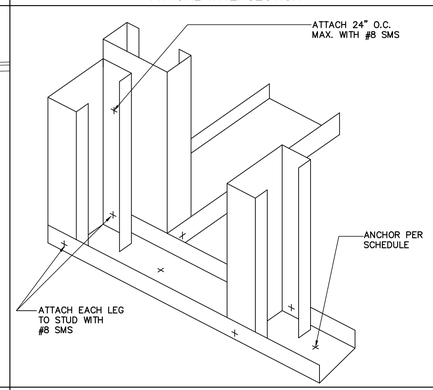
STEEL STUD BEARING AND NON-BEARING WALL ELEVATION | 5



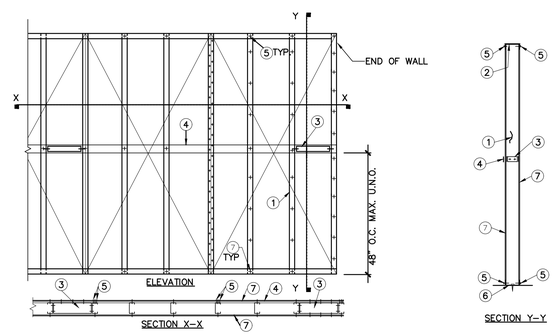
MTL STUD TO TRACK AT TOP OR BOTTOM OF WALL | 1



METAL STUD WALL CONNECTION TO PURLINS (PARALLEL) | 18



TYPICAL CORNER | 14

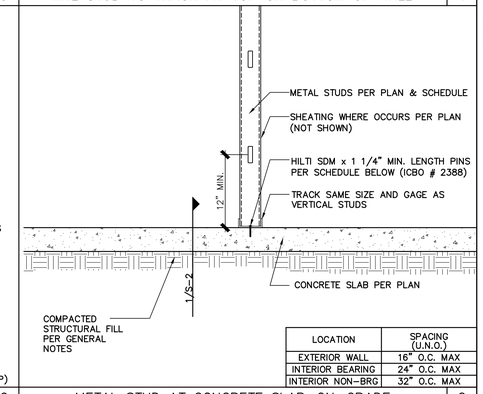


KEYED NOTES

1. MTL STUD PER PLAN
2. CONTINUOUS TRACK. GAGE TO MATCH STUD GAGE.
3. 25ga SLD BLKG W/ WEB BENT & ATTACHED TO STUD W/(2) #6ga SCREWS TO OCCUR AT EACH END OF WALL AND AT 8' O.C. MAX.
4. 20ga x 2" CONT. STRAP W/ 1 – #6ga MTL. SCREW @ EA. STUD & 3 EA. BLK.
5. 6ga DRYWALL SCREW EA. SIDE, STUD TO TRACK
6. 18ga CONT. TRACK W/HILTI SDM x 1 1/4: MIN. LENGTH PINS @ SPACING PER SCHED. (ICBO #2388). SEE DET. 2/S-2.
7. WALL SHEATING PER ARCHITECT.

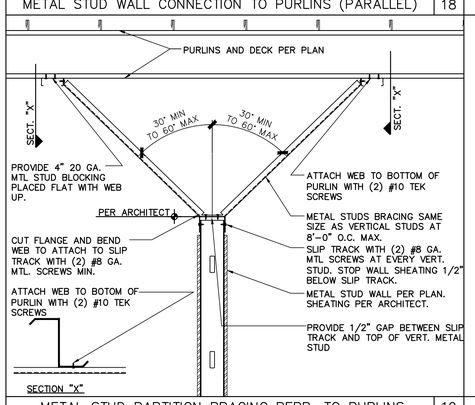
(PER ICBO # 2392P)

TYPICAL PLYWOOD SHEARWALL ON METAL STUDS | 6

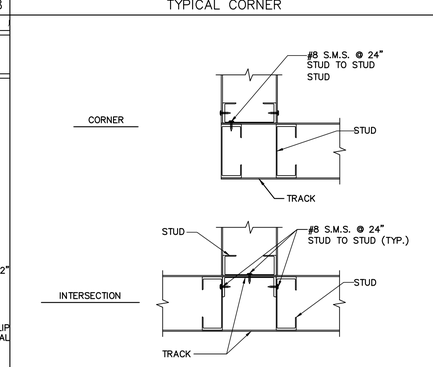


LOCATION	SPACING (U.N.O.)
EXTERIOR WALL	16" O.C. MAX
INTERIOR BEARING	24" O.C. MAX
INTERIOR NON-BRG	32" O.C. MAX

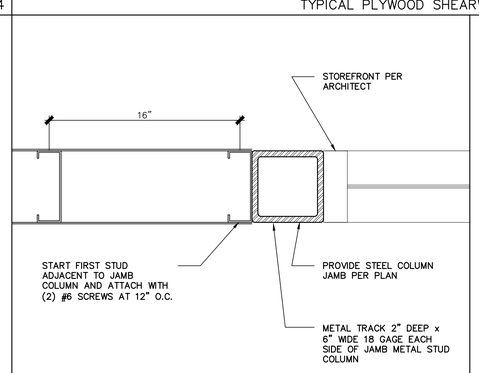
METAL STUD AT CONCRETE SLAB-ON-GRADE | 2



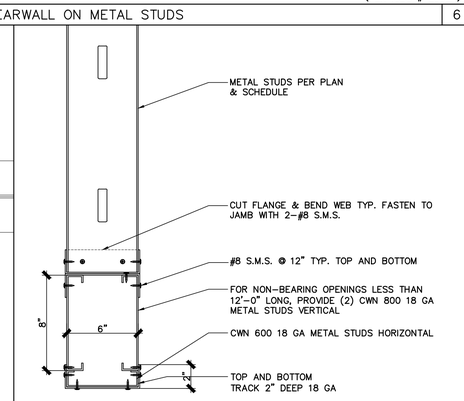
METAL STUD PARTITION BRACING PERP. TO PURLINS | 19



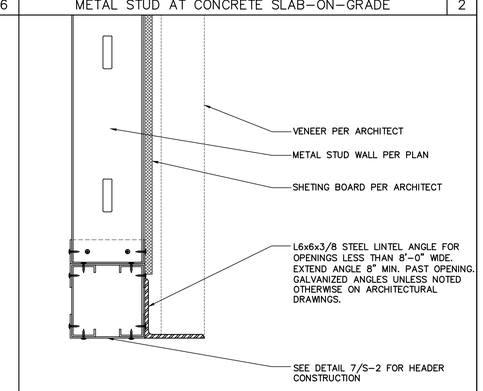
WALL TO WALL CONNECTIONS | 15



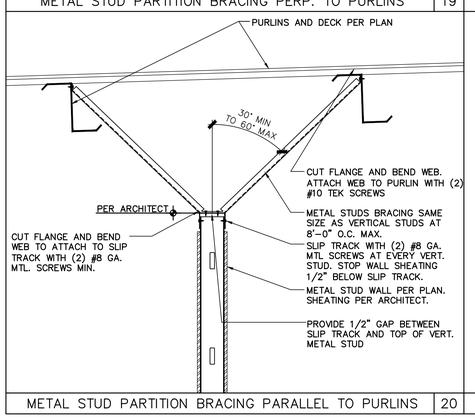
METAL STUDS JAMB COLUMN AT STOREFRONT | 11



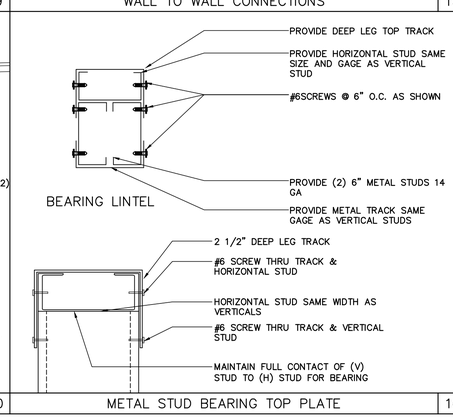
TYPICAL HEADER CONNECTION | 7



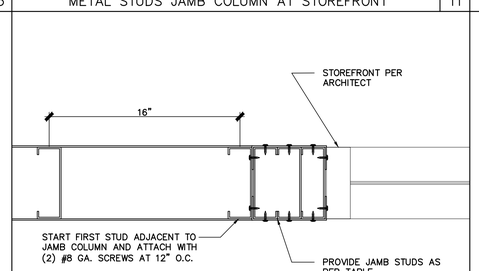
STEEL LINTEL ANGLE FOR MASONRY VENEER | 3



METAL STUD PARTITION BRACING PARALLEL TO PURLINS | 20



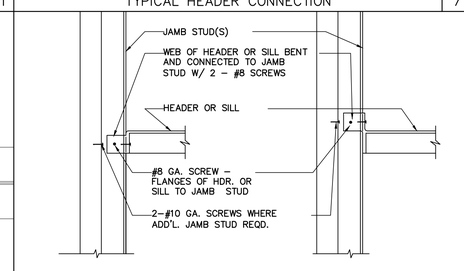
METAL STUD BEARING TOP PLATE | 16



CLEAR OPENING WIDTH	JAMB STUDS EACH SIDE
3'-4"	1
6'-4"	2
8'-0"	3
10'-0"	4
12'-0"	4
14'-0"	5

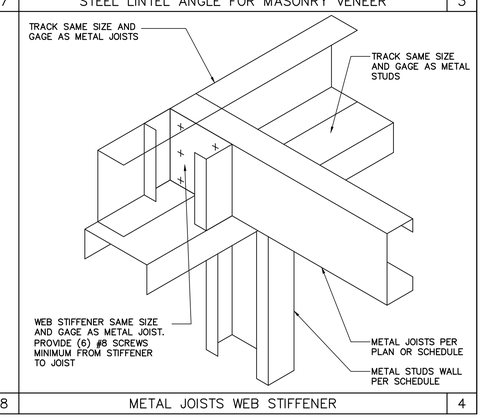
FOR WIDTHS NOT SHOWN, CONTACT ENGINEER OF RECORD.

METAL STUDS JAMB AT STOREFRONT | 12



NOTE: DETAIL AT WOOD JAMB STUD SAME W/ 2–8d NAILS – WEB OF HEADER OR SILL TO STUD (IN LIEU OF SCREWS)

SILL AND HEADER DETAIL | 8



METAL JOISTS WEB STIFFENER | 4

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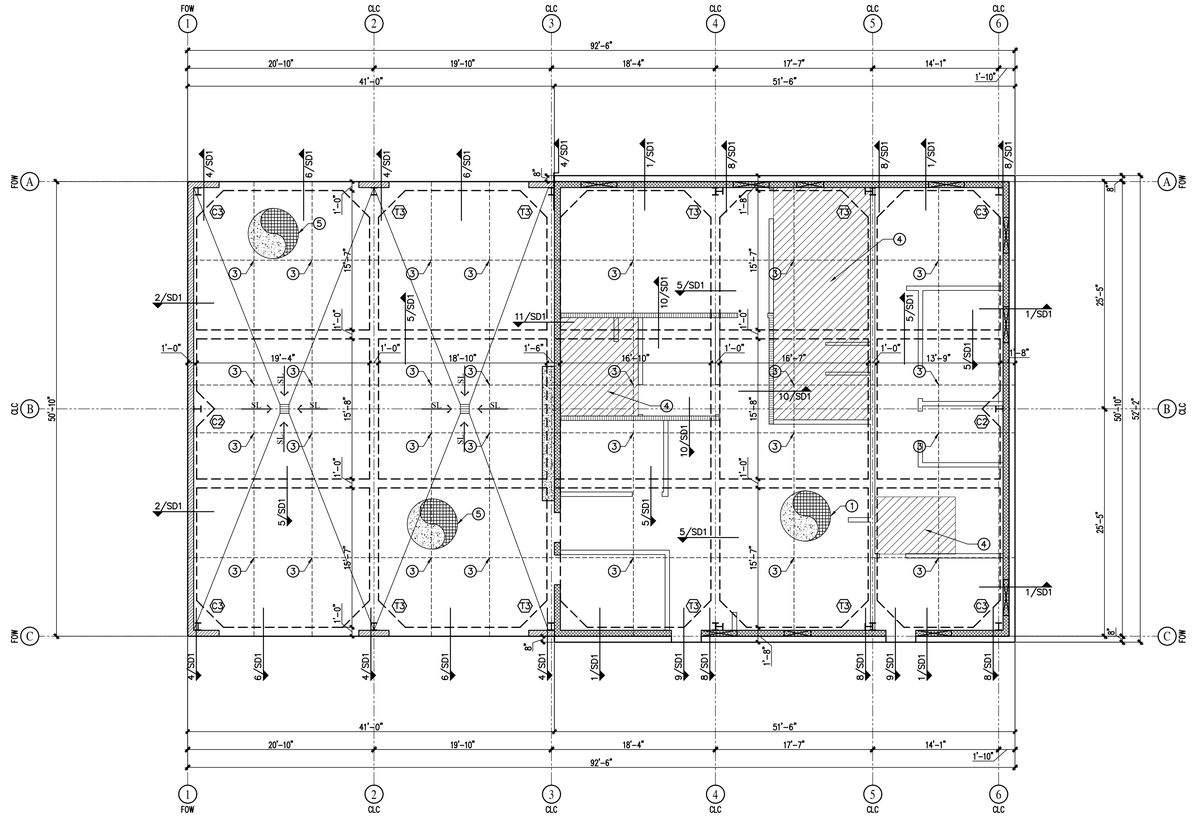
TYPICAL METAL STUDS DETAILS

DATE: 9/28/2015
REVISIONS:

SHEET NO.:
S-1.3
JOB NO.: SSE-13-139.1



1 FOUNDATION PLAN

SCALE: 1/8" = 1'-0"

KEYED FOUNDATION NOTES

1. 5" THICK SLAB ON GRADE WITH #4 BARS @ 15" O.C. EACH WAY AT MID-DEPTH OF SLAB OVER 10 MIL VISQUEEN MOISTURE BARRIER OVER APPROVED COMPACTED FILL.
2. CMU WALL EXPANSION JOINT SEE DETAIL 1/S-1.2
3. SLAB CONTROL JOINTS, SEE DETAIL 13/S-1.1
4. RECESS SLAB AT SHADED AREA 1-1/2" (REFER TO ARCHITECTURAL PLANS).
5. 8" THICK SLAB ON GRADE WITH #5 BARS @ 12" O.C. EACH WAY AT 3" FROM TOP OF SLAB OVER 10 MIL VISQUEEN MOISTURE BARRIER OVER APPROVED COMPACTED FILL.

FOUNDATION NOTES

1. SEE SHEET S-1.1 FOR GENERAL NOTES AND TYPICAL FOUNDATION DETAILS.
2. SEE SHEET S-1.2 FOR TYPICAL CMU WALL DETAILS.
3. SEE SHEET S-1.3 FOR TYPICAL METAL STUD WALL DETAILS.
4. CONTRACTOR IS RESPONSIBLE FOR LOCATION OF ALL FLOOR DRAINS (F.D.) AND FLOOR DEPRESSIONS WHETHER OR NOT THEY ARE NOTED ON THE STRUCTURAL NOTES OR PLANS.
5. DIMENSIONS SHOWN ARE FOR GENERAL INFORMATION, COORDINATE WITH ARCHITECTURAL PLANS.
6. CONTRACTOR/SUBCONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL DIMENSIONS WITH ARCHITECTURAL PLANS BEFORE COMMENCING ANY WORK. THE CONTRACTOR/ SUBCONTRACTOR SHALL REPORT ANY DISCREPANCIES TO THE ARCHITECT/ENGINEER BEFORE THE WORK HAS BEGUN.
7. WALL LEGEND:
   - INDICATES METAL STUD WALL PER ARCH
   - INDICATES 6" LOAD BEARING METAL STUD WALL TO BE 600S162-33 @ 16" O.C.
   - INDICATES 8" METAL WALL BY P.E.B.M.
   - INDICATES 8" CMU WALL. REFER TO CMU WALL SCHEDULE FOR REINFORCING.
8. ABBREVIATIONS:
   CLC=CENTER LINE COLUMN
   CLW=CENTER LINE WALL
   FOC=FACE OF COLUMN
   FOW=FACE OF WALL
   FFE=FINISH FLOOR ELEVATION
9. ALL ELEVATIONS REFERENCED HEREIN, ARE FROM THE BUILDING FINISH FLOOR ELEVATION OF 0'-0". REFER TO CIVIL PLANS FOR FINAL BUILDING ELEVATION.
10. REFER TO DETAIL 1/S-1.2 FOR CMU CONTROL JOINTS. UNLESS NOTED OTHERWISE, CONTROL JOINTS SHALL START AT 10 FT FROM EDGES OR CORNERS AND 20 FT O.C. IN BETWEEN. PROVIDE LOCATION OF CONTROL JOINTS FOR ENGINEER OF RECORD TO APPROVE BEFORE ERECTION OF WALLS.
11. REFER TO CIVIL PLANS FOR RAMPS, STAIRS & SIDEWALKS.

CMU WALL REINFORCING SCHEDULE

WALL TYPE	t	REINFORCING- SEE FOOT NOTE (5)	FOOT NOTE	SPEC. INSP.
WL-1	6"	#4 BARS (V) @ 48" O.C. CTR. & (1) #5 BAR (H) AT 10'-0"	(1)	NO
WL-2	8"	#5 BARS (V) @ 48" O.C. CTR. & (1) #5 BAR @ 5'-4" O.C. (H)	(2)	NO
WL-3	8"	#5 BARS (V) @ 32" O.C. CTR. & (1) #5 BAR @ 5'-4" O.C. (H)	(3)	NO
WL-4	8"	#5 BARS (V) @ 24" O.C. CTR. & (1) #5 BAR @ 5'-4" O.C. (H)		NO

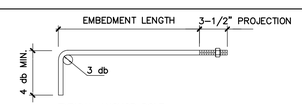
(1)TYP. 6" CMU INTERIOR NON-BEARING WALL U.N.O.
(2)TYP. 8" CMU INTERIOR NON-BEARING WALL U.N.O.
(3)TYP. 8" CMU INTERIOR BEARING WALL U.N.O.
(4)NOT USED
(5)ALL HORIZONTAL (H) REINFORCEMENT TO OCCUR IN CONTINUOUS BOND BEAMS SPACED AS INDICATED IN THE SCHEDULE ABOVE.

FOOTING SCHEDULE

TYPE	A	B	C	D	REINFORCING
T2		2'-0"	2'-0"	3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM
T3		3'-0"	3'-0"	3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM
T4		4'-0"	4'-0"	3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM
T5		5'-0"	5'-0"	3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM
T6		6'-0"	6'-0"	3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM
S2	2'-0"			3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM
S3	3'-0"			3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM
S4	4'-0"			3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM
S5	5'-0"			3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM
S6	6'-0"			3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM
S7	7'-0"			3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM
S8	8'-0"			3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM
C2		2'-0"	2'-0"	3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM
C3		3'-0"	3'-0"	3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM
C4		4'-0"	4'-0"	3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM
C5		5'-0"	5'-0"	3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM
C6		6'-0"	6'-0"	3'-0"	#5 BARS @ 10" O.C. EACH WAY @ BOTTOM

NOTE: D = FOOTING DEPTH BELOW FINISH FLOOR

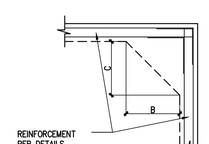
ANCHOR BOLT LENGTH SCHEDULE



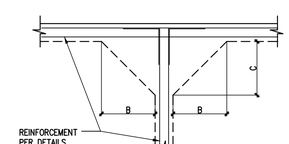
TYPICAL ANCHOR BOLT

MINIMUM ANCHOR BOLT EMBEDMENT (1), (2)	
DIAMETER	EMBEDMENT
1/2" (4)	12"
5/8" (4)	18"
3/4" (5)	24"
7/8" (5)	24"
1" (5)	30"
1 1/8" (6)	30"
1 1/4" (6)	30"

1. AN ADDITIONAL 2" OF EMBEDMENT SHALL BE PROVIDED FOR ANCHOR BOLTS LOCATED ON TOPS OF COLUMNS AND PEDESTALS.
2. ANCHOR BOLTS SHALL BE A307 HEX HEAD BOLTS.
3. NOT USED
4. MINIMUM 1.5" EDGE DISTANCE IN CONCRETE.
5. MINIMUM 2" EDGE DISTANCE IN CONCRETE.
6. MINIMUM 2.75" EDGE DISTANCE IN CONCRETE.



TYPE "C"



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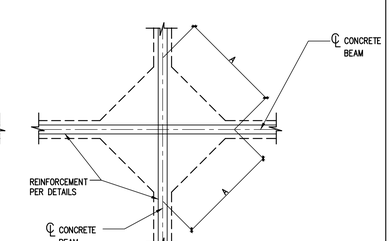

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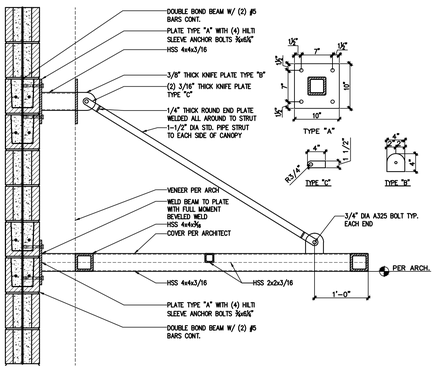
DATE: 9/28/2015
REVISIONS:

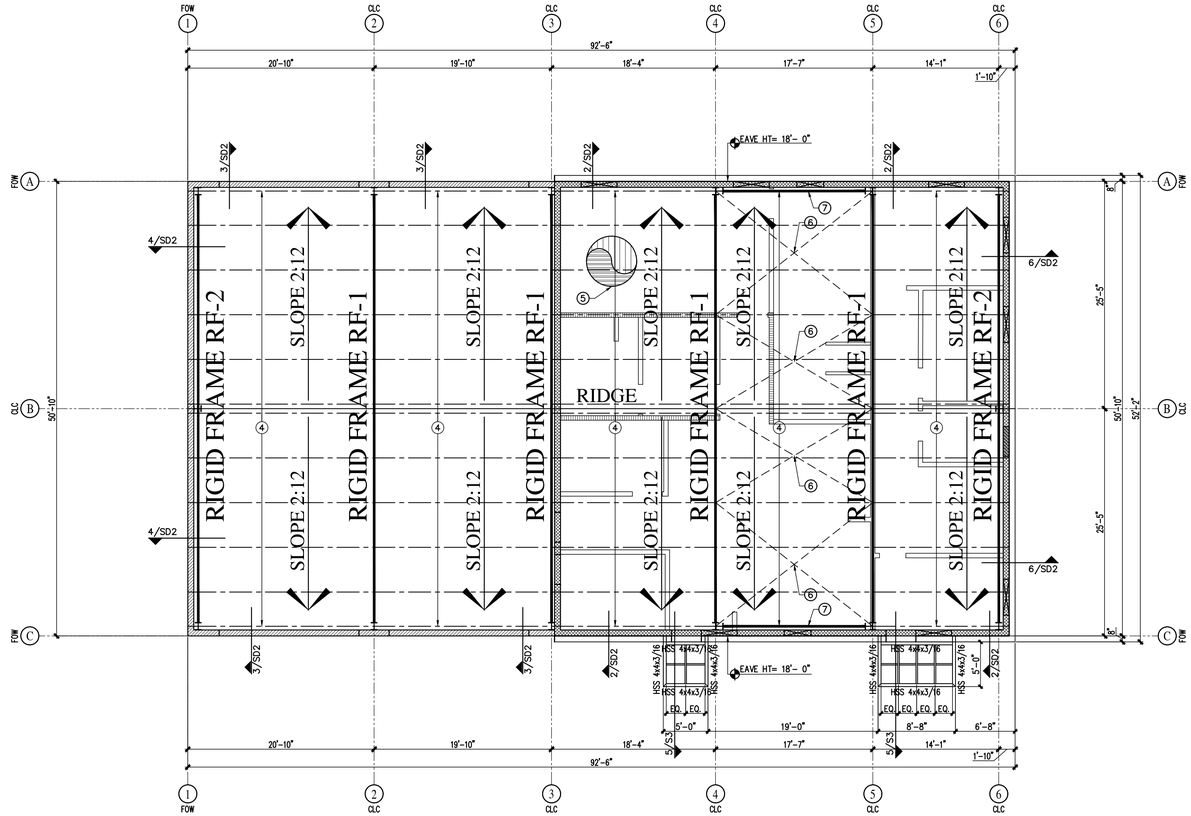
FOUNDATION PLAN

SHEET NO.:
S-2

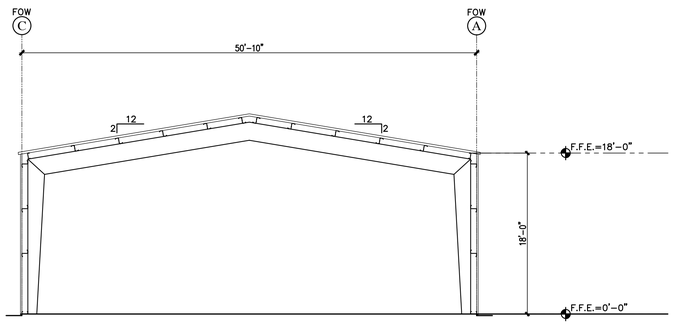
JOB NO.: SSE-13-139.1



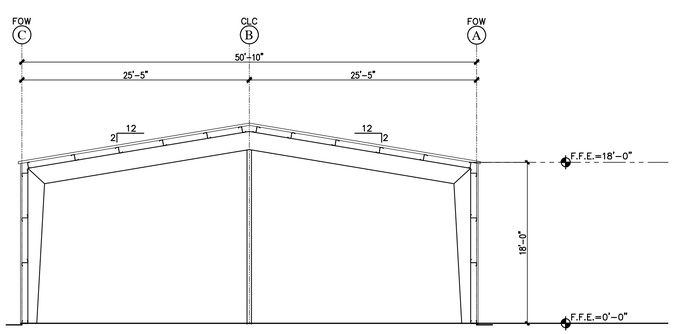
5 CANOPY TYPICAL SECTION
SCALE: 3/4" = 1'-0"



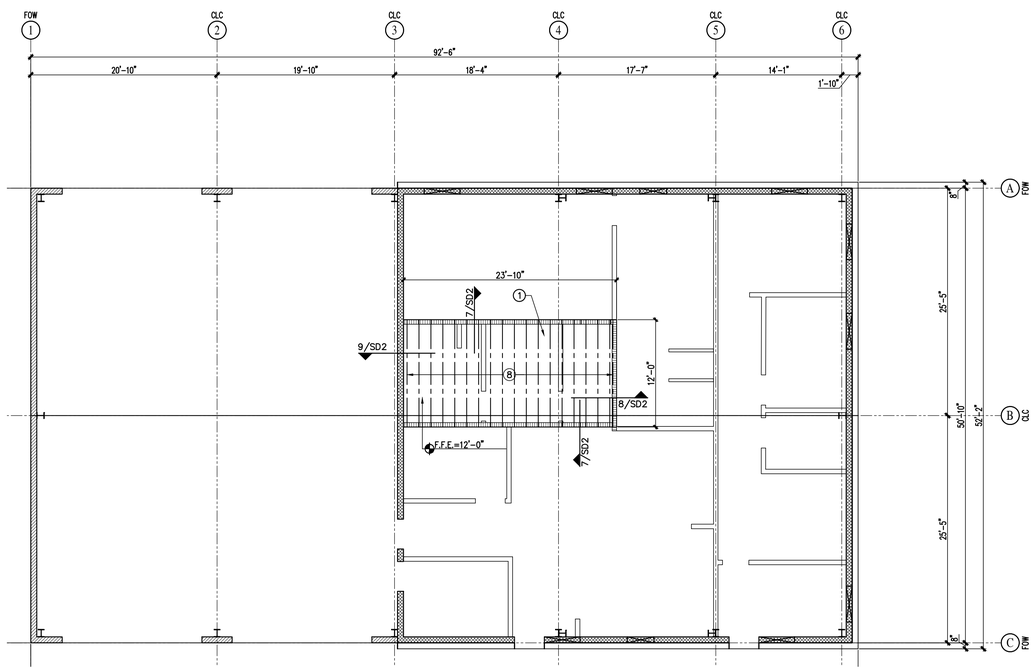
1 ROOF FRAMING PLAN
SCALE: 1/8" = 1'-0"



3 PRE-ENGINEERED RIGID FRAME ELEVATION RF-1
SCALE: 1/8" = 1'-0"



4 PRE-ENGINEERED RIGID FRAME ELEVATION RF-2
SCALE: 1/8" = 1'-0"



2 MEZZANINE FRAMING PLAN
SCALE: 1/8" = 1'-0"

FRAMING GENERAL NOTES

1. SEE SHEET S-1.1 FOR GENERAL NOTES AND TYPICAL FOUNDATION DETAILS.
2. SEE SHEET S-1.2 FOR TYPICAL CMU WALL DETAILS.
3. SEE SHEET S-1.3 FOR TYPICAL METAL STUD WALL DETAILS.
4. REFER TO MECHANICAL AC DRAWINGS FOR LOCATION AND SIZE OF REFRIGERANT PIPING AND DUCT WORK, MECHANICAL UNITS, WEIGHTS, & SUPPORTS.
5. DIMENSIONS SHOWN ARE FOR GENERAL INFORMATION, COORDINATE WITH ARCHITECTURAL PLANS.
6. JOISTS MANUFACTURER TO REFER TO MECHANICAL DRAWINGS FOR MECHANICAL EQUIPMENT LOCATION AND WEIGHTS.
7. WALL LEGEND:
   - INDICATES METAL STUD WALL PER ARCH
   - INDICATES 6" LOAD BEARING METAL STUD WALL TO BE 600S162-33 @ 16" O.C.
   - INDICATES 8" METAL WALL BY P.E.B.M.
   - INDICATES 8" CMU WALL. REFER TO CMU WALL SCHEDULE FOR REINFORCING.
8. ABBREVIATIONS:
   CLC=CENTER LINE COLUMN
   CLW=CENTER LINE WALL
   FOC=FACE OF COLUMN
   FOW=FACE OF WALL
   FFE=FINISH FLOOR ELEVATION
9. REFER TO DETAILS 9 THRU 12/S-1.2 FOR TYPICAL INTERIOR PARTITION TOP OF WALL BRACING
10. ALL ELEVATIONS REFERENCED HEREIN, ARE FROM THE BUILDING FINISH FLOOR ELEVATION OF 0'-0". REFER TO CIVIL PLANS FOR FINAL BUILDING ELEVATION.

KEYED FRAMING NOTES

1. FLOOR DECK TO BE 2" NORMAL WEIGHT CONCRETE DECK WITH WWF 6x6-W2.9xW2.9 OVER VULCRAFT METAL DECK 0.6C 24 GA. WITH FASTENER PATTERN 33/4 WITH #12 TEK SCREWS AT SUPPORT AND #10 TEKS SCREWS @ 12" O.C. AT SIDELAPS. TOTAL THICKNESS OF SLAB = 2" (1.4" CONC. FILL + 0.6" MTL. DECK)
2. NOT USED.
3. CANOPY ROOF DECK TO BE VULCRAFT METAL DECK 3N 18 GA. WITH FASTENER PATTERN 24/4 WITH #12 TEK SCREWS AT SUPPORT AND #10 TEKS SCREWS @ 12" O.C. AT SIDELAPS.
4. 8" ZEE PURLINS AT 5'-0" O.C. MAX. PROVIDE BRACING AND LAP AS REQUIRED BY PRE-ENGINEERED BUILDING MANUFACTURER.
5. STANDING SEAM METAL ROOF PER ARCHITECT
6. DIAGONAL BRACING AS REQUIRED BY PRE-ENGINEERED BUILDING MANUFACTURER.
7. PORTAL FRAME AS REQUIRED BY PRE-ENGINEERED BUILDING MANUFACTURER.
8. FLOOR JOISTS TO BE 800S200-68 @ 16" O.C.

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DATE: 9/28/2015
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ROOF FRAMING PLAN

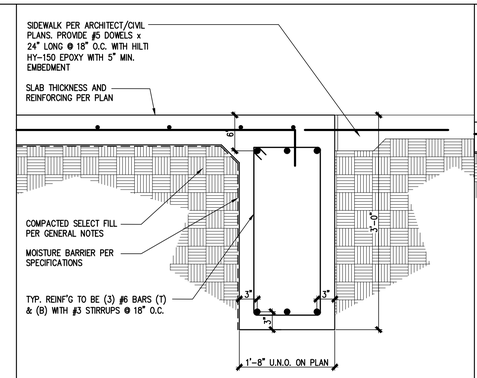
SHEET NO.:
S-3

JOB NO.: SSE-13-139.1

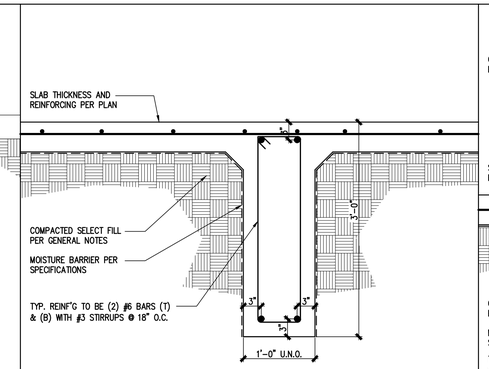
DETAIL NOT USED 17

DETAIL NOT USED 13

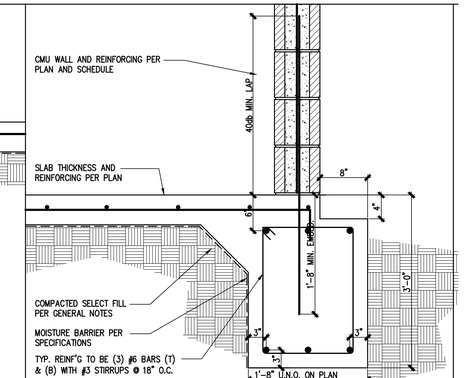
PERIMETER GRADE BEAM 9



INTERIOR GRADE BEAM 5



PERIMETER GRADE BEAM



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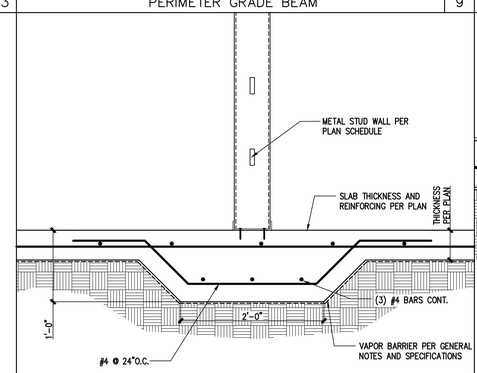
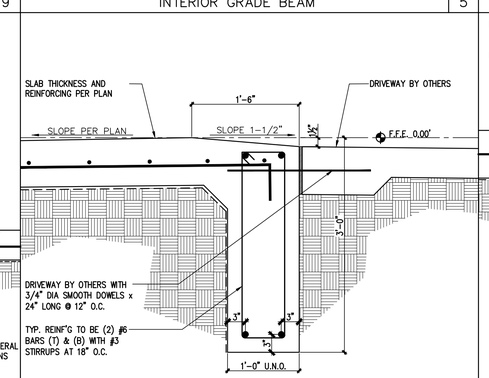
THICKENED SLAB AT BEARING INTERIOR PARTITIONS 10



PERIMETER GRADE BEAM AT ENTRY 6



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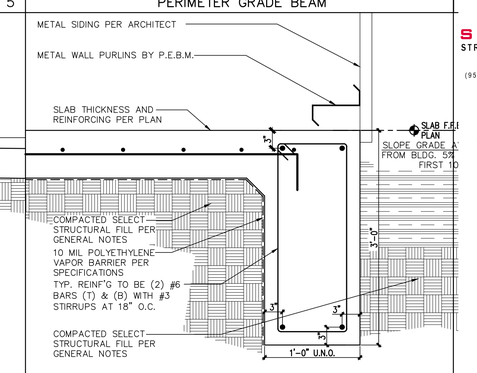

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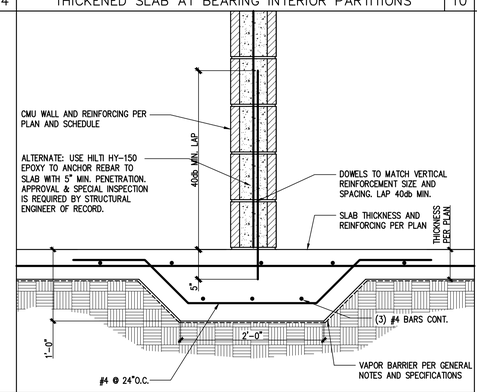
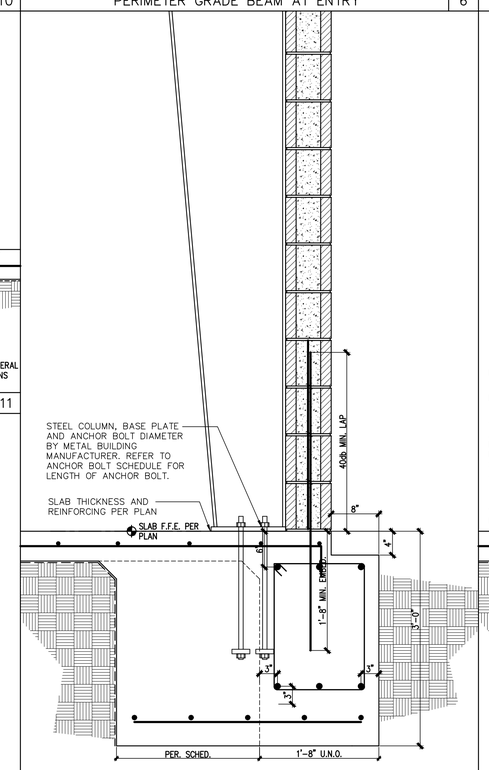


SPREAD FOOTING 8



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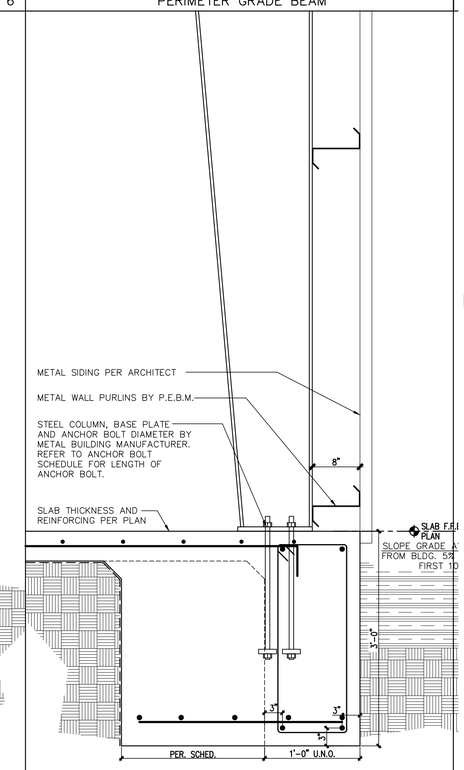

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TBPE Reg. No.: F-7661

WEBB COUNTY/TEXAS
WEBB COUNTY MAIN FIRE STATION
AND ADMINISTRATION BUILDING

BOB BULLOCK LP 20 - RR6078A RD.
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STATE OF TEXAS
VICTOR M. DANDA JR.
92641
LICENSED
PROFESSIONAL ENGINEER

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DATE: 9/28/2015
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FOUNDATION DETAILS

SHEET NO.:
SD-1
JOB NO.: SSE-13-139.1

DETAIL NOT USED 17

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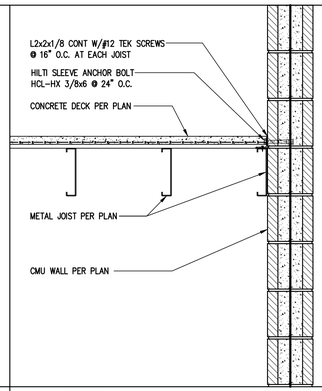

FLOOR JOIST BEARING PARALLEL TO CMU WALL 9

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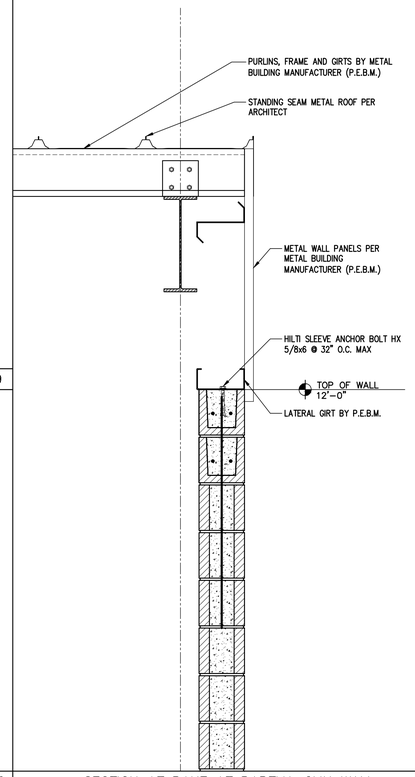
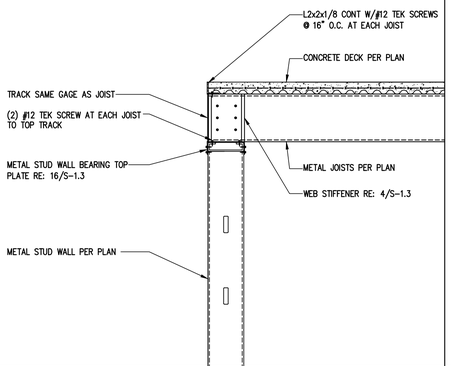
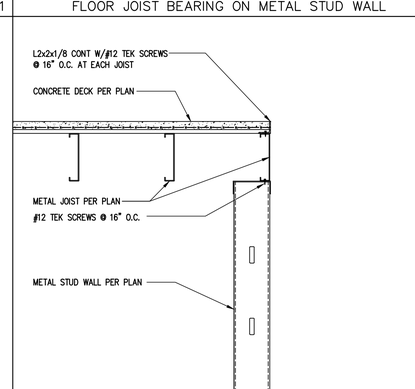


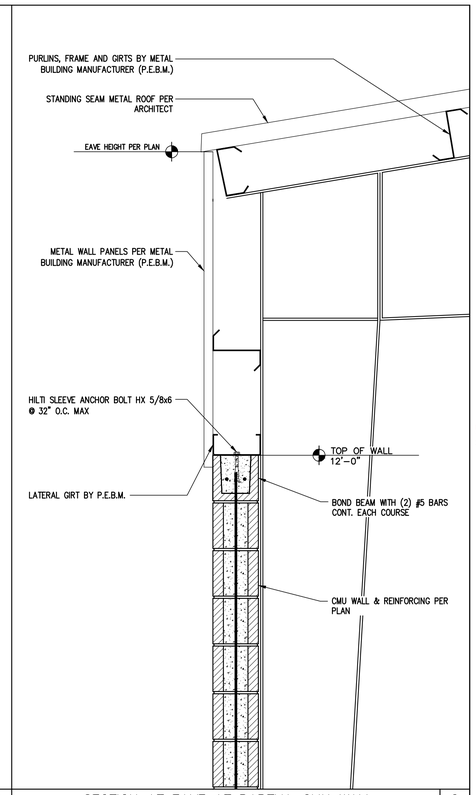
SECTION AT RAKE AT PARTIAL CMU WALL 6



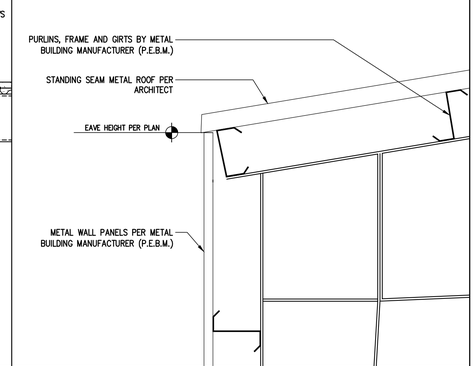
FLOOR JOIST BEARING ON METAL STUD WALL 7



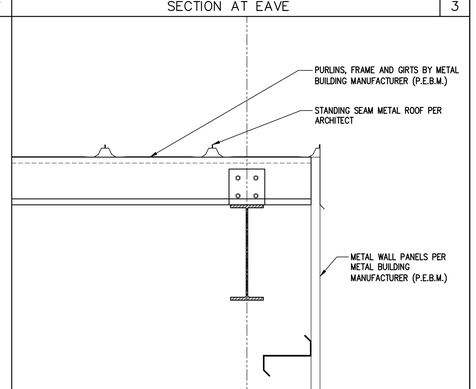
FLOOR JOIST PARALLEL TO METAL STUD WALL 8



SECTION AT EAVE AT PARTIAL CMU WALL 2



SECTION AT EAVE 3



RIGID FRAME AT RAKE 4

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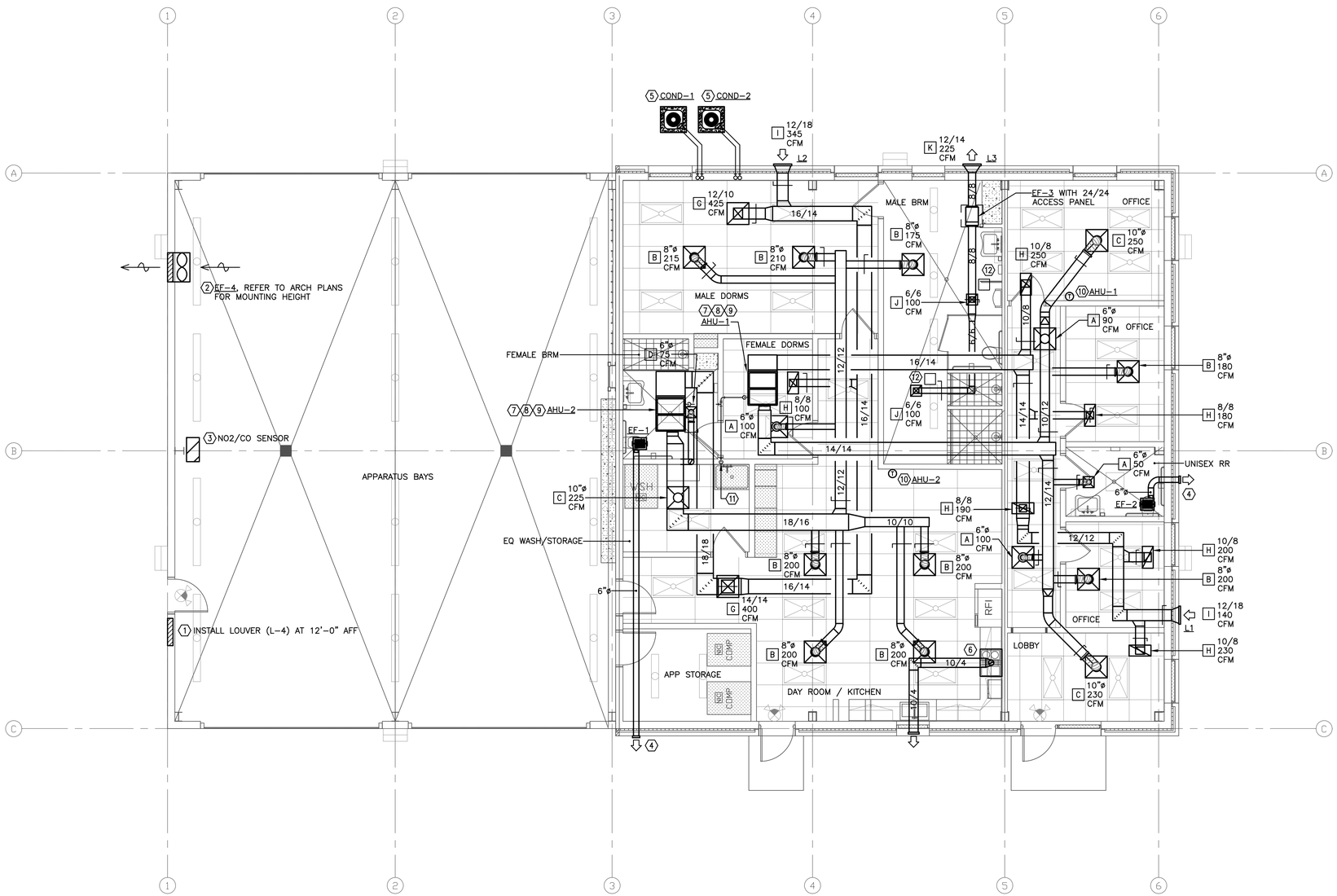
REVISIONS:

ROOF FRAMING DETAILS

SHEET NO.:
SD-2
JOB NO.: SSE-13-139.1



1 MECHANICAL FLOOR PLAN
3/16" = 1'-0"

MECHANICAL KEYED NOTES:

1. PROVIDE WIND DRIVEN RAIN RESISTANT LOUVER 30/30 EQUIVALENT TO RUSKIN MODEL ELF6375DXD. PROVIDE WITH 120V VOLUME CONTROL DAMPER (VCD-40) INTERLOCK WITH INDICATED FAN.
2. PROVIDE WIND DRIVE RAIN RESISTANT LOUVER 30/30 EQUIVALENT TO RUSKIN MODEL ELF6375DXD. PROVIDE 120V VOLUME CONTROL DAMPER AND MOUNT EXHAUST FAN BEHIND DAMPER. INTERLOCK DAMPER WITH FAN.
3. PROVIDE "BRASCH GAS DETECTOR" WITH SOLID STATE CARBON MONOXIDE SENSOR AND DETECT BOTH CARBON MONOXIDE AND NITROGEN DIOXIDE, 120V, MODEL No. GSS-NCM-1. PROVIDE WITH MANUAL OVER RIDE SWITCH. INTERLOCK WITH EXHAUST FANS TO CONTROL VENTILATION IN THE APPARATUS BAY. BOTH FANS (EF-4 AND EF-5) SHALL RUN ON ALARM. INSTALL AS PER MANUFACTURES INSTRUCTIONS CONTROL WIRING, RELAYS, AND STARTERS BY ELECTRICAL CONTRACTOR.
4. PROVIDE FAN MANUFACTURER'S WALL CAP.
5. PROVIDE 6" HOUSEKEEPING PAD.
6. ROUTE 10/4 EXHAUST DUCT TO WALL CAP. PROVIDE BROAN WALL CAP MODEL No. 649.
7. PROVIDE FULL SIZE PLENUM ON END OF THE UNIT WITH SLIDE OUT FILTER FRAME AND ACCESS PANEL. FRAME SHALL HOUSE 2" MERV 8 PLEATED FILTERS.
8. INSTALL AHU IN MEZZANINE ABOVE. PROVIDE PROPER PLATFORM OR SUSPEND FROM STRUCTURE. PROVIDE SECONDARY DRAIN PAN WITH FLOAT SWITCH WIRED TO SHUT DOWN UNIT UPON ACTIVATION.
9. PROVIDE DUCT SMOKE DETECTOR IN SUPPLY AND RETURN DUCT.
10. INSTALL THERMOSTAT AT 48" AFF ABOVE FINISHED FLOOR. COORDINATE LOCATION WITH OTHER TRADES AND WITH GENERAL CONTRACTOR.
11. ROUTE CONDENSATE DRAIN LINE FULL SIZE TO DRAIN/FIXTURE AT THIS APPROXIMATE LOCATION. TERMINATE 2" ABOVE THE DRAIN/FIXTURE RIM. INSULATE ALL CONDENSATE LINES.
12. PROVIDE 12/12 ACCESS PANELS TO CONTROL VOLUME DAMPERS.

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DATE: 09/28/15
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MECHANICAL FLOOR PLAN

SHEET NO.:
M1
JOB NO.: 15096

9/28/2015
STATE OF TEXAS
SEAN M. RODRIGUEZ
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Texas Firm Registration No. F-005318

JOB 15096

Sep 29, 2015 – 1:27pm
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DX SPLIT AIR HANDLING UNIT SCHEDULE

MARK	AHU-1	AHU-2
SERVES	OFFICE	DORM
TYPE	CV	CV
SUPPLY (CFM)	1200	1800
OUT SIDE AIR (CFM)	140	345
EXT. SP. (IN. WG)	0.75	0.75
FAN MOTOR HORSEPOWER	1/2	1
FAN RPM	1050	1050
FAN STYLE/CONFIGURATION	HORZ.	HORZ.
COOLING COIL		
MAX. COIL FACE VEL. (FPM)	500	500
ROWS/FINS		
EAT DB/WB (F)	80.4/64.9	80/67.3
LAT DB/WB (F)	55/53.5	55/54
TOTAL GRAND (MBTUH)	36	57.6
TOTAL SENSIBLE (MBTUH)	31	46.1
REHEAT COIL		
HEATING KW @208 V	7.2	10.8
HEATING BTUH	24624.0	36936.0
HEATING EAT DB (F)	67	64
HEATING LAT DB (F)	86	83
ELECTRICAL DATA		
VOLTS/PH/HZ	240/1/60	240/1/60
MCA	55/25	60/50
MOCP	60/25	60/50
MANUFACTURE	TRANE	TRANE
MODEL No.	GAM5A0B36	GAM5A0C60
NOTES:	1,2,3,4,5	1,2,3,4,5

NOTES:
1. PROVIDE 2" PLEATED 30% EFFICIENT MERV 8 FILTERS. PROVIDE SLIDE OUT FILTER FRAME ON RETURN INLET OF THE AIR HANDLER.
2. PROVIDE WITH DUAL POINT OF ELECTRICAL CONNECTION FOR EACH UNIT. THE UNITS SHALL BE CONSTANT VOLUME. UNITS SHALL BE PROVIDED WITH INTEGRAL CIRCUIT BREAKER DISCONNECTS.
3. PROVIDE SECONDARY DRAIN PAN WITH EMERGENCY FLOAT SWITCH. INTERLOCK FLOAT SWITCH WITH UNIT SAFETIES.
4. INSTALL ALL UNITS AS PER THE MANUFACTURERS SPECIFICATIONS AND RECOMMENDATIONS. PROVIDE THE MANUFACTURERS MINIMUM CLEARANCES FOR OPERATION AND SERVICE OF THE UNIT. COORDINATE THE INSTALLATION OF THE UNIT WITH ALL OTHER DISCIPLINES, DUCTWORK, STRUCTURE, ELECTRICAL, AND ALL OTHER OBSTRUCTION PRIOR TO INSTALLATION OF THE UNIT, ITS EQUIPMENT PAD, AND ALL ACCESSORIES.
5. MECHANICAL SPACES HAVE BEEN DESIGNED AROUND THE SPECIFIED MANUFACTURER. ALTERNATE MANUFACTURERS EQUIPMENT SHALL NOT EXCEED THE SPECIFIED MANUFACTURES PHYSICAL DIMENSIONS AND WEIGHTS.

CONDENSING UNIT SCHEDULE

MARK	COND-1	COND-2
SERVES	AHU-1	AHU-2
TOT MBTUH	36	60
AMBIENT TEMP.	105	105
SEER (EER)	14(11.5)	13(10.5)
VOLTS/PH	208/3/60	208/3/60
MCA	14	21
MOCP	20	35
MFG	TRANE	TRANE
MODEL No.	4TTA3036	4TTA3061
NOTES:	1,2,3,4	1,2,3,4

NOTES:
1. PROVIDE COMPRESSOR WITH 5 YEAR WARRANTY.
2. PROVIDE RAWAL HOTGAS BYPAS VALVE.
3. SIZE REFRIGERANT LINES PER MANUFACTURES RECOMMENDATIONS.
4. EQUIVALENT MANFUACTURES ARE LENNOX, CARRIER, AND TRANE.

FAN SCHEDULE

MARK	EF-1	EF-2	EF-3	EF-4
SERVES	WOMENS	MENS	RESTROOM	TRUCK BAY
TYPE/DRIVE	CEILING	CEILING	INLINE	WALL/PROP
CFM	75	75	200	3000
E.S.P. IN W.G.	0.50	0.50	0.50	0.60
HORSEPOWER	64 WATTS	64 WATTS	0.1	3/4
RPM (MAX.)	923	923	1703	1750
SONES (MAX.)	2.5	2.5	9.1	21
VOLTS/PHASE/HERTZ	115/1/60	115/1/60	115/1/60	208/3/60
MANUFACTURER	COOK	COOK	COOK	COOK
MODEL NUMBER	GC-144	GC-144	70SQN-B	24XMWH
NOTES	1,2,3,4,5	1,2,3,4,5	2,3,4,5	5,7

NOTES
1. PROVIDE MANUFACTURER'S WALL CAP.
2. PROVIDE PREWIRED 5AMP SPEED CONTROL RELAY.
3. ALL FANS SHALL BE EQUIPPED WITH BACKDRAFT DAMPER.
4. FAN SHALL SWITCHED WITH THE RESTROOM LIGHTS.
5. EQUIVALENT MANUFACTURERS: COOK, GREENHECK, TWIN CITY OR EQUAL.
6. EXHAUST FAN TO BE CONTROLLED BY A TIME CLOCK SET TO RUN FROM 7AM–7PM. TIME CLOCK BY DIV.16.
7. PROVIDE FAN WITH WALL HOUSING AND OSHA GUARD AUTOMATIC BELT TENSIONER, AND EPOXY COATING. MOUNT FAN/HOUSING TO WALL LOUVER.

NOTE:
PROVIDE APR CONTROLS, AS MANUFACTURED BY RAWAL DEVICES, INC. OF WOBURN, MA. (800-727-6447) SHALL BE INSTALLED IN ACCU-1 & 2 TO PROVIDE CONTINUOUS CAPACITY MODULATION ON THE REFRIGERATION CIRCUIT OF THE UNITS FOR ADDITIONAL CAPACITY CONTROL DURING PART LOAD CONDITIONS. APR CONTROLS SHALL BE INSTALLED ON LEAD CIRCUIT (FIRST-ON/LAST-OFF) IN SYSTEMS WITH MULTIPLE CIRCUITS FOR STAGING.

THE APR CONTROL HOT GAS BYPASS VALVE SHALL BE SET TO START OPENING AT 109 PSI TO MAINTAIN THE EVAPORATIVE COIL ABOVE 36° F. THE LIQUID INJECTION VALVE SHALL BE SET AT 12-13° F SUPERHEAT, AND SHALL FUNCTION AS A COMPRESSOR OVERHEAT PROTECTION DEVICE. THE PATENTED VORTEX DESUPERHEATER CHAMBER SHALL HAVE ACCESS VALVE TO ALLOW PRESSURE TESTING, EVACUATION AND CHARGING OF SYSTEM. APR CONTROLS COME SET FROM THE FACTORY PRESET, BUT MUST BE CONFIRMED IN THE FIELD. ADJUSTMENT INSTRUCTION ARE PROVIDED WITH APR CONTROLLER.

AIR DEVICE SCHEDULE

PLAN MARK	MANUF. & MODEL NUMBER	SERVICE	MODULE SIZE	NECK SIZE	FACE SIZE	BORDER TYPE	FINISH	BLOW PATTERN	MAT'L.	OPTIONS/NOTES
A	TITUS TMS-AA	SUPPLY	24 X 24	8"ø	18 X 18	3	26	4	ALU	PROVIDE TRM WHEN SURFACE MOUNTING
B	TITUS TMS-AA	SUPPLY	24 X 24	10"ø	18 X 18	3	26	4	ALU	PROVIDE TRM WHEN SURFACE MOUNTING
C	TITUS TMS-AA	SUPPLY	24 X 24	12"ø	18 X 18	3	26	4	ALU	PROVIDE TRM WHEN SURFACE MOUNTING
D	TITUS TMS-AA	SUPPLY	12 X 12	6"ø	12 X 12	1	26	4	ALU	TRM
E	TITUS 301FL	SUPPLY	20 X 12	18 x 10	20 X 12	1	04	2	ALU	–
F	TITUS 350FL	RETURN EXHAUST	26 X 26	24 X 24	26 X 26	1	04	–	ALU	–
G	TITUS 50 F	RETURN EXHAUST	24 X 24	22 X 22	24 X 24	3	26	–	ALU	½" X ½" X 1" CORE
H	TITUS 50 F	RETURN EXHAUST	24 X 12	22 X 10	24 X 12	1	26	–	ALU	½" X ½" X 1" CORE
I	RUSKIN ELF6375DXD	INTAKE LOUVER	12 X 18	12 X 18	12 X 18	7	CBA	–	ALU	BUG SCREEN
J	TITUS 50 RS	EXHAUST	12 X 12	10 X 10	12 X 12	1	26	–	SS	–
K	RUSKIN ELF6375DXD	EXHAUST LOUVER	12 X 14	12 X 14	12 X 14	7	CBA	–	ALU	BUG SCREEN

BORDER TYPE
1. SURFACE MOUNT
2. SNAP-IN
3. LAY-IN
4. SPLINE
5. DROPPED
6. BEVELED
7. FLUSH

BLOW PATTERN
1. 1-WAY
2. 2-WAY
2C. 2-WAY, OPPOSITE
3. 3-WAY
4. 4-WAY+

FINISH
01 ALUMINUM
04 MILL (STD)
26 WHITE
CBA COLOR BY ARCHITECT

MATERIAL
ST'L 22 GAUGE STEEL
ALU ALUMINUM
SS STAINLESS STEEL

OPTIONS/NOTES

TRM	RAPID MOUNT FRAME
PFSS	SS PLASTER FRAME
PFA	ALUM PLASTER FRAME
AG-15	STEEL DAMPER
AG-15-AA	ALUMINUM DAMPER
AG-15-SS	STAINLESS STEEL DAMPER
EQT	EARTHQUAKE TABS
L	FRONT BLADE LONG ORIENTATION
S	FRONT BLADE SHORT ORIENTATION
AG-85	BUTTERFLY DAMPER
EG	EQUALIZING GRID
TRV	THROW REDUCING VANES

GENERAL ENERGY NOTES:

THERMOSTATIC CONTROLS MUST HAVE A 5deg DEADBAND OR HAVE MANUAL CHANGEOVER BETWEEN HEATING AND COOLING.

PROVIDE AUTOMATIC CONTROLS: SETBACK TO 55degF (HEAT) AND 85degF (COOL); 7-DAY CLOCK, 2-HOUR OCCUPANT OVERRIDE, 10-HOUR BACKUP IN THE EVENT OF A POWER LOSS.

OUTDOOR AIR SUPPLY AND EXHAUST DUCTS SHALL BE PROVIDED WITH AUTOMATIC MEANS TO REDUCE AND SHUT OFF AIRFLOW WITH THE EXCEPTION FOR SYSTEM DESIGNED FOR CONTINUOUS OPERATION OR SYSTEM WITH AN FLOW RATE LESS THAN 3,000 CFM; SYSTEMS WITH READILY ACCESSIBLE MANUAL DAMPERS; OR RESTRICTED BY HEALTH AND LIFE SAFETY CODES.

ALL JOINTS, LONGITUDINAL AND TRANSVERSE SEAMS AND CONNECTIONS IN DUCTWORK SHALL BE SECURELY FASTENED AND SEALED WITH WELDS, GASKETS, MASTICS OR TAPES. TAPES AND MASTICS USED TO SEAL DUCTWORK SHALL BELISTED AND LABELED IN ACCORDANCE WITH UL181A OR UL181B. DUCT CONNECTIONS TO FLANGES OF AIR DISTRIBUTION SYSTEMS SHALL BE SEALED AND MECHANICALLY FASTENED. DUCT TAPE IS NOT PERMITTED AS A SEALANT OF ANY METAL DUCTS.

INSULATION SHALL BE PROVIDED FOR PIPING AS NOTED IN THE TABLE BELOW. PIPING INSULATION SHALL BE PROVIDED FOR RETURN CIRCULATION HOT WATER SYSTEM WITH 1" OR R-4 INSULATION. THE FIRST 8' OF PIPING IN NONCIRCULATING SYSTEMS SERVED BY EQUIPMENT W/O INTEGRAL HEAT TRAPS SHALL BE INSULATED WITH 5" OR R-4 INSULATION.

WATER HEATING EQUIPMENT NOT SUPPLIED WITH INTEGRAL HEAT TRAPS AND SERVING NONCIRCULATING SYSTEMS SHALL BE PROVIDED WITH HEAT TRAPS ON THE SUPPLY AND DISCHARGE PIPING AS ASSOCIATED WITH THE EQUIPMENT.

AUTOMATIC CIRCULATING HOT WATER SYSTEMS OR HEAT TRACE SHALL HAVE TIME SWITCHES THAT ARE CAPABLE OF BEING SET TO TURN OFF THE SYSTEM.

EACH AREA SHALL HAVE AT LEAST ONE MANUAL CONTROL FOR LIGHTING SERVING THAT AREA, UNLESS THE LIGHTING IS FOR SECURITY OR EMERGENCY AREAS THAT MUST REMAIN CONTINUOUSLY ILLUMINATED OR FOR ILLUMINATION OF MEANS OF EGRESS.

EACH AREA THAT IS REQUIRED TO HAVE A MANUAL CONTROL SHALL ALSO PROVIDE BI-LEVEL SWITCHING TO UNIFORMLY REDUCE THE LIGHT BY 50% UNLESS THE AREA IS SERVED BY:
a. ONE LUMINAIRE.
b. CONTROLLED BY AN OCCUPANCY SENSOR
c. CORRIDORS, STOREROOMS, RESTROOMS OR PUBLIC LOBBIES.

FIXTURES SHALL BE PROVIDED WITH ELECTRONIC BALLASTS.

MINIMUM PIPE INSULATION (inch)		
	NORMINAL PIPE DIA.	
FLUID	≤ 1.5"	> 1.5"
STEAM	1-1/2	3-1/2
HOT WATER	1	1-1/2
CHILL WATER or REFRIGERANT	1	1

MINIMUM DUCT INSULATION (R)	
UNCONDITIONED SPACE	≤ 5
OUTSIDE BLDG. ENVELOPE	≥ 8

EXCEPTIONS:
1. WHEN LOCATED WITHIN EQUIPMENT.
2. WHEN DESIGN TEMP. DIFFERENCE BETWEEN THE INTERIOR AND EXTERIOR OF THE DUCT OR PLENUM DOES NOT EXCEED 15'F.

HVAC GENERAL NOTES:

A. THESE GENERAL NOTES APPLY TO ALL HVAC DRAWINGS.
B. DUCT SIZES ARE INSIDE CLEAR DIMENSIONS.
C. INSULATE DUCTWORK AS FOLLOWS:
1. WRAP ALL INDOOR SUPPLY, RETURN, OUTSIDE AIR DUCT AND EXHAUST DUCT WILL 2-INCH THICK INSULATION WITH A THERMAL MIN. R-5 VALUE PER SPECIFICATIONS. THIS APPLIES TO CONCEALED DUCTWORK.
2. COVER ALL OUTDOOR SUPPLY AND RETURN DUCTS WITH 2" THICK RIGID BOARD INSULATION WITH A THERMAL MIN. R-8 VALUE PER SPECIFICATIONS. ALL OUTDOOR DUCTS SHALL HAVE ALL JOINTS AND SEAMS SEALED LIQUID TIGHT WITH A RCD #8, UL-181 MASTIC OR EQUAL. ALL JOINTS AND SEAMS ON THE RIGID INSULATION BOARD SHALL BE SEALED LIQUID TIGHT USING RCD #8, UL-181 MASTIC OR EQUAL. THEN ALL RIGID BOARD SHALL BE PAINTED WITH A LIBERAL AMOUNT OF "KOOL-SEAL" ALUMINUM ROOF COATING #20-400 OR EQUAL.
3. PROVIDE DOUBLE WALL DUCTWORK IN AREAS WHERE DUCT IS EXPOSED TO VIEW. PROVIDE DUCT INSULATION BETWEEN DUCT WALLS WITH MINIMUM R-VALUE OF 5. REFER TO SPECIFICATIONS.
D. PROVIDE FLEXIBLE CONNECTION AT DUCT ATTACHMENTS TO MECHANICAL EQUIPMENT.
E. HVAC EQUIPMENT SUBMITTED OTHER THAN SCHEDULED MANUFACTURER'S SHALL NOT EXCEED PHYSICAL DIMENSIONS DUE TO SPACE LIMITATIONS.
F. ALL PIPING AND DUCTWORK PENETRATIONS OF FIRE-RATED BARRIERS SHALL BE PROTECTED WITH FIRE BLOCKING MATERIAL AND/OR DAMPERS PER SPECIFICATIONS.
G. MANUAL VOLUME DAMPERS INSTALLED IN RECTANGULAR DUCTWORK SHALL BE OPPOSED BLADE TYPE. MANUAL VOLUME DAMPERS INSTALLED IN ROUND DUCTWORK SHALL BE BUTTERFLY TYPE.
H. BALANCING DAMPERS IN EXTERNALLY INSULATED DUCTWORK SHALL BE PROVIDED WITH A BUILD-OUT ON DAMPER OPERATOR TO EXTEND OPERATOR HANDLE TO OUTSIDE OF INSULATION.
I. CONCEALED DUCTWORK TO HAVE OPERABLE QUADRANTS ON BALANCING DAMPERS.
J. PROVIDE ACCESS TO ALL CONTROL, MOTORIZED, BALANCING AND FIRE DAMPERS. PROVIDE ACCESS DOORS IN DUCTS AND CEILINGS WHERE NECESSARY.
K. DUCTWORK SHALL BE GALVANIZED G-90 SHEETMETAL FABRICATED TO SMACNA STANDARDS. DUCTWORK SHALL BE SHEET STEEL OF LOCK-FORMING QUALITY, ASTM-525. SEAL ALL DUCT SEAMS, TRANSVERSE AND LONGITUDINAL SEAMS AIR TIGHT WITH LOW PRESSURE DUCT SEALANT.
L. FLEXIBLE DUCTWORK SHALL BE EQUAL TO FLEXMASTER 8M WITH AN INSULATING R-VALUE OF 5 OR BETTER. FLEX DUCT SHALL NOT EXCEED 6 FT. IN LENGTH. DUCT RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK.
M. PROVIDE 7-DAY PROGRAMMABLE THERMOSTAT WITH 24 HOUR MEMORY BACKUP SIMILAR TO HONEYWELLS T7350M1008/U.

HVAC SYMBOLS AND ABBREVIATIONS

DUCTWORK:
- 20"ø — PRIMARY DUCT, ROUND
- 20/12 — PRIMARY DUCT, RECTANGULAR
- DUCT TRANSITION
- BRANCH TAP
- MANUAL VOLUME DAMPER (MVD)

LINE TYPES:
- NEW EQUIPMENT
- NEW PIPING OR DUCT
- EXISTING PIPING OR DUCT

- RETURN AIR
- FSD — FIRE/SMOKE DAMPER
- CEILING DIFFUSER
- RETURN/EXHAUST AIR GRILLE

MISCELLANEOUS:
- TS HS — ZONE TEMP/HUMIDITY SENSOR
- T H — ZONE THERMOSTAT/HUMIDISTAT
- A 8"ø 200 CFM — AIR DEVICE TYPE, NECK SIZE, SCHEDULED CFM
- NEW CONNECTION TO LANDLORD'S BASE SYSTEM

NOTE: ALL SYMBOLS & ABBREVIATIONS MAY NOT APPLY TO THIS PROJECT

LEGEND

ϕ	SQUARE
ø	ROUND
ACC.DR.	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
CFM	CUBIC FEET PER MINUTE
DB	DRY BULB
E/A	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
ESP	EXTERNAL STATIC PRESSURE
FC	FLEXIBLE CONNECTION
FLA	FULL LOAD AMPS
FPI	FINS PER INCH
FT W.G.	FOOT WATER GAUGE
GA.	GAUGE
GALV	GALVANIZED
GPM	GALLONS PER MINUTE
HVAC	HEATING VENTILATING & AIR CONDITIONING
IN W.G.	INCH WATER GAUGE
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
MBH	THOUSAND BTU PER HOUR
MOCP	MAXIMUM OVER CURRENT PROTECTION
O/A	OUTSIDE AIR
PD	PRESSURE DROP
R/A	RETURN AIR
RLA	RUNNING LOAD AMPS
RPM	REVOLUTION PER MINUTE
S/A	SUPPLY AIR
SP	STATIC PRESSURE
SQ FT	SQUARE FEET
U.C.D.	UNDERCUT DOOR BY 1"
WB	WET BULB

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MECHANICAL SCHEDULES

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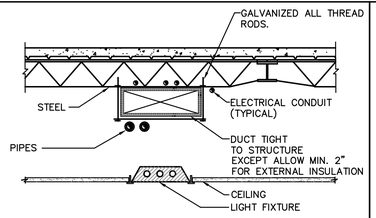
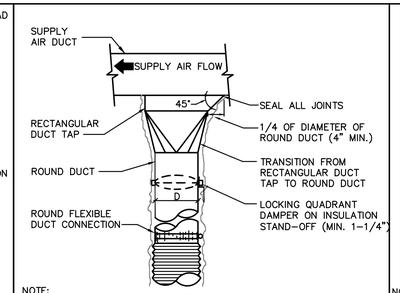


NOTES:

1. PIPES AND ELECTRICAL CONDUIT CAN BE ROUTED BETWEEN JOISTS OR THROUGH JOIST WEB SPACE AS REQUIRED. 2– DUCT SHALL BE LOCATED AS HIGH AS POSSIBLE.
2. U.L. DESIGN ASSEMBLY NUMBERS ARE SHOWN ON ARCHITECTURAL PLANS WHEN REQUIRED.
3. INSTALLATION OF ALL SERVICES MUST BE COORDINATED BY THE CONTRACTOR.

1 TYP. MEP INSTALLATION DETAIL

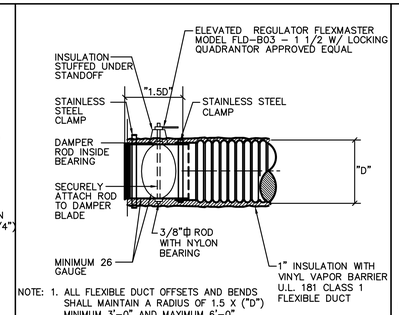
NOT TO SCALE — MAGD101.DWG



NOTE:
SEE FLOOR PLAN FOR SIZES

2 RECTANGLUAR TAP TO ROUND TRANSITION

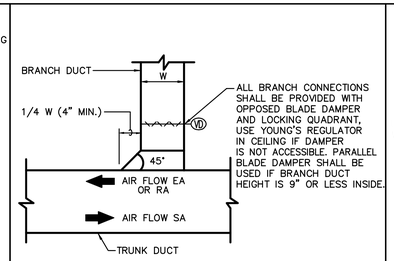
NOT TO SCALE — MAGD302.DWG



NOTE: 1. ALL FLEXIBLE DUCT OFFSETS AND BENDS SHALL MAINTAIN A RADIUS OF 1.5 X ("D") MINIMUM 3'–0" AND MAXIMUM 6'–0"
2. TYPICAL OF ROUND DUCT CONNECTIONS TO RECTANGULAR DUCTS

3 SPIN-IN DETAIL

NOT TO SCALE — MAGD301.DWG

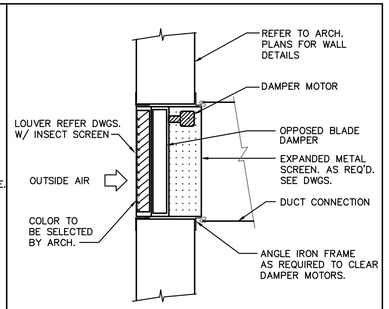


ALL BRANCH CONNECTIONS SHALL BE PROVIDED WITH OPPOSED BLADE DAMPER AND LOCKING QUADRANT, USE YOUNG'S REGULATOR IN CEILING IF DAMPER IS NOT ACCESSIBLE. PARALLEL BLADE DAMPER SHALL BE USED IF BRANCH DUCT HEIGHT IS 9" OR LESS INSIDE.

NOTE: THIS CONNECTION SHALL BE TYPICAL FOR ALL RECTANGULAR BRANCH DUCT CONNECTIONS TO RECTANGULAR TRUNK DUCTS, INCLUDING SUPPLY, RETURN, OUTSIDE AIR AND EXHAUST DUCTS.

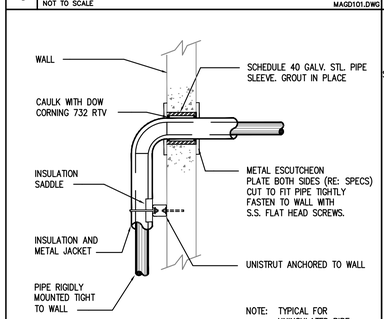
4 RECTANGULAR BRANCH DUCT TAP

NOT TO SCALE — MAGD300.DWG



5 INTAKE LOUVER MOUNTING

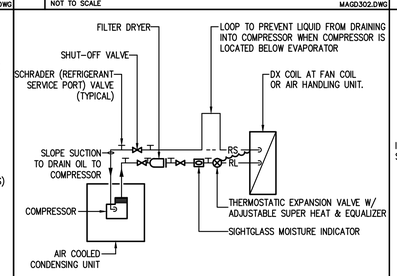
NOT TO SCALE — MADT301.DWG



NOTE: TYPICAL FOR UNINSULATED PIPE.

6 PIPE ENTRY THRU EXTERIOR WALL

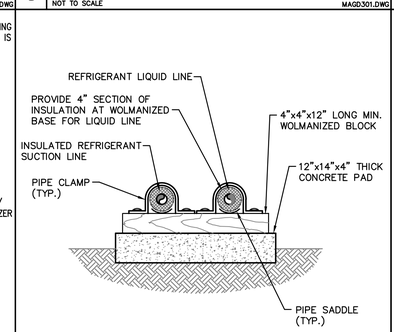
NOT TO SCALE — MPPE302.DWG



NOTE:
1. COMPLY WITH MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS.
2. TYPICAL FOR EACH SEPARATE REFRIGERANT CIRCUIT.
3. USE "ACR" HARD DRAWN COPPER REFRIGERANT PIPE.

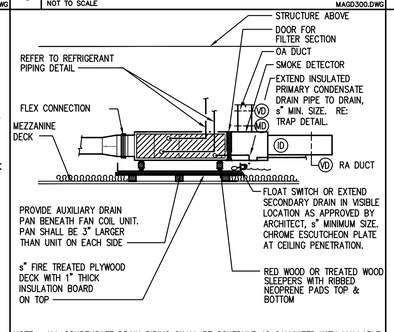
7 REFRIGERANT PIPING SCHEMATIC

NOT TO SCALE (5 TONS AND SMALLER) — MPRE104.DWG



8 GROUND MTD. REFR. PIPE

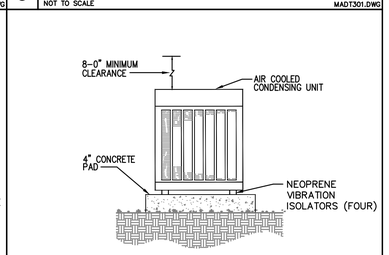
NOT TO SCALE — MPRE202.DWG



NOTE: ALL CONDENSATE DRAIN PIPING SHALL BE SCHEDULE 40 GALVNIZED WITH MALLABLE IRON SCREWED FITTINGS.

9 FAN COIL UNIT MOUNTING (DX)

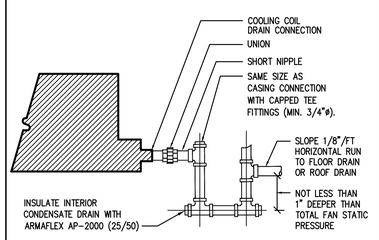
NOT TO SCALE — MEFC200.DWG



NOTE:
CLEARANCE AROUND UNIT FOR AIR FLOW AND SERVICE PER MANUFACTURER INSTALLATION INSTRUCTION.

10 CONDENSING UNIT MOUNTING ON GRADE

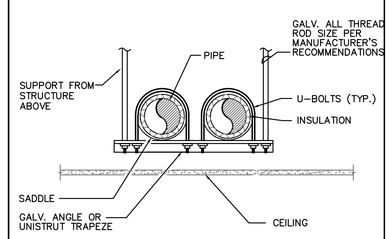
NOT TO SCALE — MECU100.DWG



NOTE:
1. MAINTAIN MINIMUM 1" AIR GAP AT FLOOR DRAIN OR ROOF DRAIN.
2. ALL CONDENSATE DRAIN PIPING SHALL BE SCHEDULE 40 PVC WITH SOLVENT WELD FITTINGS OR TYPE "L" COPPER PIPE.

11 COOLING COIL CONDENSATE DRAIN

NOT TO SCALE — MPCE300.DWG



12 PIPE HANGER DETAIL

NOT TO SCALE — MPHS103.DWG

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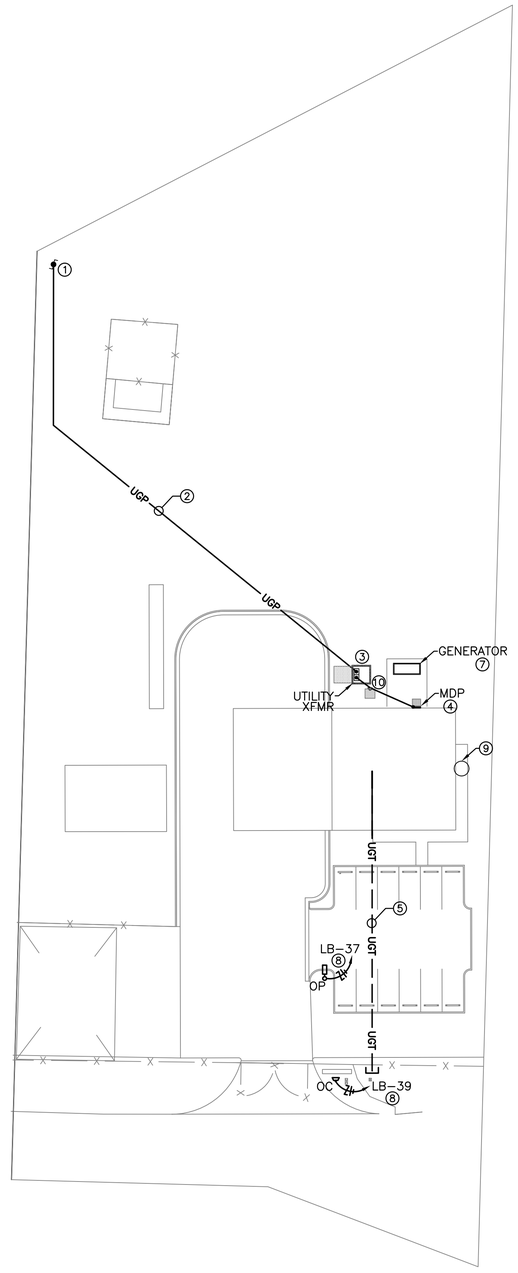

1 ELECTRICAL SITE PLAN
1" =30'-0"

GENERAL NOTES:

A. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS AT THE JOB SITE BEFORE COMMENCING ANY PHASE OF THE WORK. ADJUSTMENTS FOR FIT AND COORDINATION SHALL BE MADE AT NO ADDITIONAL COST TO THE OWNER. NOTIFY ENGINEER OF ANY CONFLICTS, DISCREPANCIES OR OMISSIONS PRIOR TO COMMENCEMENT OF THE CONTRACT WORK.

B. CONTRACTOR SHALL REVIEW ALL ARCHITECTURAL, CIVIL, MECHANICAL & STRUCTURAL DRAWINGS AND SPECIFICATIONS FOR ANY ADDITIONAL REQUIREMENTS.

C. CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHER TRADES.

D. ALL CONDUIT SHALL BE AS STRAIGHT AS POSSIBLE AND PARALLEL OR PERPENDICULAR TO BUILDING LINES.

E. PROVIDE MULTI-CONDUCTOR HOMERUNS AS SHOWN AND USE A #10 AWG NEUTRAL. PROVIDE GREEN GROUND WIRE IN ALL RACEWAYS.

F. SEAL ALL WALL, ROOF, AND FLOOR PENETRATIONS WITH UL LISTED FIRE SEALANT.

G. ALL CONDUIT SHALL BE ROUTED CONCEALED WITHIN WALLS AND/OR ABOVE CEILINGS.

H. REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT MOUNTING HEIGHTS OF ALL DEVICES.

ELECTRICAL SITE PLAN KEY NOTES:

1. APPROXIMATE LOCATION OF NEW DIP POLE BY UTILITY COMPANY, FIELD COORDINATE EXACT LOCATION.
2. NEW UNDERGROUND ELECTRICAL PRIMARY BY POWER COMPANY.
3. APPROXIMATE LOCATION OF NEW PAD MOUNTED UTILITY TRANSFORMER. PROVIDE CONCRETE FOUNDATION PER POWER COMPANY REQUIREMENT.
4. REFER TO SHEET E4.1 FOR FEEDER AND GROUNDING REQUIREMENTS.
5. PROVIDE TWO(2) 4" CONDUITS WITH PULL CORDS FOR TELEPHONE AND CABLE SERVICE. ROUTE TO NEAREST EASEMENT.
6. NOT USED.
7. PROVIDE CONCRETE FOUNDATION PER GENERATOR MANUFACTURES REQUIREMENTS.
8. ROUTE VIA LIGHTING CONTACTOR.
9. PROVIDE 50FT STEEL MONOPOLE TOWER, ROHN MODEL DEP50MA-LRCL-BGK5GGX-TT050TSP OR EQUIVALENT. PROVIDE GROUND RING AND CONNECT TO POLE.
10. PROVIDE UNISTRUT RACK FOR ELECTRICAL POWER METER. FIELD COORDINATE EXACT REQUIREMENTS AND LOCATION.

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ELECTRICAL SITE PLAN

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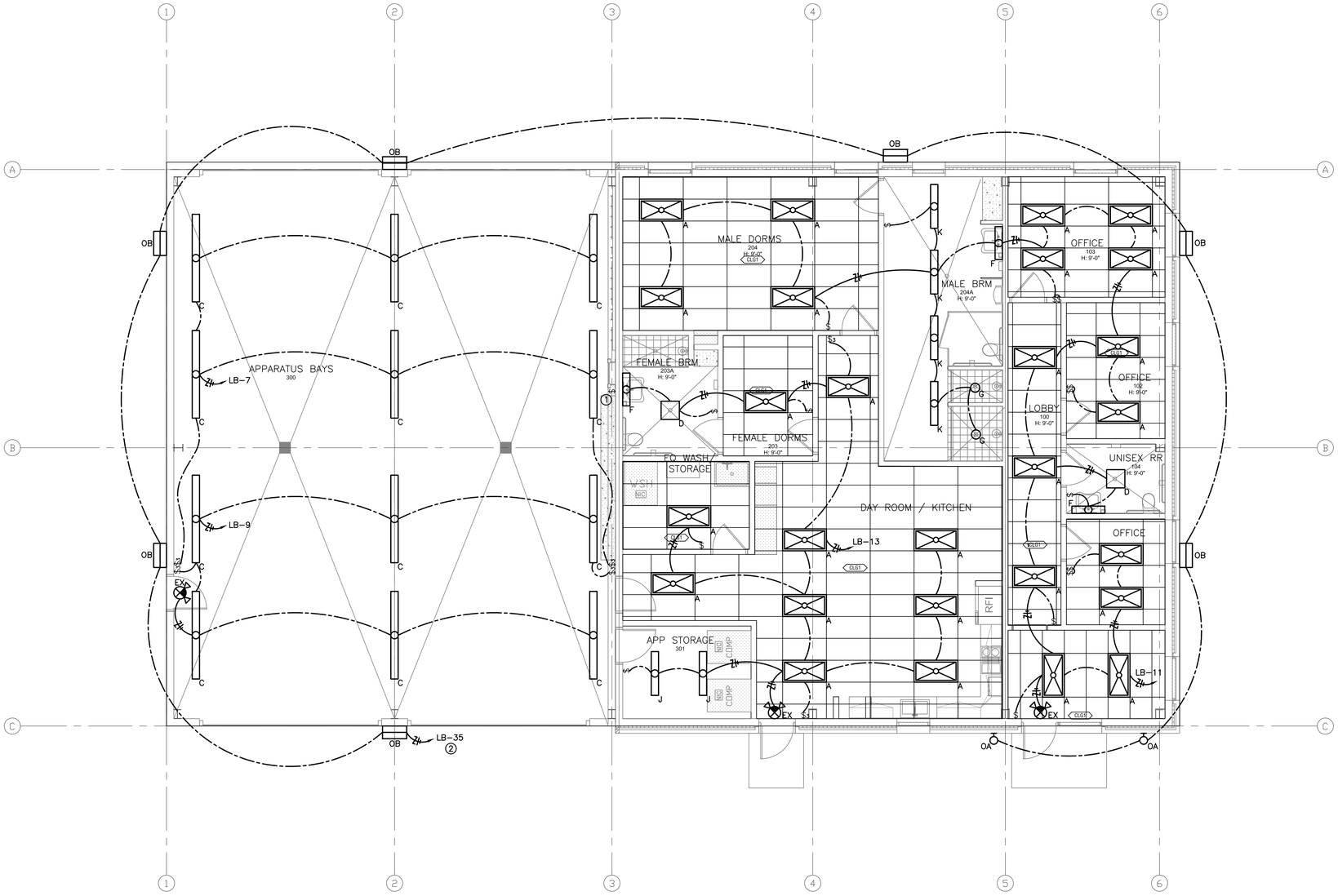
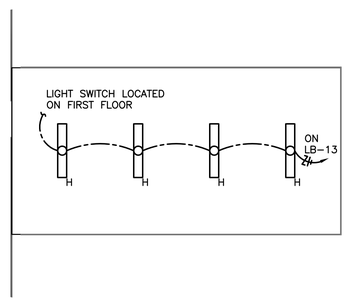


1 ELECTRICAL LIGHTING PLAN
3/16" =1'-0"



2 ELECTRICAL LIGHTING PLAN-MEZZANINE
3/16" =1'-0"

GENERAL NOTES:

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C. CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHER TRADES.

D. ALL CONDUIT SHALL BE AS STRAIGHT AS POSSIBLE AND PARALLEL OR PERPENDICULAR TO BUILDING LINES.

E. PROVIDE MULTI-CONDUCTOR HOMERUNS AS SHOWN AND USE A #10 AWG NEUTRAL. PROVIDE GREEN GROUND WIRE IN ALL RACEWAYS.

F. SEAL ALL WALL, ROOF, AND FLOOR PENETRATIONS WITH UL LISTED FIRE SEALANT.

G. ALL CONDUIT SHALL BE ROUTED CONCEALED WITHIN WALLS AND/OR ABOVE CEILINGS.

H. REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT MOUNTING HEIGHTS OF ALL DEVICES.

ELECTRICAL LIGHTING KEY NOTES:

1. LIGHT SWITCH FOR MEZZANINE LIGHTING. FIELD COORDINATE EXACT LOCATION.
2. ROUTE VIA LIGHTING CONTACTOR.

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ELECTRICAL LIGHTING PLAN

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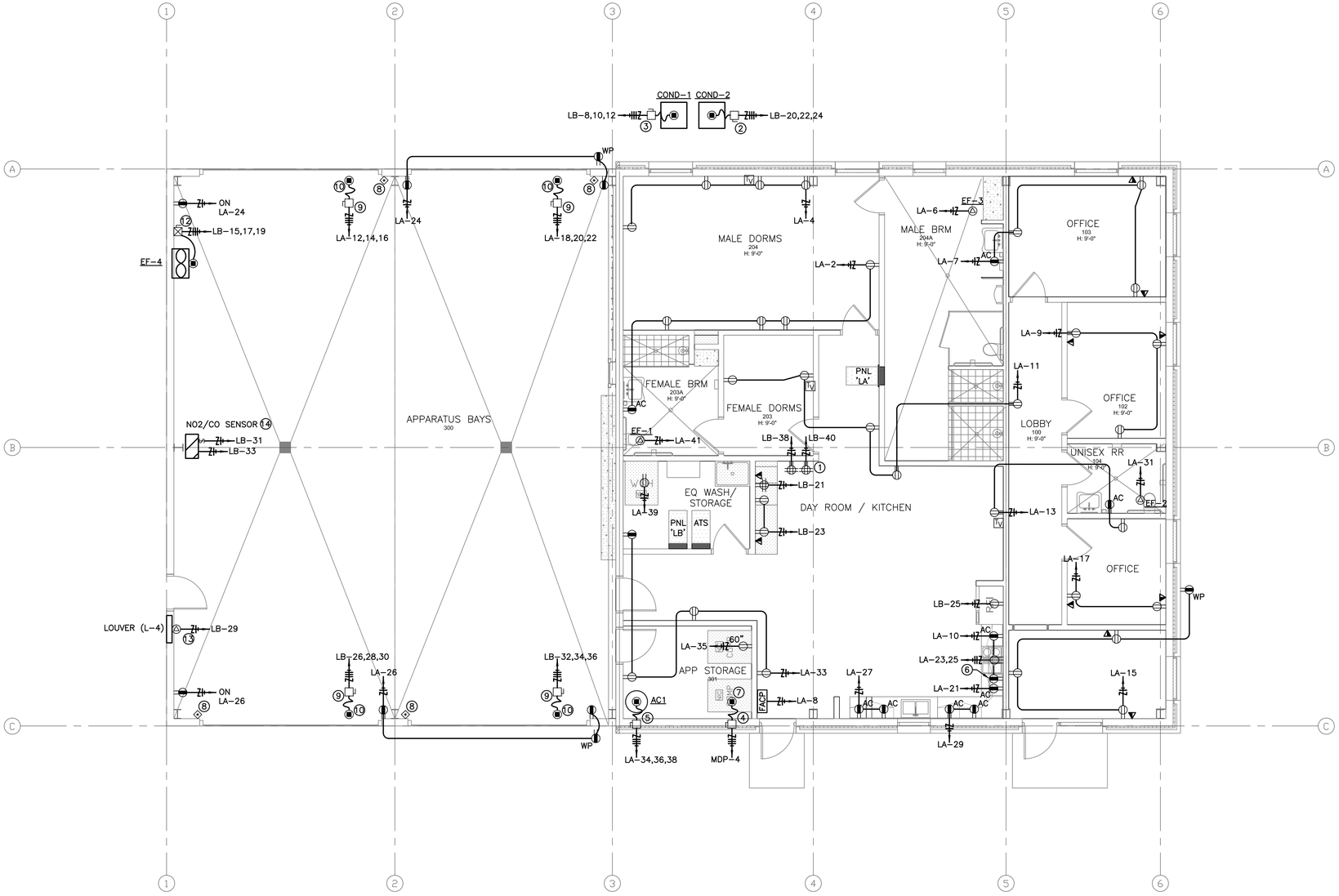
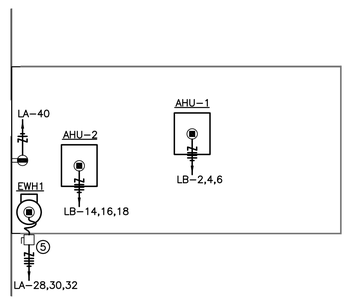


1 ELECTRICAL POWER PLAN
3/16" = 1'-0"



2 ELECTRICAL POWER PLAN-MEZZANINE
3/16" = 1'-0"

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D. ALL CONDUIT SHALL BE AS STRAIGHT AS POSSIBLE AND PARALLEL OR PERPENDICULAR TO BUILDING LINES.

E. PROVIDE MULTI-CONDUCTOR HOMERUNS AS SHOWN AND USE A #10 AWG NEUTRAL. PROVIDE GREEN GROUND WIRE IN ALL RACEWAYS.

F. SEAL ALL WALL, ROOF, AND FLOOR PENETRATIONS WITH UL LISTED FIRE SEALANT.

G. ALL CONDUIT SHALL BE ROUTED CONCEALED WITHIN WALLS AND/OR ABOVE CEILINGS.

H. REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT MOUNTING HEIGHTS OF ALL DEVICES.

ELECTRICAL POWER KEY NOTES:

1. PROVIDE 3/4" PLYWOOD TERMINAL BOARD WITH GRAY FLAME RETARDANT PAINT FINISH.
2. PROVIDE 60A/3P/NF NEMA-3R DISCONNECT.
3. PROVIDE 30A/3P/NF NEMA-3R DISCONNECT.
4. PROVIDE 100A/3P/NF NEMA-1 DISCONNECT.
5. PROVIDE 60A/3P/NF NEMA-1 DISCONNECT.
6. PROVIDE 120V POWER FOR KITCHEN HOOD. REFER TO MECHANICAL PLANS.
7. PROVIDE 208V POWER FOR 10 HP BREATHING AIR COMPRESSOR. FIELD COORDINATE EXACT LOCATION AND REQUIREMENTS.
8. TYPICAL: OVERHEAD DOOR UP/DOWN PUSH BUTTON CONTROLLER
9. PROVIDE 30A/3P/NF NEMA-1 DISCONNECT.
10. PROVIDE 208v, 3ph CONNECTION TO OVERHEAD DOOR MOTOR.
11. NOT USED.
12. PROVIDE 30A/3P/3F/00/NEMA 12 STARTER DISCONNECT WITH 120V COIL FOR EXHAUST FAN. INTERCONNECT WITH NO2/CO GAS DETECTOR.
13. PROVIDE 120V POWER FOR DAMPER. REFER TO MECHANICAL PLANS.
14. NO2/CO GAS DETECTOR FURNISHED BY DIVISION 15 INSTALLED BY DIVISION 16. COORDINATE MOUNTING LOCATION WITH MECHANICAL CONTRACTOR. PROVIDE 2-POSITION SWITCH. SEE DETAIL 4, SHEET E5.2 FOR ADDITIONAL REQUIREMENTS.

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WEBB COUNTY/TEXAS
WEBB COUNTY MAIN FIRE STATION
AND ADMINISTRATION BUILDING

CONSULTANT

BOB BULLOCK LP. 20 - RR6078A RD LOT 2
LAREDO, TEXAS 78045

ELECTRICAL POWER PLAN

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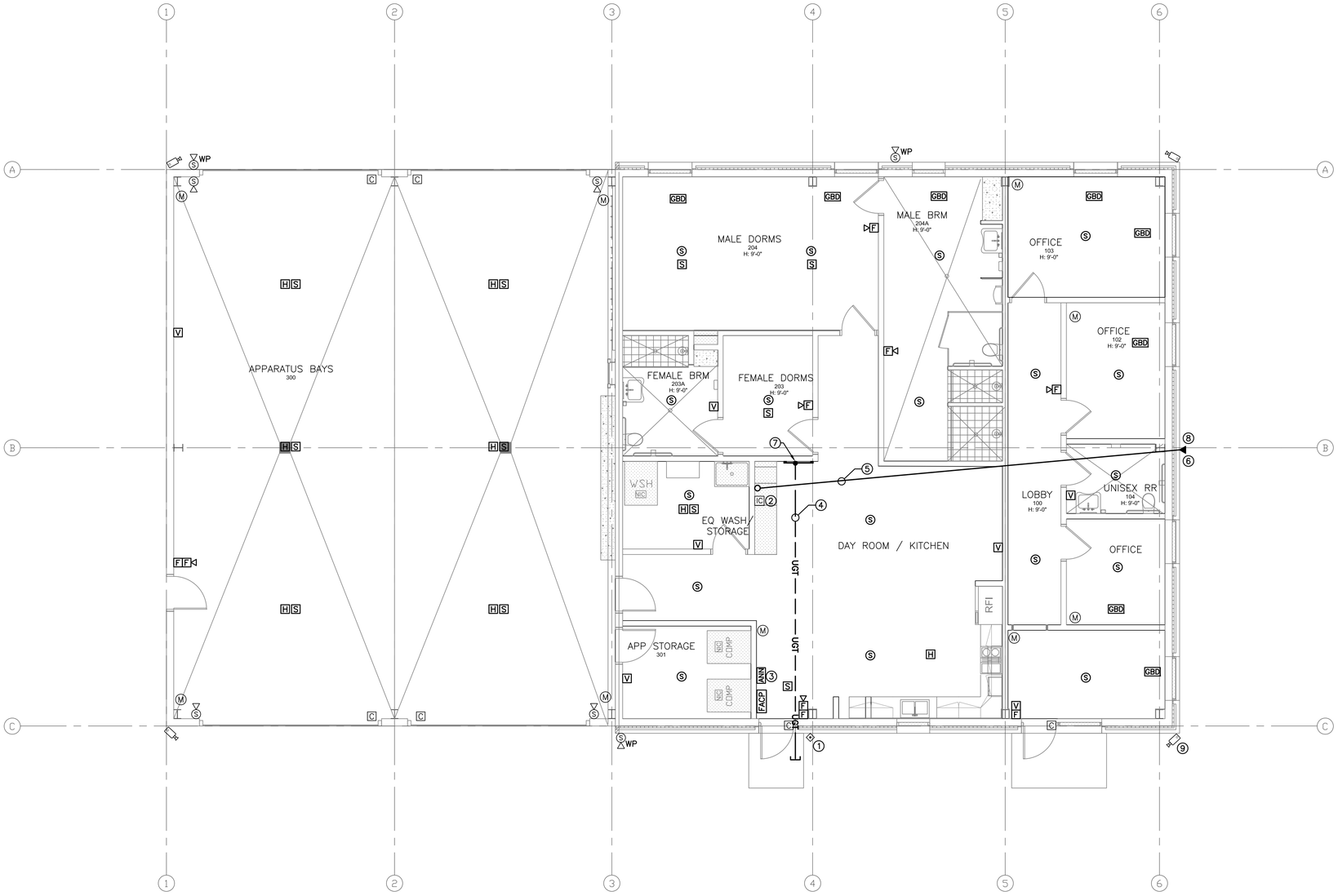
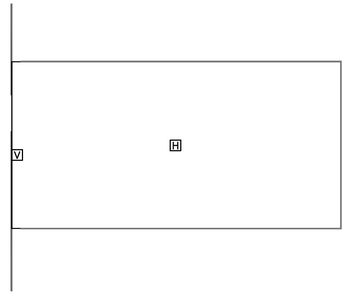


1 SPECIAL SYSTEMS PLAN
3/16" = 1'-0"



2 SPECIAL SYSTEMS PLAN-MEZZANINE
3/16" = 1'-0"

GENERAL NOTES:

A. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS AT THE JOB SITE BEFORE COMMENCING ANY PHASE OF THE WORK. ADJUSTMENTS FOR FIT AND COORDINATION SHALL BE MADE AT NO ADDITIONAL COST TO THE OWNER. NOTIFY ENGINEER OF ANY CONFLICTS, DISCREPANCIES OR OMISSIONS PRIOR TO COMMENCEMENT OF THE CONTRACT WORK.

B. CONTRACTOR SHALL REVIEW ALL ARCHITECTURAL, CIVIL, MECHANICAL & STRUCTURAL DRAWINGS AND SPECIFICATIONS FOR ANY ADDITIONAL REQUIREMENTS.

C. CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHER TRADES.

D. ALL CONDUIT SHALL BE AS STRAIGHT AS POSSIBLE AND PARALLEL OR PERPENDICULAR TO BUILDING LINES.

E. PROVIDE MULTI-CONDUCTOR HOMERUNS AS SHOWN AND USE A #10 AWG NEUTRAL. PROVIDE GREEN GROUND WIRE IN ALL RACEWAYS.

F. SEAL ALL WALL, ROOF, AND FLOOR PENETRATIONS WITH UL LISTED FIRE SEALANT.

G. ALL CONDUIT SHALL BE ROUTED CONCEALED WITHIN WALLS AND/OR ABOVE CEILINGS.

H. REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT MOUNTING HEIGHTS OF ALL DEVICES.

SPECIAL SYSTEMS KEY NOTES:

1. EXTERIOR INTERCOM STATION.
2. INTERCOM BASE STATION.
3. GENERATOR REMOTE ANNUNCIATOR
4. PROVIDE (2) 4"C WITH PULL CORDS FOR FUTURE COMMUNICATIONS. SEE SHEET E0.1 FOR CONTINUATION.
5. PROVIDE (1) 4"C WITH PULL CORD FOR FUTURE RADIO COMMUNICATION CABLING. FIELD COORDINATE EXACT LOCATION.
6. APPROXIMATE LOCATION OF NEW RADIO TOWER
7. STUB UP CONDUITS 12" AFF. FIELD COORDINATE EXACT LOCATION.
8. GROUND RADIO TOWER PER MANUFACTURERS RECOMMENDATIONS.
9. TYPICAL: CCTV SYSTEM BY OWNER. PROVIDE CONDUIT ROUGH-IN. COORDINATE ROUGH-IN HEIGHTS WITH ARCHITECT.

9/28/2015

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SPECIAL SYSTEMS PLAN

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LIGHT FIXTURE SCHEDULE - FIRE STATION

TYPE	MANUFACTURER & CATALOG NO.	VOLTAGE	LAMPS	MOUNTED	DESCRIPTION
A	LITHONIA #2SP8-G332-A12125-MVOLT-GEB10IS	120	(2)-28WT8	RECESSED	2x4 LAY-IN FLUORESCENT
C	LITHONIA #TEJ-432-MVOLT-GEB10IS-WG2EJ	120	(6)-28WT8	SURFACE	8' TANDEM STRIPLIGHT W/6-28WT8 LAMPS &WIREGUARD
D	LITHONIA #FM72-ACLS-LP	120	(1)48WT9 & (1)32WT9	SURFACE	20" SQUARE LOW PROFILE W/ 2 T9 CIRCLINE LAMPS
F	LITHONIA #11891-MVOLT-GEB10IS	120	(2)-25WT8	SURFACE	3' VANITY FXITURE W/ 2-25WT8 LAMPS
G	LITHONIA #L7X-AT-7LD1PF	120	40W A19	RECESSED	SHOWER LIGHT
H	LITHONIA #C-2-32-MVOLT-GEB10IS-WGCUN ST-HC36	120	(2)-28WT8	PENDANT	4' STRIPLIGHT W/ WIREGUARD
J	LITHONIA #LB-2-32-MVOLT-GEB10IS	120	(2)-28WT8	SURFACE	4' LOW-PROFILE WRAPAROUND W/ 2-32WT8 LAMPS
K	LITHONIA #10640-32-MVOLT-GEB10IS	120	(2)-28WT8	SURFACE	4' LINEAR FLUSH MOUNT W/ 2-32WT8 LAMPS
OA	SPI #AEW1032-2N60-120-PTXX	120	(2)60W	SURFACE	DECORATIVE EXTERIOR FIXTURE
OB	LITHONIA #CSXW-LED-30C-1000-40K-T4M-MV-DDBXD	120	104W LED	SURFACE	WALLPACK
OC	HYDREL #4754-28T5-MV-WWD-KM-SBA12-LPI41K-BZ	120	28T5-41K	GROUND	FACADE FLOODLIGHT
OP	LITHONIA #CSX2-LED-120C-1000-40K-T4M-MV-SPA-DB	120	416W LED	POLE	LITHONIA POLE #SSS-4G-DM19-DDB
EX	LITHONIA #LHQM-P-W-3R-120-N	120	LED	SURFACE	EXIT SIGN W/EMERGENCY LIGHTS

PANEL ' LA '

W/TVSS — 200 AMP, M.L.O, 120/208 V, 3Ø, 4W, S/N, FLUSH, NEMA 1, 35 KAIC

CKT #	LOAD SERVED	LOAD	CONDUIT & WIRE SIZE	BKR SIZE	A	B	C	BKR SIZE	CONDUIT & WIRE SIZE	LOAD	LOAD SERVED	CKT #
1	TVSS	-		30/3	A			20/1	#12 AWG	900	MALE DORM RECEPT.	2
3		-				B		20/1	#12 AWG	720	MALE DORM RECEPT.	4
5		-					C	20/1	#12 AWG	250	EF-3	6
7	OFFICE RECEPT.	720	#12 AWG	20/1	A			20/1	#12 AWG	300	FACP	8
9	OFFICE RECEPT.	720	#12 AWG	20/1		B		20/1	#12 AWG	500	COUNTERTOP/HOOD RECEPT.	10
11	DORMS/MISC. RECEPT	900	#12 AWG	20/1			C	20/3	#12 AWG	600	OVERHEAD DOOR	12
13	MISC. RECEPT.	900	#12 AWG	20/1	A				#12 AWG	600	"	14
15	LOBBY RECEPT.	720	#12 AWG	20/1		B			#12 AWG	600	"	16
17	OFFICE RECEPT.	360	#12 AWG	20/1			C	20/3	#12 AWG	600	OVERHEAD DOOR	18
19					A				#12 AWG	600	"	20
21	MICROWAVE	1600	#12 AWG	20/1		B			#12 AWG	600	"	22
23	STOVE	4160	#6 AWG	50/2			C	20/1	#12 AWG	720	APP BAY RECEPTS.	24
25	"	4160	#6 AWG		A			20/1	#12 AWG	720	APP BAY RECEPTS.	26
27	COUNTERTOP RECEPT.	1080	#12 AWG	20/1		B		45/3	#6 AWG	4000	EWH1	28
29	COUNTERTOP RECEPT.	1080	#12 AWG	20/1			C		#6 AWG	4000	"	30
31	EF-2	64	#12 AWG	20/1	A				#6 AWG	4000	"	32
33	STORAGE RECEPT	720	#12 AWG	20/1		B		45/3	#10 AWG	2004	AC1	34
35	APP STORAGE COMP	1080	#12 AWG	20/1			C		#10 AWG	2004	"	36
37					A				#10 AWG	2004	"	38
39	WASHER	1500	#12 AWG	20/1		B		20/1	#12 AWG	180	MEZZANINE RECEPT.	40
41	EF-1	64	#12 AWG	20/1			C					42
43					A							44
45						B						46
47							C					48
49					A							50
51						B						52
53							C					54
55					A							56
57						B						58
59							C					60

CONNECTED LOAD = 45730 VA — PHASE A = 14968 VA — PHASE B = 14944 VA — PHASE C = 15818 VA

PANEL ' LB '

W/TVSS — 200 AMP, M.L.O, 120/208 V, 3Ø, 4W, S/N, SURFACE, NEMA 1, 35 KAIC

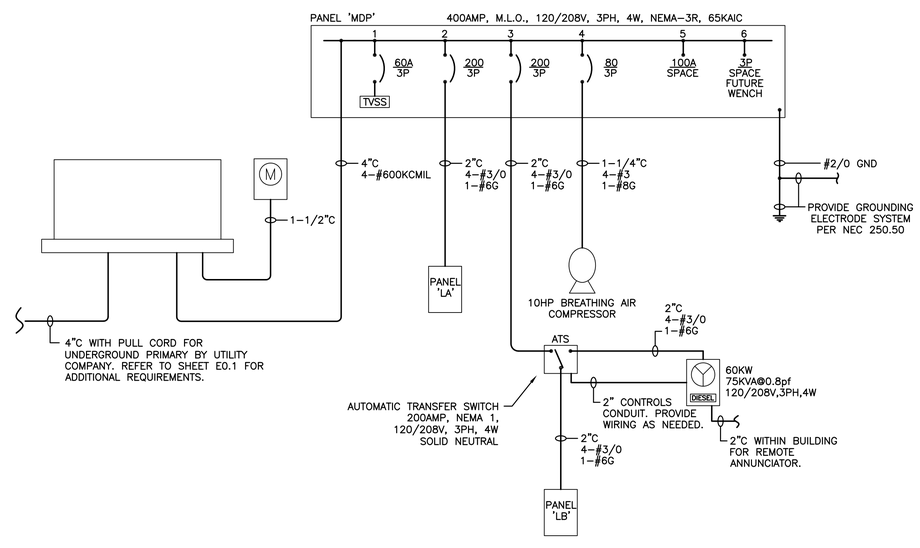
CKT #	LOAD SERVED	LOAD	CONDUIT & WIRE SIZE	BKR SIZE	A	B	C	BKR SIZE	CONDUIT & WIRE SIZE	LOAD	LOAD SERVED	CKT #
1	TVSS	-		30/3	A			35/3	#8 AWG	3600	AHU-1	2
3		-				B			#8 AWG	3600	"	4
5		-					C		#8 AWG	3600	"	6
7	APPARATUS BAY LTG	1008	#10 AWG	20/1	A			20/3	#12 AWG	1680	COND-1	8
9	APPARATUS BAY LTG	1008	#10 AWG	20/1		B			#12 AWG	1680	"	10
11	MISC. LIGHTING	1380	#10 AWG	20/1			C		#12 AWG	1680	"	12
13	MISC. LIGHTING	1026	#10 AWG	20/1	A			50/3	#6 AWG	5520	AHU-2	14
15	EF-4	420	#12 AWG	20/3		B			#6 AWG	5520	"	16
17	"	420	#12 AWG				C		#6 AWG	5520	"	18
19	"	420	#12 AWG		A			35/3	#8 AWG	2520	COND-2	20
21	RADIO	360	#12 AWG	20/1		B			#8 AWG	2520	"	22
23	DISPATCH RECEPT.	360	#12 AWG	20/1			C		#8 AWG	2520	"	24
25	REFRIGERATOR	1200	#12 AWG	20/1	A			20/3	#12 AWG	600	OVERHEAD DOOR	26
27						B			#12 AWG	600	"	28
29	LOUVER L-4	600	#12 AWG	20/1			C		#12 AWG	600	"	30
31	CO SENSOR	180	#12 AWG	20/1	A			20/3	#12 AWG	600	OVERHEAD DOOR	32
33	CO SENSOR	180	#12 AWG	20/1		B			#12 AWG	600	"	34
35	BUILDING LIGHTING	968	#10 AWG	20/1			C		#12 AWG	600	"	36
37	SITE LIGHTING	416	#6 AWG	20/1	A			20/1	#12 AWG	360	IT RECEPT.	38
39	SITE LIGHTING	100	#6 AWG	20/1		B		20/1	#12 AWG	360	IT RECEPT.	40
41							C					42
43					A							44
45						B						46
47							C					48
49					A							50
51						B						52
53							C					54
55					A							56
57						B						58
59							C					60

CONNECTED LOAD = 54326 VA — PHASE A = 19130 VA — PHASE B = 16948 VA — PHASE C = 18248 VA

ESTIMATED ELECTRICAL LOAD

120/208V, 3Ø, 4W

DESCRIPTION		CONNECTED LOAD	DEMAND FACTOR	NEC DEMAND
LIGHTING		5906	125%	7383
RECEPTACLES		11660	NEC 220-44	10830
H.V.A.C.	(HEAT)	27360	100%	27360
LARGEST MOTOR		0	125%	0
MOTOR LOAD		17100	100%	17100
MISC. SINGLE PHASE LOADS		40038	100%	40038
TOTAL VOLT-AMPERES		102064		102711
AMPACITY: 102711	208 X 3ph =			285 AMPS



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SCHEDULES AND ONE-LINE

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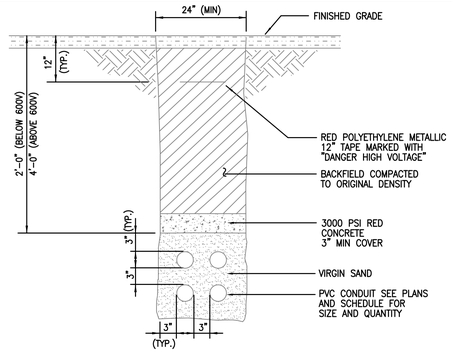
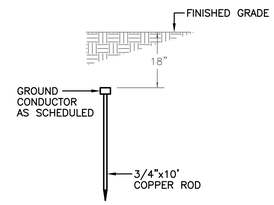
SYMBOL	DESCRIPTION
B-2	HOMERUN TO CIRCUIT AND PANEL INDICATED
	NEUTRAL CONDUCTOR
	HOT CONDUCTOR
	GROUNDING CONDUCTOR
	TRAVELER
	SWITCH LEG
(2)	NUMBER IN PARENTHESIS INDICATES CIRCUIT TO WHICH DEVICE IS CONNECTED
S	TOGGLE SWITCH – 120/277V, 20A
S3	THREEWAY SWITCH – 120/277V, 20A
SK	KEY SWITCH – 120/277V, 20A
S4	FOURWAY SWITCH – 120/277V, 20A
SD	DIMMER SWITCH
	DUPLEX RECEPTACLE – 125V, 20A, 1P
	GROUND FAULT INTERRUPTER DUPLEX RECEPTACLE 125V, 20A, 1P
	ISOLATED GROUND RECEPTACLE – 125V, 20A, 1P
	SINGLE RECEPTACLE – 250V, AMPS PER PANEL SCHEDULE
	QUADRAPLEX RECEPTACLE – 125V, 20A, 1P
	SINGLE RECEPTACLE – 125V, 20A, 1P
	DUPLEX RECEPTACLE – 125V, 20A, 1P (FLOOR MOUNTED)
	TELEPHONE OUTLET BOX WITH 1"C TO ACCESSIBLE LOCATION ABOVE CEILING
	DATA/TELEPHONE OUTLET BOX WITH 1"C TO ACCESSIBLE LOCATION ABOVE CEILING
	DATA OUTLET BOX WITH 1"C TO ACCESSIBLE LOCATION ABOVE CEILING
TV	TELEVISION OUTLET BOX WITH 3/4"C TO ACCESSIBLE LOCATION ABOVE CEILING
T	THERMOSTAT OUTLET BOX WITH 3/4"C TO ACCESSIBLE LOCATION ABOVE CEILING
	DOOR BELL/BUZZER
T	DOOR BELL/BUZZER TRANSFORMER
	PUSHBUTTON
S	SPEAKER
J	JUNCTION BOX, SIZED PER N.E.C.
F	FIRE ALARM PULL STATION
F	FIRE ALARM AUDIO/VISUAL SIGNAL
V	FIRE ALARM ADA VISUAL SIGNAL
R	FIRE ALARM SHUT DOWN RELAY
S	SMOKE DETECTOR
H	HEAT DETECTOR
SD	DUCT MTD. SMOKE DETECTOR
TS	TAMPER SWITCH
FS	FLOW SWITCH
A	ANSUL SUPPRESSION SYSTEM
DR	FIRE ALARM DOOR RELEASE
WP	WEATHER PROOF
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
E.C.	ELECTRICAL CONTRACTOR
NL	NIGHT LIGHT – ON 24 HOURS
	240V, 1P EQUIPMENT CONNECTION
	120V, 1P EQUIPMENT CONNECTION
	240V, 3P EQUIPMENT CONNECTION
	208V, 3P EQUIPMENT CONNECTION
	208V, 1P EQUIPMENT CONNECTION
	277V, 1P EQUIPMENT CONNECTION
	480V, 3P EQUIPMENT CONNECTION
	480V, 1P EQUIPMENT CONNECTION
	DISCONNECT SWITCH – SIZE AND POLE AS NOTED
	COMBINATION STARTER/DISCONNECT SWITCH
	STARTER
SM	MANUAL MOTOR STARTER
	PANELBOARD AS SPECIFIED
FACP	FIRE ALARM CONTROL PANEL
DC	DOOR CONTACTOR ROUGH–IN WITH 3/4" C TO ACCESSIBLE LOCATIONS ABOVE CEILING.
AK	ACKNOWLEDGE PUSHBUTTON OUTLET BOX WITH 1"C. TO ACCESSIBLE LOCATION ABOVE CEILING.
ATS	AUTOMATIC TRANSFER SWITCH
M	MOTORIZED DAMPER BY DIVISION 15.

1 ELECTRICAL LEGEND — SCALE: NO SCALE

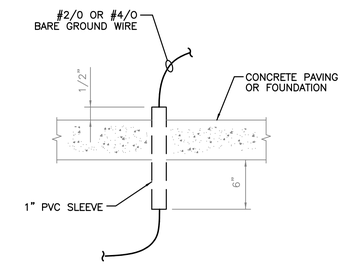
NOTE: NOT ALL SYMBOLS MAY APPLY TO THIS JOB!



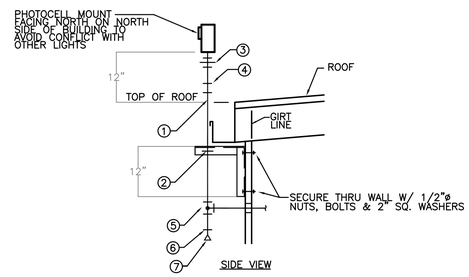
2 ELECTRICAL DUCT BANK DETAIL — SCALE: NO SCALE



3 GROUND ROD DETAIL — SCALE: NO SCALE

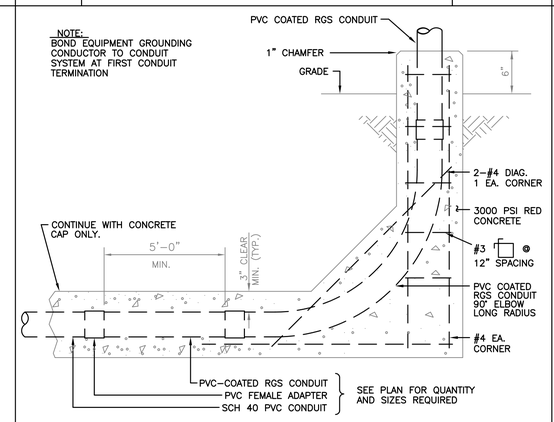


4 TYPICAL CONCRETE PENETRATION — SCALE: NO SCALE

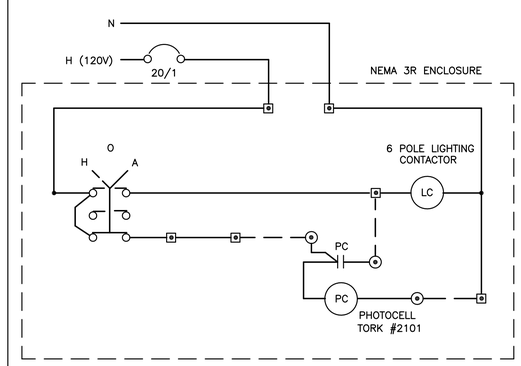


BILL OF MATERIAL			
ITEM	DESCRIPTION	SIZE	QTY
1	CONDUIT, RIGID GALV. STEEL	3/4"	AS REQ'D
2	UBOLT, 1/4" GALV. STEEL	3/4"	1
3	UNION, MALE MALLEABLE	3/4"	1
4	CONDUIT BODY, TYPE "C"	3/4"	1
5	CONDUIT BODY, TYPE "T"	3/4"	1
6	REDUCER, GALV. STEEL	3/4 X 1/2"	1
7	DRAIN/BREATHER, UNIVERSAL S.S.	1/2"	1

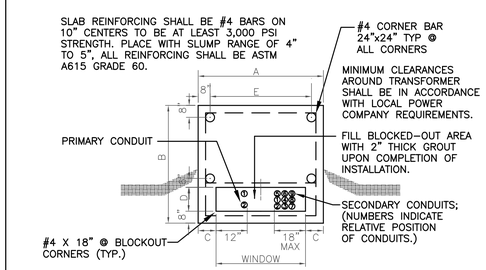
5 PHOTOCELL MOUNTING DETAIL — SCALE: NO SCALE

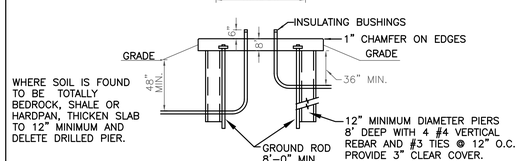


6 CONDUIT STUB-UP DETAIL AT GRADE — SCALE: NO SCALE



7 LIGHTING CONTROL SCHEMATIC — SCALE: NO SCALE

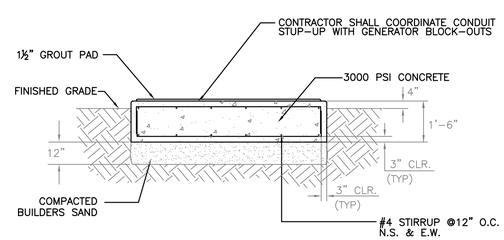




NOTE: CONCRETE POURED IN PLACE

KVA SIZE	A	B	C	D	E	MAX. WEIGHT	WINDOW
75 –500	72	68	12	16	56	10,000	48"
750 – 2500	84	79	12	16	68	19,000	60"

8 TRANSFORMER FOUNDATION DETAIL — SCALE: NO SCALE



9 GENERATOR FOUNDATION DETAIL — SCALE: NO SCALE

9/28/2015

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ELECTRICAL DETAILS

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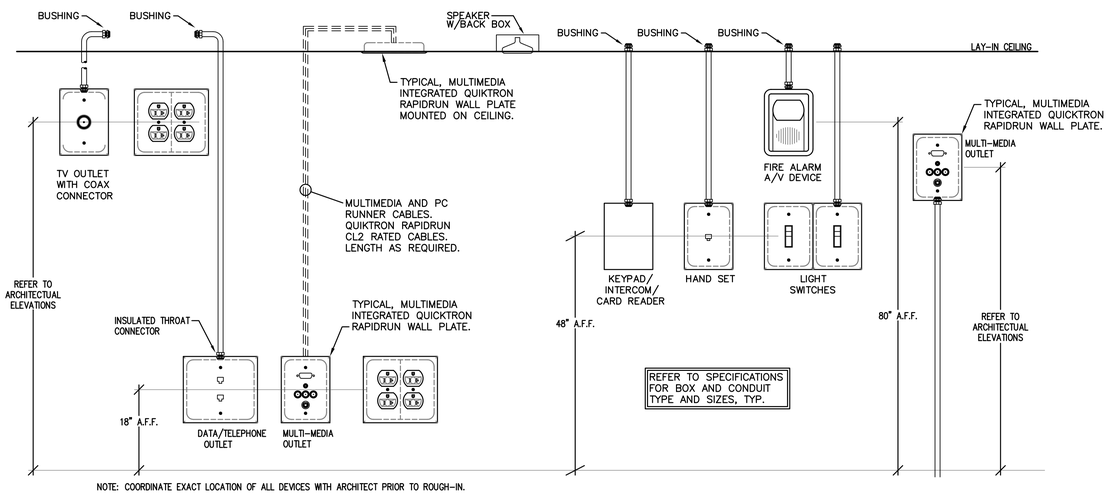


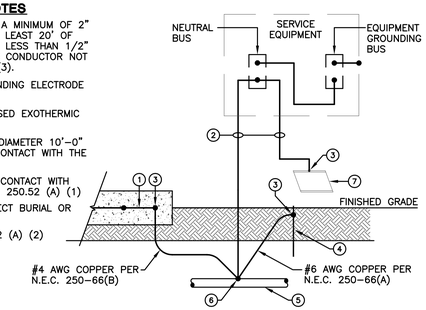
NOTE: COORDINATE EXACT LOCATION OF ALL DEVICES WITH ARCHITECT PRIOR TO ROUGH-IN.

1 TYPICAL DEVICE ELEVATIONS (UNLESS NOTED OTHERWISE)
NOT TO SCALE

SCALE: NO SCALE

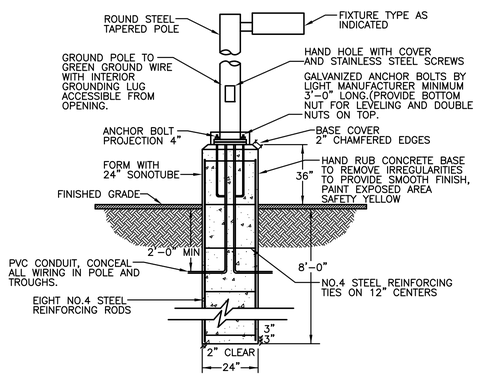
GROUNDING ELECTRODE KEYED NOTES

1. CONCRETE ENCASED ELECTRODE ENCASED BY A MINIMUM OF 2" CONCRETE OF FOUNDATION CONSISTING OF AT LEAST 20' OF ONE OR MORE STEEL REINFORCING BARS NOT LESS THAN 1/2" DIAMETER OR AT LEAST 20' OF BARE COPPER CONDUCTOR NOT LESS THAN #4 AWG. PER N.E.C. 250.52 (A) (3).
2. RGS CONDUIT WITH FULL SIZE COPPER GROUNDING ELECTRODE CONDUCTOR PER N.E.C. TABLE 250–66
3. CONNECTION SHALL BE CADWELD COPPER–BASED EXOTHERMIC WELD.
4. COPPER BONDED STEEL ELECTRODE 5/8" IN DIAMETER 10'–0" LONG WITH A MINIMUM OF 8'–0" IN DIRECT CONTACT WITH THE EARTH PER N.E.C. 250–52 (A) (5).
5. METAL UNDERGROUND WATER PIPE IN DIRECT CONTACT WITH THE EARTH FOR 10'–0" OR MORE PER N.E.C. 250.52 (A) (1)
6. BOLTED TYPE CONNECTION SUITABLE FOR DIRECT BURIAL OR EXOTHERMIC WELD (TYP)
7. METAL FRAME OF BUILDING PER N.E.C. 250.52 (A) (2)



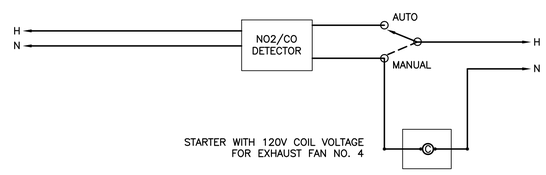
2 GROUNDING ELECTRODE SYSTEM DETAIL
NOT TO SCALE

SCALE: NO SCALE



3 LIGHT POLE FOUNDATION DETAIL

SCALE: NO SCALE



4 NO2/CO VENTILATION CONTROL DIAGRAM
NOT TO SCALE

9/28/2015

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ELECTRICAL DETAILS

SHEET NO.: E5.2

JOB NO.: 15096

Sep 29, 2015 – 3:12pm
15096_E1.dwg

PLUMBING GENERAL NOTES

1. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS AT THE JOB SITE BEFORE COMMENCING ANY PHASE OF THE WORK. ADJUSTMENTS FOR FIT AND COORDINATION SHALL BE MADE AT NO ADDITIONAL COST TO THE OWNER. NOTIFY ENGINEER OF ANY CONFLICTS, DISCREPANCIES OR OMISSIONS PRIOR TO COMMENCEMENT OF THE CONTRACT WORK.
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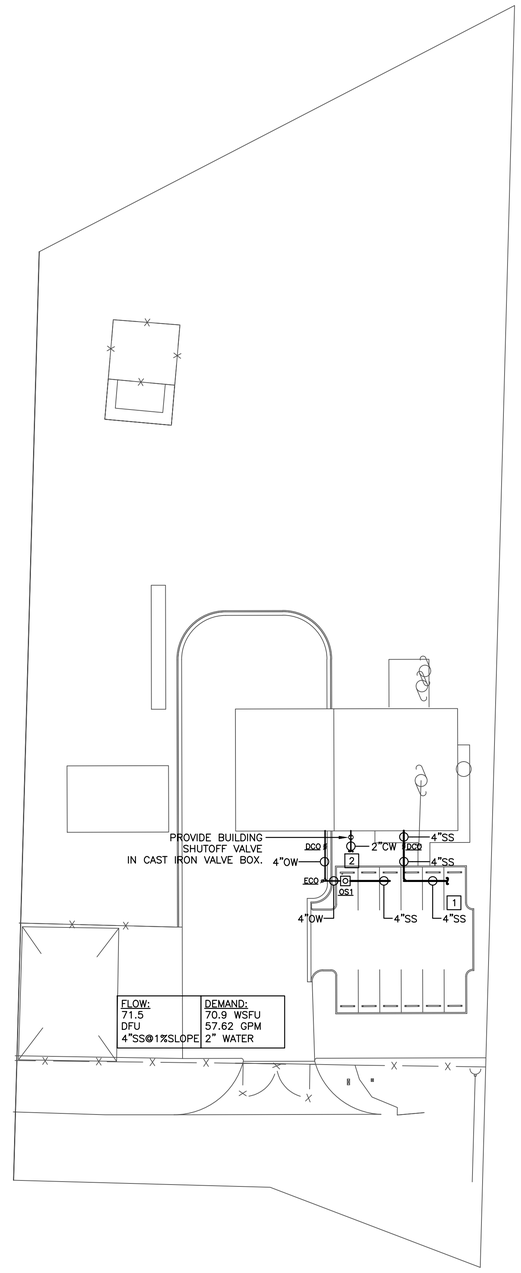
3. CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHER TRADES.
4. SEAL ALL WALL, ROOF, AND FLOOR PENETRATIONS WITH UL LISTED FIRE SEALANT.

PLUMBING KEYNOTES:

1 PROVIDE 4"SS. REFER TO CIVIL SITE PLAN FOR CONTINUATION.

2 PROVIDE 2"CW. REFER TO CIVIL SITE PLAN FOR CONTINUATION.



1 PLUMBING SITE PLAN
1" = 30'-0"

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PLUMBING SITE PLAN

SHEET NO.:
P1.0
JOB NO.: 15096

Sep 29, 2015 – 2:46pm
15096_P1.dwg

PLUMBING GENERAL NOTES

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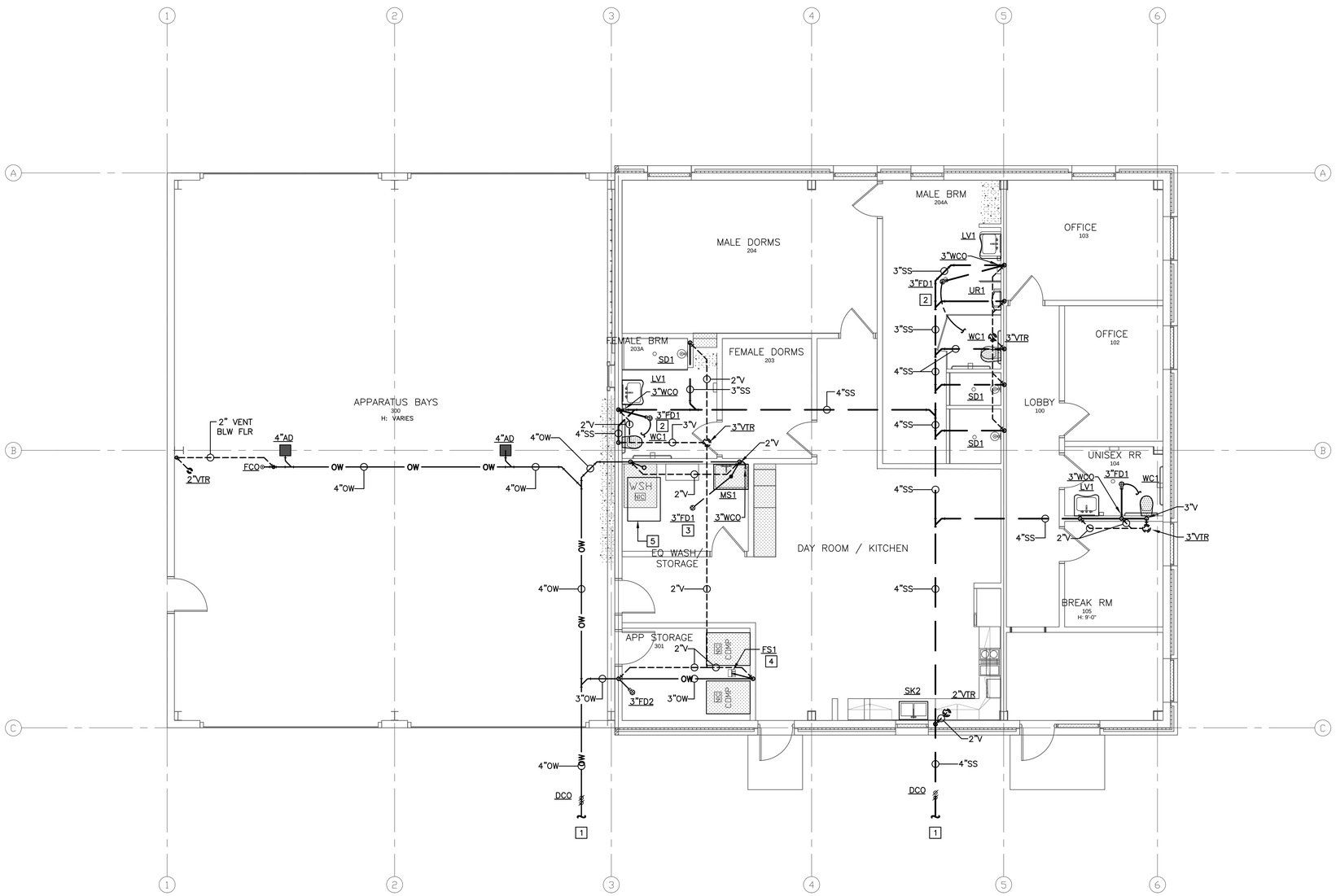
3. CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHER TRADES.
4. SEAL ALL WALL, ROOF, AND FLOOR PENETRATIONS WITH UL LISTED FIRE SEALANT.

PLUMBING KEYNOTES:

1. REFER TO PLUMBING SITE PLAN FOR CONTINUATION.
2. PROVIDE 1/2" LINE FROM FLOOR DRAIN TRAP PRIMER CONNECTION TO WATER CLOSET TRAP PRIMER CONNECTION. REFER TO DETAIL SHEET.
3. FLOOR DRAIN TO TIE INTO MOP SINK ABOVE P-TRAP AS INDIRECT WASTE CONNECTION. REFER TO PLUMBING DETAILS.
4. ROUTE CONDENSATE FROM BREATHING AIR COMPRESSOR TO SUPPLIED FLOOR DRAIN. TERMINATE WITH PROPER AIR GAP.
5. PROVIDE 4" HOUSEKEEPING PAD FOR WASHING MACHINE. ROUTE WASHING MACHINE DISCHARGE TO FORMED IN SLAB 6"x36"x12" TRENCH DRAIN.



1 PLUMBING DWV PLAN
3/16" = 1'-0"

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PLUMBING DWV PLAN

SHEET NO.:
P1.1
JOB NO.: 15096

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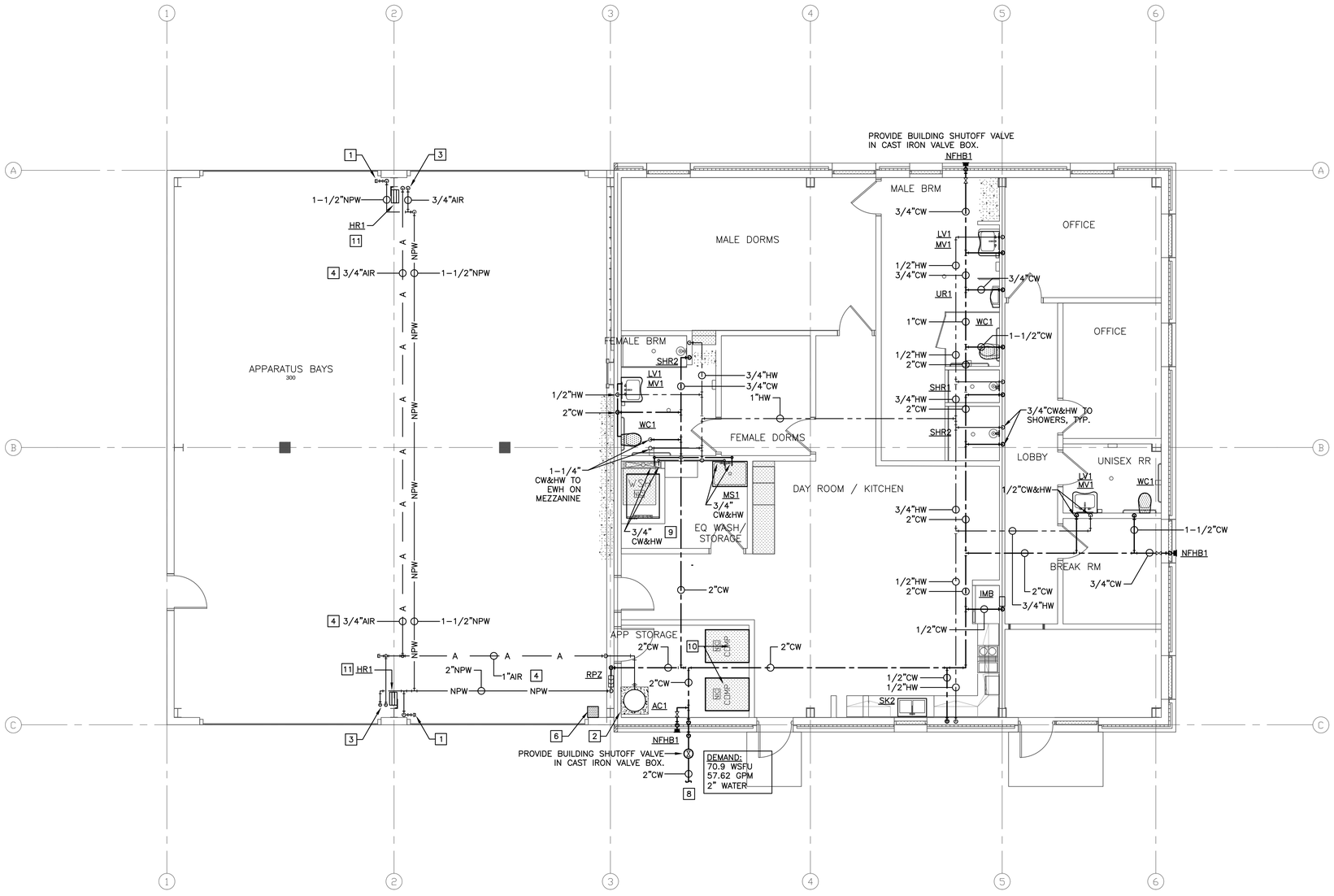


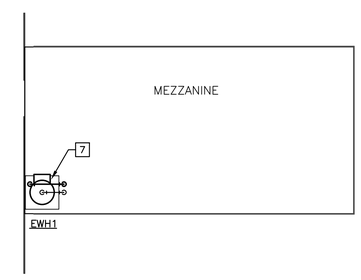
1 PLUMBING WATER PLAN
3/16" = 1'-0"

PLUMBING GENERAL NOTES

1. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS AT THE JOB SITE BEFORE COMMENCING ANY PHASE OF THE WORK. ADJUSTMENTS FOR FIT AND COORDINATION SHALL BE MADE AT NO ADDITIONAL COST TO THE OWNER. NOTIFY ENGINEER OF ANY CONFLICTS, DISCREPANCIES OR OMISSIONS PRIOR TO COMMENCEMENT OF THE CONTRACT WORK.
2. CONTRACTOR SHALL REVIEW ALL ARCHITECTURAL, CIVIL, MECHANICAL & STRUCTURAL DRAWINGS AND SPECIFICATIONS FOR ANY ADDITIONAL REQUIREMENTS.
3. CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHER TRADES.
4. SEAL ALL WALL, ROOF, AND FLOOR PENETRATIONS WITH UL LISTED FIRE SEALANT.

PLUMBING KEYED NOTES:

1. PROVIDE 1-1/2" BALL VALVE WITH MALE THREADED PIPE END FOR FIRE DEPARTMENT USE (TANK FILL). LOCATE 18" ABOVE FLOOR/GRADE.
2. PROPOSED AIR COMPRESSOR LOCATION. INSTALL AIR COMPRESSOR ON 6" CONCRETE HOUSEKEEPING PAD. REFER TO PLUMBING FIXTURE SCHEDULE. FIELD COORDINATE FINAL LOCATION OF AIR COMPRESSOR WITH OWNER/ARCHITECT.
3. PROVIDE 3/4" COMPRESSED AIR DROP AND 3/4"NPW TO HOSE REELS. FIELD COORDINATE EXACT LOCATION.
4. ROUTE COMPRESSED AIR LINE AS HIGH AS POSSIBLE, ABOVE CEILING LINE.
5. PROVIDE ISOLATION VALVE ABOVE CEILING FOR MAINTANCE OF FIXTURES. PROVIDE VALVE IDENTIFICATION TAG AS PER SPECIFICATIONS.
6. PROVIDE ALARM WITH FLASHING STROBE FOR OIL INTERCEPT AT THIS LOCATION. COORDINATE FINAL LOCATION WITH ARCHITECT AND ELECTRICAL CONTRACTOR.
7. PROVIDE ELECTRIC WATER HEATER IN MEZZANINE. INSTALL PER MANUFACTURER'S INSTALLATION INSTRUCTION. ROUTE T&P AND PAN TO APPROVED LOCATION. REFER TO PLUMBING FIXTURE SCHEDULE FOR HEATER SIZE. FIELD COORDINATE EXACT LOCATION.
8. PROVIDE 2" DOMESTIC WATER SERVICE AT THIS APPROXIMATE LOCATION. COORDINATE EXACT WATER ENTRANCE WITH OWNER/ARCHITECT. REFER TO CIVIL SITE PLAN FOR CONTINUATION.
9. PROVIDE 3/4"HW&CW CONNECTION TO WASHING MACHINE. INSTALL PER MANUFACTURER'S INSTALLATION INSTRUCTION.
10. BREATHING AIR COMPRESSOR AND BOTTLE FILL EQUIPMENT AT THIS LOCATION. EQUIPMENT PROVIDED BY OWNER, INSTALLED BY CONTRACTOR. INSTALL PER MANUFACTURER'S INSTALLATION INSTRUCTION. PROVIDE PIPING, FITTINGS AND ALL NECESSARY APPURTENANCES REQUIRED FOR COMPLETE SYSTEM INSTALL. ROUTE CONDENSATE TO FLOOR DRAIN, SEE DWV PLAN SHEET P1.1.
11. PROVIDE WALL/SIDE MOUNTED HOSE REEL (HR1). MOUNT HOSE REEL TO COLUMN AT THIS APPROXIMATE LOCATION. PROVIDE SUPPORT USING APPROVED METHODS. PROVIDE WATER AND AIR CONNECTION TO HOSE REEL. FIELD COORDINATE EXACT MOUNTING LOCATION AND HEIGHT WITH OWNER/ARCHITECT.



2 PLUMBING WATER PLAN - MEZZ.
3/16" = 1'-0"

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PLUMBING WATER PLAN

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JOB NO.: 15096

Sep 29, 2015 – 2:46pm
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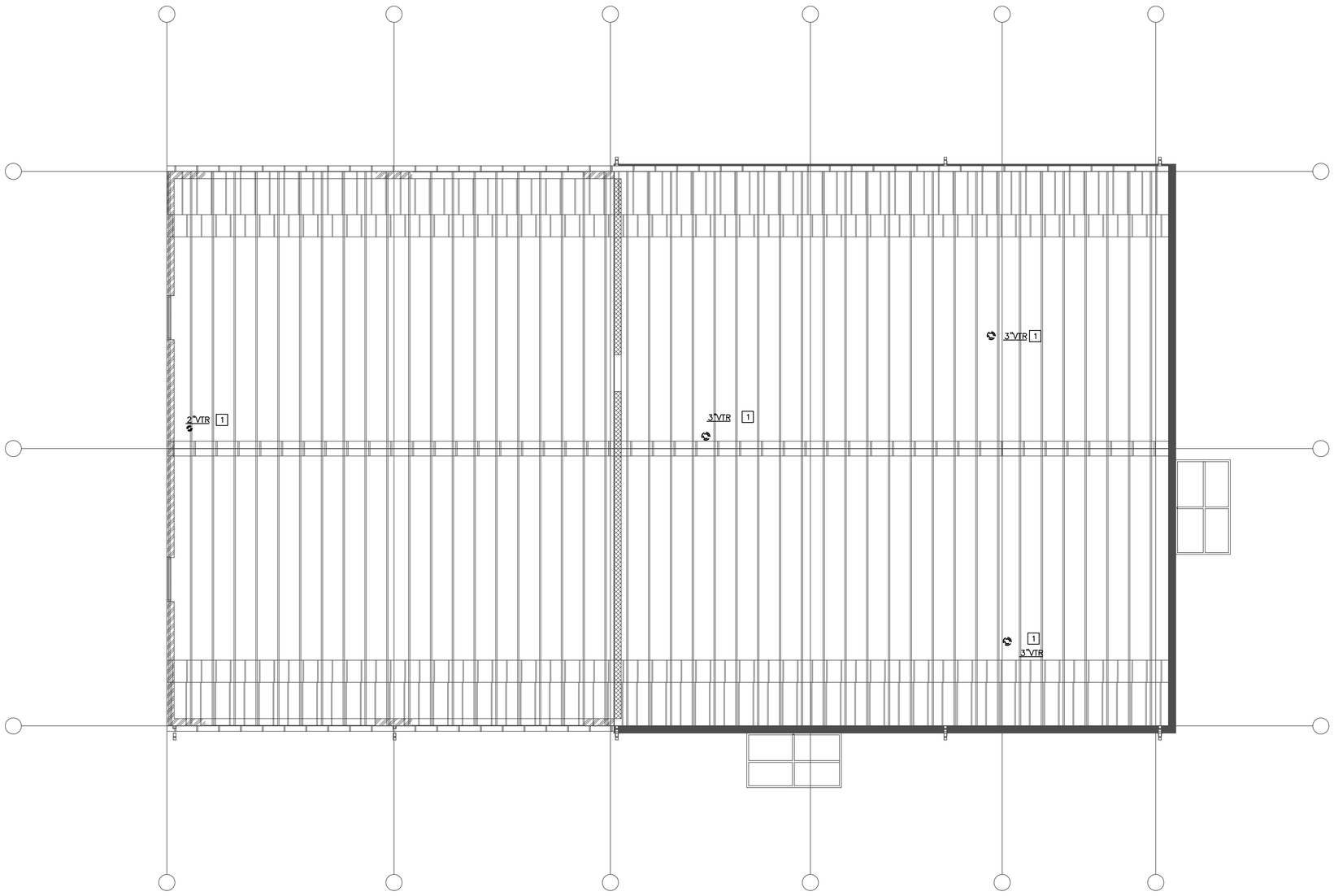

1 PLUMBING ROOF PLAN
1/8" = 1'-0"

PLUMBING GENERAL NOTES

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4. SEAL ALL WALL, ROOF, AND FLOOR PENETRATIONS WITH UL LISTED FIRE SEALANT.

KEYED NOTES

1 PLUMBING ROOF VENT; VENTS SHALL MAINTAIN A MINIMUM OF 10' CLEARANCE FROM HVAC INTAKE/SUPPLY FANS. REFER TO MECHANICAL PLANS FOR EXACT LOCATION OF HVAC EQUIPMENT. FIELD VERIFY EXACT LOCATION.

9/28/2015

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PLUMBING ROOF PLAN

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PLUMBING FIXTURE SCHEDULE

PLAN MARK	MINIMUM ROUGH-IN SIZES WST & VENT	VENT	DRAIN	CW	HW	DESCRIPTION
WATER CLOSET WC1 (FLOOR MOUNT) (FLUSH VALVE)	4"	2"	4"	1"	----	KOHLER No. K-4405 "HIGHLINE", FLOOR MOUNT, WHITE V.C. ELONGATED SIPHON JET (1.28 GPF) BOWL WITH 1-1/2" TOP SPUD, BEMIS No. 1955CWH WHITE OPEN FRONT SEAT LESS COVER AND SLOAN "ROYAL" 111-1.28-TP FLUSH VALVE. FIXTURE MUST MEET ADA/TDLR. PROVIDE TRAP PRIMER CONNECTION WITH FIXTURE.
WATER CLOSET WC2 (FLOOR MOUNT) (FLUSH VALVE)	4"	2"	4"	1"	----	KOHLER No. K-4350 "WELLCOMME", FLOOR MOUNT, WHITE V.C. ELONGATED SIPHON JET (1.28 GPF) BOWL WITH 1-1/2" TOP SPUD, BEMIS No. 1955CWH WHITE OPEN FRONT SEAT LESS COVER AND SLOAN "ROYAL" 111-1.28 FLUSH VALVE.
URINAL UR1	2"	2"	1-1/2"	3/4"	----	KOHLER No. K-5016-ET "DEXTER" WHITE V.C. SIPHON JET FIXTURE WITH 3/4" TOP SPUD AND WALL HANGERS (0.5 GPF). PROVIDE SLOAN ROYAL No.186-0.5 FLUSH VALVE AND MIFAB OR EQUAL FLOOR MOUNTED CARRIER. MOUNT AT ADA/TAS HEIGHT.
LAVATORY LV1 (WALL HUNG)	2"	1-1/2"	1-1/4"	1/2"	1/2"	KOHLER No. K-2005 "KINGSTON" WALL MOUNTED WHITE V.C. LAVATORY WITH FRONT OVERFLOW. FAUCET SHALL BE BLADE LEVER OPERATED ZURN No. Z812A4-XL-FC0.5 CHROME PLATE FINISH FAUCET, 0.5 GPM, GOOSENECK STYLE WITH WRIST BLADE HANDLES, FIXED GRID DRAIN STRAINER, SEMI CAST BRASS OFFSET TAILPIECE AND P-TRAP WITH C.O. STOPS AND SUPPLIES. PROVIDE MIFAB MC-41 SERIES FLOOR MOUNTED CONCEALED ARM CARRIER WITH TWO UPRIGHTS. SEE ARCHITECTURAL DRAWINGS FOR MOUNTING HEIGHT.
MIXING VALVE MV1	SEE PLAN	----	----	1/2"	1/2"	PROVIDE WATTS THERMOSTATIC MIXING VALVE No. MMV-M1 WITH 1/2" INLET AND 1/2" OUTLET CONNECTIONS, INTEGRAL FILTER WASHERS ,HOT AND COLD CHECK VALVES AND CHECK STOPS, AND STAINLESS STEEL SPRINGS. SET TEMPERATURE LIMIT AT 110°F. ASSE 1070 CERTIFIED
ELECTRIC WATER COOLER EWC1 (BI LEVEL COOLER)	2"	1-1/2"	1-1/2"	1/2"	----	ELKAY No. EZSTL8C BARRIER-FREE, LEAD FREE, DUAL HEIGHT WALL MOUNT COOLER, 8.0 GPH CAPACITY, COOLED TO 50°F WITH 80°F AMBIENT WATER TEMP., UNIT SHALL USE 3.7 FL. AMPS, WIRED FOR 120V/1ø/60Hz. POWER. PROVIDE ELKAY APRON LKAPREZL UNDER UPPER UNIT. PROVIDE MIFAB FLOOR MOUNTED WATER COOLER SUPPORT SYSTEM. PROVIDE CAST BRASS P-TRAP WITH C.O., STOPS AND SUPPLIES. COLOR TO BE SELECTED BY ARCHITECT. MOUNT LOWER UNIT AT ADA HEIGHT.
SINK SK1 (SINGLE COMPARTMENT)	2"	1-1/2"	1-1/2"	1/2"	1/2"	ELKAY No. LRAD-1918 "LUSTERTONE" 6" DEEP 3 HOLE PUNCH, 18 GA. 304 STAINLESS STEEL SELF RIMMING SINK WITH OFF-CENTER REAR DRAIN OPENING. PROVIDE T&S BRASS FAUCET No. B-866-04 SWIVEL GOOSENECK WITH WRIST BLADE HANDLES, LK-18 FIXED GRID DRAIN STRAINER, WITH OFFSET TAILPIECE. PROVIDE C.P. CAST BRASS P-TRAP WITH C.O., LOOSE KEY STOPS AND SUPPLIES. PROVIDE TRUEBRO No. 102-EZ INSULATION KIT FOR ADA.
SINK SK2 (DOUBLE COMPARTMENT)	2"	1-1/2"	1-1/2"	1/2"	1/2"	ELKAY No. LRAD-3321 "LUSTERTONE" 6" DEEP 4 HOLE PUNCH, 18 GA. 304 STAINLESS STEEL SELF RIMMING DOUBLE BOWL SINK WITH OFF-CENTER REAR DRAIN OPENINGS. PROVIDE T&S BRASS FAUCET No. B-2347 SWIVEL GOOSENECK FAUCET WITH WRIST BLADE HANDLES, 4FT SIDE SPRAY AND 8" INLET CENTERS. LK-18 FIXED GRID DRAIN STRAINER, WITH OFFSET TAILPIECE. PROVIDE C.P. CAST BRASS P-TRAP WITH C.O., LOOSE KEY STOPS AND SUPPLIES. PROVIDE TRUEBRO No. 102-EZ INSULATION KIT FOR ADA.
ELECTRIC WATER HEATER EWH1	----	----	----	3/4"	3/4"	A.O. SMITH No. DRE-52-12, 50 GALLON STORAGE W/ 12000 W ELEMENT. UNIT SHALL HAVE 49 GPH FIRST HR RECOVERY AT 90° F. TEMPERATURE RISE. UNIT SHALL BE RATED FOR 150PSI WORKING PRESSURE, GLASS LINED TANK, ASME TPR VALVE, 6 YEAR WARRANTY, BRASS DRAIN VALVE, AND MFG'S HEAT TRAPS. UNIT SHALL BE 208 VOLT, THREE PHASE.
EXPANSION TANK XT	----	----	----	3/4"	----	AMTROL No. ST-25V, HEAVY DUTY BUTYL, FDA APPROVED DIAPHRAGM, POLYPROPYLENE LINED DOME WITH 10.3 GALLON VOLUME. ELBI IS AN EQUIVALENT MANUFACTURE.
REDUCED PRESSURE BACKFLOW PREVENTER RPZ	----	----	----	2"	----	WATTS NO. 009QT-FDA REDUCED PRESS. PRINCIPLE DOUBLE CHECK VALVE WITH INTERMEDIATE ATMOSPHERIC VENT. DRAIN TO FLOOR RECEPTOR. INSTALL AT 36" ABOVE GRADE WITH CLEARANCE FOR SERVICE AND PIPING BRACKETING. PROVIDE SHUT OFF VALVE AND FULL SIZE STRAINER ON INLET AND SHUT OFF VALVE ON OUTLET RISER. TEST AND CERTIFY PER AWWA C-511
MOP SINK MS1	3"	2"	3"	1/2"	1/2"	FIAT MSB-2424 MOLDED STONE 24"x24"x10" WITH AND STAINLESS STEEL CAP ON THRESHOLD MODEL E-88-AA; CAULK OUTLET BRASS DRAIN WITH S.S. STRAINER. PROVIDE A KOHLER No. K8907-RP SERVICE SINK FAUCET WITH VACUUM BREAKER HOSE END SPOUT, PAIL HOOK AND TOP REINFORCING BRACKET. PROVIDE WITH MOP HANGER BRACKET FOR UP TO 3 MOPS.
NON-FREEZE HOSE BIBB NFHB	----	----	----	3/4"	----	WOODFORD MODEL #B65, AUTOMATIC DRAINING, FREEZELESS WALL HYDRANT W/ ANTI-SPHON VACUUM BREAKER ENCLOSED IN A BRASS FLUSH WALL BOX.
ICE MAKER BOX IMB	----	----	----	1/2"	----	OATY WMB NO. 38681 WITH 1/4" TURN BALL VALVE AND SWEAT CONNECTION.
HOSE BIBB HB	----	----	----	3/4"	----	WOODFORD MODEL #24, AUTOMATIC DRAINING, WALL HYDRANT W/ ANTI-SPHON VACUUM BREAKER
WALL CLEANOUT WCO	SEE PLAN	SEE PLAN	SEE PLAN	----	----	ZURN NO. ZS1469-7-VP ROUND STAINLESS STEEL ACCESS COVER COMPLETE WITH SECURING SCREW. PROVIDE CLEANOUT PLUG TO MATCH PIPE MATERIAL.
SHOWER DRAIN SD1	2"	2"	2"	----	----	ZURN No.Z-2254-CP SHOWER DRAIN WITH 4" DIAMETER STAINLESS STEEL STRAINER AND 1/2" IPS TRAP PRIMER CONNECTION AND DEEP SEAL TRAP. SHOWER PAN 40 MIL THICKNESS. PROVIDE PROSET SYSTEMS TRAP GUARD INSERT No. TG33-Z-415.
SHOWER SYSTEM SHR1	----	----	----	1/2"	1/2"	PROVIDE SYMMONS SHOWER SYSTEM MODEL No. C-96-1-295-X-A WITH PRESSURE-BALANCING MIXING VALVE WITH LEVER HANDLE, INTEGRAL CHECK STOPS, ADJUSTABLE STOP SCREW TO LIMIT HANDLE TURN, AND CAST BRASS SHOWER HEAD WITH ARM AND FLANGE. PROVIDE 2" SHOWER DRAIN, SAME AS "FD1" WITH TYPE "S" STRAINER. SEE FIXTURE SD1. MOUNT SHOWER HEAD AT 82" ABOVE FINISHED FLOOR, FIELD VERIFY EXACT MOUNTING HEIGHT WITH OWNER/ARCHITECT.
SHOWER SYSTEM SHR2	----	----	----	1/2"	1/2"	PROVIDE SYMMONS SHOWER SYSTEM WITH HAND SPRAY MODEL No. C-96-500-B30-V-X-CHKS-QD WITH PRESSURE-BALANCING MIXING VALVE WITH LEVER HANDLE, ADJUSTABLE STOP SCREW TO LIMIT HANDLE TURN, LEVERTROL DIVERTER WITH INTEGRAL VOLUME CONTROL, INTEGRAL CHECK STOPS, CAST BRASS SHOWER HEAD WITH ARM AND FLANGE, WALL/HAND SHOWER WITH QUICK DISCONNECT AND IN-LINE VACUUM BREAKER, FLEXIBLE 60" METAL HOSE, WALL CONNECTION AND FLANGE, AND 30" SLIDE BAR FOR HAND SHOWER MOUNTING. MOUNT SHOWER HEAD AT 78" ABOVE FINISHED FLOOR.

GENERAL NOTES:

1. CONTRACTOR TO FIELD VERIFY ELEVATIONS AND DIMENSIONS OF FINISHED FLOORS AND WALLS. TRUE ALL DRAINS, ROUGH-INS AND CARRIERS IN ACCORDANCE WITH THE PROPOSED ELEVATIONS AND FINISHED SURFACES.
2. MOUNTING HEIGHT ELEVATION OF ALL WALL HUNG OR COUNTER MOUNTED FIXTURES SHALL BE COORDINATED WITH THE ARCHITECT PRIOR TO INSTALLATION OF ROUGH-IN WORK.
3. FOR ALL FIXTURES AND EQUIPMENT WITH ASSOCIATED TRIM OR COMPONENT ACCESSORIES, PROVIDE UNDER SEPARATE DIVISIONS AND REQUIRING PLUMBING CONNECTIONS; THIS CONTRACTOR SHALL FIELD COORDINATE EXACT REQUIREMENTS OF, MAKE PROVISIONS FOR, AND SUPPLY ALL MATERIALS AND LABOR FOR MAKING FINAL CONNECTIONS.
4. CONTRACTOR SHALL REFER TO SHOP DRAWINGS OF EQUIPMENT TO BE SUPPLIED FOR FINAL COORDINATION OF ALL ROUGH-IN OPENINGS BEFORE BEGINNING WORK.
5. ALL FIXTURE AND EQUIPMENT STUB-OUTS SHALL BE PROVIDED WITH A STOP VALVE. ALL FIXTURE STOPS SHALL BE SOLID BRASS, LOOSE KEY OPERATED, CHROME PLATED (WERE EXPOSED), AND FITTED TIGHT TO CHROME PLATED BRASS WALL ESCUTCHEON PLATES. SUPPLY RISERS SHALL BE TYPE "L" TUBING, CHROME PLATED. PROVIDE 1/2" FIP X 3/8" OD COMPRESSION FITTINGS FOR ALL SINKS, LAVATORIES, AND SIMILAR FIXTURES.
6. ALL P-TRAPS WITHIN THE BUILDING, ABOVE GRADE AND EXPOSED TO INSPECTION SHALL BE CHROME PLATED ADJUSTABLE, CAST BRASS WITH CLEANOUT PLUG. PROVIDE CAST SLIP NUTS AND WASHERS, 17 GAGE SEAMLESS TUBULAR BRASS DRAIN TO WALL AND WALL FLANGE. PROVIDE 1-1/2" P-TRAP FOR ALL LAVATORIES AND SIMILAR FIXTURES. PROVIDE 1-1/2" P-TRAP FOR ALL SINKS AND SIMILAR FIXTURES, MCGUIRE OR EQUAL
7. ALL ROUGH-IN OPENINGS SHALL BE FITTED WITH CHROME PLATED, WROUGHT BRASS DEEP BELL OR BOX ESCUTCHEON PLATES FITTED TIGHT TO PIPE AND FLUSH TO WALL. STEEL ESCUTCHEON PLATES ARE NOT ACCEPTED.
8. ALL EXPOSED BRASS SHALL BE CHROME PLATED.
9. ALL HANDICAPPED ACCESSIBLE FIXTURES SHALL BE OF APPROVED TYPES AND WITH REQUIRED CONTROLS INSTALLED TO HEIGHTS AND CLEARANCES, AS PRESCRIBED BY THE AMERICAN DISABILITIES ACT (ADA) AND THE TEXAS ACCESSIBILITY STANDARDS (TAS). FIXTURES SHALL COMPLY WITH ALL FEDERAL, STATE, AND LOCAL ACCESSIBILITY CODE REQUIREMENTS. PROVIDE FIXTURES WITH DEPTHS AT MAXIMUM PERMITTED AND AVAILABLE FOR INTENDED FIXTURE USE.
10. INSULATE ALL EXPOSED WATER AND DRAIN LINES ON ADA/TAS ACCESSIBLE LAVATORIES AND SINKS WITH MCGUIRE PRO WRAP OR EQUAL. PROVIDE OFFSET DRAIN FITTINGS WHERE REQUIRED TO PROVIDE MINIMUM CLEARANCES.
11. ALL ADA/TAS SINKS SHALL BE STAMPED WITH DRAIN OUTLET AT THE REAR OF THE BOWL.
12. PLUMBING FIXTURES SHALL BE OF WATER CONSERVATION TYPE IN ACCORDANCE WITH SENATE BILL 587 FOR WATER SAVING PERFORMANCE. LAVATORY(0.5GPM) AND SINK FAUCETS(2.2GPM) SHALL INCLUDE GPM FLOW CONTROL.
13. ORIENT ADA/TAS WATER CLOSET FLUSH VALVE WITH OPERATOR ON LARGE SIDE OF ENCLOSURE AND BELOW GRAB BARS.
14. SEAL ALL SPACES BETWEEN PLUMBING FIXTURES AND MOUNTING SURFACES WITH WHITE LATEX CAULK WIPED SMOOTH AND FLUSH WITH FIXTURE.
15. FLOOR DRAINS SHALL BE INSTALLED AT LOW POINTS OF UNIFORMLY SLOPED FLOOR. CONTRACTOR SHALL FIELD COORDINATE WITH STRUCTURAL TO INSURE FLOORS ARE UNIFORMLY SLOPED ACROSS ENTIRE TOILET ROOMS OR OVER AS WIDE AN AREA AS PRACTICAL FOR OPEN AREA FLOOR DRAINS. CONVEX FLOOR SLOPE IN THE IMMEDIATE VICINITY OF THE FLOOR DRAIN IS NOT ACCEPTABLE.
16. EQUIVALENT MANUFACTURES OF CHINA FIXTURES ARE KOHLER, ELJIER, AND CRANE. EQUIVALENT MANUFACTURES OF STAINLESS FIXTURES ARE JUST AND ELKAY.
17. WATER HEATER SHALL BE PROVIDED WITH CODE APPROVED VACUUM BREAKER AND BRASS ASME TEMPERATURE AND PRESSURE RELIEF VALVE. ROUTE TPR DRAIN LINE FULL SIZED TO EXTERIOR OF BUILDING AND TERMINATE 6" ABOVE FINISHED GRADE, OR AS INDICATED ON PLANS.
18. ROOF PENETRATIONS SHALL BE DONE IN STRICT COMPLIANCE WITH THE ARCHITECTS SPECIFICATIONS AND SHALL BE LEAK PROOF.
19. FIELD VERIFY ALL EXISTING CONDITIONS AND LOCATION OF STUB OUTS. NOTIFY ARCHITECT OF ANY DISCREPANCIES IMMEDIATELY WHICH MAY AFFECT THE INTENDED DESIGN.
20. ALL PLUMBING WORK SHALL BE DONE IN STRICT COMPLIANCE WITH ALL STATE AND LOCAL CODES.
21. THE PLUMBING CONTRACTOR SHALL GUARANTEE THE COMPLETE PLUMBING SYSTEM TO BE FREE OF DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF 12 MONTHS FROM DATE OF FINAL ACCEPTANCE.
22. ALL WATER HEATER SUPPLY CONNECTIONS SHALL HAVE HEAT TRAP NIPPLE CONNECTIONS. HEAT TRAP NIPPLES NOT REQUIRED IF HOT WATER RECIRCULATION SYSTEM IS PROVIDED.

PLUMBING SYMBOLS

SYMBOL	ABBREV.	DESCRIPTION
	VTR	VENT THRU ROOF
	HD	HUB DRAIN
	FD	FLOOR DRAIN
	FS	FLOOR SINK
	HB	HOSE BIBB
	NFWH	NON-FREEZE WALL HYDRANT W/ BOX
	CW	COLD WATER PIPING
	HW	HOT WATER PIPING
	HWR	HOT WATER RETURN PIPING
G	G	GAS PIPING
D	D	DRAIN PIPING
SW	SW	SOFT WATER
	SS	SANITARY SEWER PIPING
CD	CD	CONDENSATE DRAIN PIPING
OW	OW	OIL WASTE PIPING
		VENT PIPING
	CO	WALL CLEAN OUT
	FCO	FLOOR CLEAN OUT
	ECO	EXTERIOR CLEAN OUT
	DCO	DOUBLE CLEAN OUT
	RCP	RECIRC PUMP
	BFP	BACKFLOW PREVENTOR
	QCHC	QUICK CONNECT HOSE CONNECTION
		WATER SHUT-OFF VALVE(FULL PORT)
		THERMOMETER
		GATE VALVE
		WATER HAMMER ARRESTOR
		BALL VALVE
		GAS PRESSURE REGULATOR
		CHECK VALVE
		CAP PIPE END
		PIPE RISE
		PIPE DROP
		UNION
		TIE NEW INTO EXISTING AT THIS POINT

NOT ALL SYMBOLS MAY BE USED

AIR COMPRESSOR SCHEDULE

MARK	AC1
TYPE	VERTICAL TANK, TWO STAGE
MIN. TANK CAPACITY (GALLONS)	80
PSG RATING	125
CFM DISPLACEMENT	23.5
CFM DELIVERY	19.1
RPM	734
NO. OF CYLINDERS	2
MOTOR HP	5
VOLTS-PHASE	208-3PH
MANUFACTURER	CHAMPION
MODEL	VR5-8
NOTE	1,2

NOTES: (THE EQUIPMENT SHALL BE PROVIDED WITH THE FOLLOWING ACCESSORIES/OPTIONS).
1. TEFC MOTOR.
2. INDOOR APPLICATION

PLUMBING FIXTURE SCHEDULE - CON'T.

PLAN MARK	MINIMUM ROUGH-IN SIZES WST & VENT	VENT	DRAIN	CW	HW	DESCRIPTION
FLOOR DRAIN FD1	3"	2"	3"	----	----	ZURN No.ZN-415 CAST IRON DRAIN WITH 6" DIAMETER TYPE 'B' STRAINER AND 1/2" IPS TRAP PRIMER CONNECTION AND DEEP SEAL TRAP. PROVIDE PROSET SYSTEMS TRAP GUARD INSERT No. TG33-Z-415.
FLOOR DRAIN FD2	3"	2"	3"	----	----	ZURN No. ZN-415 CAST IRON DRAIN WITH 6" DIAMETER TYPE 'I' STRAINER AND 1/2" IPS TRAP PRIMER CONNECTION AND DEEP SEAL TRAP. PROVIDE PROSET SYSTEMS TRAP GUARD INSERT No. TG33-Z-415.
AREA DRAIN AD	SEE PLAN	2"	----	----	----	JR SMITH No. 2410 CAST IRON DRAIN WITH 12" SQUARE TOP DUCTILE IRON GRATE, FREE STANDING SEDIMENT BUCKET, AND DEEP SEAL TRAP.
SAND/OIL INTERCEPT OS1	SEE PLAN	----	----	----	----	PARK EQUIPMENT No. CMP250, PRECAST CONCRETE 250 GAL. CAPACITY SAND/OIL INTERCEPT WITH STAINLESS STEEL COALESCING BAFFLES AND CONTAINER. 4500 PSI CONCRETE WITH STEEL REBAR REINFORCING. PROVIDE HIGH LEVEL FLOAT SWITCH AND REMOTE ALARM.
WATER HAMMER ARRESTOR SA1	SEE RISER	SEE RISER	SEE RISER	----	----	SIOUX CHIEF MODEL 652A. TYPE I COPPER TUBE, POLY PISTON WITH TWO EPDM O-RINGS. INSTALL TO MANUFACTURES SPECIFICATIONS.
COMBIMATION HOSE REEL HR1	----	----	----	----	----	GRAINGER MODEL C-LP-350-350. AIR/WATER COMBINATION HOSE REEL, 50 FT., 3/8 HOSE DIAMETER. FULL FLOW BRASS SWIVEL WITH NITRILE SEALS.

PLUMBING PIPE MATERIALS SCHEDULE

PIPING SYSTEM	PIPING MATERIAL
SANITARY SEWER BELOW GRADE	SCHEDULE 40 DWV PVC
SANITARY DRAIN AND VENTS ABOVE GRADE	SCHEDULE 40 DWV PVC*
DOMESTIC HOT & COLD WATER BELOW GRADE	COPPER, TYPE "K" SOFT
DOMESTIC HOT & COLD WATER ABOVE GRADE	COPPER, TYPE "L" HARD DRAWN
HOT WATER PIPE INSULATION	1" RIGID FIBER GLASS
GAS PIPING	SCHEDULE 40 BLACK STEEL
AIR COMPRESSOR PIPING	ALUM. PIPING SIMPLAIR EASY PIPELINE OR EQUAL

*SCHEDULE 40 DWV PVC SHALL NOT BE USED IN RETURN AIR PLENUMS. WHERE CEILING PLENUMS ARE USED FOR RETURN AIR, CONTRACTOR SHALL ONLY USE BELL AND SPIGOT SERVICE WEIGHT CAST IRON PIPE.

SAND-OIL SEPERATOR CALCULATIONS

SHOP AREA	CALCULATIONS	CAPACITY (CFT)	MIN. CAPACITY (GAL) (1CFT=7.48052gal)
2198 SQFT	$6 \text{ CFT} + \frac{(2198 \text{ SQFT} - 100)}{100 \text{ SQFT/CFT}} =$	26.98 CUBIC FEET	201.82 GAL

9/28/2015

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CONSULTANT

PLUMBING FIXTURE SCHEDULES

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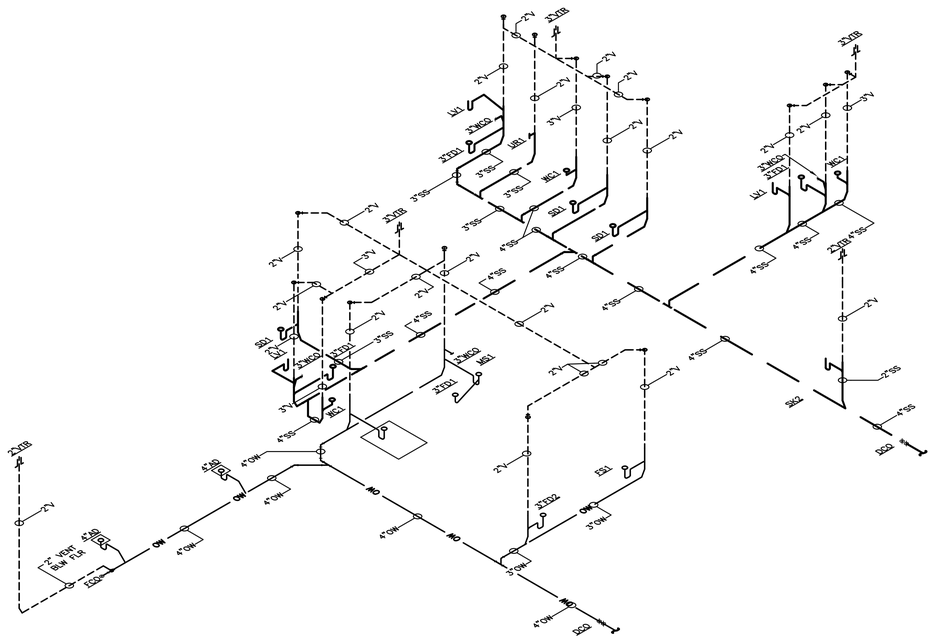
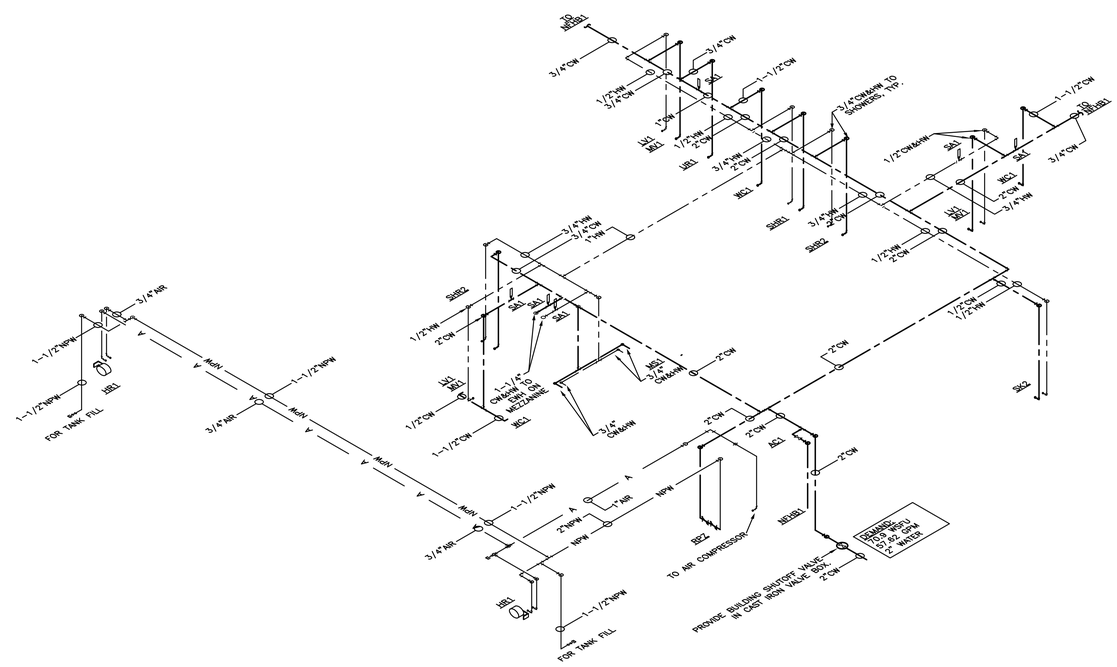


1 DWV RISER DIAGRAM
NO SCALE



2 WATER RISER DIAGRAM
NO SCALE

9/28/2015

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PLUMBING RISER DIAGRAMS

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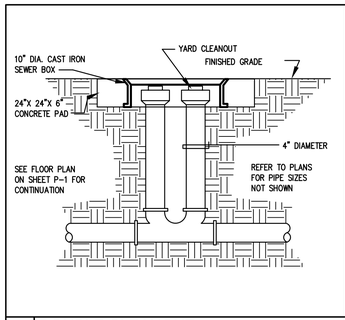
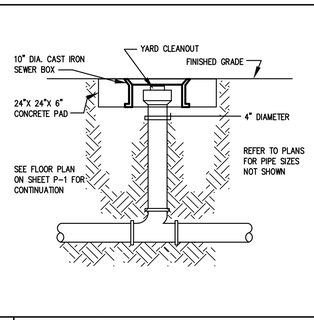


1 DOUBLE CLEANOUT
NOT TO SCALE
PPTP100



2 EXTERIOR CLEANOUT
NOT TO SCALE
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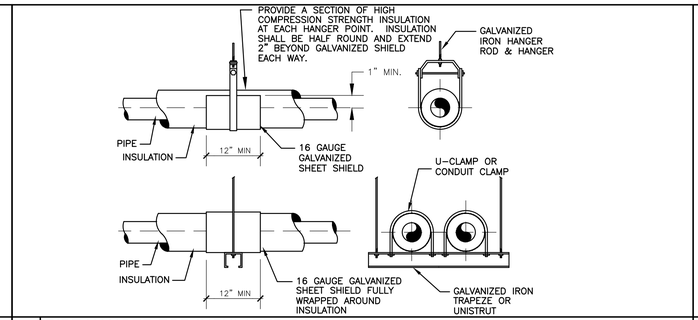
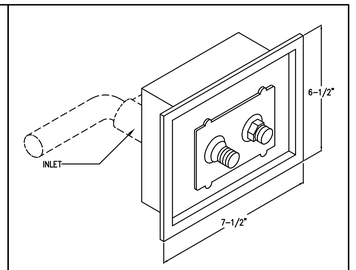
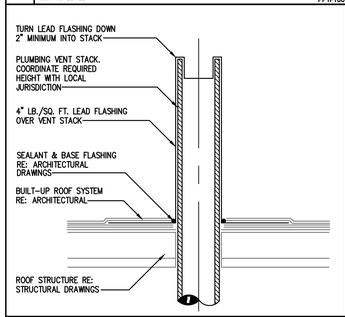


3 PIPE HANGER FOR INSULATED PIPE
NOT TO SCALE

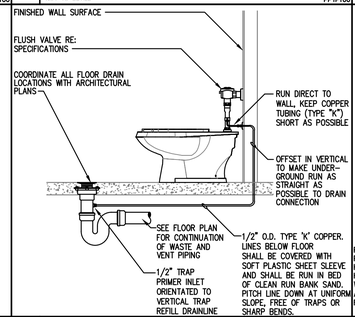


NOTE: WALL HYDRANTS SHOWN WITHOUT LOCKING DOOR FOR CLARITY. UNIT FURNISHED WITH VACUUM BREAKER AND LOCKING T-KEY HANDLE.

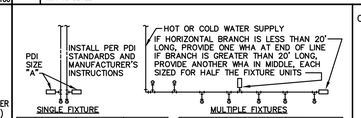
4 WALL HYDRANT DETAIL
NOT TO SCALE
PWH104



5 VENT THRU ROOF
NOT TO SCALE
PPMV103



6 TRAP PRIMER DETAIL
NOT TO SCALE
PPTP103

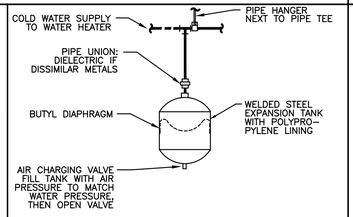


PDI SIZE	PIPE SIZE	FIXTURE UNIT LOAD	SIOUX CHIEF MODEL No. *
A	1/2"	1-11	652-A
B	3/4"	12-32	653-B
C	1"	33-60	654-C
D	1-1/4"	61-113	655-D
E	1-1/2"	114-154	656-E
F	2"	154-330	657-F

FIXTURE UNIT TABULATION		
FIXTURE	COLD	HOT
VALVE WATER CLOSET	10	--
TANK WATER CLOSET	5	--
URINAL	5	--
LAVATORY/SINK	1.5	1.5
JANITOR'S SINK	3	3
SHOWER/BATHTUB	2	2

PC TO PROVIDE WATER HAMMER ARRESTERS BY SIOUX CHIEF, PRECISION PLUMBING PRODUCTS, WATTS OR APPROVED EQUIVALENT WITH PISTON AND O-RING CONSTRUCTION, HAVING PDI #WH- 201, ASSE #1010 AND ANSI #A112.26.1M CERTIFICATION. INSTALL IN HORIZONTAL OR VERTICAL POSITION, BUT NEVER UPSIDE DOWN. INSTALL IN LINE WITH WATER FLOW DIRECTION IF POSSIBLE. SIZE THE UNITS AS SHOWN ON THE DRAWINGS AND/OR PER THE TABLES SHOWN ABOVE. PROVIDE ACCESS PANEL FOR SERVICING OR REPLACEMENT, WHERE REQUIRED.

7 WATER HAMMER ARRESTOR
NOT TO SCALE
PPTP100

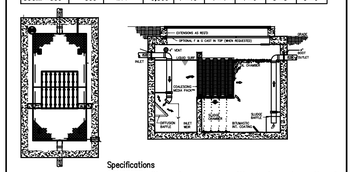


PIPING ARRANGEMENT SHOWN IS SCHEMATIC. ADJUST TO SUIT FIELD CONDITIONS. MAKE PIPE SAME SIZE AS TANK FITTING. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION PROCEDURE. VERIFY PROPER OPERATION WHEN INSTALLED.

EXPANSION TANK INSTALLATION SHALL OCCUR ONLY WHEN THERE IS A BACK FLOW PREVENTION DEVICE INSTALLED WITHIN THE TENANT SPACE WATER SYSTEM OR BUILDING WATER SYSTEM.

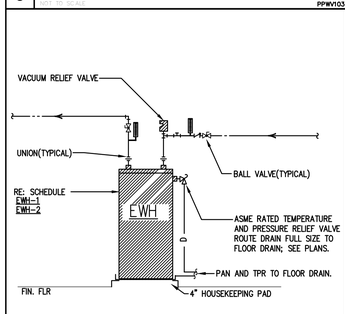
8 EXPANSION TANK DETAIL
NOT TO SCALE
PPTP100

SAND-OIL INTERCEPTOR SCHEDULE								
MODEL NO.	CAPACITY US Gal	OIL CAP. US (GAL)	EMPTY WT (LBS)	LENGTH L1	WIDTH W1	HEIGHT H1	INLET FL1	OUTLET FL2
SOCMP-500	500	250	9,500	7'-10"	4'-4"	4'-6"	3'-3"	3'-0"

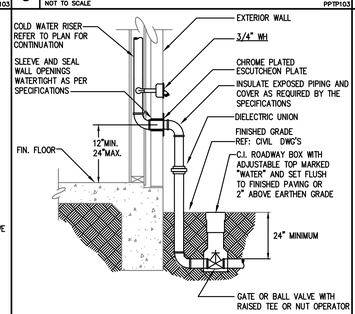


Specifications
CONCRETE : Class 1 concrete with design strength of 4500 PSI at 28 days. Unit is of monolithic construction at floor and first stage of wall with sectional riser to required depth.
REINFORCEMENT: Grade 60 reinforced with steel rebar conforming to ASTM A615 on required centers or equal.
MATERIALS: Access frame & cover shall be fabricated with min. 1/4" thick nonskid floor plate, boltdown, & lifting handles. All materials to be corrosion resistant.

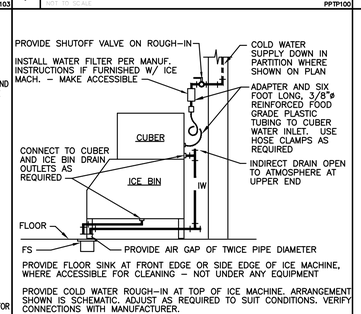
9 SAND/OIL SEPERATOR
NOT TO SCALE
PPTP105



10 GENERAL WATER HEATER DETAIL
NOT TO SCALE
PWHE301



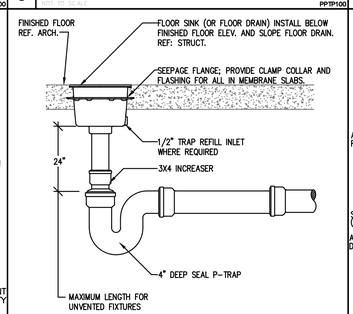
11 WATER PIPE ENTRY DETAIL
NOT TO SCALE
PWR202



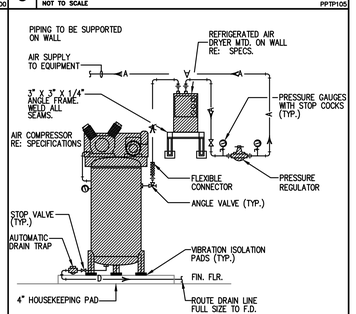
PROVIDE FLOOR SINK AT FRONT EDGE OR SIDE EDGE OF ICE MACHINE, WHERE ACCESSIBLE FOR CLEANING - NOT UNDER ANY EQUIPMENT

PROVIDE COLD WATER ROUGH-IN AT TOP OF ICE MACHINE. ARRANGEMENT SHOWN IS SCHEMATIC. ADJUST AS REQUIRED TO SUIT CONDITIONS. VERIFY CONNECTIONS WITH MANUFACTURER.

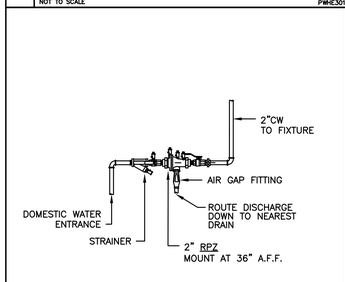
12 ICE MAKER CONNECTION
NOT TO SCALE
PPMD100



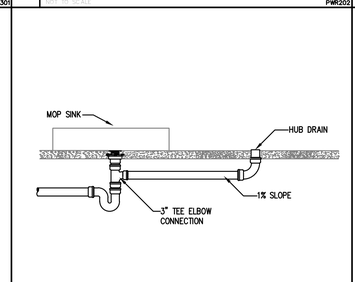
13 FLOOR DRAIN DETAIL
NOT TO SCALE
PPMD100



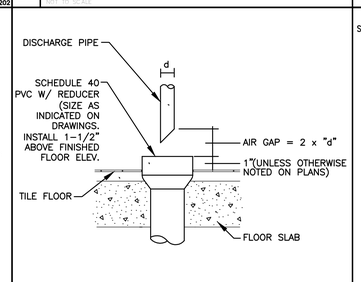
14 GENERAL AIR COMPRESSOR DETAIL
NOT TO SCALE
PPAC101



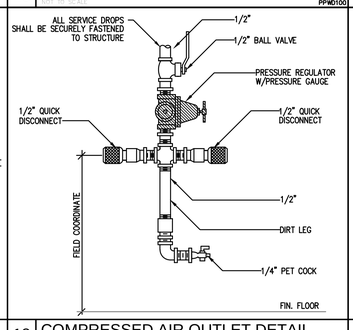
15 BACKFLOW PREVENTER DETAIL
NOT TO SCALE



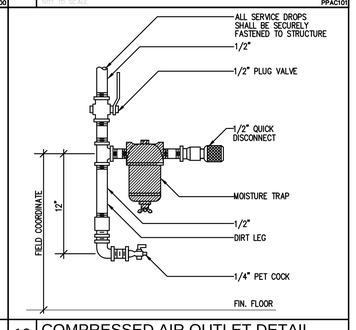
16 TIE IN ABOVE MOP SINK TRAP
NOT TO SCALE
PPTP105



17 HUB DRAIN W/ AIR GAP
NOT TO SCALE



18 COMPRESSED AIR OUTLET DETAIL
NOT TO SCALE
PPAC103



19 COMPRESSED AIR OUTLET DETAIL
NOT TO SCALE
PPAC104

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Texas Firm Registration No. F-005318
JOB 15096

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DATE: 09/28/15
REVISIONS:

PLUMBING DETAILS

SHEET NO.:
P4.1
JOB NO.: 15096

Webb County Main Fire Station and Administration Building

FOR

WEBB COUNTY

HICKEY PEÑA ARCHITECTS

REGISTERED ARCHITECT
MARIO A. PEÑA
20580
STATE OF TEXAS

Digitally Signed on 09/28/15

Architect's Project #: 1312

Date Issued: September 28th 2015

VOLUME 1 OF 2

SPECIFICATIONS

Owner:
Webb County
1620 Santa Ursula, 2nd Floor
Laredo, Tx 78040
956-523-4055
Contact: Luis Perez Garcia Iii, Pe., C.F.M.

ARCHITECT:
Hickey Peña Architects
919 Victoria
Laredo, TX 78040
956.722.8186
Contact: Mario A Peña, AIA
Mario@hickeypena.com
Monica@hickeypena.com

Civil Engineer:
Peua Consulting L.L.C.
109 E Del Mar Blvd #5
Laredo, Tx 78041
210-621-5797
Contact: Oscar Castillo P.E.

Structural Engineer:
Synergy Structural Engineering, Inc.
6909 Springfield Ave. Suite: 105
Laredo, Tx 78041
956-753-5860
Contact: Victor De Anda

Mep:
Nrg Engineering
5656 S Staples, Suite 360
Corpus Christi, Tx 78411
361-852-2727
Contact: John Rodriguez

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DIVISION A

Request For Proposals

Sealed Proposals will be received at the offices of Webb County Clerk (1110 Victoria, Suite 201, Laredo, Tx 78040) –on **October 16th 2015 at 3pm,** and publicly opened, read, and taken under advisement for the furnishing of all necessary materials, machinery, equipment, labor, superintendence, and all other services and things required for certain construction improvements. Said Proposal shall be marked:

Webb County Main Fire Station and Administration Building Proposal #RFP: 2015-16

The Contract Performance for this project shall be **150 Calendar Days** as defined in Draft Contract A101-2007 and A201-2007 included in the Specifications manual.

The scope of work involves site demolition, utility relocations, and construction of a new, stand-alone Fire Station and parking lot as per plans and specifications prepared by Hickey Peña Architects dated September 28, 2015

There will be a Pre-Proposal Conference **October 13th 2015** at 9am at Webb County Engineering Department, 1620 Santa Ursula 2nd Floor, Laredo Texas, 78040.

When submitted by mail, this envelope shall be placed in another envelope addressed as indicated in this **RFP: 2015-16**

Only proposals and proposal guaranties actually in the hands of the designated official at the time set in this Notice to Bidders shall be considered. Proposals submitted
by telephone, telegraph, or fax, will not be considered.

Contractors are expected to inspect the site of the work and inform themselves regarding all local conditions.

Copies of the plans and specifications may be reviewed free of charge at the office of the Owner – Webb County or copies may be obtained upon a fee of $75.00 for each set of documents

Criteria For Selection Of Contractor

I. Price 65%
   a. Use price form to indicate proposed price

II. Reputation of the contractor – 10%
   a. Provide list of 3 references including name, telephone number, and email address of each.

III. Experience of contractor 15%
   a. Provide list of projects currently working on
   b. Provide list of most recently completed projects.
   c. Provide list of Webb County Projects.

IV. Proposals are to be submitted to Webb County Clerk; 1110 Victoria; Suite 201; Laredo, Texas 78040

V. Questions regarding the specifications of the project are to be made to Luis Perez Garcia at lperezgarcia@webbcountytx.gov

VI. Questions regarding submission of the proposal are to be made to Leticia Gutierrez at lgutierrez@webbcountytx.gov

VII. Questions and answers will be posted on the website for the benefit of all interested contractors

VIII. Selected contractor will have to provide payment and performance bonds before Letter to Proceed is issued.

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor or other person doing business with local governmental entity

This questionnaire reflects changes made to the law by H.B. 1491, 80th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code by a person who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the person meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the person becomes aware of facts that require the statement to be filed. *See* Section 176.006, Local Government Code.

A person commits an offense if the person knowingly violates Section 176.006, Local Government Code. An offense under this section is a Class C misdemeanor.

OFFICE USE ONLY

Date Received

1 **Name of person who has a business relationship with local governmental entity.**

2 ☐ **Check this box if you are filing an update to a previously filed questionnaire.**

(The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date the originally filed questionnaire becomes incomplete or inaccurate.)

3 **Name of local government officer with whom filer has employment or business relationship.**

_____

Name of Officer

This section (Item 3 including subparts A, B, C & D) must be completed for each officer with whom the filer has an employment or other business relationship as defined by Section 176.001(1-a), Local Government Code. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer named in this section receiving or likely to receive taxable income, other than investment income, from the filer of the questionnaire?

☐ Yes ☐ No

B. Is the filer of the questionnaire receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer named in this section AND the taxable income is not received from the local governmental entity?

☐ Yes ☐ No

C. Is the filer of this questionnaire employed by a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership of 10 percent or more?

☐ Yes ☐ No

D. Describe each employment or business relationship with the local government officer named in this section.

4

_____ _____

Signature of person doing business with the governmental entity Date

Adopted 06/29/2007

CERTIFICATION
REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION FOR COVERED CONTRACTS

PART A.

Federal Executive Orders 12549 and 12689 require the Texas Department of Agriculture (TDA) to screen each covered potential contractor to determine whether each has a right to obtain a contract in accordance with federal regulations on debarment, suspension, ineligibility, and voluntary exclusion. Each covered contractor must also screen each of its covered subcontractors.

In this certification "contractor" refers to both contractor and subcontractor; "contract" refers to both contract and subcontract.

By signing and submitting this certification the potential contractor accepts the following terms:

1. The certification herein below is a material representation of fact upon which reliance was placed when this contract was entered into. If it is later determined that the potential contractor knowingly rendered an erroneous certification, in addition to other remedies available to the federal government, the Department of Health and Human Services, United States Department of Agriculture or other federal department or agency, or the TDA may pursue available remedies, including suspension and/or debarment.
2. The potential contractor will provide immediate written notice to the person to which this certification is submitted if at any time the potential contractor learns that the certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
3. The words "covered contract", "debarred", "suspended", "ineligible", "participant", "person", "principal", "proposal", and "voluntarily excluded", as used in this certification have meanings based upon materials in the Definitions and Coverage sections of federal rules implementing Executive Order 12549. Usage is as defined in the attachment.
4. The potential contractor agrees by submitting this certification that, should the proposed covered contract be entered into, it will not knowingly enter into any subcontract with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the Department of Health and Human Services, United States Department of Agriculture or other federal department or agency, and/or the TDA, as applicable.

Do you have or do you anticipate having subcontractors under this proposed contract?
☐ Yes

☐ No

5. The potential contractor further agrees by submitting this certification that it will include this certification titled "Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion for Covered Contracts" without modification, in all covered subcontracts and in solicitations for all covered subcontracts.
6. A contractor may rely upon a certification of a potential subcontractor that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered contract, unless it knows that the certification is erroneous. A contractor must, at a minimum, obtain certifications from its covered subcontractors upon each subcontract's initiation and upon each renewal.
7. Nothing contained in all the foregoing will be construed to require establishment of a system of records in order to render in good faith the certification required by this certification document. The knowledge and information of a contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
8. Except for contracts authorized under paragraph 4 of these terms, if a contractor in a covered contract knowingly enters into a covered subcontract with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the federal government, Department of Health and Human Services, United States Department of Agriculture, or other federal department or agency, as applicable, and/or the TDA may pursue available remedies, including suspension and/or debarment.

PART B. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION FOR COVERED CONTRACTS

Indicate in the appropriate box which statement applies to the covered potential contractor:

☐ The potential contractor certifies, by submission of this certification, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded form participation in this contract by any federal department or agency or by the State of Texas.

☐ The potential contractor is unable to certify to one or more of the terms in this certification. In this instance, the potential contractor must attach an explanation for each of the above terms to which he is unable to make certification. Attach the explanation(s) to this certification.

Name of Contractor	Vendor ID No. or Social Security No.	Program No.

Signature of Authorized Representative

Date

Printed/Typed Name and Title of Authorized Representative

CERTIFICATION REGARDING FEDERAL LOBBYING
(Certification for Contracts, Grants, Loans, and Cooperative Agreements)

PART A. PREAMBLE

Federal legislation, Section 319 of Public Law 101-121 generally prohibits entities from using federally appropriated funds to lobby the executive or legislative branches of the federal government. Section 319 specifically requires disclosure of certain lobbying activities. A federal government-wide rule, "New Restrictions on Lobbying", published in the Federal Register, February 26, 1990, requires certification and disclosure in specific instances.

PART B. CERTIFICATION

This certification applies only to the instant federal action for which the certification is being obtained and is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $100,000 for each such failure.

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No federally appropriated funds have peen paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, or the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.

2. If any funds other than federally appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with these federally funded contract, subcontract, subgrant, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying", in accordance with its instructions. (If needed, contact the Texas Department of Agriculture to obtain a copy of Standard Form-LLL.)

3. The undersigned shall require that the language of this certification be included in the award documents for all covered subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all covered subrecipients will certify and disclose accordingly.

Do you have or do you anticipate having covered subawards under this transaction?
☐ Yes
☐ No

Name of Contractor/Potential Contractor	Vendor ID No. or Social Security No.	Program No.

Name of Authorized Representative	Title

Signature – Authorized Representative

Date

PROOF OF NO DELINQUENT TAXES OWED TO WEBB COUNTY

Name _____ owes no delinquent property taxes to Webb County.

_____ owes no property taxes as a business in Webb County.
(Business Name)

_____ owes no property taxes as a resident of Webb County.
(Business Owner)

_____
Person who can attest to the above information

*** SIGNED NOTORIZED DOCUMENT AND PROOF OF NO DELINQUENT TAXES TO WEBB COUNTY.**

The State of Texas
County of Webb
Before me, a Notary Public, on this day personally appeared _____, know to me (or proved to me on the oath of _____ to be the person whose name is subscribed to the forgoing instrument and acknowledged to me that he executed the same for the purpose and consideration therein expressed.

Given under my hand and seal of office this ____day of _____ 2014.

Notary Public, State of Texas

_____
(Print name of Notary Public here)

My commission expires the _____day of _____20__.

Qualifier Information

Name of Qualifier: _____

Address: _____

_____

Phone: _____

Email Address: _____

Signature of Person Authorized to Sign Qualifier:

_____
Signature

_____
Print Name

_____
Title

Indicate status as to "Partnership", "Corporation", "Land Owner", etc.

_____

_____
(Date)

Note:
All submissions relative to these RFQ shall become the property of Webb County and are nonreturnable.

If any further information is required please call the Webb County Purchasing Agent, Dr. Cecilia May Moreno, at (956)523-5224 or Administrative Assistant, Leticia Gutierrez, at (956)-523-4127.

References

Name of Firm	Address	Phone	Name of Contact

COUNTY OF WEBB

Terms and Conditions of Invitations for Bids/Proposals

1. GENERAL CONDITIONS:

Proposers/Bidders are required to submit their proposals upon the following expressed conditions:

(A) Proposers shall thoroughly examine the scope of work and layouts, instructions and all other contract documents.

(B) Proposers shall make all investigations necessary to thoroughly inform themselves regarding plant and facilities for delivery of materials and equipment as required by the bid conditions. No plea of ignorance by the bidder of conditions that exist or that may hereafter exist as a result of failure to fulfill in every detail the requirements of the contract documents of the County or the compensation of the vendor.

(C) Proposers is advised that all County contracts are subject to all legal requirements provided for in county, state and federal statutes and regulations.

2. PREPARATION OF BIDS/PROPOSALS:

Proposals will be prepared in accordance with the following:

(A) Unit prices shall be shown and where there is an error in extension of prices, the unit price shall govern.

(B) Alternate bids will not be considered unless specifically requested within the proposal package.

(C) Proposed Period of Performance (POP) must be shown and shall include Sundays and holidays.

(D) Bidders will not include Federal taxes or State of Texas limited sales excise and use taxes in bid prices since the County of Webb is exempt from payment of such taxes. An exemption certificate will be signed where applicable upon request.

3. DESCRIPTION OF SUPPLIES:

Any catalog or manufacturer's reference used in describing an item is merely descriptive, and not restrictive, unless otherwise noted, and is used only to

indicate type and quality of material. Bidders are required to state exactly what they intend to furnish otherwise they shall be required to furnish the items as specified.

4. SUBMISSION OF BIDS/PROPOSALS:

(A) Bids/Proposals and changes thereto shall be enclosed in sealed envelopes addressed to the Webb County Clerk. The name and address of the bidder, the date of the proposal opening and the material or service bid on shall be placed on the outside of the envelope.

(B) Bids/Proposals must be submitted in the forms furnished. Electronic bids/proposals will not be considered. Bids/Proposals, however, may be modified by written notice provided such notice is received at the County Clerk's Office before the time and date set for the proposal opening.

(C) Samples, when required, must be submitted within the time specified, at no expense to the County of Webb. If not destroyed or used up during testing, samples will be returned upon request at the proposer expense.

5. REJECTION OF BIDS/PROPOSALS:

(A) The Purchasing Agent may reject a bid/proposal if it is deemed to be non responsive and/or provided by not responsible bidder/proposer.

(B) No bid/ proposal submitted herein shall be considered if the proposer owes any delinquent taxes to the County of Webb at the time proposals are opened. In the event that the successful proposer herein subsequently becomes delinquent in the payment of his or its County taxes, such fact shall constitute grounds for cancellation of the contract.

(C) No bid/proposal submitted herein shall be considered unless the bidder/proposer warrants that upon execution of a contract with the County of Webb, the bidder/ proposer will not engage in employment practices which have the effect of discriminating against employees or prospective employees because of race, color, sex, creed, disability, or national origin and will submit such report as the County may thereafter require to assure compliance.

(D) The County may, however, reject all proposals whenever it is deemed in the best interest of the County to do so, and may reject any part of a bid. County may also waive any minor informalities or irregularities in any bid.

6. WITHDRAWAL OF BIDS/PROPOSALS:

Bids/Proposals may not be withdraw after the closing time and date.

7. LATE BIDS/PROPOSALS OR MODIFICATIONS:

Bids/Proposals and modifications received after the time set for the proposal submission will not be considered.

8. CLARIFICATIN OR OBJECTION TO PROPOSAL SPECIFICATIONS:

If any person contemplating submitting a proposal for this contract is in doubt as to the true meaning of the specifications, or other bid/proposal documents or any part thereof, the bidder/proposer may submit to the Purchasing Agent on or before five days prior to scheduled opening a request for clarification. All such requests for information shall be made in writing and the person submitting the request will be responsible for its prompt delivery. Any interpretation of Webb County proposal package specification instructions, if made, will be made only by Addendum duly issued. A copy of such Addendum will be posted on the web-site and email to the vendors list that have received email copy of package. The County will not be responsible for any other explanation or interpretation made or given prior to the award of the contract. Any objections to the specifications and requirements as set forth in this proposal must be filed in writing with the Purchasing Agent on or before five days prior to the scheduled opening.

Where there is a question that will not lead to an addendum, the questions will be made in writing to the Purchasing Department. The answer will be in writing posted on the website for everyone to receive the same response.

9. DELINQUENT TAXES:

All vendors seeking to do business with Webb County must owe no delinquent taxes to the County. Attestation of owing no delinquent taxes will be required. If a vendor owes taxes to Webb County, those taxes should be paid before submitting a proposal.

10. AWARD OF CONTRACT:

(A) The contract will be awarded to the best qualified according to the bid/proposal criteria and a written award letter will be issue.
   (1) Award of a bid/proposal requires formal approval by the Commissioners Court.
   (2) Bid/Proposal contract must also be approved by the Commissioners Court.
   (3) The written notice to proceed will be for construction contracts provided after all contract documents are signed.

(D) Prices must be quoted F.O.B. Webb County with all transportation charges prepaid, unless otherwise specified in the Invitation for Bids/Proposals.

(E) Delivery time will be considered in breaking of tie proposals.

(F) Period of Performance will commence with written Notice to Proceed.

11. BID BOND

A bid bond in the amount of 5% of the Bid/Proposal issued by an acceptable surety company shall be submitted with each bid. A certified check or Bank Draft payable to the Webb County may be submitted in lieu of the Bid Bond. All such bonds, cashier checks shall be drawn payable to Webb County.

12. PERFORMANCE AND PAYMENT BOND

A Performance Bond is require for **construction work** if the contract is in excess of $100,000; and a Payment Bond is require if the **construction contract** is in excess of $25,000. The requirement is for all prime contractors which enter into a formal contract with the State, any department, board, agency, municipality, county, school district or any division or subdivision. The failure of the successful bidder/proposer to execute the agreement and supply the required bonds within ten (10) days **after** the award or within such extended period as Webb County may grant, shall constitute a default and Webb County may, at its option either award the contract to next lowest responsible bidder, or re-advertise for bids/proposals. In either case, Webb County may charge against the bidder the difference between the amount of the bid, and the amount for which a contract is subsequently executed irrespective of whether this difference exceeds the amount of the bid bond. If a more favorable bid is received through re-advertisement, the defaulting bidder shall have no claim against Webb County for a refund.

13. WORKERS' COMPENSATION INSURANCE COVERAGE:

The Workers' Compensation Commission has adopted Rule 110.110 effective with all bids advertised after September 1, 1994. The TWCC has stated that it is aware that a statutory requirement for workers' compensation insurance coverage is not being met. Therefore, Rule110.110 requires that all bidders be covered under workers' compensation insurance to achieve compliance from both contractor(s) and governmental entities. **Attachment A** is provided in accordance with the requirements on governmental entities. Please read carefully and prepare your bid in full compliance to TWCC Rule 110.110. Failure to provide the required certificates upon submission of a bid could result in your bid being declared non-responsive.

14. REFERENCES:

Webb County requires proposer to supply with this proposal, a list of at least three (3) references where like services have been supplied by their firm. Include name of firm, address, telephone number and name of representative.

15. STATEMENTS:

No oral statement of any person shall modify or otherwise change, or affect the terms conditions, plans and/or specifications stated in the bid/proposal packages.

16. ETHICS:

The proposer shall not accept or offer gifts or anything of value nor enter into any business arrangement with any employee, of the Webb County Purchasing Department.

17. PROPRIETARY INFORMATION:

All materials submitted to the County become public property and are subject to the Texas Open Records Act upon receipt. If a proposer does not desire proprietary information in the proposal to be disclosed, each page must be identified and marked proprietary a time of submittal. The County will, to the extent allowed by law, endeavor to protect such information from disclosure. The final decision as to what information must be disclosed, however, lies with the Texas Attorney General. Failure to identify proprietary information will result in all unmarked sections being deemed non-proprietary and available upon public request.

(Revised 2013)

PROJECT: **Webb County Main Fire Station and Administration Building**

Form of Non-Collusive Affidavit

A F F I D A V I T

STATE OF TEXAS {}
COUNTY OF WEBB {}

_____

Being first duly sworn, deposes and says

That he is _____
(A Partner or Officer of the firm of, etc.)

The party making the foregoing proposal or bid, that such proposal or Proposal is genuine and not collusive or sham; that said Bidder has not colluded, conspired, connived or agreed, directly or indirectly, with any Bidder or Person, to put in a sham Proposal or to refrain from bidding, and has not in any manner, directly or indirectly, sought by agreement or collusion, or communication or conference, with any person, to fix the Proposal price or affiant or of any other Bidder, or to fix any overhead, profit or cost element of said Proposal price, or of that of any other Bidder, or to secure any advantage against the owner or any person interested in the proposed Contract; and that all statements in said proposal or Proposal are true.

_____
Signature of

Bidder, if the Bidder is an individual
Partner, if the Bidder is a Partnership
Officer, if the Bidder is a Corporation

Subscribed and sworn before me this ____ day of _____, 200____

_____
Notary Public

My Commission expires

_____

PROPOSAL SCHEDULE

PROJECT: **Webb County Main Fire Station and Administration Building**

Base Proposal shall consist of a lump sum.
All work covered by these documents is to be included under one or more General Contracts with bidding conditions as described in the INSTRUCTIONS TO BIDDERS.
TOTAL BASE Price: $ _____
TOTAL BASE Price(WRITTEN IN WORDS): _____
_____
_____
_____

Contractor
_____
Signature Title
_____
Address City/State Zip Code
Telephone Number: (___)_____
Fax Number: (___)_____
NOTE: ALL PROPOSAL ITEMS WILL BE PAID FOR WHEN COMPLETE IN PLACE, TESTED, AND ACCEPTED BY THE OWNER.

SCHEDULE OF VALUES

All Proposals shall include a Schedule of Values (SOV) to be used as a tool in evaluating the bids. All contractors shall submit the SOV in order for their bid to be considered. Contractors are to review and consider the drawings and specifications in their entirety and shall then organize the bid into the divisions found in the SOV herein. The SOV costs and quantities found herein and/or submitted do not represent a bid schedule nor does it represent the entire detail of the scope of work. However, the sum of all the values stated in the SOV shall be equal to the total base bid. It shall not be used as a list of materials or services to be provided. Only the final executed Contract, Drawings, and Specifications, with the exception of the SOV, shall be considered the Construction Documents.

BASE PRICE

	QTY	RATE	COST	SUB TOTALS
GENERAL REQUIREMENTS				
Building Permit				
General Liability				
Bonds				
Temporary Facilities				
Clean Up and Close Out				
Equipment Rental				
Electrical Entrance - House Meter				
ADA Allowance				
Exterior Signage Allowance (Metal Letters)				
Betterment Fund Allowance				
Landscaping & Irrigation Allowance				
Cast Metal Plaque Allowance				
Door Hardware Allowance				
		TOTAL:		
SITE WORK (GENERAL)				
Site Demolition				
Utilities				
Grading				
Termite Control				
Perimeter Fencing				
Concrete Sidewalks				
Parking Lot Asphalt				
Curb and Gutter				
Striping - ADA Symbol & Access Space				
Stiping - Parking Spaces				
Handicap Signage				
Site Lighting				

Hose Rack	
Emergency Generator	
Radio Tower Antenna Relocation	
	TOTAL:
BUILDING	
Building Pad-Compact/Fill/Excavate	
Foundation	
CMU	
Metal Stud	
5/8" Gypsum Board-Tape, Float, Text, and Painted	
Pre-Engineered Metal building	
Structural Steel	
Erect Steel	
MTL Panels	
Roof Structure	
Standing Seam MTL Roof	
Mezzanine Concrete Decking	
Mezzanine Chain Link	
Building Insulation	
Gutters and Flashing	
Metal Coping	
Canopies	
Storefronts Assemblies	
Storefront Doors	
Windows	
Doors	
Louvers	
Wall Hatch	
Overhead Doors	
Plumbing	
Electrical	
Paint	
Porcelain Floor Tile	
VCT Floor Tile	
Wall Tile	
ACT	

HVAC	
Millwork	
Restroom Partitions	
Restroom Accessories	
	TOTAL:
SUBTOTAL	
Contractor's O.H. Profit	

TOTAL BASE PRICE ESTIMATE

Substitute Alternate	
Substitute Alternate #1 : Porcelain tile in lieu of VCT floor tile	
Substitute Alternate #2 : Apparatus Concrete lieu of asphalt	

ADD Alternate	
ADD Alternate #1: Site Marquee	
ADD Alternate #2: Existing Equipment relocation	

PROPOSED PROGRESS SCHEDULES:

Data on Equipment to be used on the Work: (Include the number of machines, the type, capacity, age and conditions and locations)

Subcontractors: (Submit a list of proposed Subcontractors. List sources, types and manufacturers of proposed materials)

CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE

The Contractor shall not commence work under this Contract until he/she has obtained all the insurance required under this paragraph and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his/her Sub-Contract until the insurance required of tile Subcontractor has been so obtained and approved.

a. Compensation Insurance: The Contractor shall procure and shall maintain during the life of this Contract Workmen's Compensation Insurance as required by applicable State or Territorial law for all of hisser employees to be engaged in work at the site of the project under this contract and, in case of any such work sublet, the Contractor shall requite the Subcontractor similarly to provide Workmen's Compensation Insurance for all of the latter's employees to be engaged in such work unless such employees are covered by the protection afforded by the Contractor's Workmen's Compensation Insurance. In the case where any class of employees engaged in hazardous work on the project under this Contract and is not protected under the Workmen Is Compensation Statute, The Contractor shall provide and shall cause each Subcontractor to provide adequate employee's liability insurance for the protection of such of his/her employee as are not otherwise protected.

b. Contractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance: The Contractor shall procure and shall maintain during the life of his Contract: Contractor's Public Liability Insurance, Contractor's Property Damage Insurance and Vehicle Liability Insurance in the amount of not less than $200,000 for bodily injury, including accidental death, to any one person and an amount not less than
$300,000 on account of any one occurrence: Property Damage in the amount not less than $100,000 per occurrence and $200,000 aggregate; and Vehicle Liability of $100,000 for any one person or $200,000 for each occurrence.

c. Subcontractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance: The Contractor shall either (1) require each of his/her Subcontractor to procure and shall maintain during the life of his/her Subcontracror, Subcontractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance of the type and in the amount specified in Subparagraph b. above or, (2) insure the activities of his/her Subcontractors in his/her policy specified in Subparagraph b. above.

d. Scope of Insurance and Special Hazards: The insurance required under Subparagraph b. and c. above shall provide adequate protection for the Contractor and his/her Subcontractor's, respectively, against damage claims which may arise from operations under this Contract, whether such operations be by the insured or by any one directly or indirectly employed by him/her and also against any of the special hazard which may be encountered in the performance of this Contract.

e. Builder's Risk Insurance (Fire and Extended Coverage): Unless otherwise provided by the Owner, the Contractor shall procure and shall maintain during the life of this Contract Builder's Risk Insurance (Fire and Extended Coverage on a 100 percent (100%) completed value basis on the insurable portion of the project. The Owner, the Contractor, and Subcontractor (as their interests may appear), shall be named as the Insured.

f. Proof of Carriage of Insurance: The Contractor shall furnish the Owner with certificates showing

the type, amount, class of operations covered, effective dates and dates of expiration of policies. Such certificates shall also contain substantially the following statement: "The Insurance covered by this certificate will not be cancelled or materially altered, except after ten (10) days written notice has been received by the Owner".

CERTIFICATE OF INSURANCE

To:

Date: _____

NOTICE OF AWARD

To:_____
_____
_____

Project:

The **Webb County** has considered the Proposals submitted for the above described project in response to its advertisement for Proposals dated _____ and _____ and related information to Bidders.

You are hereby notified that your Proposal in the amount of $_____, has been favorably considered for the project by the Owner. Pursuant to the Information to Bidder you are asked to sign the proposed Contract (in three duplicate originals) and to return the same, along with the required Certificate of Insurance and Payment Bond and Performance Bond within ten (10) days of your receipt of this Notice, for the approval and signature of the Owner.

For the purpose of effective date of the Performance and Payment Bond, and the required Certificate of Insurance, the date of _____may be considered the date of the Contract, if the Documents are approved by the Owner.

If you fail to submit the proposed Contract and the Performance and Payment Bonds and the Certificate of Insurance within ten (10) days from your receipt of this Notice, your Proposal will be considered as withdrawn and your Proposal bond will be forfeited.
You are asked to acknowledge receipt of this Notice by signing in the appropriate place below.

Dated this _____ day of _____

_____
Owner

ACKNOWLEDGMENT:
Receipt of this Notice is hereby acknowledged

_____
Dated this ____ day of _____

_____
Authorized Signature
Title: _____

NOTICE TO PROCEED

To: _____ Date: _____
_____
_____

Project:

In accordance with the construction contract dated _____
you are hereby notified to commence work on _____
Contract time is _____

_____
Owner

The above NOTICE TO PROCEED is hereby acknowledged by _____
on this the _____ day of _____.

_____
Authorized Signature

_____
Name: Type

_____
Title:

PERFORMANCE BOND

(To be Used in Texas under V.A.T.S. 5160)

THE STATE OF _____{}

COUNTY OF _____{}

KNOW ALL MEN BY THESE PRESENTS: That we (1)

_____ a

(2) _____ of

hereafter called Principal and (3) _____

of _____, State of _____, hereinafter called the

Surety, are held and firmly bound unto (4) _____ of

_____ hereinafter called Owner, in the penal sum of _____

_____

($_____) Dollars in lawful money of the United Stated, to be paid in (5) WEBB COUNTY, TEXAS

_____ for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain Contract with (6) _____

_____

the Owner, dated the _____ day of _____ a copy of which is hereto attached and made a part hereof for the Construction of:

_____

_____

_____

(hereinafter called the "Work")

These notes refer to the numbers in body of Contract above:

Date of Bond must not be prior to Date of Contract.

(1) Correct name of Contractor.
(2) A Corporation, or Partnership or an Individual, as case may be.
(3) Correct name of Surety.
(4) Correct name of Owner.
(5) County and State.
(6) Owner.

NOW THEREFORE, if the Principals shall well, truly and faithfully perform the work in accordance with the Plans, Specifications and Contract Documents during the original term thereof, and any extensions thereof which may be granted by the Owner with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under such Contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED FURTHER, that if any legal action be filed upon this Bond, venue shall lie WEBB County, State of Texas, and that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the

Contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any wise affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.

IN WITNESS WHEREOF, this Instrument is executed in six counterparts, each one of which shall be deemed an original, this the __ _____ day of _____.

ATTEST:

_____ _____

(Principal) Secretary PRINCIPAL

By: _____

(SEAL)

_____

Address (State and Zip Code)

_____ _____

Witness as to Principal Telephone Number

_____

Address (State and Zip Code)

PAYMENT BOND

(To be Used in Texas under V.A.T.S. 5160)

THE STATE OF _____ {}

COUNTY OF _____ {}

KNOW ALL MEN BY THESE PRESENTS: That we

(1) _____

(2) _____ of _____

hereinafter called Principal and (3) _____

of _____, State of _____

hereinafter called the Surety, are held and firmly bound unto (4) _____of _____

hereinafter called Owner, and unto all Persons, Firms, and Corporations who may furnish materials for, or perform Labor upon the building or improvements hereinafter referred to in the penal sum of _____

_____ ($_____) Dollars in lawful money of the United Stated, to be paid in (5) _____ for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain Contract with (6) _____

the Owner, dated the _____ day of _____ a copy of which is hereto attached and made a part hereof for the construction of:

_____

_____

(hereinafter called the "Work")

These footnotes refer to the numbers in body of contract above:

Date of Bond must not be prior to Date of Contract.

(1) Correct name of Contractor.
(2) A Corporation, or Partnership or an Individual, as case may be.
(3) Correct name of Surety.
(4) Correct name of Owner.
(5) County and State.
(6) Owner.

NOW THEREFORE, if the Principals shall well, truly and faithfully perform the work in accordance with the Plans, Specifications and Contract Documents during the original term thereof, and any extensions thereof which may be granted by the Owner with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under such Contract, then this obligation shall be null and void; otherwise to remain in full force and effect.

This Bond is made and entered into solely for the prosecution of all claimants supplying labor and material in the prosecution of the work provided for in said Contract, and all such claimants shall have a direct right of action under the Bond as provided in Article 5160, Revised Civil Statues 1925, as amended by House Bill 344, Acts 46 Legislature, Regular Session, 1959.

PROVIDED FURTHER, that if any legal action be filed upon this Bond, venue shall lie WEBB County, State of Texas, and that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any wise affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.

PROVIDED FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in six counterparts, each one of which shall be deemed an original, this the ___ _____ day of _____.

ATTEST:

_____ _____

(Principal) Secretary PRINCIPAL

By: _____

(SEAL) _____

Address (State and Zip Code)

_____ _____

Witness as to Principal Telephone Number

_____

(SEAL)

_____

Surety

ATTEST:

_____
(Surety Secretary)

By:_____

(SEAL)

_____
Address (State and Zip Code)

_____
Telephone Number

NOTE: If Contractor is Partnership, all Partners should execute Bond.

PERFORMANCE - PAYMENT BOND FORM

M-24, 25, Attach. Sa

_____ _____(SEAL)

Individual Principal

_____ _____

Address (State and Zip Code) Business - Address

_____ _____

Telephone Number (Area Code) Telephone Number (Area Code)

ATTEST: _____

Corporate Principal

_____ _____

(State and Zip Code) Business Address Name

_____

Telephone Number (Area Code)

_____ _____

Address (State and Zip Code) (Affix Corporate Seal)

By: _____

ATTEST: _____

Address (State and Zip Code)

_____ _____

Corporate Surety

_____

_____

Business Address

_____

(Affix Corporate Seal)

_____

Telephone:

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the _____ Secretary of the Corporation named as Principal in the within Bond; that _____ _____, who signed the said Bond on behalf of the Principal was then _____ _____, of said Corporation; that I know his signature thereof is genuine; and that said Bond was duly signed, sealed, an attested for and in behalf of said Corporation by authority of its governing body.

_____
Title

_____ _____

Date: _____ (Affix Corporate Seal)

_____
Telephone No.

The rate of premium on this Bond is _____ per thousand. Total of premium charge

$_____

NOTE: The above must be filled in by Corporate Surety. Power-of-Attorney of person signed for Surety company must be attached.

DRAFT

AIA® Document A101™ – 2007

Standard Form of Agreement Between Owner and Contractor

where the basis of payment is a Stipulated Sum

AGREEMENT made as of the « » day of « » in the year « »
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

« »
« »
« »

and the Contractor:
(Name, legal status, address and other information)

« »« »
« »
« »
« »

for the following Project:
(Name, location and detailed description)

The Architect:
(Name, legal status, address and other information)

«Hickey Peña Architects»« »
«919 Victoria
Laredo, Texas 78040»
«Telephone Number: (956) 722-8186»
«Fax Number: (815) 846-1546»

The Owner and Contractor agree as follows.

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

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

AIA Document A201™-2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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User Notes: (1230518130)

TABLE OF ARTICLES

1 THE CONTRACT DOCUMENTS

2 THE WORK OF THIS CONTRACT

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10 INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.
(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

« »

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

« »

§ 3.2 The Contract Time shall be measured from the date of commencement.

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than « » (« ») days from the date of commencement, or as follows:
(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

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User Notes: (1230518130)

« »

Portion of Work	Substantial Completion Date

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

« »

ARTICLE 4 CONTRACT SUM
§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » ($ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

« »

§ 4.3 Unit prices, if any:
(Identify and state the unit price; state quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price Per Unit ($0.00)

§ 4.4 Allowances included in the Contract Sum, if any:
(Identify allowance and state exclusions, if any, from the allowance price.)

Item	Price

ARTICLE 5 PAYMENTS
§ 5.1 PROGRESS PAYMENTS
§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported

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User Notes: (1230518130)

by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of « » percent (« » %). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;

.2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of « » percent (« » %);

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

.1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and
(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)

.2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:
(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

« »

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 FINAL PAYMENT

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« »

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User Notes: (1230518130)

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »
« »

§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:
(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)

[« »] Arbitration pursuant to Section 15.4 of AIA Document A201–2007

[« »] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

« » % « »

§ 8.3 The Owner's representative:
(Name, address and other information)

« »
« »
« »
« »
« »
« »

§ 8.4 The Contractor's representative:
(Name, address and other information)

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§ 8.5 Neither the Owner's nor the Contractor's representative shall be changed without ten days written notice to the other party.

§ 8.6 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

§ 9.1.4 The Specifications:
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

« »

Section	Title	Date	Pages

§ 9.1.5 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

« »

Number	Title	Date

§ 9.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

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.2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

« »

ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.

(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

Type of insurance or bond	Limit of liability or bond amount ($0.00)

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
« »« »	« »« »
(Printed name and title)	*(Printed name and title)*

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A201-2007: GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

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

THE OWNER:
(Name, legal status and address)
« »

THE ARCHITECT:
(Name, legal status and address)
«Hickey Peña Architects»« »
«919 Victoria
Laredo, Texas 78040»

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15 CLAIMS AND DISPUTES

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

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

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1.1.1, 2.3, 3.9, 7, 8.2.2, 12.1, 12.2, 13.5.2, 14.3.1, 15.1.2

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

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

§ 1.1.2 THE CONTRACT

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

§ 1.1.3 THE WORK

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

§ 1.1.4 THE PROJECT

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

§ 1.1.5 THE DRAWINGS

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

§ 1.1.6 THE SPECIFICATIONS

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

§ 1.1.7 INSTRUMENTS OF SERVICE

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

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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

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

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

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

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

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

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM
If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER
§ 2.1 GENERAL
§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

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

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER
§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or

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the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

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

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

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

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

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

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

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

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

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

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§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

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

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

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

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

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other

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facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

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

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

§ 3.5 WARRANTY

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

§ 3.6 TAXES

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

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

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

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

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

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume

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the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

§ 3.9 SUPERINTENDENT

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

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

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

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

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

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§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE
The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

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

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

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

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

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

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

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

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

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

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

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required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

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

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

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

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

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

§ 3.16 ACCESS TO WORK
The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

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

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§ 3.18 INDEMNIFICATION

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

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

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

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

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

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

§ 4.2 ADMINISTRATION OF THE CONTRACT

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

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

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§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION
Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

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

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

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

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

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

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

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

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

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

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

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

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

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

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

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

§ 5.3 SUBCONTRACTUAL RELATIONS

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

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be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

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

- **.1** assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- **.2** assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

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

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

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

§ 6.2 MUTUAL RESPONSIBILITY

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

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that

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the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

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

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

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

§ 6.3 OWNER'S RIGHT TO CLEAN UP

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

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

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

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

§ 7.2 CHANGE ORDERS

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

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

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

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

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

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

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

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.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

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

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

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

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

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

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

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

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

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ARTICLE 8 TIME

§ 8.1 DEFINITIONS

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

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

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

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

§ 8.2 PROGRESS AND COMPLETION

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

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

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

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

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

§ 9.2 SCHEDULE OF VALUES

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

§ 9.3 APPLICATIONS FOR PAYMENT

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

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

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

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

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

§ 9.4 CERTIFICATES FOR PAYMENT

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

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

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

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

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

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.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a separate contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

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

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

§ 9.6 PROGRESS PAYMENTS

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

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

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

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

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

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

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

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect,

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stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

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

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

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

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

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

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

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

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

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the

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

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

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

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

- **.1** liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents; or
- **.3** terms of special warranties required by the Contract Documents.

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

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

§ 10.2 SAFETY OF PERSONS AND PROPERTY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

§ 10.4 EMERGENCIES

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- **.1** Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- **.2** Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- **.3** Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- **.4** Claims for damages insured by usual personal injury liability coverage;
- **.5** Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- **.6** Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- **.7** Claims for bodily injury or property damage arising out of completed operations; and
- **.8** Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction

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of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or

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otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE
The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE
The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION
The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the

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Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

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

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

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

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

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

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

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

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

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

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

ARTICLE 13 MISCELLANEOUS PROVISIONS
§ 13.1 GOVERNING LAW
The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

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

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

§ 13.3 WRITTEN NOTICE
Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

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

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

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§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

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

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

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

§ 13.6 INTEREST

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

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

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

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency that requires all Work to be stopped;

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

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

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

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

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

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

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

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

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

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

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

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

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

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

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

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

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

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

- **.1** that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
- **.2** that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

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

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

- **.1** cease operations as directed by the Owner in the notice;
- **.2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- **.3** except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

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

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

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

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

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

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

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

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION
§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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

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

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

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

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

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

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

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

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

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

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

§ 15.4 ARBITRATION

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

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

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

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

§ 15.4.4 CONSOLIDATION OR JOINDER

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

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an

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additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

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

DRAFT

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DIVISION B

CONTRACT TIME & LIQUIDATED DAMAGES

PROJECT:

The Contract Performance for this project shall be **180 Calendar Days** as defined in the Specifications under A101-2007 and A201-2007

The time set forth in the proposal for the completion of the work is an essential element of the Contract. For each working day under the conditions described in the preceding Paragraph that any work shall remain uncompleted after the expiration of the working days specified in the Contract, together with any additional working days allowed, the amount per day given in the following schedule will be deducted from the money due or to become due the Contractor, not as a penalty but as liquidated damages.

FOR AMOUNT OF CONTRACT		
From More Than	**To and Including**	**Amount of Liquidated Damages Per Working Days**
$0	$100,000	$200
100,000	500,000	400
500,000	1,000,000	550
1,000,000	2,000,000	700
2,000,000	5,000,000	850
5,000,000	10,000,000	1,200
10,000,000	15,000,000	1,500
15,000,000	20,000,000	1,700
20,000,000	Over 20,000,000	2,500

EQUAL OPPORTUNITY CLAUSE

PROJECT:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex or natural origin. The Contractor will take Affirmative action to insure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color or national origin. Such action shall include, but not limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection of training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of the non-discrimination clause.

2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or natural origin.

3. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or worker's representative of the Contractor's commitments under Section 202 of Executive Order No. 11246, as amended (3CFR 169 (1974) and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

4. The Contractor will comply with all provisions of Executive Order No. 11246, as amended, and of the rules, regulations and relevant orders of the Secretary of Labor.

5. The Contractor will furnish all information and reports required by Executive Order No. 11246, as amended, and by the rules, regulations and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations and orders.

6. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of such rules, regulations or orders, this Contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246, as amended, and such other sanctions may be imposed and remedies invoke as provided in Executive Order No. 11246, as amended or by rule, regulation or

order of the Secretary of Labor, or as otherwise provided by law.

7. The Contractor will include the Provisions of Paragraph 1 through 7 in every Subcontract or purchase order unless exempted by rules, regulations or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246, as amended, so that such provisions will be binding upon each Subcontractor or Vendor. The Contractor will take such action with respect to any Subcontract or Purchase Order, as the contracting may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a Subcontractor or Vendor as a result of such direction by the contracting agency, the Contractor may request the United States to enter into such litigation to protect the interest of the United States.

INSPECTION BY CITY

PROJECT:

The work covered by these Specifications shall at all times be subject to inspection by the City of Laredo authorized inspectors.

The Contractor shall furnish the City Inspector with every reasonable facility for ascertaining whether the work performed is substandard and deviates from the requirements of the plans and specifications. The City Inspector shall have the authority to halt the construction of any portion of the work not meeting requirements until such time as said work has been corrected to the satisfaction of the Inspector and the Architect/Engineer.

PROJECT SIGN

Contractor to provide and install a 4' x 8' project sign to remain throughout the construction phase. Coordinate with architect for location on the site. Sign should be made of exterior grade materials.

Coordinate final design with Architect. Submit a 16"x 24" sample layout for approval.

CONTRACTOR TO REMOVE SIGNS UPON COMPLETION OF PROJECT

OWNER'S LOGO

WEBB COUNTY

Webb County Main Fire Station and Administration Building

Project Architect

HICKEY | PEÑA ARCHITECTS

919 Victoria
Laredo, Tx 78040
P 956.722.8186
F 815.846.1546
hickeypena.com

AREA DESIGNATED FOR GENERAL

DIVISION C

AWARD AND EXECUTION OF CONTRACT

C-4.01 CONSIDERATION OF PROPOSALS:

For the purpose of award, after the proposals are opened and read, the Proposals considered the most advantageous to the Owner would be carefully studied. The Proposals will then be compared and the results made public. Until the award of the Contract is made, the Owner reserves the right to reject any or all proposals, to waiver technicalities, to advertise for new proposals, or to proceed to do the work otherwise when the best interests of the Owner will be thereby promoted.

C-4.02 AWARD TO CONTRACT:

Contract will not be awarded until the necessary investigations as to the competency of the low bidder are made. Award of Contract will be made by the Owner, upon recommendation by the Consultant to the best value responsible bidder meeting the requirements of the Owner. Award of Contract will be made within sixty (60) days after the opening of proposals, unless stated otherwise in the Notice to Bidders.

C-4.03 RETURN OF PROPOSAL GUARANTIES:

As soon as the proposal price has been compared the Engineer may, at his discretion, return the proposal guaranties accompanying in those proposals, which, in his judgment, will not be considered in making the award. When award is made, the successful bidder's proposal guaranty only will be retained until after Contract and Bond have been executed.

C-4.04 PERFORMANCE AND PAYMENT BOND:

With ten (10) days after Notification of Award of Contract, the successful bidder shall execute and file with the Owner a separate surety and payment bond as required by Chapter 93 of the Acts of the Regular Session of the 56th Legislature of Texas, in the full amount of the contract price as a guarantee of the faithful performance of the Contract and payment of all obligations which may be incurred for material and labor used in the work. Bonds shall be executed by a surety company authorized to do business in the State of Texas on the bond forms provided in these Documents. Any surety shall be subject to the approval of the Owner.

C-4.05 EXECUTION OF CONTRACT:

Within ten (10) days after Notification of Award of contract, the successful bidder shall sign and place in the hands of the Owner the necessary agreement entering into a Contract with the Owner.

C-4.06 NOTICE TO PROCEED:

The Notice to Proceed shall be issued within ten (10) days of the execution of the Agreement by the Owner provided that the Contractor has properly executed and submitted all Documents required by the Owner within the same period of time. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement between the Owner and Contractor.

If the Contractor has submitted all Documents required and the Notice to Proceed has not been issued within the ten (10) day period or within the time extension, the Contractor may terminate the Agreement without further liability on the part of either party. Furthermore, should the Contractor fail to execute all the requirements within this same ten (10) days period or within the time extension, the City may terminate the Agreement.

C-4.07

The Owner may make such investigations as he deems necessary to determine the ability of the Bidder to perform the work, and the Bidder shall furnish to **Webb County** all such information and data for this purpose as the Owner may request.

C-4.08 APPROVAL OF CONTRACT:

No Contract shall be binding upon the Owner until it has been signed by the Owner and returned to the Contractor.

C-4.09 FAILURE TO EXECUTE CONTRACT:

Failure to comply with any of the requirements of these Specifications, to execute Contract within ten (10) days after notification of work, or to furnish surety as required, shall be just cause for the annulment of the award. In case of annulment of award, the proposal guaranty shall become the property of the Owner, not as penalty, but as a liquidated damage.

C-4.10

After the Notice to Proceed is issued, the Owner shall provide the Contractor with three (3) complete sets of Plans and Specifications for Contractor's use during construction. In the case that additional sets are required, the Contractor shall make arrangements to obtain the extra sets at his own expense.

C-4.11 RESPONSE TIME DURING THE PROSECUTION OF THE PROJECT:

The contractor shall furnish the owner with three (3) local telephone numbers where contractor or a responsible representative of contractor can be reached at any and all time during the prosecution of this project, and especially during weekends or holidays. Failure of contractor to respond to any such emergency which causes Owner personnel, equipment and materials to be used in such emergency will result in the contractor being charged an amount which shall be twice the cost incurred by the Owner in using personnel, equipment and materials to handle such emergency due to failure of the contractor to do so, and, in addition, the contractor will be charged a penalty of $500.00 for each emergency to which it does not respond. In this connection, "failure to respond" means the failure of the contractor to respond to telephone calls from the relevant staff or owner.

C-6.01 AUTHORITY OF ENGINEER:

The work will be observed, tested and inspected by the Engineer, and performed to his satisfaction, in accordance with the Contract, Plans and Specifications. The Engineer will decide all questions which may arise as to the quality and acceptability of materials furnished and work performed, as to the manner of performance and rate of progress of said work, as to the interpretation of the Plans or Specifications relating to the work, as to the fulfillment of the Contract on the part of the Contractor and to the rights of different Contractors on the project.

The decisions of the City Engineer will be final.

C-6.02 CITY ENGINEER AS REFEREE:

The City Engineer will act as referee in all questions, arising under the terms of the Contract between the parties thereto, and his decisions shall be final and binding.

C-6.03 ADEQUACY OF DESIGN:

It is understood that the Owner selected the Engineer named herein to prepare the Plans and Specifications, and all supplements thereto, and it is agreed that the Owner will be responsible for the adequacy of the design, sufficiency of the Plans and Specifications, and safety of structures, provided the Contractor has complied with said Plans and Specifications, all modifications thereof, and additions and alterations thereto approved by the Engineer. The burden of proof shall be upon the contractor to show that he has fully complied with the Plans and Specifications, all modifications thereof, and all additions and alterations thereof.

C-6.04 PLANS:

Plans will show the lines, grades, cross sections, details and general features of the work. Where shop drawings or working drawings are required, they shall be furnished by the Contractor and approved by the Engineer. Authorized alterations to the Plans will be endorsed on approved copies of the Plans or shown on supplementary sheets.

The approval by the Engineer of the Contractor's shop drawings or working drawings will not relieve the Contractor of any responsibility under the Contract.

The Contractor shall furnish the Engineer with such blue print copies of shop drawings or working drawings as may be required for approval and for the purposes of supervision.

The contract price shall include the cost of furnishing all such prints.

C-6.05 CONFORMITY WITH PLANS:

The finished work shall conform with the lines, grades, cross sections, details and dimensions shown on the Plans. Such deviations from the Plans as may be required will, in all cases, be determined by the Engineer and authorized in wiring.

C-6.06 COORDINATION OF PLANS AND SPECIFICATIONS AND SUPPLEMENTAL AGREEMENTS:

The Plans, Specifications, and supplemental agreements are essential parts of the Contract, and a requirement occurring in one is as binding as though occurring in all. In case of disagreement, Plans shall govern over "Technical Provisions," and "Special Provisions" shall govern over "Technical Provisions." The Contractor shall not take advantage of any apparent error or omission on the Plans or Specifications. In the event the Contractor discovers any apparent error or discrepancy, he shall immediately call upon the Engineer for his interpretation and decision, and such decision shall be final.

C-6.07 COOPERATION OF CONTRACTOR:

The Contractor shall give the work the constant attention necessary to facilitate the progress thereof and shall cooperate with the Engineer and with other Contractors in every way possible.

The Contractor shall have on the work at all times, a satisfactory and competent English-speaking Superintendent, authorized to receive order, and act for him as his agent. The Contractor shall designate to the Engineer in writing the name of such Superintendent, and the designated Superintendent may not be removed from the work without the written permission of the Engineer.

C-6.08 CONSTRUCTION STAKES:

The Contractor shall furnish and set at his own expense any and all construction stakes and blue tops as seems necessary for the satisfactory prosecution of the work.

Any missing construction stakes which have been destroyed by the different utility companies, vandals and/or the contractor at the time of construction will be replaced by the contractor at this own expense.

The Engineer may, at his option, make spot or complete checks on all construction alignment and grades to determine the accuracy of the contractor's survey work. These checks, however, will not relieve the Contractor of his responsibility of constructing the work to the lines and grades as shown on the plans or approved change orders. Computations, sketches, and other drawings used in the design and layout of this project will be made available to the Contractor, however these items will not relieve the contractor of his responsibility.

C-6.09 QUANTITIES OF MATERIALS:

It shall be the responsibility of the Contractor to verify all quantities of materials shown on the Plans before ordering such materials. Payment is provided for acceptable materials, and materials rejected due to improper fabrication or excess quantity or other reasons within the control of the Contractor will not be paid for regardless of the quantities or dimension shown on the Plans.

C-6.10 APPROVAL OF MATERIALS:

The sources of supply of materials shall be subject to the approval of the Engineer. Representative samples of materials proposed for use shall be submitted, if required, for examination and testing by an independent testing laboratory selected by the City.

Results obtained from testing such samples may be used for preliminary approval, but will not be used as final acceptance of materials. All materials proposed for use may be inspected or tested at any time during their preparation or use.

If at any time, it is found that sources of supply which have been approved do not furnish a product of uniform quality, or if the product becomes unacceptable at any time, the Contractor shall furnish approved material from another source.

Any material, which after approval has for any reason become unfit for use, shall not be incorporated into the work.

C-6.11 SAMPLES AND TESTS:

Samples and testing procedures shall conform to the requirements of appropriate designations of the American Association of State Highway Officials or the American Society for Testing Materials.

Test for determining the fitness of materials; tests for the purpose of obtaining preliminary approval of materials; tests for determining concrete mixes will be at the expense of the Contractor. Tests for the actual control of the work, such as soil compacting tests and concrete compressive strength test, will be at the expense of the Owner. Any and all retesting because of failure in soil compaction or concrete compressive strength tests shall be done at the expense of the Contractor. Tested and accepted subgrade shall be covered and protected with the flexible base within a maximum of seven (7) days. Tested and accepted flexible base shall be primed and cured a minimum of seventy two (72) hours and shall be cured with asphalt within seven (7) days. Failure to comply with the seven (7) days limitations may result in the need for re-testing at the Contractors expense depending on weather conditions and at the discretion of the Engineer. The Contractor shall provide such facilities as the Engineer may require for conducting field tests and collecting and forwarding samples. All sampling and testing shall be under the control of the Engineer and shall be done in laboratories approved by him.

C-6.12 STORAGE:

Materials shall be stored as to insure the preservation of the quality and fitness for the work. Material which is not, in the opinion of the Engineer, properly stored and protected will not be included as material in hand in the estimates.

C-6.13 AUTHORITY AND DUTIES OF INSPECTORS:

Inspectors employed by the Owner shall be authorized to inspect all work done in any part of the project and all preparation, fabrication, or manufacturer of the materials to be used.

The Inspector shall be authorized to call to the attention of the Contractor any failure of the work or materials to conform

to the Specifications or the Plans. He will in no case act as foreman or perform other duties for the Contractor, nor shall he interfere with the management of the work. In the event the Contractor does not comply with the requirements of the Owner and the Engineer, he may stop all work until the non-compliance is corrected.

If the progress of the work becomes unduly delayed because of negligence on the part of the Contractor, the Inspector shall notify the Owner and the Engineer, who may require the Contractor to give reasons for the delay. If it is found that the Contractor is at fault, then it is the prerogative of the Owner to demand correction.

Inspection as provided herein shall not relieve the Contractor from any obligation to perform the work in conformity with the requirements of the Plan and Specifications. No Inspector shall be authorized to revoke, alter, enlarge or release any requirements of the Plans and Specifications, or to issue instructions contrary to the Plans and Specifications, or to approve or accept any portion of the work.

The Contractor shall furnish every reasonable facility for ascertaining whether or not the work is performed in accordance with the Plans and Specifications.

No backfill shall be made unless inspected by the Engineer or the City's representative designated in writing and verbal approval of field Engineer is given to such work; if the Contractor should backfill any work without such inspection and approval, the Contractor shall remove or uncover such portions of the finished work as may be directed. After examinations, the Contractor shall restore said portion of the work to the standard required by the Plans and Specifications. Should the work thus exposed and examined prove acceptable or unacceptable, the uncovering or removing and the replacing of the covering or making good of the parts removed shall be done at the Contractor's expense.

C-6.14 SUSPENSION OF WORK:

In case of any dispute arising between the Contractor and the Inspector as to materials furnished or the manner of performing the work, the Inspector shall have authority to reject materials or suspend work until the question at issue can be referred to and decided by the Engineer.

If the Contractor refuses to suspend work on verbal order, the Inspector shall issue a written order to suspend work giving the reason for such suspension. After placing the order in the hands of the Contractor's man in charge, the Inspector shall immediately leave the job. Work done during the absence of the Inspector shall not be paid for.

C-6.15 REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK:

All work which has been rejected or condemned shall be repaired or removed and replaced as the Engineer may direct, at the expense of the Contractor. Materials not conforming to the requirements of the Plans and Specifications shall be removed immediately from the site of the work and replaced with satisfactory material at the expense of the Contractor.

Work done without lines and grades, work done beyond the lines and grade shown on the Plans, work done without inspection, or any extra or unclassified work done without written authority and prior agreement in writing as to the prices will be done at the Contractor's risk and will be considered unauthorized. At the option of the Engineer, such work may not be measured and paid for, or may be ordered removed and replaced at the expense of the Contractor.

Upon the failure of the Contractor to repair satisfactorily or to remove and replace rejected, unauthorized, or condemned work or materials immediately after receiving formal notice from the Engineer, the Owner may at his own option:

a. Recover for such defective work or materials on the Contractor's bond, or;

b. Recover from such defective work or materials by action in a court having proper jurisdiction in such matter, or;

c. Employ labor and equipment and satisfactorily repair, or remove and replace, such defective work or materials and charge the cost of same to the Contractor, which cost will be deducted from any money due him.

C-6.16 DISPUTED CLAIMS FOR EXTRA WORK:

In case the Contractor deems extra compensation is due him for work or materials not clearly covered in the Contract, or not ordered by the Engineer as "EXTRA WORK", the Contractor shall notify the Engineer in writing of his intention to make claim for such extra compensation before he begins the work on which he bases the claim and shall afford the Engineer every facility for keeping actual cost of the work.

Failure on the part of the Contractor to give such notice or to afford the Engineer every facility for keeping account of actual cost of the work shall constitute waiver of the claim for extra compensation. The filing of such notice by the

Contractor and the keeping of cost by the Engineer shall not in any way be construed to prove the validity of the claim. Extra work of any kind should only be performed by Contractor upon receipt of an approved Change Order issued by Owner. When the work has been completed, the Contractor shall within ten (10) day file claim for extra compensation with the Engineer, who will present it to the Owner for consideration.

C-6.17 FINAL INSPECTION

Whenever the work provided for under the Contract has been satisfactorily completed and the final cleaning up performed, the Contractor shall notify the Engineer to make the "Final Inspection". Such inspection will be made within ten (10) days of such notification. After such final inspection, if the work is found to be satisfactory, the Contractor will be notified in writing of the acceptance of same. No time charge will be made against the Contractor between the date of notification of the Engineer and the date of the final inspection.

DEFINITION OF ABBREVIATIONS

C-2.01 DEFINITION OF ABBREVIATIONS:

Whenever the abbreviations defined herein occur on the Plans, in the Specifications, Contract, Bond, advertisement, Proposal, or in any other Instrument herein contemplated or to which the Specifications apply or may apply, the intent and meaning shall be as follows:

A.S.H.O	American Association of State Highways Official
HP	Horsepower
K.W.	Kilowatt
Am. or Amp.	Ampere
KVA	Kilovolt
A.S.T.M.	American Society for Testing Materials
In. or "	Inch or Inches
Lin.	Linear
Asph.	Asphalt
Lb. or #	Pound
Ave.	Avenue
A.W.W.A.	American Waterworks Association
Max.	Maximum
Min.	Minimum
MH	Manhole
I.P.	Iron Pin
B & S.	Bell and Spigot
Mono.	Monolithic
Blvd.	Boulevard
No.	Number
B.T.U.	British Thermal Unit
%	Percent
B.M.	Bench Mark
PL	Property Line
C.I.	Cast Iron
R.	Radius
C.C.C.	Center to Center
Rein.	Reinforced or reinforcing
C/G	Curb & Gutter
C.L.	Center Line
V.G.	Valley Gutter
Con. or Conc.	Concrete
Rem.	Remove
C.S.P.	Concrete Sewer Pipe
Rep.	Replace
C.M.	Circular Mil
R.C.S.D.P.	Reinforced Concrete Storm Drain Pipe
C.F.M.	Cubic Feet per Minute
C.O.	Cleanout
R.P.M.	Revolutions per minute
Cond.	Conduit Minute
Corr.	Corrugated
ROW or R of W	Right of Way
Cu.	Cubic
Vol.	Volume
Culv.	Culvert
S.S.	Sanitary Sewer
Dia.	Diameter
S.D.	Storm Drain
D.S.	Double Strength
Sq.	Square
Dr.	Driveway
Std.	Standard

Elev. or El.	Elevation
T.H.D.	Texas Highway Department
F.	Fahrenheit
V.C.P.	Vitrified Clay Pipe
Ft. or '	Foot or Feet
V	Volt
Gal.	Gallon
Yd.	Yard
S.O.P .	Secretaria de Obras Publicas (Mexican Secretaries of Public Works)
Tex. D.O.T., or TxDOT	Texas Department of Transportation

C-1.01 DEFINITION OF TERMS:

Whenever the terms defined herein occur on the Plans, in any other documents or instrument herein contemplated or to which the Specifications apply, the intent and meaning shall be as follows:

C-1.02 OWNER: (Or Party of the First Party):

The individual, firm corporation or the political subdivision for whom the facilities covered by these Plans and Specifications are to be constructed.

C-1.03 CONTRACTOR: (Or Party of the Second Part):

The individual, firm or corporation with whom the Contract is made by the Owner.

C-1.04 CITY ENGINEER:

City Engineer employed by the Owner, or such other Engineer, or Supervisor authorized by the City Engineer or the Owner to act on their behalf.

C-1.05 CONSULTANT:

Licensed Engineer or Architect hired by the Owner to prepare the Contract Documents.

C-1.06 BIDDER:

An individual, firm or corporation submitting a proposal.

C-1.07 SUPERINTENDENT:

An authorized representative of the Contractor.

C-1.08 INSPECTOR:

An authorized representative of the Owner and Engineer

C-1.09 LABORATORY:

A testing laboratory approved by the Owner and Engineer.

C-1.10 CONTRACT:

The Agreement between the Owner and the Contractor covering the furnishing of all materials and labor necessary to complete the work and consisting of the Plans and Specifications, together with such supplemental agreements as may be made from time to time.

C-1.11 WORKING DAY:

A "Working Day" is defined as any day not including Saturdays, Sundays, or any legal holidays, observed by the City of Laredo, in which weather or other conditions, not under the control of the Contractor, will permit construction of the principal units of work for a continuous period of not less than seven (7) hours. If the contractor opts to work on Saturday, Sunday, or legal holiday requiring construction inspection, said days are considered working days and charged to the contract time.

C-1.12 WORK:

All structures, services, machinery, equipment, or other facilities that are described in the Plans and Specifications together with such additions or modifications as may be ordered by the Owner from time to time.

C-1.13 WORK, ORDER, OR NOTICE TO PROCEED:

A document authorized by the Owner and issued by the Engineer directing the Contractor to proceed on all or part of the work and a specified date.

C-1.14 CHANGE ORDER:

A supplemental agreement adding to or modifying the Contract, including such additional Plans and Specifications as necessary to properly describe the required change.

C-1.15 SURETY:

The corporate body which is bound with the Contractor for the faithful performance of the work covered by the Contract.

C-1.16 PLANS:

The drawings published by the Engineer showing the locations, character, dimensions and details of the work which are part of the Contract.

C-1.17 SPECIFICATIONS:

The directions, provisions and requirements contained herein pertaining to the method and manner of performing the work, or to the quantities, or to the qualities of materials to be furnished under the Contract. The term "Specifications" shall be deemed to include the

Contract Documents, the Special Provisions, the General Provision, and the Technical Provisions as contained herein, together with all supplemental agreements and change orders. Specifications are part of the Contract. Plans take precedence over Specifications if in conflict.

C-1.18 CALENDAR DAYS:

A "Calendar Day" is defined as any day of the week inclusive of Saturdays, Sundays, and legal holidays.

INSTRUCTIONS TO BIDDERS

Article I. Examination of Contract Documents and Site:

1. Each bidder, before submitting his proposal, shall fully examine and acquaint himself with the contract documents and the site of the proposed project. he shall make such investigation as he may deem necessary to fully inform himself of the existing conditions, facilities, difficulties, restrictions and requirements incident to
completion of the project under the terms of the contract.

2. Failure of the bidder to acquaint himself adequately with the site and such conditions, facilities, difficulties, restrictions and requirements will not relieve him of his obligation to perform the entire contract at the price set forth in his proposal.

Article II. Contract Documents:

1. Drawing and specifications are on file at the offices of the Webb County.

2. If any bidder is in doubt as to the meaning of any part of the drawings, specifications, or other contract documents, or if he discovers what he considers to be a discrepancy, omission or conflict in such contract documents, he shall immediately call architect's attention to same by written notice or request for an interpretation of same. Any opinion expressed by architect in interpreting the contract documents shall not be binding upon owner, nor does architect warrant that the owner will accept his interpretation of such document.

Article III. Conditions of the Contract

The conditions of the contract consisting of the general conditions and the supplementary general conditions shall govern the construction of the entire project, in the event of conflict between the provisions of the general conditions and the supplementary general conditions, **the provisions of the general conditions shall control.**

General Conditions

The standard form promulgated by the American Institute of Architects, AIA document no. A-201, 2007 edition entitled " the General Conditions of the contract for the construction of buildings" shall constitute the general conditions of the contract. The terms of such documents are incorporated herein by Draft Documents.

Article IV. Supplementary General Conditions

Article 1. Definitions

The term "owner" refers to **Webb County** the term "Architect" refers to Hickey Peña Architects and the architect's authorized representative. The term "project" refers to **Webb County Main Fire Station and Administration Building** the scope of which is set forth below.

The term "Contractor" refers to the person or firm to whom owner has awarded the contract for the completion of the project.

The term "Contract Documents" refers to and consists of the instructions to bidders, the proposal, the agreement (also referred to as the construction contract), the general and
supplementary general conditions of the contract, and the drawings and specifications for the general construction of the above referenced-project in accordance with the plans
and specifications dated September 24th 2015

Article 2. Scope of Work:

Unless otherwise specified in the contract documents, contractor shall furnish all labor, services, materials, tools, equipment and supervision necessary to the full and final completion of the project, and everything incidental there to, as shown on the drawings, stated in the specifications, or reasonably inferable therefrom, all in accordance with the contract documents.

Article 3. Constructing the Contract Documents:

In the event of ambiguity or conflict in the contract documents: supplementary general conditions take precedence over general conditions; figures take precedence over scale dimensions; and descriptive notes take precedence over general notes or code indications**; unless the contrary intention is apparent.**

Except as provided above, changes in contract documents made with the consent of all parties in ink control those printed or typed, and type written provisions control over printed, or mimeographed provisions. In the event errors, conflicts, omissions or discrepancies are noted in the contract documents or in the work done by other affecting his work, contractor shall notify architect at once and architect will issue instructions to correct such errors, conflicts or discrepancies. This includes typographical errors in the specifications and notional errors on the drawings, where doubtful interpretation. If, after such errors, conflicts, omissions or discrepancies have been noted, contractor proceeds with the work so affected without instructions from the Architect, he shall make good any resulting damage or defect.

Article 4. Drawings and Specifications:

Architect has arranged the drawing and specifications into designated sections and divisions for convenience of reference only. such arrangement is not to be considered as
a complete segregation of all the work required to be performed, or materials to furnished, by a given contractor, sub-contractor or material man. each contractor,
sub-contractor or material man must review and consider the contract documents in their entirety.

In general, the drawings will indicate dimensions, positions, and this kind of construction. Work not particularly detailed, marked, or specified shall be the
same as similar parts that are detailed, marked or specified.

There are certain intricacies of construction that are impracticable to specify in detail or to fully cover on the drawings, but all such details are to be worked out along the lines of good practice, and in compliance with the ordinances covering such work.

Contractor, upon completion of the project, shall furnish architect with "as-built" drawings showing actual location in line and elevation of all new exterior utility lines
within the limits of site and of any relocation from that shown on the drawings of concealed piping or conduit within lines of the building.

Article 5. Contractor's Schedule:

Within one (1) week after the effective day of the construction contract, contractor shall furnish Architect a complete schedule of anticipated job progress, schedule of order placement for materials, and schedule for material delivery. Contractor shall immediately notify architect of the occurrence or anticipated occurrence of any deviation therefrom.

Article 6. Materials:

Unless otherwise indicated in the contract' documents, all materials shall be new, in strict compliance with the specifications and the best of their respective kinds. Before ordering any materials or doing any work, contractor shall note and review all pertinent measurements at the site and shall be responsible for the correctness of same no extra charge or compensation will be allowed on account of any difference between actual dimensions and the measurements indicated on the drawings. Any differences which may be found shall be submitted to architect for his consideration and instructions before proceeding with the work.

Materials shall be furnished at such times and in such quantities as to insure the uninterrupted progress of the work according to schedule. materials stored shall be properly protected from weather or damage.

Upon receipt of notice from architect that any material placed in the project or on the site is not of the quality specified or has been improperly placed, contractor shall remove same from the site or have same replaced, as the case ,may be, within 24 hours after receipt of such notice.

Article 7. Handling Materials:

Contractor shall be responsible for the proper care and protection of all materials, tools and equipment delivered to the site for his use.

When any existing or constructed area of the project is used as a shop, storeroom, or otherwise, the contractor will be held responsible for any repairs, patching or cleaning

arising from such use. Contractor shall protect and be responsible for any damage to his work or material, from the date of the contract until the final payment is made, and shall make good without cost to owner, any damage or loss that may occur during this period.

Contractor shall handle all materials as directed, so that they may be inspected by architect. should any material be found defective or in any way not' in accordance with
contract, such material, without regard to the stage of completion, may be rejected by architect and, if so rejected, shall be removed at once from the premises by
contractor installing same.

Article 8. Substituted Materials, Products, Methods or Services:

In certain instances specific materials, products, methods and services have been specified by brand or trade-name partly for the purpose of establishing the effect or standard of quality desired. upon the prior written approval of architect, substitutions for such specifically named materials, products, methods or services may be made provided the materials, products, methods or services desired to be substituted have been proven to architect to provide the effect or standard of quality desired. The decision of the architect is absolute and final.

Article 9. Inspection and Testing of Materials:

All materials and equipment used in the construction of the project shall be adequately inspected and tested in accordance with accepted standards at no expense to owner, unless otherwise specifically provided in the contract documents.

Article 10. Laying out Building:

Contractor shall employ an experienced and competent civil engineer to establish a permanent bench mark to which easy access may be had during the progress of the work, determine all lines and grades, and verify same from time to time during the progress of the work.

Article 11. Temporary Facilities:

Contractor shall make temporary connections for all utilities necessary during construction and shall remove them after completion of the project.

Contractor shall provide and maintain sanitary facilities for workmen at the job in accordance with the laws of Texas and the code ordinances of the city and county at location of construction. Contractor shall completely remove such facilities upon direction of the architect when the project is completed.

During construction, contractor shall provide and erect at the project site according to the instructions of architect a sign approximately 4 feet high and 8 feet long. No other signs will be erected without the prior approval of architect and owner.

Article 12. Cooperation with owner and city building officials:

When required, contractor shall notify the proper official of the county and/or the city in advance of all stopping and starting of construction. contractor shall cooperate with the officials at all times. If any authorized official, or authorized representative of owner, should deem an inspection necessary, contractor shall provide the proper facilities to insure that such official, or representative, can conveniently examine and inspect the work.

Article 13. Risk of Loss and Protection of Work:

Prior to acceptance by owner, contractor shall bear all risk of loss to the project from any and all causes, whether within or without contractor's control, save and except any damage, injury or loss which may be caused by the negligence of owner, or his employees.

Contractor shall continuously maintain adequate protection of all the work from damage and shall protect the owner's property from injury or loss arising in connection with
contract. Contractor shall, at his own expense, replace or repair any such damage, injury or loss, or the same may be done at his expense by owner.

Contractor shall adequately protect adjacent property as provided by law and the contract documents.

Article 14. Re-examination of Questionable Work:

Re-examination of questionable work may be ordered by the architect, and if so ordered, the work must' be uncovered by the contractor. contractor shall pay all costs of
uncovering or replacing any questionable work unless the work was covered after the inspection and approval of architect and, upon uncovering, is found to be in accordance
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with the contract documents, in which event such costs of uncovering shall be borne by owner.

Article 15. Periodic Payment on the Contract:

On or before the 15th day of each month, owner will pay to contractor the sum equal to 90% of the cost to owner of the labor performed, materials suitably stored on the site and
materials built into the project during the preceding calendar month based on estimates timely certified by contractor and approved by the architect, in no event however, shall owner pay to contractor partial payments totaling more than 95% of the contract price until the final completion and acceptance of the project. upon completion and acceptance of the project architect shall issue a "certificate of substantial completion" within thirty (30) days thereafter, owner shall pay to contractor the balance due on the contract price calculated in accordance with the terms and provisions of the contract documents.

Article 16. Payments Withheld and Applied by Owner:

Contractor shall pay promptly when due all lawful demands of sub-contractors, laborers, workmen, mechanics, material man, and persons who furnish machinery or parts thereof,
equipment, power tools, or any other supplies whatsoever for debts incurred in the furtherance of the performance of this contract, and shall save owner harmless from all claims growing out of such demands. Upon request by owner or architect, contractor shall furnish satisfactory evidence that all such obligations have been paid, discharged or waived. In the event contractor fails to do so, owner may, at will, after having served written notice on contractor, either pay unpaid bills of which owner has written notice or
withhold from contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims. When satisfactory evidence has been received by owner that all such liabilities have been fully discharged, owner shall resume payment in accordance with the terms of the contract. In no event shall the provisions of this paragraph be construed to impose any obligation upon the owner to either contractor or his surety. In paying any unpaid bills under the contract, owner shall be deemed the agent of contractor, and any payment so made by owner, shall be considered as a payment made under the contract by owner to contractor and owner shall not be liable to contractor for any such payment made in good faith.

The provisions of this article shall be deemed as alternative to the provisions of state law relating to the matters dealt with herein, and in no event shall they be deemed do alter , amend, or change the same, nor as an attempt do so.

Article 17. Liquidated Damages and Time of Completion:

A. After the required completion date, the contractor will be charged liquidated damages as per Division B of this manual

B. The contractor shall plan his Proposal to include labor, materials, equipment, etc., costs that will be necessary to facilitate completion on the required date.

C. If delays occur due to government orders, acts of the owner, or unusual acts of god, the contractor shall submit in writing within thirty days after the delay, a request for extension of time. If such request is denied by the architect, an appeal may be made to a board of arbitration as outlined in section i, general conditions, "arbitration".

Article 18. Insurance:

Contractor shall purchase and maintain in force at all times during the term of the contract, until the project is finally completed and accepted by owner, the insurance
required in article 11.1.1 of the general conditions as well as the following:

A. Bodily injury and property damage liability insurance in at least the following types with the minimum limits hereafter indicated, to-

wit:

	Bodily Injury Each **Person Accident**	**Property Damage** Each **Accident Aggregate**
1. Worker's Compensation		Statutory
2. Contractor's Comprehensive	$500,000 $1,000,000	$500,000 $599,000
General and Protective Liability Covering: Premises-operations Independent Contractors Products Contractual		
3. Automobile Liability	$500,000 $1,000,000	$500,000 $599,000

Covering:
Owned Automobiles:
non-owned automobiles including hired auto mobiles and those of independent contractors.

4. Umbrella (excess liability policy) or additional limits foregoing risks limits $5,000,000

B. builder's risk insurance written on the Texas standard form for actual completed value, covering fire, extended coverage, vandalism and malicious mischief is to be performed to the extent of 100% of the insurable value thereof, including items of labor and material connected therewith whether in or adjacent to the structure insured, materials in place or to be used as a part of the permanent construction, and temporary structures, miscellaneous materials and supplies incident to the work.

No policy shall. contain any exclusion for explosion, collapse, or underground coverage.

The loss, if any, is to be made adjustable with and payable to the owner as trustee for the insured and contractor and sub-contractor as their interests may appear.

Trustee shall deposit any money received from insurance in an account separate prom all its other funds and shall distribute it in accordance with such agreement as the parties in interest may reach, or under an award of arbitrators appointed, one by the owner, another by joint action of the other parties in insert, all other procedure being as provide elsewhere in the contract for arbitration.

The trustee shall have power to adjust and settle any loss with the insurers unless one of the contractors interested shall object in writing within three working days of the occurrence of loss, and thereupon arbitrators shall be chosen as above. the trustee shall in that case make settlement with the insurers in accordance with the directors of such arbitrators, who shall also, if distribution by arbitration is required, direct such distribution.

No work shall be commenced by contractor until after the policy, or policies, evidencing the insurance coverage herein required, or certificates of such insurance providing that the insurer shall give owner fifteen (15) days written notice prior to cancellation, material revision or intention not to renew, have been filed with owner.

Article 19. Use and/or Occupancy by Owner prior to Acceptance:

After written notice to contractor, owner may use and/or occupy, before final acceptance of the project, the whole or any part of the project for the purpose for which the project is intended, provided that such proposed use and/or occupancy will not, in contractor's opinion, interfere with the completion of the work. should contractor consider that owner's proposed use and/or occupancy would interfere with the completion of the work, contractor shall, within 48 hours after receiving notice of such intended use and/or occupancy, notify owner thereof in writing if contractor does not timely object to owner's proposed use and/or occupancy it shall be conclusively presumed that contractor has no objection to such use and/or occupancy by owner, and that such use and/or occupancy will not interfere with, hinder or delay contractor in the completion of such project such use and/or occupancy shall not be considered as owner's acceptance of the project, or any part thereof, nor shall such use and/or occupancy in any way prejudice owner's right to

assert any claim against contractor to which owner would have been entitled to assert in absence of any such use and/or occupancy

Article 20. Royalties and Patents:

The contractor shall pay all royalties and license fees. he shall defend all suits or claims for infringement or any patent rights and shall save the owner harmless from loss on account thereof.

LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC

C-7.01 LAWS TO BE OBSERVED:

The Contractor shall make himself familiar with and shall observe and comply with, all Federal, State, and local laws, ordinances and regulations which in any manner affect the conduct of the work, and shall indemnify and save harmless the Owner and the Owner's representative against any claim arising from the violation of any such law, ordinance, or regulation whether by himself or by his employees.

C-7.02 PERMITS AND LICENSES:

The Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary to the due and lawful prosecution of the work.

C-7.03 PATENTED DEVICES, MATERIALS AND PROCESSES:

If the Contractor is required or desires, to use any design, device, material or process covered by letters, patent, or copyright, he shall provide for such use by suitable legal agreement with the patentee or Owner of such patent. The Contractor and his surety shall indemnify and save harmless the Owner from any and all claims for infringement by reason of the use of any such patented design, device, material, or process, or any trademark or copyright in connection with the work agreed to be performed under this Contract, and shall indemnify the Owner for any costs, expenses, and damages which it may be obliged to pay for reasons of any such infringement at any time during the prosecution, or after the completion of the work.

C-7.04 PUBLIC, SAFETY AND CONVENIENCE:

The safety of the public and the convenience of traffic shall be regarded as of prime importance during construction and provisions thereof, made necessary by the work, shall be the direct responsibility of the Contractor, and shall be performed at his own expense.

Where the Contractor is required to construct temporary crossings for streams, culverts, ditches or trenches, his responsibility for accidents shall include the approaches as well as the structures of such crossing.

C-7.05 SANITARY PROVISIONS:

The Contractor shall, at his own expense, provide and maintain in a neat, sanitary condition such accommodations for the use of his employees as may be necessary to comply with the requirements or the State Department of Health and of other authorities having jurisdiction.

C-7.06 BARRICADES AND WARNING SIGNS:

The Contractor shall furnish and maintain adequate barricades, warning and directing signs, red flags, lights and other traffic control devices as are necessary to comply with the latest edition of the TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREET AND HIGHWAYS.

All provisions of barricades and warning signs shall be considered an incidental and necessary part of the work and no direct payment will be made therefore. All costs of providing such safe guards shall be included in the prices Proposal for other parts of the work.

C-7.07 USE OF EXPLOSIVES:

When the use of explosives is necessary in the prosecution of the work, the Contractor shall use the utmost care not to endanger life or property. All explosives shall be stored in a secured manner and all storage places shall be marked clearly with the words "DANGEROUS EXPLOSIVES". The method of storing and handling explosives and highly inflammable

materials shall conform to the requirements of Federal and State laws and regulations. The Contractor shall not use explosives until he has taken the legal precautions necessary to save harmless the Owner from any claims arising from such use of explosives.

C-7.08 PROTECTION AND RESTORATION OF PROPERTY:

The Contractor shall take all measures necessary to protect public or private property which might be injured by any process of construction, and in case of any injury or damage to said property, he shall restore at his own expense the damaged property to a condition similar or equal to the existing before such injury damage was done, or he shall make good such injury or damage in an acceptable manner.

Where the work involves excavation any public or private driveway, alley street or roadway, the Contractor shall do any work necessary to restore such driveway, alley, street or roadway to a condition similar or equal to that existing before such work was done. The Contractor shall be responsible for any subsidence of backfill or pavement failure due to such excavation, and shall promptly repair any such subsidence or failure.

C-7.09 PROTECTION OF EXISTING UTILITIES:

The Contractor shall contact the utility company for exact location prior to doing any work that might interfere with or damage present utilities.

The Contractor shall take all measures necessary to protect existing surface drains, seers, under drains, conduits, utilities, or similar underground structures, and to provide temporary service when service in any of these is interrupted.

When such facilities are encountered, the Contractor shall notify the Engineer who will arrange for their removal, if necessary. Any utility lines cut or damaged shall be repaired and restored to working conditions as determined by the Engineer.

C-7.10 RESPONSIBILITY FOR DAMAGE CLAIMS:

The Contractor shall save harmless the Owner from all suits, action in or claims brought on account of any injuries or damages sustained by any person or property in consequence of any neglect in safeguarding the work by the Contractor; or on account of any claim or amount recovered for any infringement of patent or reward under the "Workmen's Compensation Laws" or any other laws. He shall be held responsible for all damage or injury to property of any character occurring during the prosecution of the work resulting from any omission, neglect, or misconduct on his part in the manner or method executing the work, or from defective work or materials.

C-7.11 RESPONSIBILITY FOR THE WORK:

Until acceptance of the work by the Engineer, in writing, it shall be under the charges and care of the Contractor. The Contractor shall rebuild and make good at his own expense all injuries and damage to the work occurring before its completion and acceptance. In case of suspension of work for any cause, the Contractor shall be responsible for all the preservation of all materials.

C-7.12 USE OF COMPLETED WORK:

Whenever, in the opinion of the Engineer, any portion of the work is in acceptable conditions, it may be entered upon and used by the Owner upon the written order of the Engineer. Such use shall be held an acceptance of that portion of the work, but not into be considered as a waiver of any of the provisions of these Specifications. Pending final completion and acceptance of the entire work, all necessary repairs and renewal of any part of the work so used, due to defective material or work, to natural causes other than wear and tear, or to the operations of the Contractor, shall be performed by the Contractor at his own expense.

C-7.13 NO WAIVER OF LEGAL RIGHT:

Inspection by the Engineer or by any of his duly representatives, any order, measurement, or certificate by the Engineer; any order by the Owner for the payment of money, any payment for or acceptance of any of work, or extension of time; or any possession taken by the Owner shall not operate as a wavier of any provision of the Contract, or any power therein preserved to the Owner, or of any right to damages therein provided. A waiver of any breach of the Contract shall not be held to be a waiver of any other or subsequent breach.

The Owner reserves the right to correct any error that may be discovered in any estimate that may have been paid, and to adjust that or any subsequent estimate to meet the requirements of the Contract. The Owner reserves the right to claim and recover sums as may be sufficient to correct any error or make good any deficit in the work resulting from error, dishonesty, or collusion in the work after the final payment has been made.

C-7.14 RESPONSIBILITIES OF PARTIES AS TO UTILITY WORK:

It shall be the responsibility of the Contractor to check and coordinate his work with the public and private utility companies, which have authority from the City of Laredo to own and operate lines, pipes, conduits, or other means of conveyance within the streets Right-of-Way. The Contractor shall contact the Engineer concerning any and all utility relocation work needed, and it shall be the responsibility of the Contractor to advise the Engineer of any lines or utility poles to be relocated. The Engineer shall assist in coordinating the various utility relocation activities but shall not be responsible for any delays occasioned by this work, although appropriate allowance for additional contract time will be made by the Engineer if warranted. The Owner shall not be responsible for any acts of the Contractor or any damages resulting from work done by the Contractor relating to the removal, alteration, or other activity concerning utilities.

C-9.01 MEASUREMENT OF QUANTITIES:

All work completed under the Contract will be measured in United States standard measures. Linear and surface measurements will be taken horizontally unless otherwise shown on the Plans. Structures will be measured to the neat lines shown on the Plans.

When any material is cubic yards in the vehicle, such measurement will be made at the point of delivery. The capacity of each vehicle shall be plainly marked on said vehicle and the capacity of marking shall not be changed without written permission of the Engineer. The Engineer shall have authority to require all vehicles to have uniform capacity.

C-9.02 SCOPE OF PAYMENT:

The Contractor shall accept the payment as provided in this Contract as full compensation for furnishing all materials, equipment, tools, labor and incidentals necessary to complete the work and for performing all work contemplated and embraced under this contract, as full compensation for loss or damage arising from the nature of the work, or from action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the work; as full compensation for all expenses incurred in consequence of the suspension or discontinuance of the work; as full compensation for all expenses incurred in consequence of the suspension or discontinuance of the work herein specified; as full compensation for expenses incurred in any infringement of patent, trade-mark, or copyright; and as full compensation for completing the work in conformity with the requirements of the Plans and Specifications. Payment will be made only on items which are complete, in place, tested and accepted by the owner. Materials on hand shall be considered for payment ONLY when proper PAID invoices are submitted with Contractor's pay estimates. Materials on hand must be placed in a secured area designed for the project under this contract and be available for inspection by City Engineers at all times. The Contractor must provide an inventory of all materials on a form acceptable to the City Engineer and which must accompany each pay request. The payment of any partial or current estimate shall in no way affect the obligation of the Contractor at his own cost to repair or renew any defective parts of the construction or to replace any defective materials used in the construction and to be responsible for all damages due to such defects. Any items to complete the work indicated on plan shall be considered subsidiary to include positions of work and no further compensation will be made.

No monies payable under this contract, except the estimate for he first month or period, shall become due and payable until the Contractor shall satisfy the Owner that he has fully settled and paid for all materials and equipment used in or upon the work and labor done in connection therewith and the Owner may if he so elects pay and or all bills wholly or in part, and deduct the amount or amounts paid from any estimate(s) except the first estimate.

In event the surety on any bond given by the Contractor becomes insolvent or is placed in the hands of a receiver or has its right to do business in the State revoked by Law, the Owner may if he so elects withhold payment of any or all estimates until the Contractor shall give a good and sufficient bond in lieu of the bond so executed by said surety.

C-9.03 PAYMENT FOR ALTERED QUANTITIES:

When alterations in the Plans or quantities of work not requiring supplemental agreements are ordered and performed, the Contractor shall accept payment in full at the contract price for the actual quantities of work done. No allowance for anticipated profits will be made. Increased or decreased work involving supplemental agreements will be paid for as stipulated in such agreements.

C-9.04 PAYMENT FOR OMITTED ITEMS:

When any item ordered omitted from the Contract, the Contractor shall accept payment in full at the contract price for any work actually performed on such item prior to the date of issuance of such order. No allowance will be made for anticipated profits on work ordered omitted. Acceptable materials ordered by the Contractor, or delivered on the work prior to the date of issuance of such order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the Owner. The Contractor shall submit immediately certified statements covering all money expended in the preparation for any item ordered omitted and shall be entitle to reimbursement for any money expended in preparation for any items when such preparation is of no value to the remaining items of the Contract.

C-9.05 PAYMENT FOR EXTRA WORK:

Extra work performed under a supplemental agreement will be paid for according to the terms of such supplemental agreement.

Extra work if performed on a force account basis will be paid for as follows:

For all labor and foreman, the Contractor will receive the wage paid on the project for each hour that said labor and foremen are actually engaged on such work to which shall be added the actual cost of premiums for public liability and workmen's compensation insurance and social security taxes for the actual amount of such payroll.

For all materials used on such work the Contractor will receive the actual cost of such materials including freight charges.

For machinery and equipment used on such work the Contractor will receive an agreed rental price for each hour that such machinery and equipment is actually used on such work. The agreed price shall include the cost of fuel, lubrication and repairs.

To the sum of the foregoing an amount equal to fifteen (15) percent thereof will be added, as compensation for the use of small tools, Superintendent's services, timekeeper's services.

Premium on bond and all other overhead expenses incurred in the prosecution of the extra work including Contractor's profit.
The sum of such payments provided for shall be accepted by the Contractor's as full compensation as provided in C-9.02.

C-9.06 PARTIAL PAYMENTS:

Once a month and within the thirty (30) days after submittal of a correct and complete estimate, the Owner shall make a progress payment to the basis of a duly certified and approved estimate of the work performed during the preceding calendar month under this Contract. To insure the proper performance of the Contract, the Owner shall retain ten (10) percent ** of the amount of each estimate until final completion and acceptance of all work covered by this Contract.

**NOTE Retainage for construction contracts over four hundred thousand ($400,000) shall be five (5) percent.

In the event that the base Proposal is less than twenty-five thousand ($25,000) the total contract price will be paid in one payment upon completion and acceptance of the project.

Should any defective material or work be discovered or should a reasonable doubt arise as to the integrity of any part of the work completed prior to final acceptance and payment, there will be deducted from the first estimate presented after the discovery of such work, an amount equal to the value of the defective or questionable work. Such defective work will be made from all subsequent estimates until the defects have been remedied or the cause for doubt removed.

C-9.07 TERMINATION OF THE CONTRACT BY THE CONTRACTOR:

If the work is stopped for a period of thirty (30) days under an order of any court of other public authority having jurisdiction, or as a result of an act of government, such as declaration of a national emergency making materials unavailable, through no act or fault of the Contractor or subcontractor or their agents or employees or any other persons performing any of the work under a Contract with the Contractor, or if the work should be stopped for a period of thirty (30) days by the Contractor because the Engineer has not issued a Certificate for payment as provided in C-9.06 or because the Owner has not made payment within the ten(10) days after such stopping of work, then the Contractor may, upon seven (7) additional days written notice to the Owner and the Engineer, terminated the Contract and recover from the Owner payment for all work executed and for any proven loss sustained upon any materials, equipment, tools, construction equipment and machinery, including reasonable profit and damages.

C-9.08 TERMINATION OF THE CONTRACT BY THE OWNER:

If the Contractor is adjudged a bankrupt, or if he makes a general assignment for the benefit of his creditors, or if a receiver is appointed on account of his insolvency, or if he persistently or repeatedly refused or fails, except in cases for which extension of time is provided, to supply enough properly skilled workmen, or proper materials, or if he fails to make prompt payment to Subcontractors or for materials or labor, or persistently disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, or otherwise is guilty of a substantial violation of a provision of the Contracts Documents, then the Owner, upon certification by the Engineer that sufficient cause exists to justify such action, may without prejudice to any right or remedy and after giving the Contractor and his surety, if any, seven (7) days written notice, terminate the employment of the Contractor and take possession of the site and of all materials, equipment, tools, construction equipment and machinery thereon owned by the Contractor and may

finish the work by whatever method he may deem expedient. In such case the Contractor shall not be entitled to receive any further payment until the work is finished.

C-9.09

If the unpaid balance of the Contract Sum exceeds the costs of finishing the work, including compensation for the Engineer's additional services made necessary thereby, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or to the Owner, as the case may be, shall be certified by the Engineer, upon application, and this obligation for payment shall survive the termination of the Contract.

C-9.10 ACCEPTANCE OF FINAL PAYMENT:

When the work provided for in the contract has been completed and the final inspection has been made by the Engineer, and all parts of the work have been approved and accepted, the final estimate showing all sums due the Contractor shall be prepared. All prior partial estimates and payments shall be subject to correction in the final estimate and payment. No payment on the final estimate will be made until the Contractor furnishes satisfactory evidence that all claims growing out of lawful demands of laborers, work, men, mechanics, subcontractors, material, men, furnishers of machinery and parts thereof, and suppliers of all kinds have been satisfied. Upon final payment the Contractor shall execute a certificate and release upon the Owner on the form specified.

C-9.11 AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS AND RELEASE OF LIENS:

Each and every pay estimate must be accompanied by an "Affidavit of Payment of Debts and Claims and Release of Liens" form (sample of which follows this Section).

C-9.12 MATERIALS ON HAND INVENTORY:

When materials on hand payment is requested, and "Inventory of Materials on Hand" is required and must be included with Contractor's Pay Estimate. Proof of payment for materials on hand is also to be included with the Materials Inventory. A sample form follows this section.

C-9.13 PHOTOGRAPHS

The Contractor shall submit with each monthly progress pay estimate four (4) each 3 ½" x 5" color photographs depicting generally the work done during that month, and each photograph properly identified and dated.

AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS AND RELEASE OF LIENS

TO: **PROJECT:**

By this instrument the undersigned Contractor engaged in the construction of the above project hereby certified that on this date, or any time prior thereto, except listed below, the Contractor has paid the full or has otherwise satisfied all obligations for all materials and equipment furnished, for all work, labor, and services performed and for all known indebtedness and claims against the undersigned for damages arising in any manner on or against the project, its land, improvements and equipment of every kind.

The undersigned hereby certified that he has received all payments currently due under his Contract for work on the above referred (except retainage). Therefore, the undersigned does hereby waive and/or release any and all liens against the property project and as of the _____ day of _____, .

_____
Contractor

_____
Authorized Signature

_____
Typed Signature and Title

STATE OF TEXAS
COUNTY OF WEBB

Before me, the undersigned authority, on this day personally appeared _____
_____ known to me to be the person whose name is subscribed to the foregoing instrument, and being first duly sworn, acknowledged to me that he/she executed the same for the purpose and consideration therein expressed and declared to me that the statements contained herein are true.

SWORN AND SUBSCRIBED TO before me this _____ day of _____,

_____
Signature - Notary Public for the State of Texas.

_____
Notary Public's Typed Signature

My Commission expires: _____

MATERIALS ON HAND INVENTORY

PROJECT:

Contractor: _____

Estimate No. _____ Dates: From _____ to _____

No.	Invoice No.	Vendor	Balance Last Period	Received Current	Placed Current	Balance

C-8.01 RIGHT-OF-WAY:

The Owner will furnish all and or right-of-way necessary for the performance of the contract and will use due diligence in acquiring land or right-of-way. Should all necessary land or right-of-way not be acquired prior to the beginning of construction, the Contractor shall begin with work upon such land or right-of-way as the Owner may have acquired.

C-8.02 DELAYS DUE TO OWNER:

Should the Owner be prevented or enjoined from proceeding with the work or authorizing its prosecution, either before or after its commencement, by reason of any litigation or by reason of the Owner's inability to acquire necessary land or right-of-way, the Contractor shall not entitled to make or assert any claim for damage by reason of such delay, or to withdraw from the contract except by consent of Owner.

The time for completion of the work will be extended by such time as determined by the Engineer as will compensate for the time lost by reason of said delay.

C-8.03 SUBLETTING OR ASSIGNING OF CONTRACT:

The "City" does not allow, permit, negotiate, authorize nor approve any assignment of contract proceeds between the "City", the "Contractor", and/or with a bank, lending institution or any type of financial institution either before, during or after a contract award.

The "City" agrees to pay the "Contractor" for specified services as stated in the agreed contract. The "City" does not agree to pay any additional party either jointly or separately for the contract under discussion.

C-8.04 SUBCONTRACTING:

The Owner will not recognize any subcontractor on the work. The Contractor shall be fully responsible to the Owner for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them.

C-8.05 PROSECUTION OF WORK:

Prior to beginning of the work, the Contractor shall submit to the Engineer such schedules, charts, or briefs as may be required, outlining the manner of prosecution of the work. The contractor shall begin the work within ten (10) calendar days after the date set in the "Work Order" or notice to proceed and shall continuously prosecute same with such diligence as will enable him to complete the work within the time specified.

The contractor shall notify the Engineer at least twenty-four (24) hours prior to the

beginning at any point. He shall not begin new portions of the work to the detriment of portions already begun.

Owner's normal working hours are Monday through Friday from 8:00 AM to 5:00 PM. The contractor shall notify the owner at least twenty-four (24) hours in advance for any work that is to be scheduled beyond the limits of the owner's working hours, and he shall not begin any such work schedule unless proper inspection by the Contractor has been pre-arranged with the Owner, with the cost for such work beyond the owner's working hours borne by the Contractor.

If at any time the methods, equipment, or sequence of operations sued by the Contractor are found to be inadequate to secure the quality of the work or rate of progress required by the contract, the Engineer may in writing order such modifications in the Contractor's methods, equipment, or sequence of operations as he may deem necessary and the contractor shall comply with such order.

C-8.06 WORKMEN AND EQUIPMENT:

All workmen employed by the Contractor shall be skilled and competent. Any person employed by the Contractor who in the opinion of the Engineer does not perform his work in a proper and skillful manner or who is disrespectful, intemperate, disorderly, or otherwise objectionable shall at the written order of the Engineer be immediately removed from the work and shall not be employed again on any part of the work without written consent from the Engineer.

The Contractor shall furnish and use such suitable machinery and equipment as may be required in the opinion of the Engineer to properly prosecute the work. The Contractor shall at the written order of the Engineer remove from the work any equipment found unsuited to properly perform the work.

Upon failure of the Contractor remove the work any person or equipment as ordered by the Engineer, the Engineer may withhold all estimates which have or may become due, or may suspend the work until such orders are complied with.

C-8.07 TEMPORARY SUSPENSION OF WORK:

The Engineer shall have the authority to suspend the work wholly or in part for such period or periods as he may deem necessary due to unsuitable weather, or such other conditions as are considered unfavorable for the prosecution of the work or for such time as is necessary due to failure on the part of the Contractor to comply with orders given or to perform any or all provisions of the contract.

If work is stopped for an indefinite period, the Contractor shall store all materials in such manner that they will not become an obstruction nor become damaged in any way, and he shall take every precaution to prevent damage or deterioration of the work performed.

The Contractor shall not suspend the work without written authority from the Engineer and shall proceed with the work promptly when notified by the Engineer to resume operations.

C-8.08 COMPUTATION OF CONTRACT TIME:

The Contractor shall complete the work within the number of days stated in the contract. The number of days used shall be the number of days from the first day of actual commencement of operations or the 10th day after the date set in the Work Order or Notice to Proceed whichever comes first, and counting that day as the first elapsed day of contract time.

If the completion of the contract requires unforeseen work, or work and materials in greater quantities than those set forth in the proposal, then additional days or suspension of time charge will be allowed the Contractor equal to the time which in the opinion of the Engineers the work as a whole is delayed.

C-8.09 FAILURE TO COMPLETE THE WORK ON TIME:

The time set forth in the proposal for the completion of the work is an essential element of the contract. If the contractor fails to complete the work in the number of working days specified, a time charge will be made for each day thereafter until the work has been satisfactorily completed.

Unless an amount per day is set forth in the "Special Provisions" to be deducted from the amount due the Contractor for each day charged in excess of the number specified, the time charge shall be based on the monetary loss suffered by the Owner as the result of such delay. Such deductions shall in no way be considered a penalty, but as compensation to the Owner for the added expense to him for engineering supervision and other costs.

C-8.10 ABANDONMENT OF WORK OR DEFAULT OF CONTRACT:

The Engineer may give notice in writing to the Contractor and his surety of delay, neglect, or default stating which if the Contractor:

- Fails to begin work within the time specified, or fails to perform the work with sufficient workmen and equipment;

- Fails to provide materials of sufficient quantity to insure the completion of the work within the contract time; or

- Performs the work unsuitable; or

- Neglects or refuses to remove materials or perform new work such as may have been rejected; or

- Discontinues the work without authority; or

- Refuses to suspend or resume operations when so directed by the Engineer; or

- Becomes insolvent or is declared bankrupt; or

- Commits any act of bankruptcy insolvency; or

- Makes an authorized assignment for the benefit of any creditor; or

- Fails from any other cause whatsoever to carry out the work in an acceptable manner.

The ten (10) days after such notice if given, if a satisfactory effort has not been made by the Contractor or his surety to correct such delay, neglect, or default, the Owner may declare the work abandoned and so notify the Contractor and his surety.

After receiving such notification of abandonment, the Contractor shall not remove from the work any machinery, equipment, tools, materials or supplies then on the site. The Owner shall have the power and authority without violating the contract to take prosecution of the work out of the hands of the contractor and to appropriate or use any or all materials and equipment on the site as may be suitable and acceptable and enter into an agreement for the completion of the contract according to the terms and provisions thereof, or use such other methods as he may elect for the completion of the contract in an acceptable manner.

All costs and charges incurred by the Owner, together with the cost of completing the work under the contract shall be deducted from any money due or which may become due to the contractor. In the case the cost to the Owner is less than the amount which would have been payable under the contract if it had been completed by the Contractor, then the Contractor shall be entitled to receive the difference. In case the cost to the Owner exceeds the amount which would have been payable under the contract, if it had been completed by the Contractor, the Contractor and his surety shall be liable and shall pay the Owner the amount of such excess.

C-5.01 INTENT OF PLANS AND SPECIFICATIONS:

It is the intent of the Plans and Specifications to describe the complete work to be performed under the Contract. Except as provided on the Plans or in the Specifications, it is also the intent that the Contractor shall furnish all items on plans, materials, supplies, tools, equipment, labor and incidentals necessary to complete the work.

C-5.02 CHANGES AND INCREASED OR DECREASED QUANTITIES OF WORK:

The Owner has the right to make such changes and alterations in the Plans or in the quantities of work as he may consider necessary or desirable, and such changes and alterations shall not be considered as a waiver of any condition of the Contract, nor shall they invalidate any provision thereof. The Contractor shall perform the work as increased or decreased, and no allowance will be made for anticipated profits.

Payment to the contractor will be made for the actual quantities of work done and materials furnished at the unit prices as set forth in the Contract, except as follows:

When the total cost of work to be done, or of materials to be furnished, is more than one hundred and twenty-five 125 percent of the total contract price for the item stated in the Proposal, then either party to the Contract, upon demand, shall be entitled to a revised consideration on that portion of the work above one hundred and twenty-five (125%) percent of the total contract price stated in the Proposal.

When the total cost of work to be done, or of materials to be furnished, is less than seventy-five (75%) percent on the total contract price for the item stated in the Proposal, then either party to the Contract, upon demand, shall be entitled to a revised consideration on the work actually done.

Revised consideration shall be determined by supplemental agreement between the parties, which supplemental agreement shall be included with, and shall become a party of, the Contract.

C-5.03 OMITTED ITEMS:

The Owner may, in writing, order the omission from the work of any item found unnecessary to the project. Such omission shall be subject to all provisions of Par. C-5.02.

C-5.04 EXTRA WORK:

When the proper completion of the project requires work for which no quantities or prices were shown in the Proposal, such work shall be called "EXTRA WORK" and shall be

performed by the Contractor when so directed in writing by the Owner. "EXTRA WORK" shall be performed in accordance with these Specifications and as may be directed by the Engineer.

Prices for extra work shall be itemized and covered by a supplement agreement submitted by the Contractor and approved by the Owner prior to the starting of such work.

Claims for extra work not authorized in writing by the Owner prior to the performance thereof will be rejected.

C-5.05 MAINTENANCE OF TRAFFIC:

When the work requires partial or complete closing of any driveway, alley, street, or roadway, the Contractor shall so schedule and prosecute his work that traffic will be hindered to a minimum.

C-5.06 REMOVAL AND DISPOSAL OF STRUCTURES AND OBSTRUCTIONS:

All structures and/or obstructions on the site of the work, which are not to remain in place or which are not to be used in the new construction shall be removed as directed by the Engineer. Such items of removal are not listed in the Proposal will not be paid for as separate items; the cost of doing such work shall be included in the unit price Proposal for other items.

C-5.07 TOOLS AND ACCESSORIES:

When special wrenches, gauges, or other special tools or accessories are required to properly maintain and operate any machine or equipment furnished under this Contract, the furnishing of such tools and accessories shall be deemed to have been included in the Contract and they shall be furnished by the Contractor without extra cost to the Owner.

C-5.08 GUARANTEES:

All structural, mechanical and electrical equipment or instrument shall be guaranteed against mechanical and physical defects, leakage, breakage, or other damage occurring during normal operation for a period of one (1) year after such equipment or instruments have been accepted by the Owner. The Contractor shall promptly repair or make good, at his own expense, any defect in such equipment or instruments.

C-5.09 GENERAL GUARANTEE:

All work included in the Contract shall be guaranteed against faulty material or workmanship for a period of one (1) year after the work has been accepted by the Owner.

Neither final acceptance of the work, nor final payment thereof, nor occupancy and use of the work by the Owner shall constitute a waiver of the Owner's right to require the Contractor to repair or make good any such faulty materials or workmanship.

C-5.10 FINAL CLEANING UP:

Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, tools, and materials and shall dispose of all rubbish, temporary structures, and surplus backfill. The site shall be left in a neat and presentable condition throughout. Any land area, driveway, sidewalk, alley, street or road (concrete or asphalt) which has been cut or disturbed during the prosecution of the work shall be repaired at the Contractor's expense to a condition at least as good or better as originally existed.

C-5.11 EXISTING STRUCTURES:

The Plans show the locations of all known surfaces and subsurface structures. However, the exact location of gas mains, water mains, conduits, sewer etc., is unknown and the Owner assumes no responsibility for failure to show any of these structures on the Plans or to show them in their exact location. It is mutually agreed such failure will not be considered sufficient basis for claims for additional compensation for extra work or for increasing the pay quantities in any manner whatsoever, unless the obstruction encountered is such as necessitates, or requires the building of special work, provision for which is not made in the Plans and Proposal, in which case the provisions in these Specifications for extra work shall apply.

01000 SAFETY AND SECURITY NOTES

1. NO VEHICLE OR EQUIPMENT SHALL MOVE UPON APRONS, TAXIWAYS AND/OR RUNWAYS UNLESS THE VEHICLE:
    a. IS MONITORING UNICOM 122.800 RADIO FREQUENCY, AND
    b. IS UNDER ESCORT BY A VEHICLE MONITORING UNICOM 122.800, OR
    c. IS IDENTIFIED BY A 3' X 3' ORANGE AND WHITE CHECKERED FLAG OR FLASHING AMBER LIGHT.

2. IT IS THE INTENT OF THESE PLANS TO MINIMIZE INTERFERENCE TO AIRCRAFT MOVEMENT, THEREFORE, IN UNCLOSED PORTIONS, AIRCRAFTS SHALL HAVE THE RIGHT-OF-WAY.
3. AIRPORT SECURITY IS OF THE UTMOST IMPORTANCE. THE CONTRACTOR SHALL SUPPLY HIS OWN LOCK FOR ACCESS GATES, AND SHALL KEEP THE GATES LOCKED OR GUARDED AT ALL TIMES, EXCEPT FOR THE BRIEF PERIOD REQUIRED FOR PASSAGE OF AUTHORIZED VEHICLES OR EQUIPMENT.
4. FLAGMEN WILL BE REQUIRED TO DIRECT THE CONTRACTOR'S VEHICLES AND EQUIPMENT WHICH ARE OPERATING IN THE AREA OF MOVING AIRCRAFT. AIRCRAFT ALWAYS HAVE THE RIGHT-OF-WAY.
5. CONSTRUCTION PERSONNEL AND EQUIPMENT WILL NOT BE ALLOWED WITHIN THE AIRPORT'S OPERATIONS AREA (AOA) UNTIL THE AREA HAS BEEN CLOSED TO AIRCRAFTS AND NOTAM'S ISSUED.
6. REFERENCE AC 150/5370-2F "OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION".
7. GENERAL SAFETY REQUIREMENTS: DURING PERFORMANCE OF THIS CONTRACT, THE AIRPORT RUNWAY, TAXIWAYS, AND AIRCRAFT PARKING APRONS SHALL REMAIN IN USE BY AIRCRAFT TO THE MAXIMUM EXTENT POSSIBLE. AIRCRAFT USE OF AREAS NEAR THE CONTRACTOR'S WORK WILL BE CONTROLLED TO MINIMIZE DISTURBANCE TO THE CONTRACTOR'S OPERATION. THE CONTRACTOR SHALL NOT ALLOW HIS/HER EMPLOYEES, SUBCONTRACTORS' SUPPLIERS, OR ANY PERSON OVER WHOM HE/SHE HAS CONTROL TO ENTER OR REMAIN IN ANY PART OF THE AIRPORT WHICH WOULD BE HAZARDOUS TO PERSONS OR TO AIRCRAFT OPERATIONS. WHENEVER AIRCRAFT OPERATIONS REQUIRE, THE ARCHITECT OR OWNER MAY ORDER THE CONTRACTOR TO SUSPEND OPERATIONS, MOVE PLANT, PERSONNEL, EQUIPMENT AND MATERIALS TO A SAFE LOCATION AND STAND BY UNTIL AIRCRAFT USE IS COMPLETED.
8. OBSTACLE FREE ZONE: CONSTRUCTION ACTIVITY WITHIN AN OBSTACLE FREE ZONE WILL REQUIRE CLOSING PART OR THE ENTIRE AFFECTED RUNWAY.
9. RUNWAY AND TAXIWAY SAFETY AREAS: CONSTRUCTION ACTIVITY WITHIN A RUNWAY SAFETY AREA WILL REQUIRE CLOSING PART OR THE ENTIRE AFFECTED RUNWAY. CONSTRUCTION ACTIVITY WITHIN TAXIWAY SAFETY AREAS/OBSTACLE FREE AREAS IS PERMISSIBLE WHEN THE TAXIWAY IS OPEN TO AIRCRAFT TRAFFIC IF:
    A. ADEQUATE WING TIP/EMPENNAGE CLEARANCE EXISTS BETWEEN THE AIRCRAFT AND EQUIPMENT/MATERIAL
    B. EXCAVATIONS, TRENCHES, OR OTHER CONDITIONS ARE CONSPICUOUSLY MARKED AND LIGHTED
    C. NOTICE TO AIRMEN ARE IN EFFECT CONCERNING THE ACTIVITY, USUALLY "PERSONNEL AND EQUIPMENT ADJACENT TO TAXIWAY _____ _____".

10. CONSTRUCTION SITE ACCESS AND HAUL ROADS: ACCESS TO THE JOB SITE SHALL BE AS SHOWN ON THE PLANS, OR AS DESIGNATED BY THE ARCHITECT AND/OR OWNER.
11. THE CONTRACTOR, HIS/HER FLAGMAN AND SUPERVISORY INDIVIDUALS SHALL MAINTAIN CONSTANT CONTACT WITH AIRPORT OPERATIONS OFFICE VIA HAND-HELD RADIO OR MOBILE COMMUNICATION DEVICES.
12. NO TRENCHES IN OR DIRECTLY ADJACENT TO OPERATIONAL PAVEMENT SHALL REMAIN OPEN WHEN THE CONTRACTOR FINISHES WORK FOR THE DAY IN THE AREA. TRENCHES

NOT BACKFILLED SHALL BE COVERED WITH STEEL PLATES TO ALLOW SAFE PASSAGE BY AIRCRAFT ACROSS THE TRENCH, IF APPROVED BY THE AIRPORT MANAGER.

13. VEHICLE IDENTIFICATION AND PARKING: (A) CONTRACTOR VEHICLES AND EQUIPMENT SHALL BE IDENTIFIED BY FLAGS AND/OR AMBER FLASHING LIGHTS DURING DAY AND AMBER FLASHING LIGHTS AT NIGHT. (B) EMPLOYEE PARKING SHALL BE IN THE CONTRACTOR'S STAGING AND STORAGE AREA.
14. THE CONTRACTOR SHALL NOT, FOR ANY REASON, ENTER ACTIVE AIRFIELD AREAS WITHOUT EXPLICIT APPROVAL BY THE ARCHITECT OR RESIDENT PROJECT REPRESENTATIVE. THE CONTRACTOR SHALL LIMIT OPERATIONS TO LIMITS OF CONSTRUCTION ACTIVITIES.
15. ALL MATERIALS AND EQUIPMENT SHALL BE STORED IN THE CONTRACTOR'S STAGING AND STORAGE AREA WHEN NOT IN USE. EQUIPMENT AND MATERIALS SHALL NOT ENCROACH UPON ACTIVE OPERATIONAL AREAS. MINIMUM CLEARANCES SHALL BE MAINTAINED ON RUNWAYS IN ACCORDANCE WITH PART 77 OF THE FEDERAL AVIATION ADMINISTRATION REGULATIONS.
16. WASTE AND LOOSE MATERIALS SHALL NOT BE PLACED ON ACTIVE AIRCRAFT MOVEMENT AREAS. MATERIALS BLOWN ON THESE AREAS MUST BE REMOVED CONTINUOUSLY BY A SWEEPER OR VACUUM TRUCK SUPPLIED BY THE CONTRACTOR DURING THE PROJECT. NO DIRECT PAY IN PROPOSAL PROPOSAL.

CONSTRUCTION NOTES

1. EACH CONSTRUCTION AREA SHALL BE SHAPED TO ALLOW DRAINAGE OF SURFACE WATER DURING EACH WORK OPERATION. IF NECESSARY, SURFACE WATER SHALL BE PUMPED IMMEDIATELY FROM EACH CONSTRUCTION AREA AFTER EACH RAIN.
2. STOCKPILE LOCATION SHALL BE ADJUSTED IN THE FIELD AND COORDINATED WITH THE OWNER. STOCKPILE SHALL NOT CREATE ANY PONDING OF WATER OR ALTER DRAINAGE PATTERNS OF THE AIRPORT PROPERTY, AND SHALL HAVE STORM WATER EROSION CONTROLS.
3. THE CONTRACTOR SHALL COORDINATE WITH THE AIRPORT MANAGER ON THE DISPOSAL OF WASTE AND SPOIL MATERIALS ON THE AIRPORT PROPERTY. ALL WASTE OR SPOIL MATERIAL NOT ACCEPTED BY THE AIRPORT MANAGER TO BE DISPOSED OF ON AIRPORT PROPERTY SHALL BE DISPOSED OF OFF THE AIRPORT PROPERTY BY THE CONTRACTOR, AT THE CONTRACTOR'S EXPENSE UNLESS OTHERWISE NOTED. NO SEPARATE PAYMENT FOR MATERIAL DISPOSAL. ANY WASTE AND/OR SPOIL MATERIAL PLACED ONTO THE AIRPORT PROPERTY SHALL BE GRADED SMOOTH AND SHALL NOT CAUSE ANY PONDING ON THE AIRPORT PROPERTY NOR CAUSE ANY PROPERTY DAMAGE TO THE AIRPORT OR THE ADJACENT PROPERTY OWNERS. THE CONTRACTOR SHALL NOT PLACE ANY WASTE AND/OR SPOIL MATERIALS IN SAFETY AREAS OR AT A HEIGHT WHICH PENETRATES THE PRIMARY SURFACE OR TRANSITIONAL SURFACE FOR RUNWAY 14/32.
4. CONTRACTOR SHALL PROVIDE AND INSTALL ALL MATERIALS AND DRAINAGE STRUCTURES TO CONSTRUCT A STABILIZED CONSTRUCTION EXIT AT EACH POINT WHERE CONSTRUCTION CREWS WILL EXIT AIRPORT PROPERTY.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND ACQUIRING AN ACCEPTABLE WATER SOURCE AS REQUIRED FOR CONSTRUCTION.
6. WATER FOR CONSTRUCTION IS AVAILABLE FROM THE CITY OF LAREDO THROUGH FIRE HYDRANTS LOCATED ON AIRPORT PROPERTY. THE CONTRACTOR SHALL COORDINATE WITH THE CITY OF LAREDO AND MEET ALL CITY OF LAREDO REQUIREMENTS FOR SETTING A METER AND BACKFLOW PREVENTER AND PAYING STANDARD CITY RATES FOR THE WATER USED. UNLESS OTHERWISE REQUIRED BY THE CITY OF LAREDO, THE CONTRACTOR SHALL FURNISH THE METER AND THE BACKFLOW PREVENTER. ALL COSTS ASSOCIATED WITH SETTING A METER AND PURCHASING THE WATER SHALL BE CONSIDERED A SUBSIDIARY COST TO THE MAJOR PROPOSAL ITEMS IN THIS PROJECT.
7. SHEETING AND BRACING: INSTALL SHEETING AND BRACING NECESSARY TO SUPPORT THE SIDES OF TRENCHES AND OTHER EXCAVATIONS WITH VERTICAL SIDES, AS REQUIRED BY CURRENT OSHA REGULATIONS. COST OF SHEETING AND BRACING SHALL BE SUBSIDIARY TO THE CONSTRUCTION.

8. WATER IN EXCAVATION: KEEP WORK FREE FROM GROUND OR SURFACE WATER AT ALL TIMES. PROVIDE PUMPS OF ADEQUATE CAPACITY OR OTHER APPROVED METHOD TO REMOVE WATER FROM THE EXCAVATION IN SUCH A MANNER THAT IT WILL NOT INTERFERE WITH THE PROGRESS OF THE WORK OR THE PROPER PLACING OF OTHER WORK. THE COST OF DEWATERING THE EXCAVATION SHALL BE SUBSIDIARY TO THE CONSTRUCTION.
9. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ALL HORIZONTAL AND VERTICAL CONSTRUCTION STAKING AS REQUIRED FOR THE PROJECT DEVELOPMENT.
10. TOPSOIL REPLACEMENT IS REQUIRED IN ALL AREAS. TOPSOIL SHALL INCLUDE THE TOP FOUR (4) INCHES OF TRENCH AND EXCAVATION. TOPSOIL SHALL BE KEPT SEPARATE FROM GENERAL EXCAVATED MATERIAL. IN CULTIVATED AREAS ROCK FROM THE EXCAVATION SHALL NOT BE INCLUDED IN THE TOP SIX (6) INCHES OF TOPSOIL BACKFILL. ALL AREAS OF BACKFILL OR EXCAVATION SHALL BE BROUGHT TO WITHIN FOUR (4) INCHES OF FINAL GRADE AND BROUGHT TO GRADE WITH COMPACTED SOIL.
11. UPON COMPLETION OF FINAL GRADING, ALL AREAS DISTURBED BY CONTRACTOR SHALL BE SEEDED AND FERTILIZED. THE CONTRACTOR SHALL WATER, FERTILIZE, AND MAINTAIN GRASS FOR AT LEAST TWO CUTTINGS, OR AS REQUIRED ENSURING A MINIMUM 70% COVERAGE GROWTH.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING HIS OWN PROJECT OFFICE, TOILET FACILITIES AND OTHER NECESSARY BUILDINGS OR SHELTERS. THE AIRPORT SPONSOR WILL NOT PROVIDE FACILITIES TO THE CONTRACTOR DURING CONSTRUCTION. TOILET FACILITIES SHALL BE MAINTAINED IN WORKING CONDITION BY THE CONTACTOR AT ALL TIMES. THE CONTRACTOR SHALL PAY FOR ALL MONTHLY UTILITY BILLS AND INSTALLATION FEES.
13. A COMPLETE PROJECT SCHEDULE SHALL BE PROVIDED AT THE PRE-CONSTRUCTION MEETING AND PRESENTED AND EXPLAINED BY THE CONTRACTOR TO THE MEETING ATTENDEES. IF ANY, RUNWAY SHUTDOWN DATES SHALL BE DETERMINED AT THE PRE-CONSTRUCTION MEETING, OR AT A LATER TIME, AS APPROVED BY AND COORDINATED WITH THE AIRPORT MANAGER.
14. THE CONTRACTOR SHALL SUBMIT HIS CONSTRUCTION WORK SCHEDULE TO THE ARCHITECT PROJECTING HIS UPCOMING WORK FOR THE NEXT THREE WEEKS. THE ARCHITECT AND THE AIRPORT MANAGER SHALL REVIEW THIS PLAN WEEKLY WITH THE CONTRACTOR TO ENSURE EVERYONE IS AWARE OF UPCOMING CONSTRUCTION EVENTS.
15. THE CONTRACTOR SHALL MAINTAIN A CLEAN SAFE CONSTRUCTION AREA. THE CONTRACTOR SHALL PERFORM CLEAN UP OPERATIONS ON A DAILY BASIS. ALL MUD, DIRT AND DEBRIS TO BE REMOVED DAILY.
16. THE CONTRACTOR SHALL NOT DEVIATE FROM THE APPROVED CONSTRUCTION SEQUENCE WITHOUT FIRST OBTAINING APPROVAL FROM THE ARCHITECT.
17. THE CONTRACTOR SHALL HAVE SUFFICIENT EQUIPMENT AND PERSONNEL ON SITE TO ACCOMPLISH EFFICIENT AND PROMPT CONSTRUCTION OF THE VARIOUS WORK ITEMS, INCLUDING WORK ON MORE THAN ONE WORK ITEM SIMULTANEOUSLY.
18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OF ANY DAMAGE TO EXISTING FACILITIES NOT DESIGNATED FOR RECONSTRUCTION OR REPLACEMENT AT HIS SOLE EXPENSE.
19. DAMAGE TO EXISTING PAVEMENTS AND NEW PAVEMENTS ON THE AIRPORT PROPERTY DUE TO MOVING OR USAGE OF HEAVY EQUIPMENT OR THE TRANSPORT OF MATERIALS TO OR ON THE SITE SHALL BE REPAIRED TO EQUAL OR BETTER QUALITY BY THE CONTRACTOR AT HIS OWN EXPENSE.
20. CONSTRUCTION EQUIPMENT AND VEHICLES SHALL TRAVEL A MINIMUM AMOUNT ON NEWLY CONSTRUCTED PAVEMENTS SO THAT THE NEWLY CONSTRUCTED AREAS WILL NOT BE DAMAGED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRS OF ANY DAMAGE TO THE NEWLY CONSTRUCTED PAVEMENTS AT THE CONTRACTOR'S EXPENSE.
21. SHOULD THE NEED ARISE, THE CONTRACTOR SHALL PROVIDE A MOTORIZED MECHANICAL SWEEPER, ALONG WITH A "FOREIGN OBJECT DAMAGE" (FOD) PLAN, PRIOR TO BEGINNING WORK. THE FOD PLAN SHALL BE PRESENTED BY THE CONTRACTOR AT

THE PRE-CONSTRUCTION MEETING. THE FOD PLAN IS SUBJECT TO APPROVAL BY THE TEXAS DEPARTMENT OF TRANSPORTATION AVIATION DIVISION.

22. CONSTRUCTION WORKERS WILL NOT BE ALLOWED TO ESTABLISH OVERNIGHT RESIDENCE ON THE PREMISES. ALL CONSTRUCTION WORKERS SHALL LEAVE THE PREMISES AT THE END OF THE THEIR WORK PERIOD.
23. WORK CANNOT COMMENCE UNTIL:
    A. SUFFICIENT BARRICADES ARE IN PLACE TO CONFINE THE WORK AREA AND CREATE A BARRIER BETWEEN AIRCRAFT AND VEHICLE MOVEMENT AREAS AND THE CONSTRUCTION AREA.
    B. ALL SAFETY EQUIPMENT FOR PERSONNEL AND CONSTRUCTION EQUIPMENT IS IN PLACE AND OPERABLE.
    C. ALL RUNWAY AND TAXIWAY SAFETY AREAS HAVE BEEN MARKED AND STAKED. STAKES SHALL BE LOCATED EVERY 500' ON BOTH SIDES OF RUNWAYS AND TAXIWAYS AND MAINTAINED FOR THE ENTIRE COURSE OF THE PROJECT BY THE CONTRACTOR. LOCATING, STAKING, STAKES AND ALL ACTIVITIES REQUIRED FOR ESTABLISHING AND MAINTAINING THE AREAS SHALL BE SUBSIDIARY WORK BY THE CONTRACTOR.
    D. THE COMPLETE PROJECT SITE, AND ANY AREAS THAT MAY BE AFFECTED BY THE CONSTRUCTION PROJECT SUCH AS HAUL ROUTES, HAS BEEN VIDEO TAPED BY THE CONTRACTOR AND THIS VIDEO PROVIDED TO THE ARCHITECT, THE OWNER AND TXDOT AVIATION DIVISION.
    E. A NOTICE TO PROCEED HAS BEEN ISSUED.

24. ALL MATERIAL SUBMITTALS FOR ITEMS TO BE USED IN CONSTRUCTION OF THE PROJECT SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW AND APPROVAL A MINIMUM OF 14 DAYS TO COMMENCEMENT OF WORK. MIX DESIGNS SHALL BE SUBMITTED A MINIMUM OF 30 DAYS.
25. THE CONTRACTOR IS RESPONSIBLE FOR THE LOCATION AND RESTRICTIONS FOR SERVICING AND MAINTAINING EQUIPMENT AND DISPOSAL OF USED LUBRICANTS, ETC. ACCORDING TO THE PERTINENT LAW AND REGULATIONS.
26. WEEKLY PROGRESS MEETINGS ARE MANDATORY. THE DAY OF THE WEEK FOR THESE MEETINGS MAY BE DETERMINED BY AGREEMENT BETWEEN THE AIRPORT MANAGER, THE ARCHITECT AND THE CONTRACTOR.
27. IT IS THE INTENT OF CONSTRUCTION PHASING TO MINIMIZE THE DISPLACEMENT AND RELOCATION OF AIRCRAFT, AND TO MINIMIZE INCONVENIENCE TO AIRPORT USERS AND BUSINESSES LOCATED ON THE AIRPORT. WHERE APPLICABLE, THE CONTRACTOR WILL BE GIVEN THE OPPORTUNITY TO SUBMIT HIS OWN CONSTRUCTION PHASING PLAN. HOWEVER, ALL PHASING MUST MEET THE STATED INTENT.
28. CONTRACTOR SHALL MAINTAIN ACCESS TO ALL HANGARS FOR THE DURATION OF THE PROJECT UNLESS OTHERWISE SHOWN ON PLANS OR APPROVED BY THE AIRPORT AND THE ARCHITECT.
29. ACCESS ROUTES FOR EACH CONSTRUCTION PHASE SHALL BE COORDINATED WITH THE AIRPORT MANAGER AND THE ARCHITECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL ACCESS ROUTES (PAVED & UNPAVED).
30. THE PAVEMENT ON THE ACCESS ROUTES MAY NOT SUPPORT CONSTRUCTION TRAFFIC. THE CONTRACTOR SHALL LIMIT LOADS AS NECESSARY TO PREVENT DAMAGE OR SHALL INCLUDE IN HIS PROPOSAL ADEQUATE BUDGET TO REPAIR DAMAGE TO PAVEMENT.
31. ALL SAWCUTTING TO BE PERFORMED PER CITY OF LAREDO STANDARDS. SAWCUTTING SUBSIDIARY TO OTHER PROPOSAL ITEMS. NO SEPARATE PAY.

EXISTING UTILITIES NOTES

1. THE CONTRACTOR SHALL ANTICIPATE ALL UNDERGROUND OBSTRUCTIONS SUCH AS, BUT NOT LIMITED TO, WATER MAINS, GAS LINES, STORM AND SANITARY SEWERS, TELEPHONE OR ELECTRIC LIGHT OR POWER DUCTS, CONCRETE AND DEBRIS. ANY SUCH LINES AND OBSTRUCTIONS INDICATED ON THE DRAWINGS SHOW ONLY THE APPROXIMATE LOCATIONS AND SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR. THE OWNER

AND ARCHITECT WILL ENDEAVOR TO FAMILIARIZE THE CONTRACTOR WITH ALL KNOWN UTILITIES AND OBSTRUCTIONS, BUT THIS SHALL NOT RELIEVE THE CONTRACTOR FROM FULL RESPONSIBILITY IN ANTICIPATING ALL UNDERGROUND OBSTRUCTIONS WHETHER OR NOT SHOWN ON THE DRAWINGS.

2 . THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, MAINTAIN IN PROPER WORKING ORDER AND WITHOUT INTERRUPTION OF SERVICE ALL EXISTING UTILITIES AND SERVICES WHICH MAY BE ENCOUNTERED IN THE WORK. WITH THE CONSENT OF THE ARCHITECT AND UTILITY OWNER SUCH SERVICE CONNECTIONS MAY BE TEMPORARILY INTERRUPTED TO PERMIT THE CONTRACTOR TO REMOVE DESIGNATED LINES OR TO MAKE TEMPORARY CHANGES IN THE LOCATION OF SERVICES. THE COST OF MAKING ANY CHANGES SHALL BE AT THE CONTRACTOR'S EXPENSE.

3 . NOTIFY ALL UTILITY COMPANIES INVOLVED TO HAVE ALL UTILITIES LOCATED AND MARKED IN THE FIELD. ALL UNDERGROUND UTILITIES SHALL THEN BE UNCOVERED TO VERIFY LOCATION AND ELEVATION BEFORE CONSTRUCTION BEGINS. COORDINATE WITH UTILITY OWNER IF UTILITY INSPECTOR MUST BE ON SITE WHEN LOCATING OR EXCAVATING NEAR UTILITIES.

4 . ALL ABOVE GROUND AND GROUND LEVEL ELECTRICAL RELATED APPURTENANCES (I.E. RUNWAY LIGHTS, CABLE BOXES, CABLE AND/OR DUCT MARKERS, CONDUIT ETC.) SHALL BE PROTECTED AT ALL TIMES. ANY DAMAGE DONE TO SAID APPURTENANCES BY THE CONTRACTOR SHALL BE REPAIRED TO LIKE QUALITY AT THE CONTRACTOR'S EXPENSE. THE REPAIRS SHALL BE PERFORMED TO THE SATISFACTION OF THE AIRPORT MANAGER, TXDOT AND THE ARCHITECT.

5 . THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OF ANY DAMAGE TO UNDERGROUND CABLE ENCOUNTERED. ANY DAMAGE TO FAA CABLE OR OTHER UNDERGROUND CABLING OR FACILITIES SHALL BE REPAIRED IN ACCORDANCE WITH THE APPLICABLE FAA SPECIFICATION AND IN A MANNER ACCEPTABLE TO THE AIRPORT MANAGER, TXDOT AND THE ARCHITECT.

6 . THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR TO ANY DAMAGE TO EXISTING PAVEMENTS, UNDERGROUND CABLES, PIPELINES, ETC. ENCOUNTERED DURING CONSTRUCTION. ALL REPAIRS MUST BE MADE IN COMPLIANCE WITH THE AIRPORT MANAGEMENT, THE ARCHITECT, FAA AND TXDOT AVIATION DIVISION REQUIREMENTS.

ENVIRONMENTAL NOTES

1. IN THE EVENT THAT UNANTICIPATED ARCHEOLOGICAL DEPOSITS ARE ENCOUNTERED DURING CONSTRUCTION, WORK IN THE IMMEDIATE AREA WILL CEASE AND THE TXDOT AVIATION ENGINEER WILL CONTACT PROFESSIONAL ARCHEOLOGISTS TO INITIATE POST – REVIEW DISCOVERY PROCEDURES UNDER THE PROVISIONS OF 36 CFR 800.13
2. IN THE EVENT THAT UNANTICIPATED HAZARDOUS MATERIALS ARE ENCOUNTERED DURING CONSTRUCTION, WORK IN THE IMMEDIATE AREA SHALL CEASE AND AIRPORT MANAGEMENT AND TXDOT WILL BE NOTIFIED.
3. HAZARDOUS WASTE: ALL SPILLS MUST BE REPORTED IMMEDIATELY TO AIRPORT MANAGEMENT.
4. EROSION CONTROLS SHALL BE INSPECTED EVERY SEVEN DAYS.
5. THE FEDERAL MIGRATORY BIRD TREATY ACT (MBTA) (16 USC 703-711), 50 CFR 10, AND FISH & GAME CODE 3503, 3513, AND 3800, PROTECT MIGRATORY AND NONGAME BIRDS, THEIR OCCUPIED NESTS, AND THEIR EGGS. IN THE EVENT THAT MIGRATORY BIRDS ARE ENCOUNTERED ONSITE DURING PROJECT CONSTRUCTION FROM FEBRUARY 15 TO OCTOBER 1, THE SUPERINTENDENT WORKING ON THE PROJECT MUST TAKE REASONABLE CARE TO AVOID IMPACTS TO PROTECTED BIRDS, ACTIVE NESTS, EGGS AND/OR THEIR YOUNG. A PERSON THAT VIOLATES THE MBTA MAY BE HELD STRICTLY LIABLE FOR ACTIONS THAT RESULT IN UNPERMITTED TAKE. WHEN MIGRATORY BIRD NESTS ARE DISCOVERED WHICH, MAY BE ADVERSELY AFFECTED BY CONSTRUCTION ACTIVITY, OR WHEN A BIRD IS FOUND INJURED OR KILLED AS A RESULT OF CONSTRUCTION ACTIVITY, IMMEDIATELY STOP WORK WITHIN 50 FEET OF THE NEST OR BIRD AND NOTIFY AIRPORT MANAGEMENT, ARCHITECT AND THE TXDOT AVIATION DIVISION ENVIRONMENTAL PLANNER.

6. ANY LOCATIONS OF THE FILTER FABRIC SILT FENCE SHOWN ON THE PLANS ARE APPROXIMATE ONLY. THE EXACT LOCATION SHALL BE DETERMINED BY THE ARCHITECT OR PROJECT REPRESENTATIVE. THE FILTER FABRIC SHALL BE INSTALLED AND MAINTAINED AS SPECIFIED. PAYMENT SHALL BE MADE BASED ON THE PRICE AS LISTED ON THE PROPOSAL PROPOSAL AND THE ORIGINAL LINEAR FEET OF MATERIAL INSTALLED. PAYMENT SHALL NOT BE MADE FOR REPLACEMENT FENCE REQUIRED FOR REPAIR OR MAINTENANCE. THE FILTER FABRIC FENCE SHALL BE MAINTAINED IN PROPER CONDITION AT ALL TIMES DURING THE PROJECT. THE COST OF REPAIRING THE FILTER FENCE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

01010 SUMMARY OF THE WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings: and conditions of the construction contract, including but not limited to General Conditions, and the Special Conditions listed below, apply to work of this section.

DIVISION 1

SECTION

01000 Job requirements
01010 Summary of the Work
01050 Field Engineering
01200 Substitutions and Products
01300 Shop Drawings, Project Data and Samples
01500 Temporary Facilities
01510 Temporary Utility Services
01530 Barricades
01700 Contract Closeout
01710 Cleaning

1.2 PROJECT/WORK IDENTIFICATION
A. Project Name and Location:
Webb County Main Fire Station and Administration Building
Bob Bullock LP 20
RR6078A RD Lot 2
Laredo Texas 78045

B. Architect: The term "Architect" refers to the professional services contractor
listed below:
Hickey Peña Architects
919 Victoria St.
Laredo, Texas 78040

C. Abbreviated Written Summary: Briefly, and without force and effect upon the contract documents, work of contract can be summarized as follows:
The project consists of site demolition, utility relocations, and construction of a new, stand-alone Fire Station and parking lot as per plans and specifications prepared by Hickey Peña Architects dated 11/14/14

1.13 CONTRACTOR USE OF PREMISES
A. General: The Contractor shall have full access to the site for the work indicated.

1. Use of the Site: Confine operations at the site to the areas permitted under the Contract.

1.14 CONSTRUCTION COORDINATION
A. General: The Contractor shall be responsible for coordinating his work with other entities performing work at the site.

1.15 INSPECTION BY REGULATORY AUTHORITIES
A. This project is subject to inspection by the following regulatory authorities:

City of Laredo Building Inspection
Occupational Safety and Health Administration

B. Notify Architect when inspections take place. Decision as to action to be taken as a result of inspections by regulatory authorities will be made by the Owner and Architect.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Identification and Description of allowances.

1.02 RELATED REQUIREMENTS

Related work of other sections:
Section 01010 – Summary of Work.
Divisions 2 through 16: Sections affected by each Alternate.

1.03 PROCEDURES
A. Allowances for incorporation into the Work are identified in the Contract Documents. Coordinate all related Work and modify surrounding Work as required to incorporate the allowances.
ALL ALLOWANCES ARE EXCLUSIVE OF THE GENERAL CONTRACTOR'S OVERHEAD AND PROFIT.

1.04 DESCRIPTION OF ALLOWANCES

ADA Allowance - $5,000: This allowance is reserved for potential construction items related to the existing site and/or proposed improvements occasioned by the review of the Texas Department of Licensing and Regulation's Elimination of Architectural Barriers Division of subject project plans and specifications. The allowance amount is exclusive of the General Contractor's overhead and profit and is to be included in the Base Proposal Amount.

Exterior Signage Allowance (Metal Letters): $3,500: This is reserved for the purchase of material, delivery, handling, and installation of permanent plaque in the form of letters and/or plaques. The allowance amount is exclusive of the General Contractor's overhead and profit.

Betterment Fund Allowance: $20,000: This allowance is reserved for use at the discretion of the Owner.

Landscape & Irrigation Allowance: $15,000.00: This allowance is reserved for the landscaping and irrigation of all green areas.

Cast Metal Plaque Allowance: $4,000 For product, delivery and handling and installation.

Door Hardware Area: $30,000: For the purchase, delivery, handling and installation of all door hardware including storefront door hardware listed in the Door Hardware schedule.

PART 2 – PRODUCTS

NOT USED IN THIS SECTION

PART 3 – EXECUTION

NOT USED IN THIS SECTION

Alternates:

Substitute Alternate:

- **Substitute alternate #1** : Porcelain Tile in lieu of VCT floor tile on plans at floors. Porcelain tile shall be: 12" x 24" PORCELAIN TILE - STRATOS ORION/GRIS UNPOLISHED BY ROCA TILE GROUP OR APPROVED EQ.
- **Substitute Alternate #2:** Apparatus Concrete lieu of asphalt Re: Civil Plans

ADD Alternate:

- **ADD Alternate #1** Site Marquee: Shall include all purchase of material, delivery, handling, and installation of permanent marquee, lighting, and signage in the form of letters and/or plaques. RE: Architectural Plans for details.
- **ADD Alternate #3:** Relocation and installation of all existing equipment.

Item	Qty	Type	Description	
1	2	Comm	Console&Consolette	10-50W VHF 136-174Mhz XTL500
2	1	Comm	Aired Materials	Tension Cable (Antennae 65')
3	1	Equipment	Washer/Extractor	Continental Girbau EM055
4	1			Bauer Compressor

01040 COORDINATION

PART I - GENERAL

101 REQUIREMENTS INCLUDED:

A. Coordination of Work of Contract.

1.02 RELATED REQUIREMENTS:

A. Related Work of Other Sections:

1. Section 0 1 0 1 0- Summary of Work.
2. Section 01045 - Cuffing and Patching.
3 . Section 01 160 - Contractor Requirements.
4. Section 0 1200 - Project Meetings.
5. Section 01300 - Submittals.
6. Section 0 1 3 1 0 - Schedules, Reports and Payments.
7 . Section 0 1340 - Shop Drawings, Product Data, Samples and Colors.
8. Section 01600 - Material and Equipment.
9. Section 0 1630 - Product Options and Substitutions.
10. Section 0 1 700 -Contract Closeout: Closeout submittals.
11. Division 15 Sections: Mechanical and Plumbing Work.
12. Division 16 Sections: Electrical Work.

103 COORDINATION, GENERAL:

A. Coordinate all portions of the Work under the Contract. Require each Subcontractor to coordinate their portion of the Work and provide their requirements for coordination of their Work with other related Work.

B. Coordinate mechanical and electrical Work with that of other trades in order that various components of systems are installed at proper time, fit available space, and allow proper service access to those requiring maintenance, including equipment
specified in other Divisions.

C. Coordinate Work of sections having interdependent responsibilities for installing, connecting to, and pricing in service, such equipment.

D. Coordinate use of Project and sequence of installation of mechanical, plumbing, and electrical Work which is indicated diagrammatically on Drawings. Folllow routines shown for pipes, ducts, and conduits as closely as practicable, with due allowance for available physical space; make runs parallel with lines of building. Utilize space efficiently to maximize accessibility for other installations, for maintenance, for repairs.

E. In finished areas, except as otherwise shown, conceal pipes, ducts, conduit, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements. Provide escutcheon plates at penetrations through finished walls and

ceilings with finish appropriate to adjacent finish surface.

F. Coordination Drawings: Before materials are fabricated or Work begun, prepare coordination Drawings including plans, elevations, sections, and other details as required to clearly define relationships between sleeves, piping, ductwork, conduit, ceiling, lighting, and other mechanical, plumbing and electrical equipment with other components of the building such as beams, columns, ceilings, and walls.

1. Hold coordination meetings with trades providing the above Work, to coordinate Work of the trades for each floor and mechanical areas.
2. Prepare coordination Drawings to 1/4" = 1'-0" scale for general layout and 3 / 8" 1' = 0" for plans and sections in congested areas such as equipment spaces.
3. Resolve conflicts between trades, prepare composite coordination Drawings and obtain signatures on original composite coordination Drawings.
4. When conflicts cannot be resolved, Contractor shall request clarification prior to proceeding with that portion of the Work affected by such conflicts or discrepancies. Prepare interference Drawings to scale and include plans, elevations, sections, and other details as required to clearly define the conflict between the various systems and other components of the building such as beams, columns, and walls, and to indicate the Contractor's proposed solution.
5. Submit Drawings for approval whenever job measurements and an analysis of the Drawings and Specifications by the Contractor indicate that the various systems cannot be installed without significant deviation from the intent of the Contract. When such an interference is encountered, cease Work in the general areas of the conflict until a solution to the question has been approved by the A/E.
6. Submit original composite coordination Drawings as part of record document submittals specified in Section 01720.

G. Remove and relocate items which are installed without regard to proper access as directed by the A/E, at no additional cost to the Owner.

1.04 CORRESPONDENCE:

All correspondence relating to this Project must show the Project name, Project number & Contract number. Copies of all correspondence between the Owner, Contractor and A/E (except shop Drawings and submittals) should be provided to all parties. Copies of correspondence for the Owner should be provided to both the Project Manager and Inspector.

1.05 MEETINGS:

A. In addition to progress meetings specified in Section'01200, hold coordination meetings and pre-installation conferences with personnel and Subcontractors to assure coordination of Work.

1.06 COORDINATION OF SUBMITTALS:

A. Schedule and coordinate submittals specified in Sections 01300, 01310, 01340, 0 1380, 01630

and 0 1700 and other Sections.

Coordinate requests for substitutions to assure compatibility of space, of operating elements, and effect on Work of other sections.

1.07 COORDINATION OF CONTRACT CLOSEOUT:

A. Coordinate completion and cleanup of Work of separate sections in preparation for Beneficial Occupancy.

B. After Owner occupancy of premises, coordinate access to site by various sections for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.08 COORDINATION WITH LOCAL PERSONNEL:

A. Problems concerning traffic, parking or blocking streets must be referred to the City of Laredo Traffic Department. Coordination is to be through the Owner's Representative.

B. Any exterior problems, including the moving of utilities is to be referred to the City of Laredo Utilities Department. Coordination is to be through the Owner's Representative.

C. The scheduling of utility outages must be coordinated with the Owner's project manager of the individual institution at least one week in advance. This coordination is to be arranged through the Owner's Representative.

PART 2- PRODUCTS
NO'T' USED

END OF SECTION

01050 FIELD ENGINEERING

Checking dimensions at site: Before ordering any materials or doing any work, verify all measurements of the building and be responsible for the correctness of them. No extras will be allowed for variations form drawings in existing conditions or for work performed under this contract. Any discrepancies found shall be submitted to the architect for instructions before proceeding.

01200 PROJECT MEETINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:
A. Bidding and Contract Requirements and Division 1 - General Requirements of the Specifications apply to this work.

1.02 SECTION INCLUDES:
A. Requirements for the arrangement, distribution of notices, and maintenance of records for the pre-construction meeting, progress meetings, and pre-installation meetings.

1.03 GENERAL:
A.Contractors, subcontractors and suppliers representatives attending the meetings / conferences of this section shall be qualified and authorized to act on behalf of the entity each represents.

B.Comply with the following meeting requirements after execution of the Contract.

1. Arrangements: Arrange for a convenient, comfortable room in which to conduct the progress meetings, furnished as necessary to accommodate the people involved and to accomplish the purpose of the meeting. Owner will provide the room for the pre-construction meeting.

2. Notices: Distribute written notices to all concerned at least 1 week in advance of the meeting date.

3. Records: Keep notes during each meeting and distribute them in the form of minutes of the meeting to all concerned within 4 days after the adjournment of the meeting.

4. Schedule Updating: Immediately following each progress meeting, where revisions to the progress schedule have been made or recognized, revise the progress schedule. Reissue revised schedule concurrently with report of each meeting.

1.04 PRE-CONSTRUCTION MEETING:

A. Chairman: The meeting will be presided over by the Owner's Representative.

B. Attendance: The following, persons will he expected to attend:

1. Owner's Representative.
2. Architect/Engineer's Construction Administrator.
3. Architect/Engineer's Consultant for Mechanical, Electrical and Structural Engineering.
4. Contractor's General Superintendent and Project Manager.
5. Major Subcontractors including those for mechanical, plumbing and electrical work.

C. Agenda: Subjects shall include, but are not limited to the following:

1. Distribution of submittals. Refer to Section 01300.
2. Sequence of critical work
3. Relation and coordination of Contractor.
4. Designation of responsible personnel.
5. Processing of Change Orders.
6. Adequacy of distribution of Construction Documents.
7. Handling of materials to permit inspection.
8. Procedure for maintaining Record Documents.
9. Use of the premises; access to the Site, office and storage areas, and Owner's requirements.
10. Major equipment deliveries and priorities.
11. Safety and first aid procedure.
12. Security procedures.
13. Housekeeping procedures.
14. Additional subjects as requested by the Owner, the Architect / Engineer or the Contractor.
15. List of major subcontractors and supplies.

1.05 PROGRESS MEETINGS:

A. Chairman: Contractor's Project Manager or Project Superintendent shall

preside over the meeting.

B. Attendance: The following persons will be expected to attend:

1. Owner's Representative.
2. Architect / Engineer's Construction Administrator.
3. Architect / Engineer's Consultants for mechanical, electrical and structural engineering until excused from attendance.
4. Contractor's General Superintendent, Project Superintendent and Project Manager.
5. Subcontractors who have work in progress.
6. Subcontractor who will start work within the next month.
7. Others as requested by Owner, Architect/Engineer, or Contractor.

C. Agenda: The Contractor will provide a written agenda including but not necessarily limited to the following items:

1. Present a brief written narrative of construction progress since the last month meeting containing:

   a. General description of work performed.
   b. Expectation of meeting scheduled dates.
   c. Description of current or anticipated delaying factors or problems, if any.

2. Review the updated Progress Schedule and present a written schedule analysis.
3. Review the Submittal Schedule/Log.
4. Review the Revision Log.
5. Review of Requests for Information.
6. Review of Record (nAs Built") Drawings.
7. Review/approval of the Pay Request.
8. General discussion: Other outstanding/current business.

D. Number of Meetings: A minimum of one progress meeting shall be held each month. Other weekly or biweekly progress meetings shall be held as determined by the Owner and shall cover those subjects as required by the Owner.

1.06 PRE-INSTALLATION MEETINGS:

A. When required in individual specification Section, convene a pre-installation meeting at the Project field office prior to commencing work of the Section.

B. Require attendance of entities directly affecting, or affected by, work of Section.

C. Notify Architect ten (10) days in advance of meeting date.

D. Contractor shall prepare agenda, preside at meeting, record minutes, and distribute copies within four (4) working days after meeting to participants, with three (3) copies furnished to the Architect and one (1) copy furnished to the Owner.

E. Review conditions of installation, preparation and installation procedures, and coordination with related work. Review submittals for all work to be installed.

F. The Contractor shall maintain an adequate inspection system and perform such inspection to insure that the work called for by this contract conforms to the contract specifications and requirements.

G. The Contractor shall maintain complete inspection records and make them available to the Owner's Representative

1.07 PRE-ROOFI NG CONFERENCE:

A. Refer to applicable Division 7 section for requirements.

1.08 LOCKSET HARDWARE/KEY CONFERENCE:

A key conference shall be conducted after approval of hardware submittal prior to the ordering of lock hardware. The General Contractor shall, in conjunction with the Project Manager, A/E and User Coordinator, establish a date for the keying conference to be held. A key conference is required to review the function of the locks and to insure that all security requirements of the Using Agency will be met.

PART 2 - PRODUCTS
NOT USED

PART 3 – EXECUTION
NOT USE

01300 SUBMITTALS

PART 1 - GENERAL

1.01. Related Documents

A. Bidding and Contract Requirements and Division 1 - General Requirements of the Specifications apply to this work.

1.02. Section Includes

A. Administrative submittal requirements including but not limited to:

1. List of proposed subcontractors.

2. List of materials.

3. Contract price breakdown.

4. Progress schedule.

1.03. Related Work

A. Coordinate the work of this Section with work of other Sections as required to properly execute the Work, and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Section 01010 - Summary of Work.

2. Section 01310 - Schedules, Reports and Payments.

3. Section 01340 - Shop Drawings, Product Data, Samples and Colors.

4. Section 01600 - Material and Equipment.

5. Section 01630 - Product Options and Substitutions.

6. Section 01700 - Contract Closeout.

7. Division 15 and 16 Sections: Additional submittal requirements for mechanical, plumbing and electrical work.

1.04. General Requirements

A. General

Immediately after the development and acceptance of the fully developed progress schedule, prepare a complete schedule of work-related submittals. Submit this schedule within 10 days of the date required for establishment of progress schedule. Correlate this submittal schedule with the listing of principal subcontractors, as required by the Special Provisions, and with the "list of materials" as specified and elsewhere in Contract Documents.

B. Form

Prepare the schedule in chronological order of submittals. Show category of the submittal, name of Subcontractor, a generic description of schedule, the scheduled date for the first submission, resubmittal, and the final release or approval by Architect/Engineer. Submittals of written data shall be on 8-1/2 x 11 inch size paper, they shall be typed and they shall clearly state the name of the project, the subject of the submittal and its date.

C. Delivery

Submittals shall be sent to the Architect/Engineer's office **AT LEAST 60 DAYS PRIOR TO CONTRACTOR'S REQUIRED APPROVAL DATE TO BE COORDINATIED WITH CONSTRUCITON SCHEDULE, MFR PREPARATION AND DELIVERY TIMES, AND INSTALLATION TIMES.**

D. Approval

When approval Is required, resubmittals shall be made when necessary in the manner described for the original submission, unless specified otherwise, until it is received.

1.05. LIST OF PROPOSED SUBCONTRACTORS AND SUPPLIERS

A. General

Not later than 30 days after Award of Contract, submit the names of subcontractors and material suppliers proposed for work tabulated by and complete for each portion of the work ir1 duplicate, in accordance with General Conditions. Performance or non-performance of any subcontractor or material supplier will not relieve the Contractor of its responsibility for work as called for under the Contract Documents.

B. Submit list of materials within 60 days after issuance of Notice to Proceed in accordance with General Conditions.

1.06. LIST OF PROPOSED MATERIALS

A. Materials List

Submit in duplicate a list of the following types of materials proposed for installation:

1. Material not specified (follow substitution requirements specified in Section 01 630).

2. Material selected from a Specification naming more than one manufacturer or supplier.

3. Material selected to conform to a reference specification when no manufacturer has been named.

B. It will be assumed that unlisted materials will be furnished as specified when only one manufacturer has been specified or that the Architect/Engineers selection will govern when more than one manufacturer has been named or when reference specifications have been used.

C. The list shall tabulated by, and be complete for, each Specification Section and portion of the Work. Include name of manufacturer of each material. For materials specified by reference standards, also include the following, with the listing of each such product:

1. Address of manufacturer.

2. Trade name.

3. Model or catalogue designation.

4. Manufacturer's data, including performance and test data and referenced standards.

1.07. Contract Price Breakdown

A. General

Submit Contract Price Breakdown to Owner and Architect at least 20 days prior to submitting first Application for Payment. (Refer to General Conditions) Upon request of Architect, furnish additional data to support values given that will substantiate their correctness. Approved Contract Price Breakdown will be used as basis for reviewing Contractors Applications for Payment.

Identify and recap the 10% of the total amount of work to be performed by the Contractor's own organization in accordance with General Conditions

B. Form and Content

1. Submit typewritten Schedule. Use AIA Document G 702.

a. Use Table of Contents of Project Manual as basis of format for listing costs of Work.

b. List installed value of component parts of Work in sufficient detail to serve as basis for computing values for progress payments.

2. List item costs shall not include General Contractor fee/overhead and profit; but, shall reflect the direct cost for labor and materials to General Contractor. Separate items into labor amounts and material amounts for each item.

3. For items on which payment will be requested for stored materials, break down value into:

a. Cost of materials, delivered and unloaded, with taxes paid.

b. Total installed value.

4. Labor Costs

Include estimated installation costs including labor, applicable taxes, insurance, fringe benefits, erection equipment and tools.

5. Materials Costs: Include estimated material and manufactured equipment costs including delivery, taxes and insurance.

6. Itemize separate line item cost for each of the following General Contractor cost items:

a. Bonds

b. Field supervision and layout.

c. Temporary facilities and controls.

d. General Contractor overhead and profit or "fee."

7. Combined total of all costs listed in Schedule shall equal Contract Sum.

C. Review and Resubmittal

1. After initial review by Owner and Architect, revise and resubmit if required.

2. Revise and resubmit along with next Application for Payment when a Change Order is issued. List each Change Order as a new line item.

1.08. Progress Schedule (Re: General Conditions)

A. Submission

Prepare and submit in triplicate, a progress schedule and bar graph or if specified, a Critical Path Method Schedule as specified in Section 01310 Schedules, Reports and Payments.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

01310 SCHEDULES, REPORTS AND PAYMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:
A. Bidding and Contract Requirements and Division 1 - General Requirements of the Specifications apply to this work.

1.02 SECTION INCLUDES:
A. Administrative submittal requirements, including but not limited to:

1. Bar chart progress schedule.
2. Daily reports.
3. Payment requests.

1.03 RELATED WORK:
A. Coordinate the work of this Section with work of other Sections as required to properly execute the Work, and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Section 01010 - Summary of Work.
2. Section 01300 - Submittals.
3. Section 01340 - Shop Drawings, Product Data, Samples and Colors.
4. Section 01700 - Contract Closeout.

1.04 PROGRESS SCHEDULE:
Coordination: Comply with General Conditions. Coordinate both the listing and timing of reports and other activities required by provisions of this Section and other Sections, so as to provide consistency and logical coordination between the reports. Maintain coordination and correlation between separate reports by updating a monthly or shorter time intervals. Make appropriate distribution of each report and updated report to all parties involved in the work including the A/E and Owner. In particular, provide close coordination of the progress schedule, contract price breakdown, listing of subcontracts, schedule of submittals, progress reports, and payment requests.

A. Preliminary Work Progress Schedule: Submit a bar-chart type progress schedule within three weeks after receipt of Notice to Proceed.

1.05 DAILY REPORTS:
A. Prepare a daily report, recording the following information concerning events at the Site; and submit duplicate copies to Architect/Engineer and Owner at regular intervals not exceeding weekly intervals:

1. List of subcontractor at the Site.
2. Approximate count of personnel at the Site.
3. High/low temperatures, general weather conditions.
4. Accidents (refer to accident reports).
5. Meetings and significant decisions.
6. Unusual events (refer to special reports).
7. Stoppages, delays, shortages, losses.
8. Meter readings and similar recordings.
9. Emergency procedures, field orders.
10. Orders/requests by governing authorities.
11. Visitors.
12. Services connected, disconnected.
13. Equipment or system test and start-ups.
14. Partial completions, occupancies.

1.06 PAYMENT REQUESTS:
A. General: Except as otherwise indicated, the progress payment cycle is to be regular. Each application must be consistent with previous applications and payments. Certain applications for payment, such as the initial application, the application at final payment application involved additional requirements. Refer to General Conditions for additional requirements.

B. Construction Voucher: AIA Document G 702 and Contractor prepared back-up sheets.
At the earliest convenient time after receiving the notice of award, the Contractor shall develop a cost breakdown to reflect the value of the

categories of work.

C. Contractor's Estimate/Contract Payments:

General Conditions, makes provisions for partial payments once each month to the Contractor based on the amount of work completed and materials stored. The approved Contract breakdown schedule will be used in calculating the progress payments.

D. Monthly Payment Estimates:
Once each calendar month the A/E, General Contractor's superintendent, and Owner's Representative will have an on-the-job meeting in which to review the Contractor's estimate and to agree upon a percentage complete for the various items of work. The Owner's Representative will review the estimate prior to presentation to the A/E for approval. The agreed upon percentage and amount will be typed on the Contract breakdown schedule and signed by the General Contractor's representative and Owner's Representative.

The A/E will show approval by signature on the face of the construction voucher AIA Document G 702 in conjunction with the authorized representative of the General Contractor. Only an original Form G702 (red dot) should be sent to the Owner, for further processing. Refer to General Conditions.

1. Limitations - Estimates will not be approved if the job site As-Built drawings are not up to date and posted.

2. Historically Underutilized Business Progress Reports will be prepared and submitted with the pay request each month in accordance with the General Conditions. Pay requests will not be approved without this completed form.

3. Contract Change Statement - All approved revisions should be entered on the Contract Change Statement. This Statement will then be attached to the Contractor's monthly payment estimate. Percentages complete should be shown opposite each item listed and extended into the "Total Complete to Date column. The total of the Total Complete to Date" should be brought forward to the line item on the breakdown schedule titled, "Changes Complete to Date".

4. Payment for Stored Materials - Invoices for stored materials will be submitted when required by the Owner's Representative.
Stored material invoices will be accepted only after an approved shop drawing or sample has been received by the Facilities Construction Division.

5. Payment of Estimates- It is the desire of the Owner to process the Contractor's estimates as promptly as possible. In order to do this, it is requested that these instructions be followed and that the Contractor make every effort to see that the estimate is mathematically correct and that only approved items are included as material stored on the site.

Invoices for stored materials will only be considered when they exceed five hundred dollars ($500) for each individual item. There will be no invoices accepted that contain tools, or expendable materials.

Invoices will only be considered that are referenced to the materials in the estimate cost breakdown. Invoices that are not legible will not be considered for payment.

All stored materials will be checked by the Project Superintendent and verified by the Owner's Representative before being incorporated into the payment estimate.

E. Base applications for Payment on value of work installed, and materials and equipment suitably stored at Site. Materials and equipment suitably stored off site in an insured or bonded warehouse may be included, if approved in writing by Owner.

F. Payment for Stored Materials:

1. Where the Schedule of Values separates items into labor amounts and material amounts, payment will be made for materials delivered and suitably stored on Site.

2. Materials stored at an off site location which are eligible for inclusion on progress payments are defined as finished goods made specifically for the Project. Raw materials, work in progress at fabrication plants, and commodity items readily available for purchase are not eligible for inclusion in Contractor's Application for Payment.

3. Payment will be made under following provisions:
   a. Items are listed separately on Application for Payment.
   b. Include with Application for Payment:
      (1) Paid receipts showing Contractor is unconditional owner.
      (2) Fully executed Transfer of Title on photocopy of form provided herein.
      (3) Location where materials are stored if off site, and method used to store.

(4) Identify items in off site storage as property of Owner and furnish description of identification method.
(5) Inventory of items and methods used to verify inventory, including Contractor's certification that quantities have been received in good order.
(6) Proof of insurance for materials stored off site, in Owner's name.
(7) Proof of transportation arranged for delivery of material stored off site.

c. Owner reserves right to verify storage by physical inspection at any time.
d. Payment does not relieve Contractor's obligations to protect, transport and install materials.
e. Title of materials upon which partial payments are made shall transfer to Owner.

Partial payment does not constitute acceptance by Owner nor a waiver of any right or claim by Owner. Any costs incurred by Owner shall be paid by Contractor.

G. Final Payment Application: Administrative actions and submittals must precede or coincide with submittal of Contractor's final payment application.

1. Complete project closeout requirements specification in Section 01700.
2. Additions and deductions resulting from (1) previous Change Orders, (2) deductions for reinspection payments, and (3) other adjustments.

a. Original Contract Sum.
b. Additions and deductions resulting from (1) previous Change Orders, (2) deductions for reinspection payments, and (3) other adjustments.
c. Retainage withheld from previous payments.
d. Total Contract Sum, as adjusted.
e. Previous payments.
f. Sum remaining due.

3. Architect will prepare final Change Order, reflecting approval adjustments to Contract Sum not previously made by Change Orders.

4. Final payment constituting entire unpaid balance of Contract Sum will be made within 60 days after final Certificate of Payment has been approved.

H. Application Transmittal: Submit three (3) executed copies of each payment application, one copy of which is completed with waivers of lien and similar attachments. Transmit each copy with a transmittal form listing those attachments, and recording appropriate information related to application in a manner acceptable to Owner. Transmit to Owner by means ensuring receipt with 24 hours.

I. Cash Flow Schedule: With the required progress schedule, prepare and submit for approval an Estimated Cash Flow Schedule for the Work, detailing the monthly payment requirements anticipated during the course of the Work.

1.08 CONTRACTOR'S PAYROLL RECORDS

A. The Contractor is required to make the weekly payroll records available to the Owner for verification. These records are necessary to ascertain whether the prescribed wage rates are being paid or to verify wages as submitted in Contract revisions. Refer to General Conditions.

B. On certain projects, the Contractor will be required to furnish a complete set of payroll records weekly.

C. The Contractor is required to submit a written monthly narrative of construction progress. This report should be submitted to the A/E with copies to the Project Manager and Project Inspector. Refer to General Conditions.

1.09 ARCHITECT/ENGINEER REPORTS

A. The A/E will make a monthly report to the Owner containing:

1. A brief synopsis of the work completed for this period; anticipated problems; and a review of the outstanding submittals and revisions.

A copy of this report shall be furnished to the Project Manager, Project Inspector, and General Contractor.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

01340 SHOP DRAWINGS, PRODUCT DATA, SAMPLES AND COLORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:
A. Bidding and Contract Requirements and Division 1 - General Requirements of the Specifications apply to this work.

1.02 SECTION INCLUDES:
A. Submittal requirements, including but not limited to:

1. Shop drawings, product data, samples and colors.
2. Submittal procedures.
3. Review procedures.
4. Mockups and field samples.

1.03 RELATED WORK:
A. Coordinate the work of this Section with work of other Sections as required to properly execute the Work, and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Section 01010 - Summary of Work.
2. Section 01040 - Coordination.
3. Section 01300 - Submittals.
4. Section 01310 - Schedules, Reports and Payments.
5. Section 01600 - Material and Equipment.
6. Section 01630 - Product Options and Substitutions.
7. Section 01700 - Contract Closeout.
8. Other Technical Sections: Additional submittal requirements.

1.04 SUBMITTALS, GENERAL:
A. In addition to the requirements outlined under the General Conditions, Contractor shall comply with the following duties and responsibilities.

B. The Contractor shall submit to the A/E for review all shop drawings, product data, samples and other submittals for all items required in the Technical Sections of the Specifications and for all items proposed for use in the Work. Do not combine submittals for specified work with requests for substitutions. Submit requests for substitutions. See Section 01630 for requirements.

C. The Contractor shall review and designate (stamp) its approval and submit, with reasonable promptness and in orderly sequence, all shop drawings, product data and samples required.

D. Submit shop drawings, product data and samples far enough in advance to allow ample time for A/E's review, re-submittal if required, and fabrication without creating any delay in the Work, or the work of any other Contractor or subcontractor.

1. Make architectural submittals a minimum of 30 days prior to needed return date.
2. Make structural, mechanical and electrical submittals a minimum of 45 days prior to needed return date.
3. Allow more review time for requests or substitutions.
4. Shop drawings will be discussed at the Pre-Construction Conference on an individual project basis regarding the number of shop drawings to be submitted for review by the A/E and Owner. See General Conditions, Article V, paragraph 5.14.4 for requirements.
5. The A/E, after review and approval of submittals, will keep one copy for file and return remaining copies to contractor.

E. Submittal Content Requirements:

1. Shop drawings shall be completely detailed and dimensioned with types, sizes, and gauges of materials noted. Where shop coat of paint is required on materials, brand name, and chemical content shall be noted on the drawings.
2. Shop drawings shall be neatly, accurately, and legibly drawn, noted and referenced.
3. Each item contained in the submittal shall be clearly referenced and noted establishing the item's location in the finished work.
4. Member and item designations shall be the same as those used on the A/E's drawings, except that, where the A/E's has used the same designation for more than one member or item, the Contractor may add a suffix to the designation to differentiate between these members.
5. Where published standard exist (such as ACI Standard 315-65 reinforcing steel), these shall be followed in the preparation of shop drawings. Where no such standards are published by the industry or trade concerned, the shop drawings

shall be prepared in a suitable form acceptable to the A/E.

F. Submittal Format Requirements:

1. Submittal Preparation: Mark each submittal with a permanent label or title block, as appropriate, for identification with the following information on the label or title block for proper processing and recording of action taken.

a. Title of submittal and date submitted.
b. Sheet number and number of sheets included (as applicable). Number drawings consecutively.
c. Project Name, Project Number, and location of Project.
d. Name of Architect and Architect's Project Number.
e. Name of Contractor, subcontractor, fabricator supplier, and manufacturer, as appropriate.
f. Name of drawing and scale (as applicable).
g. Name and date of each revision.
h. Cross reference to A/E's Drawings and Specification Sections, as appropriate.
i. Provide a space on the label or adjacent to title block for the Contractor's review and approval markings, and appropriate space for the Architect's or Engineer's "Action" stamp.
j. Name of each item on each sheet submitted and indicate its location in the Project Work.

2. Submittal Numbering System: To expedite review of shop drawings, product data, samples and other submittals, all submittals shall be assigned a submittal number clearly visible on all transmittal forms and on each copy of each submittal adjacent to Contractor's review stamp. Numbering system shall track Specifications format. In the example the number represents the following:

a. First Two Numbers: Specification Division; Division 3 in example.
b. Third Through Fifth Numbers: Numerical log of submittals within each Division; Submittal number 1 in example.
c. Last Number: Initial or re-submittal of each submittal; .0 for initial submittal, .1 for first re-submittal, and so forth.

3. Transmittal Form: Provide a letter of transmittal with each submittal, in duplicate, accurately describing the complete contents of the submittal, including the following:

a. Project name.
b. Date.
c. To:
d. From:
e. Names of subcontractor, manufacturer and supplier.
f. References.
g. Category and type of submittal.
h. Submittal purpose and description of number of sheets, type of data, equipment and product types, finishes, submittal number, and similar data.
i. Submittal and transmittal distribution record.
I. Signature of transmitter.
k. Record relevant information and requests for data on the transmittal form. On the transmittal form, or on a separate sheet attached to the form, record deviations from the requirements of the Contract Documents, if any, including minor variations and limitations.

4. Submit Plumbing, Mechanical and Electrical items specified in each individual Section at the same time. Partial submittals will not be considered.
5. Bind each of the Plumbing, Mechanical and Electrical submittals into a complete brochure; loose sheets will not be accepted. Each complete brochure shall contain a Table of Contents showing the order in which the items are arranged in the brochure and shall have extended index tabs for each item. Arrange items in the same order in each brochure. Where manufacturer's literature contains information on more than one product, clearly mark the item being submitted, using the symbol or designation used to identify the item on the Drawings or in the Specifications.

6. Group only like or related items together in a single submittal. Do not combine submittals for specified work with requests for substitutions. Submit requests for substitutions as specified in Section 01630.

G. Contractor Duties and Responsibilities:

1. Coordinate requirements for submission of each shop drawing, product data and sample as required to properly execute the Work and as necessary to maintain satisfactory progress of the Work in accordance with the Construction Progress Schedule and Submittal Schedule.

2. Review shop drawings, product data, and samples prior to submission to Architect. By submitting shop drawings, product data, and samples, Contractor represents that it has verified field measurements, field construction criteria, catalog numbers and similar data,

and has coordinated each submittal with requirements of the Work and of the Contract Documents. Contractor's responsibility for errors and omissions in submittals is not relieved by A/E's review of submittals. Submittals received from sources other than Contractor will be returned to sender without Architect's or Engineer's review "action".

3. Contractor shall certify by stamped, signed, and dated notation on each submittal, that "Submittal is in compliance with requirements of Contract Documents without deviation." Submittals without Contractors stamp and submittals which, in A/E's or Owner's opinion, are incomplete, contain numerous errors, have not been checked, or have been checked only superficially, will be returned without disposition. Delays resulting therefrom shall be Contractor's responsibility.

4. Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by A/E's review of shop drawings, product data, and samples unless Contractor has specifically informed the A/E in writing of such deviation at time of submission and A/E has given written acceptance to the specific deviation.

5. Contractor shall direct specific attention, in writing or on resubmitted shop drawings, product data or samples, to revisions other than those requested by Architect on previous submittals.

6. Contractor shall give prompt written notice to A/E of inability to comply with exceptions noted on the returned submittals or if unsatisfactory results are anticipated. Document specific reasons for inability to comply or specific unsatisfactory results that are anticipated. Propose substitution to comply with intent of the Contract Documents and produce satisfactory results in accordance with the substitution requirements of Section 01630.

7. No portion of the Work requiring submission of a shop drawing, product data or sample shall be commenced until submittal has been reviewed with "No Exceptions Taken" status by A/E, except as otherwise provided in this Section.

8. All portions of the Work shall be in accordance with approved submittals.

H. Submittal Quantity: Unless greater quantity is otherwise required, provide and transmit to the office of the A/E, at the address given in the Contract Documents, the quantity of shop drawings, and product data required in General Conditions. Submit minimum of three samples of materials requiring choice of color, texture or finish. Large Job site samples shall be limited to one for each approval submittal. Refer to Section 01630 for additional requirements.

I. Reproduction and Distribution of Submittals After A/E's Review: Provide and distribute blueline prints of reviewed shop drawing reproducible transparencies as required to provide 2 copies for Owner and 1 copy for Job Site file (both "No Exceptions Taken" status only), and copies necessary for Contractor operations. Distribute sets of product data to provide 2 copies for Owner and 1 copy for Job site file (both No Exceptions Taken" status only) and others as necessary for Contractor operations. Retain Job Site mock-ups and samples until removal is approved by A/E and Owner's Representative.

1.05 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES:
A. Shop Drawings: Comply with "Submittals, General" and the following:

1. Definition: The term "shop drawings" refers to original drawings prepared by the Contractor, subcontractor, supplier, fabricator or distributor illustrating a portion of the Work including fabrication drawings, manufacturing drawings, erection drawings, setting drawings, patterns, coordination drawings, schedules, design mix formulas, Contractor's engineering calculations, and layout drawings including ceiling layouts if varied from the Contract Documents. Do not submit Contract Drawings for shop drawings.

2. Format: Prepare drawings on minimum 8-1/2" x 11" to maximum 30" x 42" sheets. Draw plan and section details at a scale of 1" = 1'- 0", details shall be drawn at scale of 3" = 1' - 0" or larger scale. In addition to "Submittals, General" requirements, each drawing shall be cross-referenced to A/E's Drawings.

3. Content: Drawings shall include, but not be limited to the following:

a. The size thickness of members.
b. The method of anchoring and securing parts together.
c. The quantity and location of each item.
d. Other pertinent data necessary to show the work to be done, where, and how it is to be done.
e. Materials and finishes.
f. How item fits to abutting work and requirements for related construction.
g. Required connections.
h. Overall size and weight.
i. Clearances and tolerances.
j. Verify field conditions prior to fabrication.
k. Coordinate Shop Drawings and data with requirements.
I. Refer to Section 01040 - Coordination for other requirements.

B. Product Data:

1. Definition: Manufacturer's standard product specifications, installation instructions, roughing-in diagrams and templates, standard wiring diagrams, printed performance and operational range diagrams, mill reports, operating and maintenance manuals, color charts, data sheets, brochures, drawings and diagrams, and other standard illustrative and descriptive data to clearly identify pertinent data, models and materials, uses, limitations, actual dimensions and clearances required, and technical performance data including wiring diagrams and controls.

2. Mark out information not applicable to this Project and supplement standard product data to show compliance with requirements.

C. Samples:

1. Definition: Samples include:

a. Partial sections of manufactured or fabricated work.
b. Small cuts or containers of materials.
c. Complete units of repetitively-used materials.
d. Swatches showing full range of color, texture and pattern.
e. Color range sets.
f. Units of work to be used for independent inspection and testing.
g. Units of work to be used as a standard to judge materials and workmanship.

2. Provide samples for items where specified and for items requiring a choice of color, texture or finish. Samples shall illustrate the materials and workmanship and establish standards by which to judge the completed work. Refer to Section 01630 for additional requirements.

3. Typical office samples shall be approximately 12" square of 12" long unless otherwise noted and shall clearly illustrate the applicable function, corners, joints, related parts, attachment devices, specified finish and full range of colors. Full size approved samples may be incorporated into the Work.

1.06 FIELD MOCK-UPS AND FIELD SAMPLES:

A. The Contractor shall erect and maintain mock-ups and field samples as required by the various sections of the specifications. Mock-ups and field samples are required for, but not limited to the following:

1. Concrete sidewalk finishes.
2. Exterior face brick wall complete with required tooled mortar, sealants and related stonework.

B. Field samples and job site mock-ups shall be erected at the Project Site at a mutually agreed location. Contractor shall request approval for location on which to construct mock-up of field sample prior to proceeding. Each field sample or mock-up shall be complete and illustrate the range of finish and workmanship required in the completed Work and will be used by A/E, upon approval, as a standard to judge subsequent work.

C. Where several mock-ups of alternate construction techniques or finishes are required and prepared, each shall be labeled for clear identification indicating base construction finish material, special techniques used and where important for duplication of effect line pressures, grit classification, lengths of exposure, surface preparation, undercoats, strength of reagents, etc.

D. Contractor shall request review of mock-up or field sample upon completion prior to proceeding with actual construction work.

E. Contractor shall protect mock-up or field samples from damage, dirt and discoloration after A/E's approval. Retain on the job as a standard reference for materials, workmanship and appearance until removal is authorized. Do not alter, move or destroy mock-up or field sample until so authorized.

1.07 COLOR SCHEDULES:

A. After receipt of all samples, A/E will present to the Owner a proposed comprehensive color schedule for review and approval.

1. The Contractor must insure that required submittals for all items requiring color selection are accomplished in a timely manner. The A/E cannot prepare the colorboard for approval by the Owner until all items requiring color selection have been submitted.

B. The approved color schedule will then be released to the Contractor for ordering materials.

C. No color selection will be released until all colors are approved in the comprehensive color schedule. Any "early" selections requested, and acted upon by the Contractor, shall be at its own risk and understanding that material of color differing from the approved color schedule will be rejected.

D. If the Contractor is unable to submit all color selections/samples within sixty (60) days after "Notice to Proceed", the A/E may proceed with preparation of the color schedule using the color selections of a specified product. The Contractor shall be required to match the selected colors at no additional cost to the Owner of the specified product selected by the A/E.

1.08 ARCHITECTS AND ENGINEER'S ACTION:
A. Upon receipt of submittals requiring review, the A/E will review submittals and return them to the Contractor with results of the review indicated as follows:

1. REVIEWED; NO EXCEPTIONS TAKEN: Submittal has been reviewed for the limited purpose of checking for conformance information given and design concept expressed in the Contract Documents and no exceptions are taken; Contractor may proceed with work represented in submittal, provided no deviation to Contract Documents.

2. REVIEWED; EXCEPTIONS NOTED: Submittal has been reviewed as stated above and certain exceptions are noted. Contractor may not proceed with work represented in submittal, except when specific written authorization to proceed is given by A/E. Revise submittal, incorporating exceptions noted, and resubmit to A/E until "Reviewed; No Exceptions Taken" status is given.

3. REVIEWED; REVISE AND RESUBMIT: Submittal has been reviewed as stated in paragraph 1 above, Contractor may not proceed with work represented in submittal, and submittal is not acceptable for one of the following reasons:

a. Not enough information is provided to make a determination.
b. Submittal contains too many errors or omissions to make a determination.
c. Information provided does not conform with the information given in the Contract Documents.

4. REJECTED; SUBMIT SPECIFIC ITEM: Submittal has been reviewed as stated in paragraph 1 above, work represented in submittal has not been accepted in accordance with procedures specified in Section; submit specified item.

1.09 REQUIRED SUBMITTAL SCHEDULE:
A. General:

1. In addition to the requirements outlined in the General Conditions, Special Conditions, Division 1 and in the Technical Sections of the Specifications, the Contractor shall submit shop drawings, product data, samples, color samples, warranties, and other pertinent data as briefly scheduled herein.

2. Refer to each individual Section of the Specifications for specific requirements of each submittal item.

3. Where requirements are not specifically indicated, provide sufficient data as required to incorporate each item into the work.

4. All subcontractors, suppliers, and manufacturers shall provide a duration, and as otherwise specified.

B. Submittal Schedule Legend: The following abbreviations are used in remarks column of the Submittal Schedule:

C:	Color Selection Required
CR:	Certifications
CT:	Certification or Qualification
CT-I:	Of Installer or Installation
CT-M:	Of Manufacturer
CT-P:	Of Product
CT-W:	Of Welder
G-1, G-5, Etc.:	Guarantee with number of years duration
IO:	Instruction of Owner's Personnel
K:	Keys
M:	Manufacturer's Data
MO:	Maintenance and Operating Manuals
MU:	Mock-ups
R:	Additional Replacement Materials
S:	Physical Samples
SCH:	Schedule
SD:	Shop Drawings
TR:	Test Reports

C. Submittal Schedule:

Division 0 - Bidding and Contract Requirements

List of Subcontractors within 30 days after notification of Contract Award

List of Materials within 60 days after issuance of Notice to Proceed

Construction Progress Schedule within 3 weeks after issuance of Notice to Proceed General Contractor's and Maintenance Warranty G1

Division 1 - General Requirements

Construction Progress with Schedule of Values within 3 weeks and each month there after Contract Warranty and Guarantee additions noted herein Guarantees additions noted herein Project Sign SD within 30 days Maintenance MO 4 sets prior to Final Acceptance and Payment
All items requiring Color Selection within 60 days

Soil, Concrete Mix Designs	M, S

Division 2 - Site Work

Termite Control	M, G-5
Hot-Mix Asphalt Paving	M, CT-P
Flexible Base	M, TR
Select Structural Fill Borrow Material	TR, S, G-1
Lime Stabilization	TR, G-1
Compaction and Testing	TR, Special Provisions
Soil Treatment	M, G5
Sidewalk Finish Sample	S, G-1
Concrete and Reinforcing Steel	M, TR, SD, G-1
Pavement Marking	M, C, SD, G-1
Water Service System	M, SD, TR, G-1
Storm Sewer System	M, G-1
Sanitary Sewer System	M, SD, G-1
Landscape	M, SD

Division 3 - Concrete

Concrete Formwork	SD
Concrete Work	M, SD, S, TR, CT-P
Cast-in-Place Concrete	M, TR, S, SD, CR, G-1

Division 4 - Masonry

C. M. U.	M, S
Mortar	M, S, C, MU
Unit Masonry	M, CT-P, S, MU, C

Division 5 - Metals

Structural Steel	M, SD, CR, TR, CT-W, G-1
Steel Joist & Joist Girders	M, SD, CT-P
Metal Roof Decking	M, SD, CR, TR, CT-P, CT-I, G-1

Division 6 - Wood and Plastic

Rough Carpentry	M, CR, G-1
Finish Carpentry	S, SD, G-1

Division 7 - Thermal and Moisture Protection

Fluid Applied Waterproofing	M, S, CR, SD, G-10
Flexible Flashing	M, S, CR, G-1
Dampproofing	M, G-1
Vapor Retarder	M, G-1

Building Insulation	M, S, CR, G-1
Firestopping	M, SD, G-1, Schedule
Flashing and Sheet Metal	M, SD, S, CR, G-2
Joint Sealers	M, SD, S, CR, C, G-5

Division 8 - Doors and Windows

Metal Doors and Frames	M, SD, CR, G-1
Wood Doors	M, SD, S, C, CR, G-Life
Aluminum Storefront	M, SD, S, C, CR, TR, G-5
Finish Hardware Schedule	M, SCH, SD, S, G-2
Glass and Glazing	M, SD, S, C, G-1/ G-5 (mirrors)

Division 9- Finishes

Gypsum Board Systems	M, S, CT-P, G-1
Interior Slate Facing	M, S, SD, MU
Tile	M, S, C, MU, R, G-1
Acoustical Panel Ceilings	M, S, R, CD, C
Resilient Flooring	M, SD, S, CR, R, C, G-1
Carpeting	M, SD, S, C, TR, R, G-15
Painting	M, SD, S, C, CT-P, R, G-l

Division 10- Specialties

Toilet Partitions	M, SD, S, C, CR, G-l
Toilet & Bath Accessories	SCH, S, M, MO, G-15
Identifying Devices	M, SD, S, C, G-1
Fire Extinguishers and Cabinets	M, SD, C, G-l
Toilet Accessories	M, SD, C, CR, S, G-1

Division 11 - Equipment (Not Used)

Division 12 - Furnishings (Not Used)

Division 13 - Special Construction (Not Used)

Division 14- Conveying Systems (Not Used

Division 15 - Mechanical

Refer to the various Division 15 Sections specific submittal requirements	M, SD, S. C, MO, IO, G1

Division 16- Electrical

Refer to the various Division 16 Sections specific submittal requirements	M, SD, S. C, MO, IO, G1

PART 2 - PRODUCTS
NOT USED

PART 3 - EXECUTION
NOT USED

01400 QUALITY CONTROL

PART 1- GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY
A. This Section specifies administrative and procedural requirements for quality control.

B. Quality control includes

1. Quality control of products and workmanship.
2. Manufacturer's instructions.
3. Manufacturer's certificates and field services.
4. Mockups.

C. Refer to Section 01410 for provision of testing laboratory services.

1.3 QUALITY CONTROL
A. Maintain quality control over supervision, subcontractors, suppliers, manufacturers, products, services, workmanship, and site conditions, to produce Work in accordance with Contract Documents.

B. Workmanship:

1. Comply with industry standards of the region except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
2. Provide suitably qualified personnel to produce Work of specified quality.
3. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.
4. Provide finishes to match approved samples.

C. Manufacturer's Instructions:

1. Require compliance with instructions in full detail, including each step in sequence.
2. Should instruction conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

D. Manufacturer's Certificates:

1. When required in individual Specifications section, submit manufacturer's certificate, in duplicate, certifying that products meet or exceed specified requirements, executed by responsible officer.

E. Manufacturer's Field Services:

1. When required in individual Specifications section, have manufacturer or his authorized representative provide qualified representative to observe field conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment test, adjust, and balance of equipment as applicable, and to make written report of observations and recommendations to Architect.
2. Individuals to report observations and site decisions or instructions given to applicators or installers that arc supplemental or contrary to manufacturers' written instructions.
3. Submit report in duplicate within 30 days of observation to Architect/Engineer for review.

F. Mockups
1. Tests will be performed under provisions of Section 01410.
2. Assemble and erect complete, with specified attachment and anchorage devices, flashings, seals, and finishes.
3. Remove mockup and clear area when work of that section is complete, when approved by Architect.

G. Field Samples:

1. Install field samples at the site as required by individual specifications Sections for review.
2. Acceptable samples represent a quality level for the Work.
3. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by Architect/Engineer.

PART 2 - PRODUCTS
NOT APPLICABLE

PART 3 - EXECUTION
NOT APPLICABLE

01530 BARRICADES

A. Provide barricades at hazardous location, complete with signs, general lighting, warning lights and similar devices where appropriate and in accordance with governing regulations.

B. Lock-up and security: As construction of building structure shell progresses and it becomes feasible to secure project against intrusion, provide temporary security enclosure, doors and locks as necessary to prevent unauthorized entrance. deliver, store and lock-up materials and equipment in a manner which will help prevent theft and vandalism.

C. Weather protection: Provide whatever protective means and methods that are required for preventing damage to building construction caused by elements of the weather.

CONTRACTOR'S USE OF PREMISES

A. Contractor shall limit his use of the premises for work and for storage to allow for:
Work by other contractors
Owner occupancy

B. Coordinate use of premises under direction of the architect and owner.

C. Assume full responsibility for the protection and safekeeping of products under this contract, stored on the site.

D. Moved any stored products, under contractor's control, which interfere with operations of the owner, tenants, anchor stores or separate contractor.

E. Obtain and pay for the use of additional storage or work areas needed for operation.

01600 MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:
A. Bidding and Contract Requirements and Division 1 - General Requirements of the Specifications apply to this work.

1.02 SECTION INCLUDES:
A. General requirements for materials and equipment, manufacturer's instructions, transportation and handling, storage and protection, material and coordination.

1.03 RELATED WORK:
A. Related Work of Other Sections:

1. Section 01010 - Summary of Work.
2. Section 01300 - Submittals: List of Materials.
3. Section 01340 - Shop Drawings, Product Data, Samples and Colors.
4. Section 01400 - Coordination.
5. Section 01500 - Construction Facilities and Temporary Controls: Material Storage Facilities.
6. Section 01630 - Product Options and Substitutions.
7. Section 01700 - Contract Closeout.

1.04 GENERAL REQUIREMENTS:
A. In addition to General Conditions, Contractor shall use materials and equipment that are:

1. New, unless otherwise specified, and that are of good quality, free from faults and defects, and in conformance with the requirements of the Contract Documents.
2. Suitable for use and function intended.
3. Corresponding in quality to related materials in the absence of a complete specification.
4. Of quality appearance where exposed to view.
5. Of one manufacturer or source for the same specific purpose, with uniform appearance and physical properties.
6. Interchangeable and be the same, when required to be supplied in quantity.
7. Free of name, trade mark, or other insignia which is intended to identify the manufacturer, vendor, or other source(s) which is surface applied or affixed to any manufactured articles, materials, and items of equipment in any public area or similar locations within the Project. Any manufactured articles, materials, and items of equipment which bears evidence that an insignia, name, or trade mark has been removed shall not be used. Code required labels, such as Underwriters Laboratory labels, and other identification required by the Contract Documents is expected.

B. Product Color, Texture, and Pattern Selection: No work requiring A/E's review for color, texture and pattern selection shall be fabricated, delivered or installed prior to review and selection.

1. Contractor shall select product of a named manufacturer that complies with the specified requirements and submit the full range of colors, textures, patterns, including custom colors, textures and patterns for Architect's selection. All subsequently approved products of other manufacturers are approved contingent upon availability of equivalent colors, textures, and patterns available to A/E for selection.
2. When "match existing color" is indicated or specified, Contractor shall, in addition to material and construction requirements specified elsewhere, match existing color, texture, and pattern in every respect, as approved by A/E.
3. When materials have a natural range of color, texture, and pattern such as natural stone, brick, tile, anodized aluminum finish and other exposed materials and finishes, submit required number of sets of ranges of color, texture, and pattern, including representative naturally occurring defects as appropriate, for A/E's review. All work fabricated and installed shall be within range of samples approved by Architect.
In addition, Contractor shall refer selection of raw materials containing defects within limits of A/E's approved range of samples, to Architect to provide distribution of such throughout required work so as to avoid patterns and concentrations of such defects.

C. Source Limitations: To the fullest extent possible, provide products of the same generic kind, from a single source, for each item of work.

1. When specified products are available from only sources that do not or cannot produce an adequate quantity to complete Project requirements in a timely manner, consult with A/E for a determination of what product qualities are most important before proceeding. A/E will designate those qualities, such as visual, structural, durability, or compatibility, that are most important. When Architect's determination has been made, select products from those sources that produce products that possess the most important qualities, to fullest extent possible.

D. Compatibility of Options: Where product options are permitted, select products that are compatible with other products to be incorporated into the Work, including products previously selected product options.

1.05 MANUFACTURER'S INSTRUCTIONS:
A. Install products in accordance with manufacturer's printed instructions. Obtain and distribute copies of such instructions to installer, including one copy to A/E and one to Owner's Representative. Maintain one set of complete instructions at Job Site during installation and until completion.

B. Manufactured articles, materials, and items of equipment shall be handled, stored, applied, installed, connected, erected, used, cleaned, adjusted, conditioned, and protected in accordance with manufacturer's printed instructions and specifications for the Project conditions indicated, within manufacturer's published limitations, and requirements specified.

C. Should any manufactured articles, materials, and items of equipment be found to be damaged, deteriorated, or otherwise contrary to the requirements of the Contract Documents, remove and replace such damaged or deteriorated articles, materials, and items of equipment, no matter in what stage of completion and replace with new materials.

D. Should Project conditions or specified requirements be in conflict with manufacturer's instructions request written clarification from A/E before proceeding. Do not proceed with work without clear instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

E. Keep a copy of material safety data sheets for all products used in the Work, at Contractor's field house.

1.06 TRANSPORTATION AND HANDLING:
A. Arrange deliveries of materials and products in accordance with Construction Progress Schedule.

B. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry.

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

D. Promptly inspect shipments to ensure that products comply with requirements of the Contract Documents and approved submittals, quantities are correct, and products are undamaged.

1.07 STORAGE AND PROTECTION:
A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products, including factory-finished items and similar work, in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions. Comply with applicable laws, ordinances and regulations for protective storage of potentially dangerous materials.

B. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

C. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.

D. Arrange storage to provide access for inspection at all times. Periodically inspect to assure products are free from damage or deterioration, and are maintained under required conditions.

E. At end of each day's work, cover new work likely to be damaged. Provide substantial coverings necessary to protect installed products from damage, traffic, and subsequent construction operations. Refer to Section 01500 for additional requirements, including removal of temporary protections.

F. Contractor shall provide inspection of subcontractor's material for compliance with submittals on proper storage.

PART 2 - PRODUCTS
NOT USED

PART 3 - EXECUTION
NOT USED

01630 PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:
A. Bidding and Contract Requirements and Division 1 - General Requirements of the Specifications apply to this work.

1.02 SECTION INCLUDES:
A. General requirements for product options and substitution procedures.

1.03 RELATED WORK:
A. Related Work of Other Sections:

1. Section 01010 - Summary of Work.
2. Section 01300 - Submittals: List of Materials within 30 days of Notice to Proceed.
3. Section 01340 - Shop Drawings, Product Data, Samples and Colors.
4. Section 01040 - Coordination.
5. Section 01600 - Material and Equipment.
6. Section 01700 - Contract Closeout.

1 .04 GENERAL:
A. In addition to General Conditions, comply with product option and substitution requirements specified in this Section.

1.05 MATERIAL AND PRODUCT OPTIONS:
A. Materials and Products Specified by Reference Standards, by Performance, or by Description Only: Any product meeting specified requirements.

B. Materials and Products Specified by Naming Products of One or More Manufacturers with a Provision for an Equivalent Product: Submit one of the products listed which complies with specified requirements or submit a request for substitution for a product of manufacturer not specifically named which complies with specified requirements.

C. Materials and Products Specified by Naming Products of Several Manufacturers Meeting Specifications: Submit one of the products listed which complies with specified requirements or submit a request for substitution for a product of manufacturer not specifically named which complies with specified requirements.

1.06 SUBSTITUTIONS:
A. Within sixty (60) days after date of Owner's Notice to Proceed, A/E will consider requests from Contractor for substitutions. Subsequently, substitutions will be considered only when a material or product becomes unavailable due to no fault of Contractor and as follows:

1. Lockouts.
2. Strikes.
3. Bankruptcy.
5. Proven shortage.
6. Other similar occurrences.

B. Each proposed substitution of materials or products for that specified is a representation by Contractor that it has personally investigated the substitution and determined that the proposed substitution is equivalent or superior to that specified in quality, durability and serviceability, design, appearance, function, finish, performance, and of size and weight which will permit installation in spaces provided and allow adequate service access. Additionally, Contractor agrees that it will provide and do the following:

1. Same warranty for substitution as for specified product or material.
2. Coordinate installation and make other changes which may be required for Work to be complete in all respects.
3. Waive claims for additional costs which may subsequently become apparent.
4. Verify that proposed materials and products comply with applicable building codes and governing regulations and, where applicable, has approval of governing authorities having jurisdiction.

C. A/E will review requests from Contractor for substitutions with Owner. Do not purchase or install substitute materials and products without written approval. A/E will give written notice to Contractor of acceptance or rejection within a reasonable time.

D. Document each request for substitution with complete data substantiating compliance of proposed substitution with Contract Documents. As appropriate include:

1. Reason for the proposed substitution.
2. Change in Contract Sum and Contract Time, if any.
3. Effect on Construction Progress Schedule and completion date.
4. Changes in details and construction of related work required due to substitution.
5. Drawings and samples.
6. Product identification and description.
7. Performance and test data.
8. Itemized comparison of the qualities of the proposed substitution to the product specified including durability, serviceability, design, appearance, function, finish, performance, size and space limitations, vibration, noise, and weight.
9. Availability of maintenance service, source and interchangeability of parts or components.
10. Additional information as requested.

E. In the event of credit change in the cost, the Owner shall receive all benefit of the reduction in cost of the proposed substitution. Credit shall be established prior to final approval of the proposed substitution and will be adjusted by Change Order.

F. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, without having been reviewed and approved by Contractor, or when acceptance will require substantial revision of Contract Documents without additional compensation to A/E.

G. In the event that the Contractor or subcontractor has neglected to place an order for specified materials and products to meet the Construction Progress Schedule, specified requirements, color schemes or other similar provisions, such failure or neglect shall not be considered as legitimate grounds for an extension of completion time nor shall arbitrary substitutions be considered to meet completion date.

H. Only one request for substitutions will be considered for each product. When substitutions are not accepted, provide specified product.

I. Should substitution be accepted, and substitution subsequently is defective or otherwise unsatisfactory, replace defective material with specified material at no cost to Owner.

1.07 COORDINATION:
A. When a specified, optional, specified by reference standard, or proposed substitution item of equipment or material is submitted which requires minor changes or additions to the designed structure, finishes or to mechanical and/or electrical services due to its requirements being different from those shown on the Contract Documents, itemize the changes required and attach to submittal. Do not proceed with changes without approval in writing from the Architect.

B. Contractor shall make adjustments and changes required to coordinate work for installation of optional materials and products, approved substitutions and materials and products specified by reference standards without additional costs to Owner or Architect.

PART 2 - PRODUCTS
NOT USED

PART 3 - EXECUTION
NOT USED

01700 PROJECT RECORD DOCUMENTS

A. General: Related requirements specified elsewhere: Shop Drawings, Project Data, and Samples.

B. Maintenance of Documents:

Maintain at job site, one copy of:
1. Contract Drawings (full-size blueline prints).
2. Specifications
3. Addenda
4. Reviewed Shop Drawings
5. Change Orders
6. Other Modifications to Contract
7. Field Test Records

Store documents in temporary field office, apart from documents used for construction.

Provide files and racks for storage of documents.

Maintain documents in clean, dry, legible condition.

Do not use documents for construction purposes.

Make documents available at all times for inspection by Architect and Owner.

C. Marking Devices: Provide colored pencil for all marking.

D. Recording:

1. Label each document "Project Record: in min. 2 inch high printed letters.
2. Keep record documents current.
3. Do not permanently conceal any work until required information has been recorded.

E. Contract Drawings: Legibly mark to record actual construction.

1. Depths of various elements of foundation in relation to first floor level.
2. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
3. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
4. Field changes of dimension and detail.
5. Changes made by Change Order or Field Order.
6. Details not on original contract drawings.

F. Specification and Addenda: Legibly mark up each Section to record:

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
2. Changes made by Change Order or supplemental instruction.
3. Other matters not originally specified.

G. Shop Drawings: Maintain as record documents; legibly annotate following drawings to record changes made after review:

1. Reinforcing Steel
2. Millwork

H. Submittal: At completion of project the Contractor shall transfer all the accumulated changes to two complete reproducible sets of sepia drawings and shall deliver the sepia record documents to the Architect, and to the Owner.

Accompany submittal with transmittal letter, in duplicate, containing:
1. Date
2. Project title and number

3. Contractor's name and address
4. Title and number of each record document
5. Certification that each document as submitted is complete and accurate
6. Signature of Contractor, or his authorized representative

01710 CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Bidding and Contract Requirements and Division 1 - General Requirements of the Specifications apply to this work.

1.2 RELATED WORK
A. Related Work of Other Sections:
Section 01010 - Summary of Work.
Section 01300 - Shop Drawings, Project Data and Samples
Section 01500 - Construction Facilities and Temporary Controls.
Section 01720 - Project Record Documents

1.3 GENERAL REQUIREMENTS
A. General: In addition to General Conditions, provide progress and final cleaning as specified in this section.
B. Progress Cleaning: Keep premises and public properties free from accumulations of waste, debris and rubbish, caused by operations. Maintain Project in accord with State and local safety, health, and insurance standards.

C. Final Cleaning: At completion of Work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all exposed surfaces of building and Project Site, including crawl spaces; leave Project clean and ready for occupancy.

D. Pre-Final Inspection: Prior to pre-final inspection, clean all surfaces and remove all debris from project.

PART 2 - PRODUCTS

2.01 CLEANING MATERIALS
A. Use materials which will not create hazards to health or property, and which will not damage surfaces.
B. Use only materials and methods recommended by manufacturer of material being cleaned.

PART 3 - EXECUTION

3.01 CLEANING
A. In addition to removal of debris and cleaning specified in other sections, clean interior and exterior exposed-to-view surfaces affected by Work of this Contract.

B. Hazards Control: Store volatile waste in covered metal containers and remove from premises daily. Prevent accumulation of wastes which create hazardous conditions. Provide adequate ventilation during use of volatile or noxious substances.

C. Clean permanent filters of ventilating equipment and replace disposable filters when units have been operated during construction; in addition, clean ducts, blowers, and coils when units have been operated without filters during construction.

D. Remove waste, debris, and surplus materials from site. Clean paving areas, walks, drives and streets in the vicinity of the building; remove mud, rubbish, waste, stains, spills, and foreign substances from paved areas and sweep clean. Immediately clean any mud tracked out of the construction area by vehicles and equipment.

E. Keep the entire construction area clean and at least weekly conduct a general clean-up operation.

F. Keep grass/weeds cut at all times within the limits of construction; maximum time interval in growing season is two weeks.

G. Periodically inspect, tighten and realign construction/tree protection fencing.

H. Do not burn or bury rubbish and waste materials on the Project Site.

I. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.

J. Do not dispose of rubbish and wastes into streams or waterways.

K. Do not dispose of excess concrete on the Project Site.

L. Wet down rubbish and waste to lay dust and prevent it from blowing.

M. Provide on Site containers for collection of waste, debris and rubbish. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights. Do not fence, block, cover, otherwise make inaccessible, or use Owner's waste containers located inside or outside construction limits.

N. Remove temporary protection and labels not required to remain.

O. Just prior to painting and similar finishing operations, clean interior areas ready to receive finish, and continue cleaning on an as needed basis until building is ready for beneficial occupancy.

P. Disposal: Remove waste materials, debris and rubbish from the Project Site and provide legal disposal at a Texas Department of Health (TDH) permitted solid waste

facility. In hauling material from the Project Site, Contractor shall prevent debris from dropping from vehicles and littering the campus or area streets and roads. Contractor shall promptly remove any debris which falls from vehicles.

3.2 FINAL CLEANING

A. Employ experienced workmen or professional cleaners and perform cleaning in accordance with manufacturer's written recommendations, using products approved by the manufacturer for material being cleaned.

B. Prior to final inspection and the Owner's acceptance of the Work, perform final cleaning of all areas of the building and Project Site, performing all operations called for in the various Sections of Project Specifications. Final cleaning operations include, but are not limited to:

1. Remove waste, debris, and surplus materials of any nature from site. Clean paving areas in the vicinity of the building; remove stains, spills, and foreign substances from paved areas and sweep paved areas clean and rake clean other surfaces of grounds.
2. Broom cleaning of all exposed concrete floors.
3. Cleaning all stonework.
4. Cleaning all exposed unpainted metals.
5. Cleaning all architectural woodwork.
6. Cleaning all doors and polish hardware; removing excess paint and stains.
7. Cleaning all glass areas, exterior and interior.
8. Cleaning all storefront framing and doors, and glazed wall system members, exterior and interior.
9. Cleaning all walls and floors.
10. Cleaning of resilient flooring.
11. Vacuuming all carpeted floors.
12. Cleaning all toilet partitions, fixtures, and accessories.
13. Cleaning all exposed surfaces of light fixtures, including removal of construction dust, paint overspray, finger prints, and similar soiling from light fixture bodies, reflectors, and both sides of light fixture lenses.
14. Removing and disposing of all temporary protections.
15. Repair, patch and touch-up marred surfaces to match adjacent surfaces.
16. Prior to final completion, inspect exposed interior and exterior surfaces and work areas to verify that entire work is clean.

C. Clean finishes free of dust, stains, films, and other foreign substances.

D. Clean transparent and glossy materials to a polished condition; remove foreign substances. Polish reflective surfaces to a clear shine.

01730 OPERATING AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:
A. Bidding and Contract Requirements and Division 1 - General Requirements of the Specifications apply to this work.

1.02 RELATED WORK:
A. Related Work of Other Sections:

1. Section 01300 - Submittals.
2. Section 01700 - Contract Closeout.
3. Section 01735 - Maintenance Instruction.

1.03 FORMAT:
A. Prepare prior to pr - final inspections Three (3) sets of operating and maintenance data, each containing data bound in commercial quality 3-ring binders with plastic covers.

B. Cover: identify each volume with type or printed title OPERATING AND MAINTENANCE INSTRUCTIONS", name of Project, Project No., location, Contractor, date of Substantial Completion and Volume Number.

C. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Specification. Include Tab for each section number, systems and equipment number.

D. The work covered by these manuals will not be accepted nor will the Final Inspection and Acceptance be conducted until the Owner has received the manuals. The A/E will check for compliance with the specifications and furnish the approved copies to the Owner.

1.04 CONTENTS, EACH VOLUME:
A. Arrange typewritten table of contents for each volume, in systematic order:

1. A list of each product required to be included with name, address and telephone number of:

a. Subcontractor or installer.
b. Maintenance contractor, as appropriate.
c. Local source of supply for parts and replacement.

2. Identifying each product by product name and other identifying symbols.

B. Product Data:

1. Include only those sheets which are pertinent to specific product with 2. Delete references to inapplicable information.

C. Drawings:

1. Supplement product data with drawings as necessary to clearly illustrate relations of component parts of equipment and systems and control and flow diagrams.
2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.

D. Written Text: As required to supplement product data for particular installation to provide logical sequence of instructions for each procedure.

E. Miscellaneous Data:

1. Furnish copy of each warranty, bond and service contract issued.
2. Furnish proper procedures in event of failure and instances which might affect validity of warranties or bonds.

1.05 MANUAL FOR MATERIALS AND FINISHES:
A. Architectural Products, Applied Materials, and Finishes:

1. Provide manufacturer's data giving full information on product:

a. Catalog number, size and composition.
b. Color and texture designations.
c. Information required for re-ordering special manufactured products.

2. Provide instructions for care and maintenance including:

a. Manufacturer's recommendation for types of cleaning agents and methods.
b. Cautions against cleaning agents and methods which are detrimental to product.
c. Recommended schedule for cleaning and maintenance.

B. Additional Requirements: Refer to respective Specification Sections.

1.06 MANUAL FOR EQUIPMENT AND SYSTEMS:
A. Each Type of Equipment and System:

1. Provide description of unit and component parts including:

a. Function, normal operating characteristics and limiting conditions.
b. Performance curves, engineering data and tests.
c. Complete nomenclature and commercial number of replaceable parts.
d. Dimensional drawing.

2. Operating Procedures: Include the following.

a. Start-up, break-in, routine and normal operating instructions.
b. Regulation, control, stopping, shut-down and emergency instructions.
c. Summer and winter operating instructions.
d. Special operating instructions.

3. Maintenance Procedures: Include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing and checking instructions.
4. Provide servicing and lubrication schedule including list of lubricants required.
5. Include manufacturer's printed operating and maintenance instructions.
6. Describe sequence of operation by control manufacturer.
7. Include original manufacturer's parts list, price lists, illustrations, assembly drawings and diagrams required for maintenance, predicted life of parts subject to wear and items recommended to be stocked as spare parts.
8. Include control diagrams by controls manufacturer.
9. Coordinate drawings and color coded piping diagrams.
10. Schedule valve tag numbers with location and function of each valve.
11. Include water treatment procedures and tests.
12. Include final balancing reports for mechanical systems.

B. Each Electric and Electronic System:

1. Provide description of system and component parts including:

a. Function, normal operating characteristics and limiting conditions.
b. Performance curves, engineering data and tests.
c. Complete nomenclature and commercial number of replaceable parts.

2. Panelboard Circuit Directories: Provide electrical service characteristics, controls and communications.
3. Include color coded wiring diagrams.
4. Operating Procedures: Include start-up, break-in, and routine and normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and any special operating instructions.
5. Maintenance Procedures: Include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
6. Include manufacturer's printed operating and maintenance instructions.
7. Provide list of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.

C. Include warning of detrimental maintenance practices.

D. Prepare and include additional data when need for such data becomes apparent during instruction of Owner's personnel or as required under pertinent Specification Sections.

1.07 SUBMITTALS:
A. Submit completed manuals to A/E for review and transmittal to Owner 30 days prior to Pre-Final Inspection.

B. Submittal of operating and maintenance manuals shall be prior to instruction of Owner's operating and maintenance personnel.

PART 2 - PRODUCTS
NOT USED

PART 3 - EXECUTION
NOT USED

01740 WARRANTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:
A. Bidding and Contract Requirements and Division 1 - General Requirements of the Specifications apply to this work.

1.02 SECTION INCLUDES:
A. Provide preparation and submittal of warranties as specified in this Section.

B. The Contractor is responsible for implementation of all warranties, guarantees, bonds, maintenance contracts and shall perform all work required, in case of failure of Subcontractors; material suppliers and manufacturers; applicators and installers; to fulfill any and all provision of the warranties, guarantees, service and maintenance contracts and bonds.

C. General Contractor and installers shall sign warranties.

1.03 RELATED WORK:
A. Related Work of Other Sections:

1. General Conditions.
2. Section 01 300 - Submittals.
3. Section 01340 - Shop Drawings, Product Data, Samples and Colors:
Submittal schedule warranty requirements.
4. Section 01700 - Contract Closeout.
5. Individual Specification Sections: Special Project Warranties.

1.04 FORM OF WARRANTY SUBMITTALS:
A. Warranty Format: Assemble warranties executed by respective manufacturers, suppliers, subcontractors and Contractor as follows:

1. Size: 8-1/2" x 11". Punch sheets for 3-ring binder; fold larger sheets to fit into durable binders.
2. Cover: Identify each packet with type or printed title WARRANTIES".
List title of Project and name of Contractor.
3. Table of Contents: Neatly typed, using table of contents of Project Specification as format.
4. Procedures to be followed in case of failure.
5. Quantity: Provide two (2) sets.

B. Warranty Forms: Except as otherwise specified, Contractor shall execute in duplicate
on Contractor's letterhead, the Project Warranty for General Construction and special

Warranties required by various Specification Sections, on the warranty forms which follow at end of this Section.

C. Warranty Effective Date:

1. For portions of work accepted by Owner prior to Final Completion: Date of Substantial Completion.
2. For portions of work accepted by Owner at Final Completion: Date of Substantial Completion or Final Completion whichever occurs sooner.

1.05 PREPARATION:
A. Obtain warranties and guarantees, executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item or work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Substantial Completion or Final Completion is determined in accordance with General Provisions Paragraph 11.1.

B. Verify that documents comply with requirements of Contract Documents, are in form approved by Owner, contain full information, and are notarized. As a minimum, each warranty shall contain:

1. Name and location of Project.
2. Name and address of Contractor.
3. Product or work item.
4. Scope of warranty.
5. Date of beginning and duration of correction period for warranty.

C. Retain warranties until time specified for submittal.

1.06 TIME OF SUBMITTALS:
A. For equipment or component parts of equipment put into service with Owner's permission, submit documents within 10 days after acceptance.

B. Make other submittals within 10 days after Date of Substantial Completion, prior to Final Application for Payment.

1.07 SCHEDULE OF SUBMITTALS:
A. Refer to Section 01340 for Schedule of Submittals.

1.08 WARRANTY ADMINISTRATION
A representative of the Owner will be the point of contact for all warranty work.
When disagreements develop between the Warranty Administrator and the Warrantor, the Owner's Representative will act for the User.

PART 2 - PRODUCTS
NOT USED

PART 3 - EXECUTION
NOT USED

PROJECT WARRANTY FOR GENERAL CONSTRUCTION

WHEREAS, _____(Contractor),

Address _____

Telephone ( ) _____has performed _____

work on the following project: _____

Address _____

For _____
(Owner),

Address, _____and,

WHEREAS, Contractor has agreed to warrant said work to be new, unless otherwise specified in the Contract Documents, and that all Work is of good quality, free from faults and defects, and in accordance with the Contract Documents.

NOW THEREFORE, Contractor hereby warrants said work in accordance with terms hereof, complying with terms of Contract with Owner dated _____, 20____, that:

Contractor agrees to repair or replace to the satisfaction of the Owner all work that may prove defective in workmanship or materials together with all other work which may be damaged or displaced in so doing, except for abuse, modifications not executed by Contractor, insufficient maintenance, improper operation, or normal wear and tear under normal usage.

All repairs or replacements shall have a correction period for such work equal to the original correction period as herein stated, dated from the final acceptance of repairs or replacement.

CORRECTION PERIOD FOR THE WORK: STARTING _____

TERMINATING_____

In the event of our failure to comply with the above mentioned conditions within a reasonable time after being notified in writing, we hereby authorize the Owner to proceed to have defects repaired and made good at our expense, and will pay the costs and charges therefore immediately upon demand.

IN WITNESS THEREOF, this instrument has been duly executed this _____day of _____, 20_____

for Contractor by _____
(Signature

_____as its _____
(Typed Name) (Position)

SPECIAL WARRANTY FOR_____

WHEREAS, _____(Contractor),

Address _____

Telephone ( ) _____ has performed _____

work on the following project: _____

Address _____

For _____
(Owner),

Address _____,
and,

WHEREAS, Contractor has agreed to warrant said work to be new, unless otherwise specified in the Contract Documents, and that all Work is of good quality, free from faults and defects, and in accordance with the Contract Documents.

NOW THEREFORE, Contractor hereby warrants said work in accordance with terms hereof, complying with terms of Contract with Owner dated _____, 20_____ , that:

Contractor agrees to repair or replace to the satisfaction of the Owner all work that may prove defective in workmanship or materials together with all other work which may be damaged or displaced in so doing, operation, or normal wear and tear under normal usage.

All repairs or replacements shall have a correction period for such work equal to the original correction period as herein stated, dated from the final acceptance of repairs or replacement.

CORRECTION PERIOD FOR THE WORK: STARTING _____

TERMINATING _____

In the event of our failure to comply with the above mentioned conditions within a reasonable time after being notified in writing, we agree to hereby authorize the Owner to proceed to have defects repaired and made good at our expense, and will pay costs and charges therefore immediately upon demand

IN WITNESS THEREOF, this instrument has been duly executed this _____day of _____,20_____

for Contractor by _____
(Signature)

_____as its _____
(Typed Name) (Position)

And has been countersigned in accordance with terms and conditions, for

Installer by: _____ _____
(Signature) (Typed Name)
as its _____
(Position)
Name of Firm _____

Address _____

01750 MAINTENANCE MATERIALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:
A. Bidding and Contract Requirements and Division 1 - General Requirements of the Specifications apply to this work.

1.02 SECTION INCLUDES
A. Requirements for spare parts and maintenance materials required by the Various Specification Sections are specified in this Section.

1.03 RELATED WORK:
A. Related Work of Other Sections:

1. Section 01300 - Submittals.
2. Section 01700 - Contract Closeout.
3. Individual Specification Sections: Spare parts and maintenance materials.

1.04 GENERAL:
A. Assemble spare parts and maintenance materials as required in individual Specification Sections. Deliver in clean packaging identified with manufacturer's name, trade name, stock number, size, color, and other similar information identifying products. Identify building and location in building where item is used or with what it is used. Include name, address and telephone number of local supplier.

B. Deliver to Owner, prior to Pre-Final Completion, at a location within 3 miles of Project Site as directed by Owner. Include a letter of transmittal with delivery with a copy to A/E listing materials provided.

PART 2 - PRODUCTS
NOT USED

PART 3 - EXECUTION
NOT USED

02070 SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of selective demolition work indicated on drawings.

B. Types of Selective Demolition Work: Demolition requires, but is not limited to the selective removal and subsequent off-site disposal of the following.

C. Removal of existing asphalt pavement and base material indicated to be removed on the drawings.

D. Removal or temporary relocation of other miscellaneous existing items as required to complete the work as indicated in the construction documents.

E. Removal of concrete curbs and sidewalks.

1.3 SUBMITTALS:

A. Schedule: Submit detailed sequence of demolition and removal work to Owner's Representative for review prior to commencement of work, to ensure uninterrupted progress of Owner's on-site operations.

1.4 JOB CONDITIONS:

A. Occupancy: Owner and owner's tenants will be continuously occupying areas and buildings immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of normal activities. Provide minimum of 72 hours advance notice to Owner of demolition activities, which will impact normal activities.

B. Condition of Structures: Owner assumes no responsibility for actual condition of items to be removed.

Note: Conditions existing at time of commencement of contract will be maintained by Owner in so far as practicable. However, variations may occur due to Owner's operations prior to start of selective demolition work.

C. Protection: Provide temporary barricades and other forms of protection as required

to:

1. Protect Owner's personnel and general public from injury due to selective demolition work.

2. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to and from occupied portions on site.

3. Erect temporary covered passageways as required by authorities having jurisdiction.

4. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.

5. Protect surfaces with suitable coverings when necessary.

6. Remove protection at completion of work.

D. Damages: Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.

E. Traffic: Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

F. Utility Services: Maintain existing utilities unless indicated to be removed, keep in service, and protect against damage during demolition operations.

Note: Do not interrupt existing utilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruption to existing utilities, as acceptable to governing authorities.

PART 2 - PRODUCTS

Not applicable.

PART 3 – EXECUTION

3.1 SELECTIVE DEMOLITION

A. Inspection: Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing conditions to structure surfaces, equipment or to surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Owner's Representative prior to starting work.

B. Preparation: Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of items to be demolished and adjacent materials to remain.

Note: Cease operations and notify Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operation.

C. Locate, identify and temporarily disconnect utility services that are affected by adjacent repairs as necessary.

Note: Provide by-pass connections as necessary to maintain continuity of service to other areas of building. Provide minimum of 72 hours advance notice to Owner if shut-down of service is necessary during change-over.

D. Demolition: Perform selective demolition work for repairs as indicated in the construction documents in a systematic manner and as follows:

Note: Saw cut existing asphalt pavement as indicated on plans. All cuts shall be to full depth of new pavement thickness to allow proper installation of new concrete pavement. Cutting shall be performed using motor driven saw designed to cut pavement with clean, sharp, unchipped edges.

E. Pavement removal: shall be performed as required to conform with plans and specifications and to provide conditions for installation of new paving.

Note: If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of conflict. Submit report to Owner's Representative in written, accurate detail. Pending receipt of directive from Owner's Representative rearrange selective demolition schedule as necessary to continue overall job progress without delay.

3.2 - MAINTENANCE

A. Environmental Controls: Use suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

B. Repair demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

3.3 - CLEAN-UP

A. Salvage Items: Where indicated on Drawings as "Salvage-Deliver to Owner", carefully remove indicated items, clean, store and turn over to Owner and obtain receipt.

B. Disposal of Demolished Materials: Remove debris, rubbish and other materials resulting from demolition operations from building site each day. Transport and legally dispose of materials off site.

Note: If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution.

Burning of removed materials is not permitted on project site.

C. Clean-up: Upon completion of selective demolition work, remove tools, equipment and demolished materials from site. Remove protection and leave areas clean.

END OF SECTION 02070

02110 SITE CLEARING

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of site clearing is shown on drawings.

B. Site clearing work includes, but is not limited to:

1. Protection of existing trees.
2. Removal of trees and other vegetation.
3. Topsoil stripping.
4. Clearing and grubbing.
5. Removing above-grade improvements.
6. Removing below-grade improvements.

1.3 JOB CONDITIONS:

A. Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.

B. Protection of Existing Improvements: Provide protection necessary to prevent damage to existing improvements indicated to remain in place.

C. Protect improvements on adjoining properties and on Owner's property.

D. Restore damaged improvements to their original condition, as acceptable to parties having jurisdiction.

E. Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.

F. Water trees and other vegetation to remain within limits of contract work as required to maintain their health during course of construction operations.

G. Provide protection for roots over 1-1/2" diameter cut during construction operations. Coat cut faces with emulsified asphalt, or other acceptable coating, formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.

H. Repair or replace trees and vegetation indicated to remain, which are damaged by construction operations, in a manner acceptable to Engineer. Employ licensed arborist to repair damages to trees and shrubs.

I. Salvageable and Reusable Improvements: Carefully remove items indicated to be salvaged or reused and store on Owner's premises where indicated or directed.

Not applicable.

3.1 SITE CLEARING:

A. General: Remove trees, shrubs, grass and other vegetation, improvements, or obstructions interfering with installation of new construction. Remove such items elsewhere on site or premises as specifically indicated. Removal includes digging out stumps and roots.

B. Carefully and cleanly cut roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction.

C. Topsoil: Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4". Satisfactory topsoil is reasonably free of subsoil, clay, lumps, stones, and other objects over 2" in diameter, and without weeds, roots, and other objectionable material.

D. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.

E. Remove heavy growths of grass from areas before stripping topsoil.

F. Where trees are indicated to be left standing, stop topsoil stripping a sufficient distance to prevent damage to main root system or at the drip line.

G. Stockpile topsoil in storage piles in areas shown, or where directed. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent wind-blown dust.

H. Dispose of unsuitable or excess topsoil same as waste material, herein specified.

I. Clearing and Grubbing: Clear site of trees, shrubs and other vegetation, except for those indicated to be left standing.

J. Completely remove stumps, roots, and other debris protruding through ground surface.

K. Use only hand methods for grubbing inside drip line of trees indicated to be left standing.

L. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

M. Place fill material in horizontal layers not exceeding 6" loose depth, and thoroughly compact to a density equal to adjacent original ground.

N. Removal of Improvements: Remove existing above-grade and below-grade improvements necessary to permit construction, and other work as indicated.

3.2 CLEAN UP:

A. Burning on Owner's Property: Burning is not permitted on Owner's property.

B. Removal from Owner's Property: Remove waste materials and unsuitable and excess topsoil from Owner's property and dispose of offsite in legal manner.

END OF SECTION 02110

02160 TRENCH EXCAVATION SAFETY PROTECTION

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of Contract, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of trench excavation safety protection work is the construction of all trench excavation safety protection systems, to be utilized in the project and including all additional excavation and backfill necessitated by the protection system.

1.3 QUALITY ASSURANCE:

A. Provisions of, Part 1926, Subpart P - Excavations, Trenching and Shoring of the Occupational Safety and Healthy Administration Standards and Interpretations shall govern.

1.4 JOB CONDITIONS:

A. Site Information: Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner will not be responsible for interpretations or conclusions drawn there from by Contractor. Data is made available for convenience of Contractor.

B. Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.

2.1 MATERIALS:

A. General: The material shall include all components of the trench excavation protection system, which includes but not limited to sheeting, trench boxes, trench shields, sheet piling, cribbing, bracing and shoring.

3.1 CONSTRUCTION METHODS:

A. Trench Excavation Safety Protection shall be accomplished as required by the provision of, Part 1926, Subpart P - Excavations, Trenching and Shoring of the Occupational Safety and Health Administration Standards and Interpretations.

3.2 CLEAN UP:

A. Remove all trench excavation safety protection materials from site and dispose of or salvage in a legal manner.

END OF SECTION 02160

02200 EARTHWORK FOR SITE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. References

1. ASTM D 422 – Mechanical Analysis
2. ASTM D 424 – Plasticity Index
3. ASTM D 698 – Moisture Density Relationship
4. ASTM D 1557 – Moisture Density Relationship
5. ASTM D 2487 – Soil Classification
6. ASTM D 2049 – Moisture Density Determination
7. ASTM D 2922 – Field Density Test (Nuclear Method)
8. TX DOT Standard Specifications

1.2 DESCRIPTION OF WORK:

A. Extent of earthwork is indicated on drawings or as directed by the Engineer and consists of, but is not limited, to the following:

B. Excavation shall consist of the removal of material encountered to subgrade elevations indicated and subsequent disposal of these excavated materials.

C. Trenching shall consist of an open cut excavation to grades indicated on plans for the placement of utilities, concrete conduit, footings and culverts.

D. Dewatering is included in this section.

E. Embankment and Fill shall consist of the placing and compacting of suitable materials obtained from approved sources.

F. Backfilling is included in this section.

G. Preparation of subgrade for walks and pavements is included in this section.

1.3 RELATED SECTIONS:

A. Concrete is specified in Division 3.

B. Shoring and bracing is specified in the Trench Excavation Safety Protection section.

C. Base and Pavements are specified in other sections.

1.4 QUALITY ASSURANCE:

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

B. Testing and Inspection Service: Owner's Engineer will engage soil testing and inspection service for quality control testing during earthwork operations.

1. Laboratory control is employed to assist the Contractor in producing the specified results, but in no way relieves the Contractor of his obligation to produce the specified results.

2. A soils laboratory selected by the Engineer and Owner shall provide soil testing and inspection service. Testing service will include testing facilities for quality control testing during earthwork operations. Cost of this service shall be paid by the Owner.

C. Tests for Proposed Soil Materials: Contractor shall perform at his expense tests for soil materials proposed for use in the work and submit test reports on the same day tests are conducted, to the Engineer and the Owner for tests herein specified and for additional tests as may be required.

1. Provide one moisture-density relation for each type of soil encountered in subgrade and fills.

2. The testing service will determine the suitability of all materials that may be used as fill or backfill.

3. For borrow materials, perform a mechanical analysis (ASTM D 422) plasticity index (ASTM D 424), and moisture-density relation (ASTM D 1557).

D. Quality Control Testing During Construction: When fill or backfill is required to be compacted to any specified density, the Engineer may order such fill or backfill to be laboratory tested in order to ascertain compliance with specification requirements. Tests will be executed immediately prior to covering of such compacted areas. Cost for such laboratory work is to be paid for by the Owner.

1.5 SUBMITTALS:

A. A testing laboratory, as specified above, shall be employed to test and determine if the required density is being obtained and to test compaction of exposed sub grades. Laboratory reports on tests performed shall include coordinates and elevations of field tests and shall be distributed as follows:

Engineer	1 copy
Contractor	1 copy
Owner	1 copy

B. Testing service shall inspect and certify in writing all sub grades and fill layers before further construction work is performed thereon. All compacted fills shall consist of laboratory approved materials placed in horizontal layers as specified. A minimum of one field density determination shall be performed for every 5000 square feet in each layer, but in no case less than 3 tests per layer per day.

C. When tests indicate compaction does not meet requirements, fill and backfill shall be dried out or moistened as necessary and recompacted. Recompacted areas shall be retested. This procedure shall be repeated until tests indicate compliance with specified requirements. Reworking and retesting shall be provided at no cost to the Owner.

1.6 JOB CONDITIONS:

A. Site Information: Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner will not be responsible for interpretations or conclusions drawn therefrom by Contractor. Data is made available for convenience of Contractor. Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.

B. Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.

1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, the contractor shall consult with the utility owner immediately for directions. Coordinate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

2. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, during occupied hours, except when permitted in writing by the Engineer and then only after acceptable temporary utility services have been provided.

3. Provide minimum of 72-hour notice to Engineer and Owner, and receive written notice to proceed before interrupting any utility.

4. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.

C. Use of Explosives: The use of explosives is not permitted.

D. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

1. Operate warning lights as recommended by authorities having jurisdiction.

2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

3. At trees which are to remain, perform excavation within drip-line by hand, and protect the root system from damage or dry out, to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap. Paint root cuts of 1" diameter and larger with emulsified asphalt tree paint.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS:

A. Satisfactory soil materials are those complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW and SP.

B. Unsatisfactory soil materials are those complying with ASTM D2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH and PT.

C. Cohesionless soil materials include gravels, sand-gravel mixtures, sands and gravely-sands.

D. Cohesive soil materials include clayey and silty gravels, sand-clay mixtures, gravel-silt mixtures, clayey and silty sands, sand-silt mixtures, clays, silts, and very fine sands. Fill material may be required from offsite sources to produce the designated lines and grades of fills, backfills, and rough grades. Fill material brought from off the site shall conform to specifications for various uses as specified.

1. Class B Fill shall be drain gravel conforming to the Type C material as specified in the TxDOT Item 302.

2. Class C Fill shall be native earth material and as further described in following paragraphs.

3. Fill materials shall be approved and conform to the following requirements, except as specifically indicated otherwise:

a. Fill shall be earth, free of debris, cinders, combustibles, frost, ice, roots, sod, wood, cellulose, organic materials, and materials that may be subject to termite attack. Up to 30 percent of all material may be rock-like-materials not more than 0.25 cubic foot in volume nor more than 12 inches in length, if evenly distributed in the total fill.

b. Top 18 inches of fills or to replace excess excavation under topsoil of lawn and planted areas shall be earth, free of debris, cinders, frost, ice, sod, wood, and roots over 1/4 inch in diameter. Up to 10 percent of fill material may be rock-like materials not more than 0.05 cubic foot in volume nor more than 4 inches in length. Also, up to 20 percent of fill material may be topsoil, but not sod.

c. Class C Fill shall be compacted in 8" layers to at least 90 percent to optimum density as determined by ASTM D 1557.

PART 3 - EXECUTION

3.1 EXCAVATION:

A. Excavation is Unclassified, and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.

B. Unauthorized Excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without direction of the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at Contractor's expense.

1. Under retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to the Engineer.

2. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by the Engineer.

C. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown. For all paving to be placed over cut areas, excavate to required depths. Trim cuts accurately to provide for minimum design thickness of slabs or requirements of Class C Fill. Just prior to placing any base materials, density and moisture content of the top 3 inches of compacted subgrade shall be checked and if tests show the density to be more than 2% below the specified minimum or the moisture content course shall be reworked as necessary to obtain the specified compaction and moisture content.

D. Excavation for Ditches: Cut ditches to the cross-sections and grades as shown on

the drawings. Deposit excavated materials a sufficient distance from the edge of ditches to prevent cave-ins or material falling or sliding into the ditch. Keep ditches free of an accumulation of leaves, sticks and other debris until final acceptance of the work.

E. Excavation for Areas Outside Confines of Pavements and Structures: For all cut areas outside pavements excavate to required levels, grades and contours.

1. Execute earth fill outside pavement and structures to the levels, grades, and contours with Class C Fill.

F. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace according to the Trench Excavation Safety Protection section where sloping is not possible because of space restrictions or stability of material excavated.

1. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

G. Material Storage: Stockpile excavated materials classified as satisfactory soil material until required for fill or backfill operations. Place, grade and shape stockpiles for proper drainage.

1. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.

2. Dispose of excess soil material and waste materials as herein specified.

3. Where topsoil will be required on site for finish grading and planting work, strip existing topsoil to a minimum depth of 4 inches in areas of construction and cut areas of grading. Sift topsoil free of growth, debris, etc., and stockpile on site as directed. If size of site precludes on site storage, make arrangements for use of an offsite area and stockpile topsoil there. Protect against theft, erosion and any accumulation of debris during construction operations. Do not strip topsoil when it is in muddy condition.

H. Removal of Unsatisfactory Soil Materials: Excavate unsatisfactory soil materials, encountered that extend below the required elevations, to the additional depth until satisfactory material is encountered. Satisfactory and unsatisfactory soil materials shall be as determined by the testing laboratory.

1. Payment for such additional excavation, provided it is not due to the fault or neglect of the Contractor, will be made under the provisions of the Contract for Changes in the Work.

2. Where the removal of unsatisfactory soil materials is due to the fault or negligence of the Contractor in his performance of earthwork and site grading operations, excavate the resulting unsatisfactory soil material and replace with compacted

satisfactory soil material as required.

3.2 TRENCHING:

A. Excavate for Trenches: Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room. Provide 6" to 12" clearance on both sides of pipe or conduit.

1. Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations.

2. Where rock is encountered, carry excavation 4" below required elevation and backfill with a 4" layer of crushed stone or gravel prior to installation of pipe.

3. For pipes or conduit 5" or less in nominal size and for flat-bottomed multiple-duct conduit units, do not excavate beyond indicated depths. Hand excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.

4. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for entire body of pipe.

5. Flowable Fill is an acceptable option to class B Fill for backfilling of trenches.

3.3 DEWATERING:

A. Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area. Do not allow water to accumulate in excavations. Remove water to prevent soil changes detrimental to stability of sub grades. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

1. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

3.4 BACKFILL AND FILL:

A. General: Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.

1. The surface of the ground of all unpaved areas other than rock which are to receive embankment shall be loosened by scarifying or plowing to a depth of not less than 4 inches. The loosened material shall be recompacted to Class C Fill requirements.

2. Areas to receive fill material shall be proof rolled with rolling equipment weighing not less than 20 tons with not less than four pneumatic tired wheels inflated to at least 100 psi. All areas shall receive at least four consecutive passes of the equipment which shall be observed by a soils engineer. The proof rolling will locate soft zones which may need to be undercut and will densify the upper layers of the soil to receive the fill.

B. Materials: Under walks and pavements use acceptable soil material to within 2 feet of finished grade. Use satisfactory excavated or borrow material from the 2 foot line to subgrade identified in the plan details.

1. Under grassed areas use onsite soil material to within 6 inches of the finished grade. Add native or borrowed topsoil to finished grade for seeded or sprigged areas or 2 inches below finished grade for areas to be sodded.

2. Under piping and conduit, use excavated material, borrow or Class B Fill where wet conditions occur.

C. Backfill Excavations as promptly as work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, damp proofing, waterproofing and perimeter insulation.

2. Inspection, testing, approval, and recording locations of underground utilities.

3. Removal of concrete formwork.

4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of structure or utilities, or leave in place if required.

5. Removal of trash and debris.

6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

D. Embankment Under Future Roadways: Embankment areas under future roadways shall be constructed in layers approximately parallel to the finished grade of the roadbed and unless otherwise specified, each layer shall be so constructed as to provide a uniform, slope of 1/4 inch per foot from the center line of the roadbed to the outside.

1. Embankments shall be constructed to the grade established on the plans and completed embankments shall correspond to the general shape of the typical sections shown on the plans and each section of the embankment shall correspond

to the detailed section or slopes as shown on plans. After completion of the roadway, it shall be continuously maintained to its finished section and grade until the project is accepted.

2. Except as otherwise specified, earth embankments shall be constructed in successive 6-inch layers for the full width of the individual roadway cross section and in such lengths as are best suited to the sprinkling and compaction methods utilized.

3. Minor quantities of rock encountered in constructing earth embankment shall be incorporated in the specified embankment shall be incorporated in the specified embankment layers, or may be placed in accordance with the requirements for the construction of rock embankments in the deeper fills, provided such placement of rock is not immediately adjacent to structures.

4. Each layer of embankment shall be uniform as to material, density and moisture content before beginning compaction. Where layers of unlike materials abut each other, each layer shall be featheredged for at least 100 feet or the material shall be so mixed as to prevent abrupt changes in the soil. No material placed in the embankment by dumping in a pile or windrow shall be incorporated in a layer in that position, but all such piles or windrows shall be moved by blading or similar methods. Clods or lumps of material shall be broken and the embankment material mixed by blading, harrowing, discing or similar methods to the end that a uniform material of uniform density is secured in each layer. Water required for sprinkling to bring the material to the moisture content necessary for maximum compaction shall be evenly applied and it shall be the responsibility of the Contractor to secure a uniform moisture content throughout the layer by such methods as may be necessary.

5. All earth cuts, full width or part width cuts in side hill, which are not required to be excavated below subgrade elevation for base and backfilled, shall be scarified to a uniform depth of at least 6 inches below grade, and the material shall be mixed and reshaped by blading and then sprinkled and rolled in accordance with the requirements outlined above for earth embankments and to the same density as that required for the adjacent embankment.

6. After each layer of earth embankment or select material is complete, tests as necessary will be made by the Engineer. If the material fails to meet the density specified, the course shall be reworked as necessary to obtain the specified compaction.

7. The upper or final layer of the embankment shall contain no stones larger than 4 inches in their greatest dimension, and shall be composed of material so graded that the density and uniformity of the surface layer may be secured by the methods and requirements as set forth for Class C Fill.

E. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil

materials,, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

1. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

F. Placement and Compaction: Place backfill and fill material in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand-operated tampers.

1. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

2. Place backfill and fill materials evenly adjacent to structures, piping or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping or conduit to approximately same elevation in each lift.

3.5 PREPARATION OF SUBGRADE (GRADING AND COMPACTION):

A. General: Uniformly grade areas within limits of grading, including adjacent transition areas. Smooth finished surface within specified tolerances and compact to elevations, uniform levels and slopes as indicated on plans.

1. The subgrade for paved areas shall be finished to elevations required to allow for base and finished paving.

2. Grading, including excavated and filled sections and adjacent transition areas shall be reasonably smooth, compacted, and free from irregular surface changes. Degree of finish shall be that ordinarily obtainable from either blade-grader or scraper operations, except as otherwise specified. Tolerance for areas within 10 feet of buildings and all areas to be paved shall not exceed one-half inch (1/2") in cross section and in a length of 16 feet measured longitudinally. All ditches, swales and gutters shall be finished to drain readily. Unless otherwise indicated on drawings, subgrade shall be evenly sloped to provide drainage away from building walls in all directions at a grade not less than 1/4 inch per foot. Provide slope transitions at top and bottom of banks and at other breaks in grade.

3. Redress and recompact any areas that settle below required grades because of traffic, precipitation, or storage loading before execution of other work required. Correct any deviations in grading tolerance for areas to be paved by loosening, adding, or removing material, reshaping and compacting by sprinkling

and rolling. Sufficient subgrade shall be prepared in advance to insure satisfactory execution of the work.

4. After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D 698; and not less than the following percentages of relative density, determined in accordance with ASTM D 2049, for soils which will not exhibit a well-defined moisture-density relationship (cohesion less soils).

C. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations. Provide sufficient equipment capable of adding measured amounts of moisture to the soil material as determined by moisture-density relation tests. Maintain the actual moisture content in the soil material at the time of compaction to within the limits specified for satisfactory soil materials.

1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

2. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread on the surface where directed and permitted to dry. Assist drying by dicing, harrowing or pulverizing until the moisture content is reduced to a satisfactory value, as determined by moisture-density relation tests. When accepted by the soils laboratory, the soil material may be used in compacted backfill or fill.

D. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.10' above or below required subgrade elevation.

1. Compact top 6" of subgrade and each layer of backfill or fill material at 90% maximum density for cohesive material or 95% relative density for cohesion less material.

E. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 1/2" above or below required subgrade elevation.

F. Pavements: Compact top 6" of subgrade and each layer of backfill or fill material at 95% relative density.

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

H. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10' above or below required subgrade elevations. The subgrade for lawn and planting areas shall be not less than 4 inches below final finish grade, unless a greater depth is indicated on the drawings.

1. Compact top 6" of subgrade and each layer of backfill or fill material at 85% maximum density for cohesive soils and 90% relative density for cohesion less soils.

3.6 FIELD QUALITY CONTROL:

A. Quality Control Testing During Construction: Allow testing service to inspect and approve sub grades and fill layers before further construction work is performed.

1. Perform field density tests in accordance with ASTM D 2922 (nuclear method).

B. Paved Areas: Make at least one field density test of subgrade for every 5000 square feet of paved area, but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 5000 square feet of paved area, but in no case less than 3 tests.

1. If in opinion of the Engineer, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense to the Owner.

3.7 MAINTENANCE:

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

1. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

C. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.8 CLEAN UP:

A. Removal from Owner's Property: Remove waste materials, including unacceptable

excavated material, trash and debris, and dispose of it off Owner's property.

END OF SECTION 02200

02202 EXCAVATION AND BACKFILL FOR UTILITIES AND SEWERS

PART 1 - GENERAL

1.01 DESCRIPTION
A. This specification shall govern all excavation for storm or sanitary sewers, sewers structures appurtenances and connections, utility pipe or conduits, and for backfilling to the level of tile original ground, all in conformity with the locations, lines, and grades shown on the plans or as established by the Engineer. This specification also governs for the necessary pumping or bailing and drainage, and all sheathing and bracing of trench walls, the furnishing and placing of cement stabilized backfill, and hauling and disposition of surplus materials, and tile bridging of trenches and other provisions for traffic or access as provided herein.

PART 2 - PRODUCTS
NOT USED

PART 3 - EXECUTION

3.01 CONSTRUCTION
A. Unless otherwise specified on the plans or permitted by the Engineer, all sewers, pipe, and conduit shall be constructed in open cut trenches with vertical sides Trenches shall be sheathed and braced to the extent necessary throughout the construction period. Adequacy of the sheathing and bracing shall be to responsibility of the Contractor.

B. Trenches shall have a maximum width of one foot beyond the horizontal projection of the outside surfaces of the pipe and parallel thereto on each side unless otherwise specified.

C. The Contractor shall not have more than 100 feet of open trench left behind the trenching operation and no more than 250 feet of ditch behind the ditching machine that is no compacted as required by the plans and specifications.

D. For all utility conduit and sewer pipe to be constructed in fill above natura ground, the embankment shall first be constructed to an elevation not les than one foot above the top of the pipe or conduit after which excavation for the pipe or conduit after which excavation fo the pipe or conduit shall be made.

E. For pipe and conduit of all types, where soil encountered at established footing grade is a quicksand, muck, or similar unstable material, the following procedure shall be used unless other methods are called for on the plans. All unstable soil shall be removed to a depth of 2 feet below the bottom of pipe for pipes 2 feet or more in height; and to a depth equal to the height of pipe, 6 inch minimum, for pipe less then 2 feet in height. Such excavation shall be
carried at least 1 foot beyond the horizonal limits of the structure on all sides.
All unstable soil so removed shall be replaced with suitable stable material, placed in uniform layers of suitable depth as directed by the Engineer, and each layer shall be wetted, if necessary, and compacted by mechanical tamping as required to provide a stable foundation for the structure. Soil which is considered to be of sufficient stability to sustain properly the adjacent sections of the roadway embankment will be considered a suitable foundation material for the culvert or sewer. For unstable trench conditions is encountered, and additional excavation and backfill required shall be done at the contractor's expense.

3.02 Shaping of Trench Bottom.
The trench bottom shall be undercut a minimum depth sufficient to accommodate the class of bedding indicated in the plans and specification.

3.03 Dewatering Trench.
Pipe or conduit shall not constructed or laid in a trench in the presence of water. All water shall be removed from tile trench sufficiently prior to the pipe or conduit planing, operation insure a relatively dry (no standing water), firm bed. The trench shall be maintained in such dewatered condition until the trench has been backfilled to a height at lease one foot above the top of pipe. Removal of water may be accomplished by bailing, pumping" or by a well-points installation as conditions warrant. Removal of well-points shall be at rate of 1/3 per 24 hours (every third well-point).

3.04 Excavation in Streets.
Excavation its streets, together with the maintenance of traffic where specified, and the restoration of tile pavement riding surface shall the in accordance with plan detail or as required try other applicable specification.

3.05 Removing, Old Structures.
When old masonry structure or foundations are encountered in the excavation, such obstructions shall be removed for the full width of the trench and to a depth of 1 foot below the bottom of the trench. When old inlets or manholes are encountered and no plan provision is made for adjustment or connection to the new sewer, such manholes and inlets shall be removed completely to a depth 1 foot below the bottom of the trench. In each instance, the bottom to the trench shall be restored to grade by backfilling and compacting by the methods provided hereinafter for backfill. Where the trench cuts through storm or sanitary sewers which are

known to be abandoned, these sewers shall be cut flush with sides of the trench and blocked with a concrete plug in a mannere satisfactory to the Engineer.

3.06 Protection of Utilities.
The Contractor shall conduct his work such that a reasonable minimum of disturbance to existing utilities will result. Particular care shall be exercised to avoid the cutting or breakage of water and gas line. Such lines, if broken, shall be restored promptly by the Contractor. When active sanitary sewer lines are cut in the trenching operations, temporary flumes shall
be provided across the trench, while open, and the lines shall be restored when the backfilling has progressed to the original bedding lines of the sewer so cut. The Contractor shall inform utility owners sufficiently in advance of the Contractor's operations to enable such utility owners to reroute, provide temporary detours, or to make other adjustments to utility lines in order that the Contractor may proceed with his work with a minimum of delay and concerned in effecting any utility adjustments necessary and shall not hold the Owner liable for any expense due to delay or additional work because of conflicts.

3.07 Excess Excavated Material.
All materials from excavation not required for backfilling the trench shall be removed, by the Contractor, from the job site promptly following the completion of work involved.

3.08 Backfill
A. Backfill Procedure Around Pipe or Conduit and for One Foot Above Same

All trenches and excavation shall be backfilled as soon as is practical after the pipes or conduits are properly laid therein and the joints have hardened sufficiently to prevent displacement of the pipe or conduit and damage to the joints unless other protection of the pipe or conduit is directed. The backfill shall be material as described by Plan Details, free of large hard lumps, rock fragments or other debris. The backfill shall be deposited in the trench simultaneously on both sides of the pipe for the full width of the trench, in layers not to exceed six (ó) inches (loose measurement), wetted if required to obtain proper compaction, and thoroughly compacted by mechanical tampers to a density as shown on plans, so that a thoroughly compacted material shall be in place between the external wall of the pipe and the undisturbed sides of trench and to a level twelve (12) inches above the top of the pipe.

B. Backfill Over One Foot Above Pipe

Where deep trenches are required, the backfill for that portion of trench over (1) foot above the pipe or conduit shall be selected excavated material free of hard lumps, rocks fragments, or other debris, place in layers not more than 6 inches in depth (loose measurement), wetted if required and thoroughly compacted by use of mechanical tampers to the densities show on plans. Flooding of backfill is not allowed.

A period of not less than twenty-four (24) hours shall lapse between the time of jetting and the placing of the top four (4) feet of backfill.

When indicated on the plans, trenches shall be backfilled to the elevations shown with cement stabilized sand containing a minimum of 1½ sacks of standard Type I Portland cement per cubic yard of sand.

02203 TRENCH SAFETY FOR EXCAVATIONS

PART 1 - GENERAL

1.01 DESCRIPTION
A. This specification shall govern all work for providing for worker safety in excavations and trenching operations required to complete the project.

1.02 REQUIREMENTS
A. Worker Safety in excavations and trenches shall be provided by the Contractor in accordance with Occupational Safety and Health Administration (OSHA) Standards,
29 CFR Part 1926 Subpart P - Excavations.

B. It is the sole responsibility of the Contractor, and not the Owner or Engineer, to determine and monitor the specific applicability of a safety system to the field conditions to be encountered on the job site during the project.

C. The Contractor shall indemnify and hold harmless the Owner and Engineer from all damages and cost that may result from failure of methods or equipment used by the Contractor to provide for worker safety.

D. Trenches as used herein, shall apply to any excavation into which structures, utilities, or sewers are placed regardless of depth.

E. Trench Safety Plan as used herein, shall apply to all methods and materials used to provide for worker safety in excavation and trenching operations required during, the project.

F. Contractor shall submit a trench excavation safety plan specific for this project. Prepared by a Registered Professional Engineer.

02282 TERMITE CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes soil treatment for termite control.

1.3 SUBMITTALS

A. General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.

B. Product data and application instructions.

C. Certification that products used comply with U.S. Environmental Protection Agency (EPA) regulations for termiticides.

1.4 QUALITY ASSURANCE

A. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for preparing substrate and application.

B. Engage a professional pest control operator who is licensed according to regulations of governing authorities to apply soil treatment solution.
Use only termiticides that bear a federal registration number of the EPA and are approved by local authorities having jurisdiction.

1.5 JOB CONDITIONS

A. Restrictions: Do not apply soil treatment solution until excavating, filling, and grading operations are completed, except as otherwise required in construction operations.

B. To ensure penetration, do not apply soil treatment to frozen or excessively wet soils or during inclement weather. Comply with handling and application instructions of the soil toxicant manufacturer.

1.6 WARRANTY

A. Warranty: Furnish written warranty, executed by Applicator and Contractor, certifying that applied soil termiticide treatment will prevent infestation of subterranean termites. If subterranean termite activity is discovered during warranty period, Contractor will re-treat soil and repair or replace damage caused by termite infestation.
Warranty Period: 5 years from date of Substantial Completion.
The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT SOLUTION

A. General: Use an emulsible, concentrated termiticide that dilutes with water, specially formulated to prevent termites infestation. Fuel oil will not be permitted as a diluent.
Provide a solution consisting of one of following chemical elements.

B. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

1. Chloropyrifos:

a. Dursban TC, Dow Chemical Co.

2. Permathrin:
   a. Dragnet FT, FMC Corp.
   b. Torpedo, ICI Americas, Inc.
3. Cypermethrine:
   a. Prevail FT, FMC Corp.
   b. Demon, ICI Americas, Inc.
4. Fenvalerate:
   a. Gold Coast Tribute, Du Pont.
5. Isofenphose:
   a. Pryfon, Mobay Corp.

C. Dilute with water to concentration level recommended by manufacturer.

D. Other solutions may be used as recommended by Applicator if approved for intended application by local authorities having jurisdiction. Use only soil treatment solutions that are not harmful to plants.

PART 3 - EXECUTION

3.1 APPLICATION

A. Surface Preparation: Remove foreign matter that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and foundations. Toxicants may be applied before placing compacted fill under slabs if recommended by toxicant manufacturer.

B. Application Rates: Apply soil treatment solution as follows unless otherwise recommended by manufacturer:

1. Under slab-on-grade structures, treat soil before concrete slabs are placed, using the following application rates:

   a. Apply 4 gallons of chemical solution per 10 linear feet to soil in critical areas under slab, including entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers.

   b. Apply 1 gallon of chemical solution per 10 sq. ft. as an overall treatment under slab and attached slab areas where fill is soil or unwashed gravel. Apply 1-1/2 gallons of chemical solution to areas where fill is washed gravel or other coarse absorbent material.

   c. Apply 4 gallons of chemical solution per 10 linear feet of trench for each foot of depth from grade to footing, along outside edge of building. Dig a trench 6 to 8 inches wide along outside of foundation to a depth of not less than 12 inches. Punch holes to top of footing at not more than 12 inches o.c. and apply chemical solution. Mix chemical solution with the soil as it is being replaced in the trench.

2. At hollow masonry foundations or grade beams, treat voids at rate of 2 gallons per 10 linear feet, poured directly into the hollow spaces.

3. At expansion joints, control joints, and areas where slabs will be penetrated, apply at rate of 4 gallons per 10 linear feet of penetration.

C. Post signs in areas of application to warn workers that soil termiticide treatment has been applied. Remove signs after areas are covered by other construction.

D. Reapply soil treatment solution to areas disturbed by subsequent excavation, landscape grading, or other construction activities following application.

02500 FLEXIBLE BASE

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of flexible base work is shown on drawings and consists of but is not limited to a foundation course for surfacing, pavement, or other base courses; shall be composed of crushed stone, caliche or gravel, and shall be constructed as herein specified in one or more courses in conformity with the typical sections shown on the plans and to the lines and grades established and per the recommendations on the Geotechnical Engineering Study Pavement Design for Webb County Main Fire Station and Administration Building, Laredo Texas; prepared by Castle Engineering on October 10Project Number 14G031.

1.3 RELATED SECTIONS:

A. Saw-cutting of edges of existing pavement is specified in Selective Demolition section.

B. Compaction of subgrade is specified in Earthwork section.

1.4 SUBMITTALS:

A. Material Certificates: Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

1.5 QUALITY ASSURANCE:

A. Codes and Standards: Comply with Texas State Department of Highways and Public Transportation (THD) Standard Specifications, 1982 edition, and with local governing regulations if more stringent than herein specified.

1.6 JOB CONDITIONS:

A. Weather Limitations: Do not perform flexible base installation in weather conditions, which will prevent proper installation as required by specifications.

B. Grade Control: Establish and maintain required lines and elevations as indicated on plans.

2.1 MATERIALS:

A. The materials shall consist of argillaceous limestone, calcareous clay particles with or without stone, conglomerate, gravel, sand, or other granular materials. The materials shall be Type F (Pit run caliche), conforming to Item No. 247 of the State Department of Highways and Public Transportation Specifications 1993. The source of the material shall be approved by the Engineer prior to use. The plasticity index of caliche shall have a maximum of 12 and a minimum

of 5. The contractor shall stockpile the material to be used for this particular project.

B. Sampling and testing shall conform to Division C, Section 6, and Paragraph C-611 of The City of Laredo Standard Technical Specifications Manual. Stones greater than 3" in any direction shall be removed from street during construction.

3.1 SURFACE PREPARATION:

A. Proof roll compacted subgrade surface to check for unstable areas and areas requiring additional compaction.

B. Contractor shall be responsible for unsatisfactory conditions. Do not begin flexible base work until deficient compacted subgrade areas have been corrected and are ready to receive flexible base.

3.2 PLACING FLEXIBLE BASE:

A. The flexible base material shall be placed on the approved subgrade in courses not to exceed six (6) inches compacted depth. It shall be the responsibility of the Contractor that the required amount of material be delivered and uniformly spread and shaped. All material shall be moved from the place where it is dumped by cutting into windrows. After the material has been cut into windrows, it shall be sprinkled, spread, shaped, and rolled in proper sequence to prevent segregation and as necessary for required compaction.

B. The surface upon completion shall be smooth and in conformity with typical sections and to the established lines and grades. Any deviation in excess of 1/4 inch in cross section and in length of 16 feet measured longitudinally shall be corrected. All irregularities, depressions, or weak spots which develop shall be corrected.

C. Flexible base shall be compacted to an apparent dry density of not less than 98 percent of the maximum dry density as determined in accordance with THD Test Method Tex 113-E. Tests for density will be made within 24 hours after compaction operations are completed. If the material fails to meet the density specified, it shall be reworked as necessary to meet the density required.

D. Just prior to the placing of any succeeding course of flexible base or surfacing on a previously compacted course, the density and moisture of the top three (3) inches of flexible base shall be checked and if test show the density to be more than 2 percent below the specified minimum or the moisture content to be more than 3 percent above or below the optimum, the course shall be reworked as necessary to obtain the specified compaction and moisture content.

3.3 FIELD QUALITY CONTROL:

A. General: Test in-place flexible base courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable flexible base as required.

END OF SECTION 02500

02506 PRIME COAT

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of prime coat work is shown on drawings, and consists, but is not limited to, an application of asphaltic material on the completed flexible base and/or other required areas in accordance with the plans and specifications.

1.3 RELATED SECTIONS:

A. Prepared base is specified in another section.

B. Saw-cutting of edges of existing pavement is specified in Selective Demolition section.

1.4 SUBMITTALS:

A. Material Certificates: Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

1.5 QUALITY ASSURANCES:

A. Codes and Standards: Comply with Texas State Department of Highways and Public Transportation (THD) Standard Specifications, 1993 edition, and with local governing regulations if more stringent than herein specified.

1.6 JOB CONDITIONS:

A. Weather Limitations: Prime coat shall not be applied when ambient temperature is below 60E Fahrenheit and falling, but it may be applied when the air temperature is above 50E Fahrenheit and is rising; the air temperature being taken in the shade and away from artificial heat. Asphaltic material shall not be placed when general weather conditions are not suitable.

B. Grade Control: Maintain required lines and elevations.

2.1 MATERIALS:

A. General: The asphalt material for prime coat shall meet the requirements for Medium Curing Type Cutback Asphalt, MC-30, Item 300, "Asphalts, Oils and Emulsions" of the Texas State Department of Highways and Public Transportation Standard Specifications.

3.1 SURFACE PREPARATION:

A. Remove loose material from compacted base surface immediately before applying prime coat.

B. Proof roll prepared base surface to check for unstable areas and areas requiring additional compaction.

C. Contractor shall be responsible for unsatisfactory conditions. Do not begin prime coat work until deficient base areas have been corrected and are ready to receive prime coat.

D. Prime Coat: When the base and/or area is satisfactory to receive the prime coat, the surface shall be cleaned by sweeping or other approved method. If required the surface shall be lightly sprinkled with water just prior to application of the asphaltic material. The asphaltic material shall be applied on the clean surface by an approved type of self-propelled pressure distributor so operated as to distribute the prime coat at a rate not to exceed 0.20 gallon per square yard of surface, evenly and smoothly, under a pressure necessary for proper distribution.

E. Exercise care in applying bituminous materials to avoid splattering or smearing of adjoining surfaces. Remove and replace or clean any damaged surfaces.

3.2 FIELD QUALITY CONTROL:

A. General: Maintain even coverage during application, apply additional coat(s) as required to maintain indicated coverage throughout.

END OF SECTION 02506

02507 TACK COAT

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification section, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of tack coat work is shown on drawings and consists of, but is not limited to, an application of asphaltic material on completed base after the prime coat has sufficiently cured, existing pavement, bituminous surface, or other required areas in accordance with the plans and specifications.

1.3 RELATED SECTIONS:

A. Prepared base and prime coat are specified in other sections.

B. Saw-cutting of edges of existing pavement is specified in Selective Demolition Section.

1.4 SUBMITTALS:

A. Material Certificates: Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

1.5 QUALITY ASSURANCES:

A. Codes and Standards: Comply with Texas State Department of Highways and Public Transportation (THD) Standard Specifications, and with local governing regulations if more stringent than herein specified.

1.6 SITE CONDITIONS:

A. Weather Limitations: Tack coat shall not be applied when ambient temperature is below 60º Fahrenheit and falling, but it may be applied when the air temperature is above 50º Fahrenheit and is rising; the air temperature being taken in the shade and away from artificial heat. Asphaltic material shall not be placed when general weather conditions are not suitable.

B. Grade Control: Maintain required lines and elevations.

2.1 MATERIALS:

A. The asphaltic material for the tack coat shall meet the requirements for emulsified asphalt MS-1 or cut back asphalt RC-2.

3.1 SURFACE PREPARATION:

A. Remove loose material from compacted base surface immediately before applying tack coat.

B. Proof roll prepared base surface to check for unstable areas and areas requiring additional compaction.

C. Contractor shall be responsible for unsatisfactory conditions. Do not begin tack coat work until deficient base areas have been corrected and are ready to receive tack coat.

D. Tack Coat: Before the tack coat is applied, the surface shall be cleaned thoroughly. The asphaltic material shall be applied on the clean surface by an approved type of self-propelled pressure distributor, so operated as to distribute the tack coat at a rate not to exceed 0.10 gallon per square yard of surface, evenly and smoothly under a pressure necessary for proper distribution. Where the pavement mixture will adhere to the surface on which it is to be placed without the use of a tack coat, the tack coat may be omitted. The tack coat shall be rolled with a pneumatic tire roller.

E. Allow to dry until at proper condition to receive paving.

F. Exercise care in applying bituminous materials to avoid splattering or smearing of adjoining surfaces. Remove and replace or clean any damaged surfaces.

G. Joints: Apply tack coat to all surfaces of joints between old and new pavements to be connected, or between successive days work, to ensure continuous bond between adjoining work. DO NOT OMIT UNDER ANY CIRCUMSTANCES.

3.2 FIELD QUALITY CONTROL:

A. General: Maintain even coverage during application; apply additional coat(s) as required to maintain indicated coverage throughout.

END OF SECTION 02507

02511 HOT-MIX ASPHALT PAVING

PART 1 - GENERAL

RELATED DOCUMENTS:
Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY:
This Section includes provisions for hot-mixed asphalt paving over prepared base for roads and parking lots, hot mix asphalt base over prepared subgrade and oil treatment over prepared base for temporary roads and laydown areas.
Prepared subgrade is specified in Section 02200. Prepared flexible base (caliche) is specified in section 02510. Asphalt base is specified herein.

SUBMITTALS:
General: Submit the following in accordance with Conditions of Contract and Division 1 specification Sections.
Material Certificates signed by material producer and contractor, certifying that each material item complies with or exceeds specified requirements.

SITE CONDITIONS:
Weather Limitations: Apply prime and tack coats when ambient temperature is above 50 deg F (10 dog C) and when temperature has not been below 35 deg F (1 dog C) for 12 hours immediately prior to application. do not apply when base is wet or contains an excess of moisture.
Construct hot-mixed asphalt surface course when atmospheric temperature is above 40 deg F (4 deg C) and when base is dry. Base course may be placed when air temperature is above 30 deg F (minus 1 deg C) and rising.
Grade Control: Establish and maintain required lines and Elevations.

PART 2 - PRODUCTS

MATERIALS:
General: Use locally available materials and gradations that exhibit a satisfactory record of previous installations.
Coarse Aggregate: Sound, angular crushed stone, crushed gravel, or properly cured crushed blast furnace slag, complying with ASTM D 692-88.
Fine Aggregate: Sharp-edged natural sand or sand prepared from stone, properly cured blast furnace slag, gravel, or combinations thereof, complying with ASTM D 1073.
Mineral Filler: Rock or slag dust, hydraulic cement, or other inert material complying with ASTM D 242.
Asphalt Cement: ASTM D 3381 for viscosity-graded material.
Prime Coat: Medium cure cutback asphalt.
Tack Coat: Anionic emulsified asphalt; TxDOT Item 300; MS-1.
Dust Control Coat: Anionic emulsion, TxDOT Item 300; MS-1, or asphalt emulsified prime (AEP), TxDOT Item 300; AEP, diluted with water up to 50% per manufacturer's requirements.
Pavement Marking Paint: Chlorinated rubber-alkyd type, ready-mixed complying with Federal Spec TTPllSE, Type III.
Color: White, Blue, Yellow.
Prefabricated Pavement Markings: Prefabricated pavement markings for symbols and words shall conform to TxDOT Item 668.
Traffic Buttons: TxDOT Class E raised pavement markers (all-weather reflectorized):
For lane lines: Type II-C-R. Two reflective faces. White reflector facing direction of traffic, red reflector opposing traffic.
For center lines: Type II-A-A. Two reflective faces, reflecting amber to both directions of traffic.

ASPHALT-AGGREGATE MIXTURE:
Provide plant-mixed, hot-laid asphalt-aggregate mixture complying with Texas Department of Transportation (TxDOT) Item 340, Hot Mix Asphaltic Concrete Pavement. Surface mix shall be Type D, with a minimum Hveem stability of 37. Base course mix shall be Type B, with a minimum stability of 35.

PART 3 - EXECUTION

SURFACE PREPARATION:
General: Remove loose material from compacted base immediately before applying prime coat. For asphalt base placement, complete subgrade as described in Section 02200. For asphalt surface, complete base as described in Section 02510.

Prime Coat: For construction of asphalt surface over flexible base, apply prime coat at rate of 0.20 to 0.25 gal. per sq. yd., over compacted base course. Apply material to penetrate and seal, but not flood, surface. Cure and dry as long as necessary to attain penetration and evaporation of volatile.

Tack Coat: Use where construction asphalt surface or base course over prepared asphaltic base or compacted subgrade, respectively. Apply tack coat to contact surfaces of previously constructed subgrade, asphalt or Portland cement concrete and surfaces abutting or projecting into asphaltic course to be placed. Distribute evenly over surface at rate of 0.05 to 0.15 gal. per sq. yd. of surface.
Dust Control: Where asphalt is not to be placed, but dust control is desired. Apply at a rate of 0.20 to 0.50 gal. per sq. yd. over compacted base.
Apply material to penetrate, but not flood, surface. Cure and dry as long as
necessary to attain penetration and evaporation of volatile. Repeat as required during the project to control dust.
Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Clean or remove damaged surfaces.

PLACING ASPHALT MIX:

General: Place hot-mixed asphalt mixture on prepared surface, spread, and strike off. Spread mixture at minimum temperature of 225 deg F (107 deg C). Place areas inaccessible to equipment by hand. Place each course to required grade, cross-section, and compacted thickness.
Joints: Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other sections of hot-mixed asphalt course. Clean contact surfaces and apply tack coat.

ROLLING:

General: Begin rolling when mixture will bear roller weight without excessive displacement.
Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
Breakdown rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material.
Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. continue second rolling until mixture has been evenly compacted.
Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. continue rolling until roller marks are eliminated and course has attained 95 percent laboratory density.
Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot hot-mixed asphalt. compact by rolling to specified surface density and smoothness.
Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
Erect barricades to protect from traffic until mixture has cooled enough not to become marked.

TRAFFIC AND LANE MARKINGS:

Cleaning: Sweep and clean surface to eliminate loose material and dust. Apply markings only to clean, dry pavement. Install all markings in proper alignment and in conformance with locations shown on the drawings, unless otherwise directed by the Owner's Representative.
Striping: Use painted markings. Do not apply traffic and lane marking paint until layout and placement have been verified with Owner/Architect/Engineer.
Apply paint with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates to provide minimum 12 to 15 mils dry thickness.
Apply plastic markers following manufacturer's recommendations for installation. do not place markings where pavement temperature is below 60 F or above 120 F.

Install raised pavement markers using machine-mixed epoxy adhesive, applied in accordance with the manufacturer's recommendations. One hundred percent (10%) of the bonding area of raised pavement markers shall be in contact with the adhesive. Place the markers in the proper orientation immediately after the adhesive is applied, and insure that they are bonded firmly to the pavement. Adhesive or any other material that impairs
functional reflectivity will not be acceptable.
Contractor shall replace any pavement markings which expense.

FIELD QUALITY CONTROL:

General: Testing in-place hot-mixed asphalt courses for compliance with requirements for thickness and surface smoothness will be done by Owner's testing laboratory. Repair or remove and replace unacceptable paving as directed by Owner's representative. Retesting will be at the expense of the Contractor.

Thickness: In-place compacted thickness tested in accordance with ASTM D 3549 will not be acceptable if exceeding following allowable variations:
Base Course: Plus or minus 1/2 inch.
Surface Course: Plus or minus 1/4 inch.
Surface Smoothness: Test finished surface of each hot-mixed asphalt course for smoothness, using 10-foot straightedge applied

parallel with and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness:

Base Course Surface: 1/4 inch.

Wearing Course Surface: 3/16 inch.

Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

Check surface areas at intervals as directed by Owner/Architect/Engineer.

02513 HOT MIX ASPHALTIC CONCRETE PAVING

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of hot mix asphaltic concrete paving work is shown on drawings and consists of, but is not limited to, installation of a leveling-up course, a surface course or any combination of these courses as shown on the plans, each to be composed of a compacted mixture of mineral aggregate and asphaltic material. The mixture, when designed and tested in accordance with these specifications and methods outlined in THD Bulletin C-14, shall have the following:

DENSITY, PERCENT			STABILITY, PERCENT
Min.	Max.	Optimum	Not less than 45 nor more than 60
94	99	97	unless otherwise shown on the plans.

B. The pavement shall be constructed on completed base, existing pavement, bituminous surface or other required areas in accordance with the plans and specifications.

1.3 RELATED SECTIONS:

A. Prepared base, prime and tack coats are specified in other sections.

B. Saw-cutting of edges of existing pavement is specified in Selective Demolition section.

1.4 SUBMITTALS:

A. Material Certificates: Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

1.5 QUALITY ASSURANCES:

B. Codes and Standards: Comply with Texas State Department of Highways and Public Transportation (THD) Standard Specifications, and with local governing regulations if more stringent than herein specified.

1.6 JOB CONDITIONS:

A. Weather Limitations: Application of Hot Mix Asphaltic Concrete Pavement shall not begin unless the temperature is at least 50 degrees F in the shade and rising.

B. Grade Control: Establish and maintain required lines and elevations.

2.1 MATERIALS:

A. General: Material used in Hot Mix Asphaltic Concrete Pavement shall meet the requirements as set forth in Item 340 "Hot Mix Asphaltic Concrete Pavement" of the Texas Highway Department Standard Specifications.

3.1 SURFACE PREPARATION:

A. Remove loose material from surface immediately before installing each pavement course.

B. Proof roll surface to check for unstable areas and areas requiring additional compaction.

C. Contractor shall be responsible for unsatisfactory conditions. Do not begin paving work until deficient areas have been corrected and are ready to receive paving.

D. Exercise care in applying bituminous materials to avoid splattering or smearing of adjoining surfaces. Remove and replace or clean any damaged surfaces.

3.2 PLACING MIX:

A. General: Construction methods used in Hot Mix Asphaltic Concrete Pavement shall meet the requirements as set forth in Item 340, "Hot Mix Asphaltic Concrete Pavement" of Texas Highway Department Standard Specifications, and with the weather limitations required by this specification.

B. Joint: Make joints between old and new pavements, or between successive days work, to ensure continuous bond between adjoining work. Joints shall have same texture, density and contact surfaces.

3.3 ROLLING:

A. General: Begin rolling when mixture will bear roller weight without excessive displacement.
Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

B. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.

C. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.

D. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.

E. Patching Newly Installed Pavement: Remove and replace paving areas mixed with foreign materials and defective areas. Cut-out such areas and fill with fresh, hot asphaltic concrete. Compact by rolling to maximum surface density and smoothness.

F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.4 FIELD QUALITY CONTROL:

A. General: Test in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as required.

B. Thickness: In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:

Leveling Course: 1/2", plus or minus.

Surface Course: 1/4", plus or minus.

C. Surface Smoothness: Test finished surface of each asphalt concrete course for smoothness, using 10' straightedge applied parallel with, and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness.

Leveling Course Surface: 1/4".

Wearing Course Surface: 1/8".

D. Crowned Surfaces: When applicable, test with crowned template centered and at right angle to crown. Maximum allowance variance from template, 1/4".

E. Check surface areas at intervals as required to verify compliance with design intent.

END OF SECTION 02513

02520 PORTLAND CEMENT CONCRETE PAVING

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work specified in this section.

1.2 DESCRIPTION OF WORK:

A. Extent of portland cement concrete paving is shown on drawings.

1.3 RELATED SECTIONS:

A. Prepared Base Course, prime coat and tack coat are specified in other sections.

B. Concrete reinforcing steel and related materials are specified in Division 3.

C. Joint fillers and sealers are specified in Division 7.

1.4 QUALITY ASSURANCE:

A. Codes and Standards: Comply with local governing regulation if more stringent than herein specified.

1.5 SUBMITTALS:

A. Furnish samples, manufacturer's product data, test reports, and materials' certifications as required in the referenced sections for concrete, joint fillers and joint sealers.

JOB CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other activities within the construction area.

B. Utilize flagman, barricades, warning signs and warning lights as required.

2.1 MATERIALS:

A. Forms: Steel, wood or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal.

B. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required.

C. Coat forms with a non-staining form release agent that will not discolor or deface surface of concrete.

D. Reinforcing shall be new stock, free of mill scale, and delivered to the site free of rust other than that obtained in prompt transportation.

E. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

F. Metal Expansion Caps: Furnish for one end of each dowel bar in expansion joints. Design caps with one end closed and a minimum length of 3" to allow bars movement of not less than 1", unless otherwise indicated.

G. Concrete Materials: Comply with requirements of applicable Division 3 sections for concrete materials, admixtures, bonding materials, curing materials, and others as required.

H. Expansion Joint Materials: Comply with requirements of applicable Division 7 sections for performed expansion joint fillers and sealers.

I. Curing and Sealing Compound: Conform to TT-C-800, with 30% solids content minimum.

J. Epoxy Resin Grout: FS MMM-G-650.

2.2 CONCRETE MIX, DESIGN AND TESTING:

A. Comply with requirements of applicable Division 3 sections for concrete mix design, sampling and testing, and quality control, and as herein specified.

B. Design mix to produce normal-weight concrete consisting of portland cement, aggregate and water to produce the following properties.

Compressive Strength: 3600 psi, minimum at 28 days.

Slump Range: 3" to 5".

3.1 SURFACE PREPARATION:

A. Remove loose material from compacted base surface immediately before placing concrete.

B. Proof-roll prepared base surface to check for unstable areas and need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

3.2 FORM CONSTRUCTION:

A. Set forms to required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

B. Check completed formwork for grade and alignment to following tolerances.

C. Top of forms not more than 1/8" in 10'.

D. Vertical face on longitudinal axis, not more than 1/4" in 10'

E. Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.

3.3 REINFORCEMENT:

A. Locate, place and support reinforcement as specified in Division-3 sections, unless otherwise indicated.

3.4 CONCRETE PLACEMENT:

A. General: Comply with requirements of Division 3 sections for mixing and placing concrete, and as herein specified.

B. Do not place concrete until aggregate base course and forms have been checked for line and grade. Moisten base course if required to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

C. Place concrete using methods which prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.

D. Deposit and spread concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2-hour, place a construction joint.

E. When adjacent pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained sufficient strength to carry loads without injury.

3.5 JOINTS:

A. General: Construct expansion, weakened-plane (contraction), and construction joints true-to-line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.

B. When joining existing structures, place transverse joints to align with previously placed joints, unless otherwise indicated.

C. Weakened-Plane (Contraction) Joints: Provide weakened-plane (contraction) joints, sectioning concrete into areas as shown on drawings. Construct weakened-plane joints for a depth equal to at least 1/4 concrete thickness, as follows:

D. Sawed Joints: Form weakened-plane joints using powered saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints into hardened concrete as soon as surface will not be torn, abraded, or otherwise damaged by cutting action.

E. Construction Joints: Place construction joints at end of placements and at locations

where placement operations are stopped for a period of more than 1/2-hour, except where such placements terminate at expansion joints.

F. Construct joints as shown or, if not shown, use standard metal keyway-section forms.

G. Where load transfer-slip dowel devices are used, install so that one end of each dowel bar is free to move.

H. Expansion Joints: Provide pre-molded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks and other fixed objects otherwise indicated.

I. Locate expansion joints at 50' o.c. for pavement lane, unless otherwise indicated.

J. Extend joint fillers full-width and depth of joint, and not less than 1/2" or more than 1" below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface.

K. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together.

L. Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.

M. Fillers and Sealants: Comply with the requirements of applicable Division 7 sections for preparation of joints, materials, installation, and performance.

3.6 CONCRETE FINISHING:

A. After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

B. After floating, test surface for trueness with a 10' straightedge. Distribute concrete as required to remove surface irregularities, and re-float repaired areas to provide a continuous smooth finish.

C. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2" radius, unless otherwise indicated. Eliminate tool marks on concrete surface.

D. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:

E. Broom finish, by drawing a fine-hair broom across concrete surface perpendicular to line of traffic. Repeat operation if required to provide a fine line texture acceptable to Engineer.

F. On inclined slab surfaces, provide a coarse, non-slip finish by scoring surface with a stiff-bristled broom, perpendicular to line of traffic.

G. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by the Engineer.

3.7 CURING:

A. Protect and cure finished concrete paving, complying with applicable requirements of Division 3 sections. Use curing and sealing compound or approved moist-curing methods.

3.8 REPAIRS AND PROTECTION:

A. Repair or replace broken or defective concrete, as directed by the Engineer.

B. Drill test cores where directed by the Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy resin grout.

C. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Sweep concrete pavement and wash free of stains, discoloration's, dirt and other foreign material just prior to final inspection.

END OF SECTION 02520

02530 CONCRETE CURB, WALK AND FLATWORK

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of Contract, including general and Supplementary Conditions and Division-1 Specification sections, apply to work specified in this section.

1.2 DESCRIPTION OF WORK:

A. Extent of concrete curbs, walks and medians are shown on drawings.

B. Concrete Curb may be either machine laid or formed. It shall consist of Portland Cement concrete curbing with or without reinforcing steel as required, construction on an improved base in accordance with this specification and in conformity with the lines, grades, section and details shown on plans.

C. Concrete Walks shall consist of Portland Cement concrete walks with reinforcing as required conforming to the lines, grades, section and details shown on plans.

D. Concrete Medians shall consist of Portland Cement concrete medians and islands with reinforcing steel as required conforming to the lines, grades, sections and details shown on plans.

1.3 RELATED SECTIONS:

A. Concrete, Reinforcing Steel and other related items are specified in Division 3.

B. Improved Base is specified in other sections.

C. Backfill is specified in the Earthwork section.

1.4 QUALITY ASSURANCES:

A. Codes and Standards: Comply with local governing regulations if more stringent than herein specified.

1.5 JOB CONDITIONS:

A. Grade Control: Establish and maintain lines and elevations.

2.1 MATERIALS:

A. Concrete: Comply with requirements of applicable Division 3 sections for concrete materials, admixtures, bonding materials, curing materials and other items as required. Reinforcing shall be new stock, free of mill scale, and delivered to site free of rust other than that obtained in prompt transportation.

B. Forms: Steel, wood or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required. Coat forms with a non-staining form release agent that will not discolor or deface surface of concrete.

C. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

D. Metal Expansion Caps: Furnish for one end of each dowel bar in expansion joints. Design caps with one end closed and a minimum length of 3 inches to allow bars movement of not less than 1 inch, unless otherwise indicated.

E. Expansion Joint Materials: Comply with requirements of applicable Division 7 sections for performed expansion joint fillers and sealers.

F. Curing and Sealing Compound: Apply immediately after finishing and comply with requirements as specified in Division 3.

2.2 CONCRETE MIX, DESIGN AND TESTING:

A. Comply with requirements of applicable Division 3 sections for concrete mix, design, sampling and testing, quality control and as herein specified.

B. Compressive Strength shall be as follows:

1. Curb - 3,000 psi, minimum in 28 days.

2. Walk – 3,000 psi, minimum in 28 days.

3. Median - 3000 psi, minimum in 28 days.

3.1 SURFACE PREPARATION:

A. Area shall be excavated, shaped and compacted to lines, grades and cross section as shown on plans. If the surface is undercut, or the natural ground is below, "top of prepared surface" then necessary backfill shall be made with approved material and compacted with a mechanical tamper.

B. Formed Curb, Walks and Medians shall be placed on the prepared surface with a 2 inch flexible base cushion (minimum thickness). The flexible base cushion shall be moist at the time the concrete is placed.

C. Where the existing surface is at least seventy percent rock or gravel, the flexible base cushion can be eliminated.

D. Machine Laid Curb shall be placed on an improved base surface.

3.2 FORMS:

A. General: Forms shall be of metal or well seasoned wood. Wood forms for straight sections shall be not less than one and a half (1 ½) inches in thickness. Forms shall be clean, straight and free from warp. All forms shall be securely staked to line and grade and maintained in a true position during the depositing of concrete. Before concrete is placed, all forms shall be oiled with a light form oil.

B. Formed Curbs: The inside forms shall be rigidly attached to the outside forms.

C. Machine Laid Curb: No forms are required.

3.3 REINFORCING STEEL:

A. The reinforcing steel, if required shall be placed in position as shown on plans. Care shall be exercised to keep all steel in its proper location during the concrete placement.

3.4 EXPANSION JOINTS:

A. Expansion Joint Material, ¾ inch thick, shall be provided at intervals not to exceed forty (40) feet in curbs and twenty (20) feet in walks and medians.

B. Expansion joint material shall also be provided where the new construction abuts existing concrete. The expansion joint material shall be placed vertically and shall extend the full depth and width of the curb, walk, or median.

C. Dowel bars shall be smooth bars, three-eights of an inch in diameters, 18 inches in length and shall be installed at each expansion joint. One 9 inch end of each dowel shall be thoroughly coated with hot oil asphalt or red lead, so that it will not bond to the concrete; approved types of slip joints may be used in lieu of coating ends of dowels. In curb, 2 dowel bars shall be used and located as detailed on plans. For walks and medians, dowel bars shall be spaced 18 inches apart.

3.5 DUMMY JOINTS:

A. Curb: Templates for "dummy" joints shall be of steel, not less than three-sixteenths (3/16) of an inch in thickness and patterned to the shape of the curb. Templates shall be cleaned and oiled and spaced to cut the curb in sections ten (10) feet in length. The templates shall extend a distance of one half (3/4) inch into the curb from the top down.

B. Walk and Median shall be marked with transverse "dummy" joints five feet apart, by the use of approved jointing tools.

C. Walk at back of curb – continue dummy joints through both. The depth of the dummy joints shall be a minimum of ¼ of the total concrete thickness.

3.6 CONCRETE:

A. Placement: Concrete shall be placed in the forms, spaded, rodded and tamped to exclude all air and honeycombing and until mortar entirely covers the surface and has a monolithic finish.

B. If a vibrator is used, care shall be taken not to leave it in one location long enough to induce segregation.

C. Surface Finishing: The top surface shall be floated and troweled to a uniform smooth surface, then finished with a camel hair brush or wood float to a gritty texture. The outer edges shall be rounded with approved tools to the radii shown on the plans.

D. On curbs, the surface shall be dusted with a dust consisting of one part Portland Cement and two parts fine sand, then floated and troweled as stated above.

E. Curing: Immediately after finishing the curb, it shall be protected by a membrane curing agent.

F. Backfilling: Walks and curbs shall be backfilled to the full height of the concrete.

3.7 MACHINE LAID CURB:

A. Curb Extrusion: The curb shall be laid by a curbing extrusion machine. The line for top of curb shall be maintained from a guide-line or guide-rails set by the Contractor. Curb outline shall strictly conform to the details shown on the plans. The forming tube of the extrusion machine shall be readily adjustable vertically during the forward motion of the machine, to provide required variable height of curb necessary to conform to the established grade line. If a guide-line is used, a pointer or gage shall be attached to the machine in such a manner that a comparison can be made between the curb and the guideline in order to provide a continual check on the curb grade. Other methods may be used if approved by the Engineer.

B. The concrete shall be fed into the machine in such a manner and at such consistency that the finished curb will present a well compacted mass with a surface free from voids and honeycomb and true to established shape, line and grade.

C. Immediately following extrusion any voids between the trench walls and curb shall be filled with well compacted concrete and finished off flush with the surface of the base.

D. Cold Joints: Whenever extrusion is suspended long enough to produce a cold joint, three-eights (3/8) inch smooth dowel bars, eighteen (18) inches long, shall be embedded nine (9) inches into the completed curb, one-quarter (1/4) curb height from top and bottom. The end of the curb at the point of suspension of extrusion shall be cut back until all remaining concrete is of a dense well compacted nature.

E. Miscellaneous: Expansion joints, dummy joints, finishing and curing compound work shall follow the procedures previously outlined.

3.8 MAINTENANCE:

A. Repair and replace damaged concrete as directed by the engineer.

B. Protect the concrete until acceptance of work.

C. Wash free of stains, discolorations, dirt and other foreign material just prior to final inspection.

3.9 CLEAN UP:

A. Remove forms from site.

B. Backfill and slope to per cross sections.

END OF SECTION 02530

02562 CONCRETE SIDEWALKS AND DRIVEWAYS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS
A. Requirements of Drawings, General and Special Conditions and Division 1 apply to this section.

1.2 DESCRIPTION
A. The specification shall consist of sidewalks and driveways, composed of Portland cement concrete, constructed as herein specified on an approved subgrade, in conformity with the lines and grades established by the Engineer and the details shown on the plans.

PART 2 - PRODUCTS

2.01 MATERIALS
A. Materials and proportions used in construction under this item shall conform to the requirements as specified for 3000 PSI concrete under the specification Section 03300 "Cast-in-Place Concrete". Reinforcing steel shall conform to the requirements as specified in the specification Section 03200 "Concrete Reinforcing".

B. Expansion Joint Material: Expansion joint material shall be 3/4-inch thick asphalt impregnated, preformed filler conforming to the requirements of AASHTO M33 or M213; ASTM D994 or D1751 as specified, and shall be punched to admit dowels where called for in the plans. The filler for each joint shall be furnished in a single piece for the full depth and width required for the joint unless otherwise authorized by the Engineer. When the use of more than one piece is authorized for a joint, the abutting ends shall be fastened securely and held accurately to shape by stapling or other positive fastening satisfactory to the engineer.

C. Reinforcing Steel: Type specified in Section 03200. Grade 60

D. Dowels: ASTM A615; 60 KSI yield grade, smooth plain steel, unfinished. shall be approved material, shall be of such design as to provide the curb required and shall be rigidly attached to the outside forms. Where specifically permitted by the Engineer in writing, the Contractor may place concrete curb and gutter with an extrusion machine.

C. The reinforcing steel, if required, shall be placed in position as shown on the typical sections. Care shall be exercised to keep all steel in its proper location.

D. Concrete for curb and gutter shall be mixed in a manner satisfactory to the Engineer. The curb and gutter shall be poured in sections of the length indicated on the plans, and each section shall be separated by a premoulded or board joint of cross section specified for the curb and gutter, and of the thickness indicated on the plans.

E. After the concrete has been struck off and after it has become sufficiently set, the exposed surfaces shall be thoroughly worked with a wooden float. The exposed edges shall be rounded by the use of an edging tool to the radius indicated on plans. All exposed surfaces of curb and gutter, or curb, shall be brushed to a smooth and uniform surface.

F. The completed curb and gutter shall be cured with Type 2, white pigmented, curing compound unless shown otherwise on plans. Other methods of curing as outlined in the specification, Section 03300 "Cast-in-Place Concrete" will be acceptable with a required curing period of 72 hours. The curb and gutter shall be backfilled to the full height of the concrete, tamped and sloped as directed.

H. Expansion joints shall match joints in adjoining walk at end of radius, at inlets. Locate at maximum 40' spacing (contraction joints at 10'-0" max spacing)

02584 PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
1. Section 02520 - Portland Cement Concrete Paving.

1.2 SCOPE
A. Perform all work required for pavement marking as indicated on the plans an specified herein.

B. Pavement marking and other painting to be done under this specifications includes:
1. All parking space marking, are lane lines, accessible parking symbol on pavement, diagonal safety marking required at accessible parking spaces and any other marking or painting required by codes, ordinances or laws in conjunction with traffic movement or control and parking on the site.

1.3 REQUIREMENTS, CODES
A. The following specifications are minimum requirements and shall govern, except that all local, state, county and/or federal, codes and ordinances shall govern when their requirements exceed those specified herein. Contractor shall coordinate fire lane requirements with City of Alice Fire Department.

1.4 SUBMITTALS
A. Submit complete manufacturer's product data sheets for marking paint.

1.5 JOB CONDITIONS
A. Environmental Requirements. Do not apply materials in rainy or foggy conditions, or when ambient or pavement temperatures are below 50ºF, or when such conditions are anticipated in subsequent 8 hours.

PART 2 - PRODUCTS

2.1 PAINT
A. Paint:
1. Type: Non-bleeding, pigmented, alkyd-chlorinated rubber composition.
2. Non-Volatiles: 70% by weight; 50% by volume.
3. Application Thickness per Coat: 15 mile wet (7 mile dry).
4. Application Rate per Coat: 300-320 l.f. of 4" wide line per gallon.
5. Colors:
   a. White: Parking stall stripping, directional emblems, restricted parking zone striping, disabled accessibility paths
   b. Blue with White Copy Disabled parking emblems.
   c. Red with White Copy: Fire lanes.
6. Acceptable Product: Lifeguard II by Linear Dynamics Corp., Atlanta, GA.
7. Substitutions: Submit in accordance with Section 01631.

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION
A. Locate markings as indicated on Drawings. Provide qualified technician to supervise equipment and application of markings. Lay out markings using guide lines, templates and forms.

B. Thoroughly clean pavement surfaces free of dirt, sand, gravel, oil and other foreign materials.

C. Allow paving to cure before painting as required by manufacturer of traffic paint.

D. Allow protective coatings to cure a minimum of 48 hours prior to application of traffic paint.

3.2 APPLICATION
A. Apply in accordance with manufacturer's written instructions.

B. Apply one coat to Portland cement concrete paving and asphaltic concrete paving with protective seal coat.

C. Restrict traffic on pavement until stripping if fully cured.

02612 PAVEMENT STRIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of Contract, including General Conditions and Division - 1 specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. The work covered by this section consists of furnishing all paint, labor, equipment, and materials and in performing all operations in connection with paint striping and marking, complete in accordance with the specifications and the applicable plans, and subject to the terms and conditions of the contract. The work included under this section shall not be commenced until areas to be painted are in proper condition to receive the striping and marking paint.

1.3 JOB CONDITIONS:

A. Weather Limitations: The painting shall be performed only when the existing surface is dry and clean, when the atmospheric temperature is above 40 degrees F, and when the weather is not excessively windy, dusty, or foggy.

2.1 MATERIALS:

A. Traffic Paint: The traffic paint to be applied in areas with two way traffic and to the no parking areas shall be yellow. The traffic paint to be applied to the parking areas shall be white in color and shall conform to Federal Specifications TT-P-115 or approved for use by the local regulatory agency.

B. Thinner: Ordinarily, thinning will not be allowed. When thinning becomes necessary to shorten the drying time, or to lower the viscosity, only the thinner recommended by the manufacturer of the paint shall be used. Adding thinner to paint containers, for use in the work, will not be permitted.

3.1 GENERAL:

A. The work of striping and marking shall be performed by experienced personnel in a neat and workmanlike manner. All work shall be carried out under favorable weather conditions and no work shall be done unless the paving surfaces are clean and dry in all respects satisfactory for the striping work. All work shall be carefully laid out by the Contractor and all lines shall be of the width, length and pattern shown on the drawings. All lines shall be straight and accurate regarding the angles and shall be snapped with a chalk line or other approved method.

B. All traffic paint is to be delivered on the job in new unbroken sealed containers and applied in accordance with the manufacturer's specifications. No thinning is to be allowed unless specifically required by the manufacturer, in which case solvent shall be as specified by the manufacture.

C. In the carrying out of these operations, care shall be taken to avoid spilling paint or otherwise disfiguring surfaces not required to be painted. Any paint spilled or completed striping not satisfactory to the Engineer shall be removed. Waste paint and residue from cleaning and maintenance of the equipment shall be disposed of at a point and in a

manner satisfactory to the Engineer.

D. The Contractor shall schedule his operations and conduct his work in accordance with a predetermined program that shall be approved by Engineer.

3.2 EQUIPMENT:

A. The striping machine shall be of a type and manufacture regularly used in the striping of pavements. It shall be the self-propelled type, shall apply paint by means of a compressor or actuator spray gun and shall be provided with controls to accurately regulate the amount of paint to be applied to the finished stripe. The design of the machine shall be such as to produce sharp edged stripes of uniform density with square cut beginnings and endings. The machine shall further be equipped with hand-spray attachments for use where required.

3.3 APPLICATION OF PAINT:

A. Paint for striping shall be applied in two applications. The second coat may not be applied less than 24 hours after first coat.

3.4 CLEANING:

A. During progress of the work, remove from project site all discarded materials, rubbish, and debris resulting from the work. Upon completion, clean all surfaces, which have become soiled or coated as a result of work of this section, using proper methods, which will not scratch or otherwise damage finished surfaces.

02663 WATER SERVICE LINE AND TAP

PART 1 - GENERAL

1.01 DESCRIPTION
A. This Section specifies the requirements for providing a metered water service line and water tap from the existing City of Laredo water main.

1.02 QUALITY ASSURANCE
A. Reference Standards Applicable to This Section:

1. ASTM: American Society for Testing and Materials
    a. B 62: Composition Bronze or Ounce Metal Castings
    b. B 88: Seamless Copper Water Tube
    c. B 584: Copper Alloy Sand Castings for General Applications

2. City of Laredo, Utility Department:
    a. Specifications for Water Line Construction
    b. Specifications for PVC Pipe Water Conduits
    c. Specifications for Fire Hydrants

3. ANSI: American National Standards Institute
    a. 16.15: Cast Bronze Threaded Fittings Classes 125 and 250
    b. 16.18: Cast Copper Alloy Solder Joint Pressure Fittings
    c. 16.22: Wrought Copper and Wrought Copper Alloy Solder Joint Pressure Fittings
    d. 16.23: Cast Copper Alloy Solder Joint Drainage Fittings - DWV
    e. 16.29: Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV

B. Certification: Installation of the water service line and meter shall be performed by a Certified Installer. Installer shall be subject to an informal contract agreement with the City of Laredo and shall be bonded and certified to tap city water distribution mains and install water meters.

1.03 SUBMITTALS
A. In accordance with Section 01300 - Submittals, of these specifications, the following shall be submitted:

1. Certificates: Manufacturer's certificates stating that materials meet specified requirements.
2. Shop Drawings and Data: Shop Drawings and data showing details of and recommendations for connection of valves and the various types of fittings and appurtenances.

PART 2 - PRODUCTS

2.01 GENERAL
A. Products for use within the City of Laredo right-of-way shall meet the applicable requirements of City of Laredo.

2.02 MATERIALS
A. Pipe: Ductile iron complying with City of Laredo Standards.

B. Fittings: Ductile iron, conforming to City of Laredo Standards.

C. Valves: Conforming to City of Laredo Standards.

D. Meter and Meter Box: Conforming to City of Laredo Standards.

PART 3 - EXECUTION

3.01 GENERAL
A. All water work shall meet the applicable requirements of City of Laredo Standards.

3.02 EXCAVATION
A. All excavation shall be in accordance with Section 02203 - Trenching, of these Specifications.

1. Perform excavation for water line to lines and grades as indicated on the Drawings.
2. Excavate to a minimum of 6 in. outside pipe barrel. Maintain sides of trench substantially vertical. shore and support as necessary.

3.03 PIPE BEDDING
A. Provide 6 in. of cement stabilized sand bedding shaped to fully support the pipe and all appurtenances, with the exception that no water tamping shall be permitted.

3.04 PIPE LAYING
A. Prior to placing, examine each piece of pipe and fitting for defects and make necessary repairs. Pipe and fitting damaged beyond acceptable repair shall be rejected.

B. Lay the entire length of pipe at line and grade indicate Blocking shall not be used to change pipe grade or to intermittently support pipe across excavated section.

C. Bend pipe to a minimum radius as recommended by the manufacturer for the type of a specified pipe. Otherwise use suitable fittings for changes in direction.

D. Field cut pipe where necessary, using approved pipe cutter, to prevent damage to pipe and to ensure a smooth end.

E. Seal open end of pipe with plug when pipe laying operation is temporarily halted. Plug shall remain in place until operation restarts.

3.05 TESTING AND DISINFECTING
A. Conduct leakage and pressure tests by the open trench method. Allowable hydrostatic pressure and leakage shall be in accordance with City of Laredo Standards.

B. Eliminate all leaks and defects and retest lines to ensure elimination of leaks and defects at no additional cost to the City.

C. Disinfect and test water service line in accordance with City of Laredo Standards.

D. Do not connect the water service line to the existing water main until the service line has been successfully cleaned, tested, disinfected and approved by the City of Laredo.

3.06 BACKFILL
A. Backfill the excavation, after successful completion of testing and disinfecting of pipe, in accordance with Section 02202 - Backfilling, and after obtaining written approval of the City of Laredo to do so.

3.07 CLEANUP
A. Remove temporary structures, rubbish, waste materials and excess excavated materials from the Site and dispose of legally.

02666 WATER SERVICE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of Contract, including General and Supplementary Conditions, and Division 1-Specification sections, City of Laredo Standard Technical Specification Manual apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of water service piping work is shown on drawings.

B. Exterior water service piping work includes, but is not limited to, the following:

Yard piping
Control Valves

C. Comply with requirements of applicable Division-2 sections for excavation and backfilling required in connection with exterior water service piping.

D. Comply with requirements of applicable Division-3 sections for concrete work required in connection with exterior water service piping.

E. Comply with the requirements of the City of Laredo Standard Technical Specifications, Division D, I. Water.

1.3 QUALITY ASSURANCE:

A. Installer: A firm with at least 5 years of successful installation experience on exterior water service piping projects similar to this project.

B. Code Compliance: Comply with applicable portion of National Standard Plumbing Code and local plumbing codes where most stringent.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's product data and installation instruction for each product specified for water service piping.

2.1 PRESSURE PIPE:

A. General: Provide ells, tees, reducing tees, wyes, couplings and other required piping accessories of same type and class of material as conduit, or of material having equal or superior physical and chemical properties as acceptable to the Engineer.

B. All water piping shall comply with the City of Laredo Standard Technical Specificaiton, Division D. I Water Section 104 for PVC and Section 106 for Ductile Irion Pipe.

2.2 CONTROL VALVES:

A. General: Provide valves and flow control devices as indicated and in compliance with the City of Laredo Standard Technical Specification Manual Division D, I.-Water Section 110.

B. Minimum working pressure: 150 psi unless otherwise indicated.

C. Gate Valves: Standard shut-off valves with maximum working pressure cast into body, outside-screw-and-yoke type complying with AWWA C 500.

D. Check Valves: Gravity-operated, regular type, iron bodied bronze fitted with metal-to-metal or rubber faced checks, complying with AWWA C 506.

E. Butterfly Valves: Rubber seated, equipped with gear or travelling nut actuator to minimize water hammer, complying with AWWA C 504.

2.3 ACCESSORIES:

A. General: Provide anchorages for tees, plugs, caps, and bends.

B. After installation, apply a full coat of asphalt or other acceptable corrosion-retarding material to surfaces of rods and clamps.

Clamps, Straps and Washers: Steel, ANSI/ASTM A 506.
Rods: Steel, ANSI/ASTM A 575.
Rod Couplings: Malleable iron, ANSI/ASTM A 197.
Bolts: Steel, ANSI/ASTM A 307.
Cast Iron Washers: ANSI/ASTM A 126, Class A.
Thrust Blocks: 3000 psi concrete.
Water Service Identification: Plastic line markers, nomenclature "Caution, Buried Water Line Below".

3.1 INSTALLATION:

A. General: Install exterior water service piping system in compliance with local governing regulations. Water Service Piping: Extend water service piping of size and in location indicated to water service entrance at building. Provide sleeve in foundation wall for water service entry; make entry watertight. Provide gate valve at water service entry inside building; strainer, pressure gage, test tee with valve.

B. Asbestos-Cement Pipe: Shall not be used.

C. Cast-Iron Pipe: Install in accordance with AWWA C 600.

D. Control Valves: Install in accordance with manufacturer's instructions.

E. Joint Adapters: Make joints between cast-iron pipe other types off pipe with standard manufactured cast-iron adapters and fittings.

F. Interior Inspection: Inspect conduit to determine whether line displacement or other damage has occurred.

G. If the inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, correct such defects to satisfaction of the Engineer.

H. Cleaning Conduit: Clear interior of conduit of dirt and other superfluous material as work progresses. Maintain swab or drag in line and pull past each joint as it is completed.

I. Place plugs in end of uncompleted conduit at end of day or whenever work stops.

J. Sterilization: At completion of water service line installation, flush and sterilize in conformance with AWWA C 601, to the satisfaction of local authorities having jurisdiction.

3.2 TESTING:

A. Perform hydrostatic testing of completed conduit lines in accordance with local authorities having jurisdiction.

B. Perform operational testing of valves by opening and closing under water pressure to insure proper operation.

3.3 BACKFILLING:

A. Conduct backfilling operations of open-cut trenches closely following laying, jointing and bedding of pipe, and after initial inspection and testing are completed.

END OF SECTION 02666

02668 FIRE WATER SYSTEM

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of the Contract, including General and Supplementary Conditions, Division 1 - Specification sections, and City of Laredo Standard Technical Specification Manual apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of exterior fire water system work is shown on drawings.

B. Exterior fire water system work includes, but is not limited to, the following:

Yard piping.

Control valves.

Hydrants.

C. Comply with requirements of applicable Division-2 sections for excavation and backfilling required in connection with exterior fire water system.

D. Comply with requirements of applicable Division-3 sections for concrete work required in connection with exterior water system.

E. Comply with City of Laredo Standard Technical Specification Manual.

1.3 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacture of fire water system materials of types and sizes required, whose products have been in satisfactory use in similar services for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on exterior fire water system projects similar to the project.

C. NFPA Code: Comply with National Fire Protection Association (NFPA) Standard No. 24, "Standard for Outside Protection".

D. Local Fire Department/Marshall Regulations: Comply with governing regulations pertaining to hydrants, including hose unit threading and similar matching of connections.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's product data and installation instructions for pipe

and
fittings, valves, hydrants, and accessories.

B. Shop Drawings: Submit shop drawings for system, showing conduit type, size, location, and elevations. Include details of underground structures, fittings, connections, anchors and thrust blocks.

2.1 MATERIALS:

A. General: Water man line can be either PVC or ductile iron following the City of Laredo Standard Technical Specification Manual Division D, I.-Water Section 104 or 106.

2.2 HYDRANTS:

A. Refer to the City of Laredo Standard Technical Specification Manual Division D, I.-Water Section 110.

2.3 CONTROL VALVES:

A. Refer to the City of Laredo Standard Technical Specification Manual Division D, I.-Water Section 110.

2.4 ANCHORAGE AND THRUST BLOCKING:

A. Refer to the City of Laredo Standard Technical Specification Manual Division D, I.-Water Section 104.

3.1 INSTALLATION:

A. Refer to the City of Laredo Standard Technical Specification Manual Division D, I.-Water Section 104.

3.2 TESTING:

A. Refer to the City of Laredo Standard Technical Specification Manual Division D, I.-Water Section 116.

3.3 BACKFILLING:

A. Refer to the City of Laredo Standard Technical Specification Manual Division D, I.-Water Section 102.

END OF SECTION 02668

02070 SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of selective demolition work indicated on drawings.

B. Types of Selective Demolition Work: Demolition requires, but is not limited to the selective removal and subsequent off-site disposal of the following.

C. Removal of existing asphalt pavement and base material indicated to be removed on the drawings.

D. Removal or temporary relocation of other miscellaneous existing items as required to complete the work as indicated in the construction documents.

E. Removal of concrete curbs and sidewalks.

1.3 SUBMITTALS:

A. Schedule: Submit detailed sequence of demolition and removal work to Owner's Representative for review prior to commencement of work, to ensure uninterrupted progress of Owner's on-site operations.

1.4 JOB CONDITIONS:

A. Occupancy: Owner and owner's tenants will be continuously occupying areas and buildings immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of normal activities. Provide minimum of 72 hours advance notice to Owner of demolition activities, which will impact normal activities.

B. Condition of Structures: Owner assumes no responsibility for actual condition of items to be removed.

Note: Conditions existing at time of commencement of contract will be maintained by Owner in so far as practicable. However, variations may occur due to Owner's operations prior to start of selective demolition work.

C. Protection: Provide temporary barricades and other forms of protection as required to:

1. Protect Owner's personnel and general public from injury due to selective demolition work.

2. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to and from occupied portions on site.

3. Erect temporary covered passageways as required by authorities having jurisdiction.

4. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.

5. Protect surfaces with suitable coverings when necessary.

6. Remove protection at completion of work.

D. Damages: Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.

E. Traffic: Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

F. Utility Services: Maintain existing utilities unless indicated to be removed, keep in service, and protect against damage

during demolition operations.

Note: Do not interrupt existing utilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruption to existing utilities, as acceptable to governing authorities.

PART 2 - PRODUCTS
Not applicable.
PART 3 – EXECUTION

3.1 SELECTIVE DEMOLITION

A. Inspection: Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing conditions to structure surfaces, equipment or to surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Owner's Representative prior to starting work.

B. Preparation: Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of items to be demolished and adjacent materials to remain.

Note: Cease operations and notify Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operation.

C. Locate, identify and temporarily disconnect utility services that are affected by adjacent repairs as necessary.

Note: Provide by-pass connections as necessary to maintain continuity of service to other areas of building. Provide minimum of 72 hours advance notice to Owner if shut-down of service is necessary during change-over.

D. Demolition: Perform selective demolition work for repairs as indicated in the construction documents in a systematic manner and as follows:

Note: Saw cut existing asphalt pavement as indicated on plans. All cuts shall be to full depth of new pavement thickness to allow proper installation of new concrete pavement. Cutting shall be performed using motor driven saw designed to cut pavement with clean, sharp, unchipped edges.

E. Pavement removal: shall be performed as required to conform with plans and specifications and to provide conditions for installation of new paving.

Note: If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of conflict. Submit report to Owner's Representative in written, accurate detail. Pending receipt of directive from Owner's Representative rearrange selective demolition schedule as necessary to continue overall job progress without delay.

3.2 - MAINTENANCE

A. Environmental Controls: Use suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

B. Repair demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

3.3 - CLEAN-UP

A. Salvage Items: Where indicated on Drawings as "Salvage-Deliver to Owner", carefully remove indicated items, clean, store and turn over to Owner and obtain receipt.

B. Disposal of Demolished Materials: Remove debris, rubbish and other materials resulting from demolition operations from building site each day. Transport and legally dispose of materials off site.

Note: If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution.

Burning of removed materials is not permitted on project site.

C. Clean-up: Upon completion of selective demolition work, remove tools, equipment and demolished materials from site. Remove protection and leave areas clean.

END OF SECTION 02070

02730 SANITARY SEWER COLLECTION SYSTEMS

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of Contract, including General and Supplementary Conditions, and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Comply with the requirements of applicable Division-2 sections for excavation and backfilling required in connection with sewer collection system work.

B. Comply with requirements of applicable Division-3 sections for concrete work required in connection with sewer collection system work.

1.3 QUALITY ASSURANCE:

A. Installer: A firm specializing and experienced in sewer collection system work for not less than 2 years.

1.4 SUBMITTALS:

A. Shop Drawings: Submit shop drawings for underground structures, accessories, fittings, and connections.

2.1 CONDUIT MATERIALS:

A. All PVC Sewer Pipe and Fittings used in this contract shall be made of plastic, meeting the requirement of: ASTM D 3034. All PVC sewer pipe and fittings shall be SDR – 26.

B. Fittings:

1. Fittings such as saddles, elbows, tees, and wyes shall be of material and construction corresponding to and have joint design compatible with adjacent pipe.

2. Provide approved adapters for transitions to other types of pipe.

C. Pipe Joints:

1. Rubber Gasket: Bell and spigot joint, sealed by a rubber gasket so assembly will remain watertight under conditions of service including movements resulting from expansion, contraction, settlement, and deformation of pipe. Gaskets shall conform to ASTM C361.

D. Pipe Markings: Mark at intervals of 5 feet or less with following:

1. Manufactures name or trademark
2. Nominal pipe size
3. PVC cell classification, for example 12454-B.
4. Legend, "Type PSM SDR-26 PVC Sewer Pipe"
5. ASTM D3034
6. Extrusion date, period of manufactured or lot number

E. Fitting Markings

1. Manufacturer's name or trademark
2. Nominal Size
3. Material designation "PVC"
4. PSM type
5. ASTM D3034

3.1 INSTALLATION OF CONDUIT:

A. General:

1. Install conduit in accordance with governing authorities having jurisdiction, except where more stringent requirements are indicated.

2. Inspect conduit before installation to detect apparent defects. Mark defective materials with white paint and promptly remove from site.

3. Lay conduit beginning at low point of a system, true to grades and alignment indicated with unbroken continuity of invert.

4. Install gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements.

B. Cleaning Conduit:

1. Clear interior of conduit of dirt and other superfluous material as work progresses. Maintain swab or drag in line and pull past each joint as it is completed. In large, accessible conduit, brushes and brooms may be used for cleaning.

2. Place plugs in ends of uncompleted conduit at end of day or whenever work stops.

3. Flush lines between manholes if required to remove collected debris.

C. Closing Abandoned Utilities:

1. Close open ends of abandoned underground utilities which are indicated to remain in place. Provide sufficiently strong closures to withstand hydro-static or earth pressure which may result after ends of abandoned utilities have been closed.

D. Interior Inspection:

1. Inspect conduit to determine whether line displacement or other damage has occurred.

2. Make inspections after lines between manholes, or manhole locations, have been

installed and approximately two feet of backfill is in place and at completion of project.

3. If inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, correct such defects to satisfaction of Engineer.

3.2 UNDERGROUND STRUCTURES:

A. Where manholes occur in pavements, set tops of frames and covers flush with finish surface. Elsewhere, set tops 3" above finish surface, unless otherwise indicated.

B. Pre-cast Concrete Manholes:

1. Place pre-cast concrete section as shown on drawings. Provide rubber joint gasket complying with ASTM C 443 or apply bituminous mastic coating at joints of sections.

3.3 TAP CONNECTIONS:

A. Make connections to existing conduits and underground structures, so that finished work will conform as nearly as practicable to requirements specified for new work.

B. Use commercially manufactured wyes for branch connections. Field cutting into conduit will not be permitted. Spring wyes into existing line and encase entire wye, plus 6" overlap, with not less than 6" of 3000 psi 28-day compressive strength concrete.

C. Branch connections made from side into existing 12"-to-21" conduit shall have a wye sprung into the existing line, and entire wye encased with not less than 6" of 3000 psi 28-day compressive strength concrete.

D. For branch connections from side into existing 24" or larger conduit or to underground structures, cut opening into unit sufficiently large to allow 3" of concrete to be packed around entering connection. Cut ends of connection passing through conduit or structure wall to conform to shape of and be flush with inside wall, unless otherwise indicated. On outside of conduit or structure wall, encase entering connection in 6" of concrete for a minimum length of 12" to provide additional support or collar from connection to undisturbed ground.

E. Provide concrete which will attain a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

F. Use an epoxy bonding compound as interface between new and existing concrete and conduit materials.

G. Take care while making tap connections to prevent concrete or debris from entering existing conduit or structure. Remove debris, concrete, or other extraneous material which may accumulate.

3.4 BACKFILLING:

A. General:

1. Conduct backfill operations of open-cut trenches closely following laying, jointing and bedding of pipe, and after initial inspection and testing are completed. To minimize local area traffic interruptions, allow no more than 100 feet between pipe laying and point of complete backfilling.

3.5 TESTING:

A. Perform testing of completed conduit lines in accordance with local authorities having jurisdiction.

END OF SECTION 02730

02831 CHAIN LINK FENCES AND GATES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Fence is to be completed with all fittings, straps, etc. required to provide a first class installation in keeping with the highest standards for security chain link fencing.

1. All tube ends shall be capped or plugged.
2. All posts and rails shall conform to requirements of ASTM-A120-73 if pipe, or ASTM-A123-73 if "C" section.
3. Fence shall have a top rail.
4. Fence shall have a bottom tension wire tied to fabric at 24" OC max.
5. All ties shall be #11 smooth galvanized steel wire at 24" on center on top rail, post, and bottom tension wire. Aluminum ties are not acceptable.
6. Erection shall be by mechanics experienced in fence erection with work plumb, square, straight and line with accurately fitted tight joints, and securely anchored.
7. Fence fabric shall be maximum 1" off grade and cut into grade locally as required to maintain smooth top line.
8. Concrete footing top finish shall be round, diameter to match footing, edges to be flush with grade, with a smooth one inch crown.
9. Fence height to be six-foot plus the height of the three strands of barbed wire.

1.2 SIX FOOT CHAIN LINK FENCE

A. LINE POSTS

Material – 2-3/8" O.D. by 3.65 lbs./linear ft. (std. wt.) galvanized steel pipe or C-section roll formed from steel conforming to ASTM-A570-72, Grade E, 1.875" x 1.625" with minimum bending strength of 245 lbs. under a 8' cantilever load.
Spacing – 10' maximum.
Installation – set in concrete minimum of 10" in diameter and minimum of 30" deep.

B. CORNER OR TERMINAL POSTS

Material – 3" O.D. by 5.79 lbs./linear ft. (std. wt.) galvanized steel pipe or shall be a roll formed section 3.5" x 3.5" with minimum bending strength of 453 lbs. on 8' cantilever load.
Installation – set in concrete minimum of 12" in diameter and minimum of 40" deep.
Bracing – horizontal brace back to first line post with 2" O.D. std. wt.
Galvanized pipe – diagonal brace top of first line post to bottom of corner or terminal post with a galvanized 3/8" steel rod with tightening device.

C. FABRIC – 9 gauge, 2" x 96" for 8' fence.

D. FENCE TOP RAIL

Material – 1-5/8" O.D. by 2.27 lbs./linear ft. galvanized steel pipe or shall be a roll formed section 1.625" x 1.25" channel shaped rail with minimum vertical bending strength of 192 lbs. on 10' span.

E. BOTTOM TENSION WIRE

Material – 9 gauge galvanized steel wire.

1.3 INSPECTION

A. All post holes shall be inspected and approved prior to the setting of any post in concrete. Any post set without hole inspection and approval shall be removed and reset at Contractor's expense.

B. Any materials found to be non-conforming to specifications at any time shall be removed and replaced at Contractor's expense.

03100 CONCRETE FORM WORK

PART 1 - GENERAL

1.1 MATERIAL:

A. Form Design: Design erect, support, brace and maintain form work so that it will safely support all vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Carry vertical and lateral loads to the ground by form work system and by in-place construction that has attained adequate strength for that purpose. Construct form work so that concrete members and structures are of correct size, shape, alignment, elevation and position.

B. Material: Forms shall be wood, metal, or approved material conforming to the following requirements.

C. Unexposed Surfaces: Shall be plywood, lumber, or metal. Lumber shall be dressed on two edges and one side to provide a tight fit.

D. Exposed Surfaces: Wood forms shall be Commercial Standard Douglas Fir, moisture resistant concrete form plywood, minimum 5 ply and at least 9/16" thick, or forms lined with Commercial Standard Douglas Fir concrete form plywood, 3 ply, not less than 1/4" thick. A smooth concrete surface is required, free from fins, honeycombs or other defects.

E. Metal forms shall be an approved type to produce surfaces equal to those specified for wood, and shall be new, or the equivalent of new.

F. Formed Metal Construction Joints: Tongue and groove profile with knockout holes at 6" o.c. for dowels, minimum 26 ga. steel; provide complete with anchorage.

G. Oiling of Forms: Lightly coat forms with oil for exposed surfaces, except those with absorptive lining, before placing reinforcement. Remove surplus oil. Forms for unexposed surfaces may be thoroughly wet with water in lieu of oiling, immediately before placing concrete, except in cold weather with probability of freezing temperature, oiling is mandatory.

H. Form ties and spreaders shall be carbon steel, cone nut type unless otherwise called for on plans. Wood spreaders will not be permitted.

1.2 FORM CONSTRUCTION:

A. Construct forms complete with centering, cores, etc. Conform to shape, form, line and grade required. Maintain sufficiently rigid to prevent deformation under load. Joints shall be leak proof.

B. Forms placed on successive units for continuous surfaces shall be fitted to accurate alignment to assure smooth completed surface, free from irregularities. If adequate foundation for shores cannot be secured, provide trussed supports. For cleaning and inspection in wall and column forms provide temporary openings. Withdraw nails and

clean forms before reuse. Forms are to be easily removable without hammering or prying against concrete.

C. Place no concrete in any unit of work until all form work has been completely constructed, all reinforcement secured in place, all embedded items in place, and form ties at construction joints tightened.

1.3 REMOVAL OF FORMS:

A. Wall and side forms of beams and columns may be removed 48 hours after concrete placement. Bottom of slabs and joists and soffit forms of beams and ribs may be removed when ultimate strength of the concrete shown by the standard test cylinder break has reached 75% of the design strength, but not less than 3 days after concrete placement.

B. Forms shall not be removed if slabs, ribs, and beams are supporting any loading such as from quantities of construction materials, or columns, forms or shoring for roof to be placed above. In the event soffit forms are removed and the contractor thereafter desires to load the slabs, ribs, and beams, such elements of the structure to be loaded shall be re-shored at the direction of the Engineer, unless in the opinion of the Engineer, the structure will support the loading without shores.

03300 CAST-IN-PLACE CONCRETE

1.1 RELATED DOCUMENTS:

A. Standards: Comply with all applicable federal, state and local codes, and latest editions of the following, except as otherwise shown or specified. When in conflict, the more stringent requirements shall apply.

ACI 301: Specifications for Structural Concrete for Buildings.

ACI 318: Building Code Requirements for Reinforced Concrete.

ACI 614: Recommended Practice for Measuring, Mixing and Placing Concrete.

ACI 311: Recommended Practice for Concrete Installation.

ASTM standards and specifications applicable to cast-in-place concrete.

1.2 MATERIALS:

A. Portland Cement: ASTM C 150, Type 1. One brand of cement shall be used throughout the work for structural purposes.

B. Aggregates: ASTM C 33. The maximum size of aggregates shall be no larger than 1/5 the narrowest dimension between sides of forms within which the concrete is to be cast, or larger than 3/4 the minimum clear space between reinforcing bars and forms. For unreinforced slabs, the maximum size of aggregate shall not be larger than 1/3 the slab thickness.

C. Water: Clean, potable.

D. Admixtures: ASTM C 494, chemical admixtures for concrete, Type A, B, or D. When climactic conditions indicate that the temperature of the concrete may exceed 80 degrees F, an admixture of Type B or D shall be used. Do not use any admixtures or other material containing calcium chloride in the concrete.

E. Non-Shrinking Cement Grout: CRD C 588 factory premixed grout, Type D, non metallic; Masterflow 713 by Master Builders, or equal.

F. Expansion Joint Material: ASTM D 1751, pre-molded asphalt impregnated fiberboard.

G. Moisture Barrier: 6 mil clear polyethylene film, type recommended for below grade application.

H. Concrete Curing Materials: Apply appropriate curing material immediately after finishing is completed.

I. Moisture Retaining Cover: ASTM C 171, one of the following: Waterproof paper,

polyethylene sheeting, or polyethylene coated burlap.

J. Membrane Forming Curing Compound: ASTM C 309, Type I; Clear Seal by W.R. Grace or equal.

K. Proportioning and Design of Concrete Mixes: All concrete batch designs shall be proportioned and produced in accordance with ACI 318, especially Chapter 4, "Concrete Quality", and ACI 301, and shall be approved by the Engineer.

L. Concrete mix designs shall be prepared by an independent testing laboratory with copies submitted to the Engineer for his review.

M. Testing: Concrete testing will be provided by the Owner and shall be performed in accordance with the following:

N. Sampling: ASTM C 172.

O. Slump: ASTM C 143, one test for each load at point of discharge.

P. Air Content: ASTM C 173, one for each set of compressive strength specimens.

Q. Compressive Strength: ASTM C 39, one set for each 50 cu. yds. or fraction thereof of each class of concrete: 2 specimens testing at 7 days, 3 specimens testing at 28 days, and one retained for later testing if required.

R. When the total quantity of a given class of concrete is less than 50 cu. yds., strength tests may be waived by Engineer if field experience indicates evidence of satisfactory strength.

S. Test results will be reported in writing to Engineer, Contractors and concrete producer on same day tests are made.

1.3 MIXING AND PLACING CONCRETE:

A. Use ready mix concrete only. Comply with ASTM C 94, Standard Specification for Ready Mixed Concrete, except as otherwise specified herein.

B. Before placing, clean mixing and conveying equipment, forms and space to be occupied by concrete and wet forms. Remove ground water, if any, until completion of work.

C. Place no concrete in any unit of work until all form work has been completely constructed, all reinforcements securely in place, all embedded items are in place, and form ties at construction joints are tightened.

D. Provide equipment of such size and design for conveying concrete to insure continuous flow of concrete at the delivery end. When pumped concrete delivery is not used, provide runways for wheeled equipment over slab and beam areas, clear of reinforcement, from the concrete delivery point to the location of final deposit. Keep interior surfaces of conveying equipment, including chutes, free of hardened concrete, debris, water and other deleterious materials.

E. Deposit concrete continuously or in layers of such thickness so no concrete will be placed on concrete which has hardened sufficiently to cause a formation of seams or planes of weakness within the section. Place at such a rate that the surface of previous layer is still plastic. If a section cannot be placed continuously, provide construction joints as herein specified.

F. Move concrete as rapidly as practicable to place of deposit by methods which prevent separation or loss of ingredients. Deposit as nearly as practicable in final position to avoid rehandling or flowing. Do not drop concrete freely where reinforcing bars will cause segregation, nor drop freely more than 6 feet. Deposit to maintain a plastic surface approximately horizontal. In walls, deposit in horizontal layers not over 18 inches deep. In pouring columns, walls, or thin sections of considerable heights, use openings in forms, elephant trunks, tremies, or other devices which permit concrete to be placed without segregation or accumulation of hardened concrete on forms or metal reinforcement above the level of the concrete. Install so that concrete will be dropped vertically.

G. When starting a new pour, or where conditions make puddling difficult, or where reinforcement is congested, place modified concrete with the same sand-cement proportions as elsewhere, but not with more than 1/2 of the normal amount of course aggregate per yard. Use modified concrete to a depth of not less than 3 inches where starting a new pour.

H. Use mechanical vibrator at each point of dump. A standby vibrator, in good working order but not in use, shall be kept on the job until all concrete is placed. Vibrators shall not be used to transport or shove concrete inside the forms. Insert and withdraw vibrators vertically at uniformly spaced locations. Do not insert vibrators into lower layers of concrete that have begun to set, nor allow vibrators to rattle against reinforcing which is bonded into other sections. At each intersection limit the duration of vibration to the time necessary to consolidate the concrete and complete embedment of reinforcement and other embedded items without causing segregation of the mix. Limit the time of vibrating consolidation to prevent bringing excess of fine aggregate to the surface.

I. Concrete that has partially hardened and becomes unworkable or which has been contaminated by foreign material, shall not be used and shall be removed from the project site and disposed of in an acceptable location.

J. Moisture Barrier Film: When called for on plans, install a 6 mil polyethylene moisture barrier film between the concrete slab and beams and the fill. Lay film over the fill and onto both sides of beams. Lap edges of film at least six inches. Seal all joints and cut in the film such as where pipes extend through the film with waterproof tape. Keep pockets below film to a minimum. After reinforcing steel and other items have been installed, and just prior to placing concrete, repair all tears and punctures with waterproof tapes.

1.4 CONCRETE SURFACE FINISHING:

A. Monolithic Floor Finish: Concrete floor shall be tamped with suitable tools to smooth and embed coarse aggregate, after which the surface shall be screened and floated to required levels. When green concrete will support a man's weight, it shall be floated to a true and even plane, to bring excess moisture to the surface after which it shall be hand troweled to a surface finish indicated on plans. No mixture of sand and cement shall be allowed on floor slabs to absorb excess water, or used as an aid for finishing.

B. Excess water shall be removed by blotting mats only. Therefore, it will be required of the Contractor that care shall be exercised to maintain low slump concrete and prevent bleeding of excess water and development of laitance.

C. Finished floor surfaces to be level shall be placed to a tolerance of less than 1/8 inch in 10 feet of length.

D. When monolithic floor finishes are to be done in hot, windy weather, the Contractor shall provide a retarding set admix as specified, and the finisher shall be governed accordingly through the tamping, screening, and floating steps of finish in preparation of the delayed set, the purpose being to eliminate all shrinkage cracks in the floor finish.

E. Particular care shall be exercised in making good joints at doorways, etc., and where different kinds of floors or different runs of concrete floor join. Carefully finish around all pipes, floor drains, sleeves, openings, etc. All exposed edges shall be carefully tooled to a radius, and dummy joint markings shall be made on slabs as indicated, using approved tools.

1.5 FORMED FINISH SURFACES:

A. All formed concrete surfaces not exposed to view shall be finished such that the surface has the texture imparted by the form material with defective areas repaired as specified and all fins and projections exceeding 1/4" in height chipped down.

B. At tops of walls, beam lugs and other unformed surfaces strike surface off smooth and finish with a texture similar to adjacent formed surfaces.

1.6 PROTECTION AND CURING:

A. Protect slabs and exposed corners of concrete from damage to construction, traffic, or any other source. Immediately as finishing operations of slabs are completed, apply membrane forming curing compound or moisture retaining cover as specified herein. Provide curing for all concrete by keeping constantly moist for a minimum of 14 days after placement.

B. Should forms be removed from vertical surfaces prior to 15 days, the specified curing material shall be applied to prevent loss of moisture from the concrete surface.

1.7 CONSTRUCTION JOINTS:

A. Location and details of construction joints shall be as indicated on drawings, specified or as approved by Engineer. Locate so as not to impair the strength of the structure.

B. Roughen and clean all construction joints exposing coarse aggregate solidly embedded in mortar mix. Clean forms reinforcing of drippings. Clear away debris by compressed air.

C. Control Joints: Provide as indicated on drawings. Sawed joints must be sawn within 24 hours of concrete placement to control shrinkage cracks in concrete.

D. Concrete Surface Patching and Cleaning:

E. After forms are removed, remove projecting fins, bolts, form ties, and nails, not necessary for the work, or cut back one inch from the surface. Joint marks and fins in exposed work shall be smoothed off and cleaned.

F. Repair and patch defective areas with cement mortar immediately after removal of forms. Cut out honeycomb, rock pockets, voids over 1/2" diameter down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the formed concrete surface. Before placing cement mortar, thoroughly clean, dampen with water and brush-cut the area to be patched with neat cement grout.

G. Clean exposed concrete surfaces and adjoining work stained by leakage of concrete to approval of Engineer.

END OF SECTION 03300

03350 SURFACE FINISHES FOR CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, TxDOT Standard Specifications Item 427, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. This specification shall govern for the furnishing of materials; for the application; for the methods of construction; for the material requirements; and, for testing of materials used in the application of a surface finish to concrete.

B. General. The grade and/or class of finish shall be as described herein and as specified on the plans.

1. "Grade" of finish designates the areas to which a higher finish is to be applied, beyond the requirements of an Ordinary Surface Finish. Four grades of finish are included herein; i.e., Grade I, II, III and IV.

2. "Class" of finish designates the materials or the process to be used in providing the grade of finish. Three classes of finish are included herein; i.e., Class A, B and C, (Class C finish may require one or two rubs).

3. For structures and surfaces not described herein under grade of finish, a class of finish only may be specified on the plans. Where neither a grade nor class is specified, an Ordinary Surface Finish only will be required as specified in the Item, "Concrete Structures".

4. Where the plans specify a grade and class of finish, i.e., Grade II, Class C, only that class of finish shall be furnished.

5. Where the plans specify a grade and class of finish only, i.e., Grade I Finish, any of the classes of finish may be furnished. Only one class of finish shall be furnished on any individual structure, twin structures or on structures in close proximity to each other, except as specified for prestressed concrete members below.

C. Grade of Finish.

1. Grade I. The following areas shall receive a Class A, B or C (two rub) Finish, except that prestressed members shall receive either a Class A or B Finish only.

   All concrete surfaces of railing, including the parapet types; exterior vertical faces of slabs, slab spans, arches and box girders; the outside and bottom surfaces of fascia beams or girders (including prestressed members); the underside of overhanging slabs to the point of juncture of the supporting beam; all exposed vertical surfaces of bents and pipers and bottom surfaces of bent caps; all surfaces of tie beams, abutments, bridge wingwalls, culvert headwalls and wingwalls and retaining walls exposed to view after all backfill and embankment is placed.
2. Unless otherwise noted on the plans, the underside of the slab of slab spans shall be

finished its entire width.

3. Unless otherwise noted on the plans, exposed surfaces of pump houses and other miscellaneous concrete surfaces shall receive a Class A, B or C (one rub) Finish.

4. Grade II. All concrete surfaces of railing, including the parapet types, all exposed surfaces of bridge wingwalls and the exterior vertical faces of slabs and slab spans shall receive a Class A, B or C (two rub) Finish. All other surfaces described under Grade I Finish shall receive a Class A, B or C (one rub) Finish, except that prestressed members shall receive a Class A or B Finish only. The underside of slab spans shall receive an Ordinary Surface Finish only.

5. Grade III. All concrete surfaces of railing, including the parapet types, all exposed surfaces of bridge wingwalls and the exterior vertical faces of slabs shall receive a Class A, B or C (two rub) Finish. All other surfaces described under Grade I Finish shall receive an Ordinary Surface Finish.

6. Grade IV. The top and roadway faces only of all concrete railing, including the parapet types, and bridge wingwalls shall receive a Class A, B or C (one rub) Finish. All other surfaces described under Grade I shall receive an Ordinary Surface Finish.

D. Class of Finish.

1. The Class of Finish designates either an adhesive grout material, a paint-type material, or a rubbing process applied to surfaces specified in Grade of Finish, as required herein and/or as designated on the plans.

   Unless otherwise shown on the plans, the color shall be concrete gray.

2. Class A. This finish shall consist of an adhesive grout textured coating with a minimum one-sixteenth inch thickness, composed of one part white cement, one part natural (gray) cement, two parts masonry sand, one part (latex) emulsion, and enough water to form a viscous slurry of a consistency that may be applied by spray gun, brush or roller without appreciable running or sagging. The proportions of white and gray cement may be varied slightly to obtain the desires color.

3. Graduation of the masonry sand shall be as required to produce a texture satisfactory to the Engineer.

4. Prepackaged materials meeting these requirements and acceptable to the Engineer, as to color, texture and appearance, will be permitted.

5. The adhesive grout type coating shall meet the test requirements contained herein and shall be on the Departmental approved list.

6. Class B. This finish shall be a paint-type material, consisting of a synthetic elastomer-polyester base compound, containing fiber glass, asbestos, mica and perlite texturing material, which when applied by a one coat spray application at the rate of

45 plus or minus 5 square feet per gallon will yield an acceptable textured coating. Certification by the manufacturer of the above materials will be required.

7. The material shall meet the test requirements contained herein and shall be on the Departmental approved list.

8. Class C. This finish shall consist of a one rub or two rub system, as the case may be, meeting the requirements set forth below under "Construction Methods".

E. Approval of Surface Finishes.

1. The manufacturer shall certify that the material to be furnished meets the requirements of this Specification, and shall furnish test reports from an approved laboratory, as defined by Item 1 of the Standard Specifications, having prior approval of the Materials and Tests Engineer.

2. In addition to the above, the manufacturer shall furnish the following:

3. At the time of original request for approval of the surface finish, the manufacturer shall supply a one gallon sample of the material to the Materials and Tests Division, Austin, Texas 78703.

4. Each six months after approval of the material, the manufacturer shall furnish a notarized certification indicating that the material originally approved has not been changed or altered in any way. Any change in formulation of a surface finish shall require retesting, and shall be approved by the Materials and Tests Engineer prior to use.

5. The engineer may request additional information to be submitted such as infrared spectrophotometry scan, solids content, etc., for further identification. A change in formula discovered by any of the tests prescribed herein, or other means, and not reported and retested, may be cause to permanently bar the manufacturer from furnishing surface finish materials for Texas Highway Department work.

6. A list of pretested and approved surface finish materials will be maintained by the Materials and Tests Engineer.

7. The Department reserves the right to perform any of all of the tests required by this specification as a check on the tests reported by the manufacturer. In case of any variance the Departmental tests will govern.

1.3 TESTING:

1. Adhesive grout type coatings shall meet the following requirements:

2. Latex Emulsion used as the adhesive component of adhesive grout shall meet the following requirements:

3. Percent Solids by Weight. (Test Method Tex-605-J) Total vinyl, vinyl-acrylic or acrylic resin content will be

determined on the sample submitted with the original request.

4. Compatibility with Cement. (ASTM Db) Residue - 2 grams maximum. Procedure followed shall be as stated, except that no adjustment will be made for variation in solids content of the emulsion.

5. Resistance to Re-emulsification*. (Scrubability Test, Federal Specification TT-P-29) A film of the latex applied and cured as set forth in the above method shall withstand 2000 cycles without failure occurring.

   *This requirement shall not apply to non-film forming latexes.

6. Infrared Spectrum. Infrared spectrum will be determined on the sample submitted with the original request for approval.

7. Adhesive grout containing the emulsion being evaluated shall meet the following requirements:

8. Adhesion to Concrete. (Test Method Tex-606-J) Latex modified grout must exhibit 150 psi minimum bond strength.

9. Accelerated Weathering. (Fed. Method 6152, Test Std. 141a) The latex modified grout must not check, crack or lose adhesion when exposed to 1000 hours in a closed arc artificial weathering apparatus. Test shall be performed on grout applied to 3/4" x 3 1/2" x 6" mortar blocks prepared and cured as set forth in Test Method Tex-606-J. Preparation and application of grout to blocks shall be as set forth in Tex-606-J. Grout coating shall be cured for 7 days at a temperature of 70 to 77 degrees F and a relative humidity of 45 to 65 percent prior to initiating testing. Aluminum panels shall be bonded to the backs of the test blocks with an epoxy adhesive to facilitate mounting in the weathering apparatus.

10. Freeze-Thaw Resistance. (Test Method Tex-607-J) The latex-modified grout must withstand 50 cycles of freezing in air and thawing in water without cracking or losing adhesion.

11. Thixotropy or Flow Resistance. (Test Method Tex-608-J) Average thickness of grout remaining on test panel -- 50 mils minimum.

1.4 QUALITY ASSURANCE:

A. Paint type coatings shall meet the following requirements. All test methods other than Texas Methods are Federal Standard 141a.

B. Shelf Stability. (Method 3011.1)

   1. The product shall not settle hard on storage and shall be readily redispersed by paddle to a uniform consistency. Product shall not exhibit any of the undesirable qualities listed in the above method.

   2. Paint Non-Volatile Content. (Method 4041 Modified -- Time in oven, one hour)

C. Percent by Weight -- 60 minimum.

D. Pigment Content.

   1. Percent by weight -- 34 minimum, 40 maximum, calculated as follows:

E. Percent Pigment by Weight = Percent PNV - Percent VNV x 100
   100 - Percent VNV

F. Where PNV = Paint non-volatile content VNV = Vehicle non-volatile content

G. VNV shall be determined on vehicle from which pigment has been removed by centrifuging. Test Method shall be the same used for paint non-volatile content.

H. Viscosity. (Method 4287) 275 poises Maximum.

1. Determined using Brookfield RVT Viscometer rotated at 20 rpm for 2 minutes prior to taking reading.

I. Appearance of Applied Coating.

J. The material shall be applied to a troweled surface of a mortar block and allowed to dry in a vertical position for 24 hours at 77 + 2 degrees F. The resulting coating shall present a firm uniformly textured flat finish free of sags, runs, wrinkles or other film defects.

K. Hiding Power. (Method 4122.1)
Contrast Ratio -- 0.99 Minimum.

L. Flexibility. (Method 6221)

1. The separated vehicle shall be applied to a tin plate at a rate that will give a 2 mil dry film thickness. The coating shall be cured for 24 hours at 77 + 2 degrees F followed by 8 hours at 155 to 160 degrees F. The cured film must not crack when the panel is bent over a 1/8" mandrel.

M. Mildew Resistance. (Method 6271.1)

1. The coating shall evidence no fungus growth when testing under the following conditions:

N. Drying time of the coating prior to test shall be 7 days.

O. Test specimens shall be leached with water before inoculation.

P. The test organism shall be pullularia pullulans.

Q. The length of the incubation period shall be 21 days.

R. Moisture Resistance. (Test Method Tex-610-J)

1. When tested as specified, the coating must not soften or change color.

S. Accelerated Weathering. (Method 6152)

1. The coating must not check, crack or exhibit any other film defects and must now show more than a very slight change in color when exposed to 1000 hours in a closed arc artificial weathering apparatus.

T. Test will be performed on coating applied to 3/4" x 3 1/2" x 6" mortar blocks prepared and cured as set forth in Test Method Tex-606-J. Coating shall be cured for 7 days at 77 + 2 degrees F followed by 4 days at 120 + 3 degrees F. Aluminum panels shall be bonded to the backs of test blocks with an epoxy adhesive to facilitate mounting in the weathering apparatus.

U. Weight per Gallon. (Method 4184.1)

1. Weight per gallon must not vary from that of the original sample submitted with the original request for approval, by more than + 0.2 pounds per gallon.

V. Infrared Spectrum of the Vehicle Non-Volatiles. The infrared spectrum of the vehicle non-volatiles will be determined on the sample submitted with the original request for approval.

2.1 Construction Methods

A. For Class A and B materials, concrete surfaces shall be clean and free of dirt, grease, curing compound or any other bond breaking substance., Class A shall be applied on moistened surfaces but Class B requires a dry surface. The temperature of the atmosphere, concrete and compound shall be above 50 degrees F for Classes A and B at the time of application. The finished surfaces shall be protected against rain or freezing for a period of 24 hours after application.

B. Class A materials shall be sprayed, rolled or brushes, or, the Class B material sprayed on the required surfaces in a manner to provide an acceptable texture, and of the proper coverage.

C. The Class A and B material shall be applied after all preparation work required by Ordinary Surface Finish has been completed, and just prior to final acceptance of the work or as directed by the Engineer.

D. A Class C Finish shall be performed with a carborundum stone as follows, after all preparatory work required by Ordinary Surface Finish has been completed:

1. For a two rub system, the first rubbing shall bring the wetted concrete face to a paste and produce a smooth dense surface without pits, form marks or other irregularities. The use of cement or grout to form the paste will not be permitted. Striping with a brush and washing after the first rubbing will not be required. Chamfer lines shall be finished during the second rubbing.

2. The first rubbing shall be done soon after form removal. Membrane curing, if used, shall be applied after the first rub is complete. Prior to the second rubbing, any remaining curing membrane shall be removed from the surface by brushing, buffing or other satisfactory methods.

E. The second rubbing shall be performed when conditioning the structure for final acceptance. The specified surfaces shall be cleaned of drip marks and discolorations and given a final rubbing. The surface shall be striped neatly with a brush, and the past allowed to take a reset, after which the surfaces shall be washed with clean water leaving them with a neat and uniform appearance and texture.

For a one rub system, the rubbing requirements shall be the same as for the first rub above, except chamfer lines shall be finished and the paste spread uniformly, striped with a brush and allowed to take a reset after which the surfaces shall be washed with clean water leaving them with a neat and uniform appearance and texture.

2.2 Special Surface Finishes.

A. When special surface finishes are required for retaining walls, panels, copings or similar construction, the Contractor shall prepare sample panels for approval of the finish and the method of application. Unless otherwise required, panel or pattern arrangement and dimensions may be varied to achieve a more pleasing appearance or to utilize forming material more efficiently. Aggregates, materials, variation of panel or pattern arrangement, dimensions and other features affecting the work shall be approved prior to start of the work.

B. Striated Finish. The striated (grooved) pattern shall be as shown on the plans or as approved by the Engineer.

C. The finish shall be made by lining the forms with striated sheets of plywood, plastic, fiberglass, metal, or other material acceptable to the Engineer. The striation shall be of a smooth, wide pattern as sharp, narrow, angular, or closely spaced striations tend to adhere to the concrete and damage the final finish.

D. A chamfer groove shall be used along all edges of each panel. All ties, bolts or other forming accessories shall be located along the chamfer grooves or panel edges. Special care shall be taken during placing operations to avoid porosity or honeycomb.

E. Exposed Aggregate Finish. Exposed aggregate panels may be either raised, recessed or as indicated on the plans with the sides of each panel chamfered as directed by the Engineer.

F. The aggregate used for this kind of finish shall be approved by the Engineer and meet the grading requirements shown on the plans. Gravel of predominantly rounded particles shall be used, except that crushed stone may be used when a bush hammer finish is desired. The aggregate shall be large enough to remain firmly anchored in the face of the final product. The depth of finish shall be three-eights of an inch minimum to one-half of an inch maximum, unless otherwise directed by the Engineer, or shown on the plans.

G. A concrete surface retarder that penetrates approximately one-fourth of an inch shall be applied to the forms or concrete surface as an aid in achieving the desired finish. Wood forms may require 2 to 3 coatings to compensate for absorption. Form joints shall be taped or caulked to prevent escape of the retarder during placing operations. Treated form surfaces should be protected from sun and rain while exposed to the atmosphere, and shall be retreated, if the retarder is damaged by rain or severe exposure.

H. Adjacent areas of fresh concrete not requiring exposed aggregate finish shall be protected from the retarder when it is applied.

I. The finish shall be obtained by sandblasting, bush hammering, or other method, as approved by the Engineer. Horizontal surfaces may be finished by combination of brushing and washing, but only after the concrete has set sufficiently to prevent loosening of the aggregate.

J. Unless otherwise directed by the Engineer, forms for surfaces requiring exposed aggregate finish shall be removed 12 to 15 hours after concrete placement. The exposed aggregate operation shall be accomplished immediately after form removal. Except for the time required for obtaining the exposed aggregate finish, curing of all surfaces will be maintained for the minimum four day curing time. Curing of all surfaces not given the exposed aggregate finish shall be water cured or may be cured with an approved membrane curing compound. The acrylic resin sealer shall be applied to the exposed

aggregate surfaces immediately after acceptance of the surface finish by the Engineer. If the acrylic sealer is not applied, water curing or approved membrane curing shall be applied to provide the required curing, in which case the exposed aggregate surfaces will require recleaning by an approved method prior to the application of the acrylic resin sealer.

K. Exposed aggregate surface shall receive a coat of clear, non-yellowing acrylic resin sealer, consisting of approximately 81 percent thinner, and 19 percent acrylic solids by weight. The material may be applied in single or multiple coats; however, total coverage shall be at the rate of not more than 250 square feet per gallon, unless otherwise specified on the plans. Other ratios of thinner to solids may be used provided equivalent solids coverage is obtained.

2.3 MEASUREMENT AND PAYMENT

A. No direct measurement or payment will be made for the work to be done, the equipment or materials to be furnished under this item, but shall be considered subsidiary to the particular items required by the plans and the contract.

END OF SECTION 03350

04100 MORTARS

PART 1. GENERAL

Cement Mortar:

This section of the specifications covers materials and procedures required to provide mortar for all masonry work unless otherwise indicated on the plans.

Brands of cementitious materials and source of supply of sand shall remain the same throughout the entire job and shall not be changed except by written permission of the Architect.

Cementitious materials and aggregates shall be stored in such a manner as to prevent deterioration or intrusion of foreign material. Any material that has become unsuitable for good construction shall not be used.
Submit: A letter stating that the proportions of mortar mix to be used. Submit mortar colors for approval and selection by architect.

PART 2. MATERIALS
Cementitious Materials: LIGHT COLORED MORTAR TO MATCH CMU COLOR AS CLOSELY AS POSSIBLE AS PER FOLLOWING SPECIFICATIONS

Masonry Cement: ASTM C91, Type II non-staining, except with 12% maximum air content by volume.

Portland Cement: ASTM C150, Type I, non-staining without air entrainment and of natural color or white as required to produce the required color of mortar or grout.

Aggregates: Comply with ASTM C144, except for joints less than 1/4" use aggregate grade with 100% passing the No. 16 sieve.

Water: Clean and free of deleterious amount of acids, alkalis, or organic materials.
Hydrated Lime: Comply with ASTM C207.

Admixtures:
Calcium chloride ASTM D98 Type I or II may be used to accelerate the set. The amount used shall not be more than one percent of the weight of the masonry cement.

No antifreeze liquids, salts or other substances shall be used in the mortar in an attempt to lower the freezing point.

Mortar coloring shall match existing mortar as selected by architect.

PART 3. EXECUTION

Preparation:

Comply with ASTM C270 Proportion specifications, except, limit materials to those specified herein, and limit cement, lime ratio (by volume) as follows:

Type N: Not more than 1 part lime per part of Portland Cement.

Mortar for masonry shall be made in the proportions of 1 volume of masonry cement and between 2 1/4 and 3 volumes of damp, loose mortar sand.

Mortar which will be subjected to severe lateral loads, violent winds, and other conditions requiring extra wall strength shall be made in proportions of 1 volume of masonry cement plus 1 volume of Portland Cement and between 4 1/2 to 6 volumes of damp, loose mortar sand.

Water: Mix thoroughly in mechanical batch mixer for at least 5 minutes after all materials are in mixer.

Use:
Time Limits: Use and place mortar in final position within 2 1/2 hours after mixing when the air temperature is 80 degrees F. or higher; within 3 1/2 hours if air temperature is less than 80 degrees F. Mortar not used within these time limits shall be discarded.

Re-tempering: Mortars that have stiffened within the time intervals as determined in Section A above because of evaporation of moisture may be re-tempered to restore

workability by adding water. Enough water shall be added as may be necessary to produce proper workability.

04150 MASONRY ACCESSORIES

PART 1. GENERAL

Submittals: For information only, submit 2 copies of manufacturer's specifications and installation instructions for each masonry accessory required. Include data substantiating that materials comply with specified requirements. Indicate that installer has received copy of manufacturer's instructions.

PART 2. MATERIALS

Anchoring Devices for Masonry:

General: Provide straps, bars, bolts, and rods of the type and size shown, but fabricated from not less than 16 gauge sheet metal or 3/8" diameter rods stock, unless otherwise
shown. Hot dipped galvanized for use in exterior walls.

Flexible Anchors: Where masonry is shown or specified to be anchored to structural framework with flexible anchors, provide anchors which will permit horizontal and vertical movement of masonry but will provide lateral restraint, as follows:

For anchorage to steel framework provide 2-piece anchors with 3/16" steel wire section and rectangular or vee-shaped 3/16" wire tie section sized to extent t within 1" of face of
masonry. After welding, paint welded areas with heavy zinc compound.

For devices which extend into exterior wythe, fabricate from steel with 1.5 oz. hot-dip galvanized coating complying with ASTM A153, Class B2.

Individual wire ties for masonry: Fabricate from 1/8" cold-drawn galvanized steel wire, ASTM A82, unless otherwise indicated, of length required for proper embedment in wythes of masonry. Provide ties with ends bent to 90 degree angles to form hooks not less than 2" long.

For frames back-up, provide corrugated galvanized metal ties not less than 22 ga. and not less than 7/8" wide and 7" long with one end crimped for attachment to substrate. Size to
extent within 3/4" of face masonry veneer.

Joint Reinforcement - CMU Masonry Conituous Wire Reinforcing and Ties for Masonry: Provide welded wire units prefabricated in straight lengths of not less than 10' with matching corner and tee units.

Fabricate from cold drawn steel wire complying with ASTM A82, with deformed continuous side rods and plain cross-rods, and a unit width of 1 and 1/2" to 2" less than thickness of wall or partition.

For single wythe masonry, provide units fabricated as follows:

Truss type fabricated with single pair of 9 guage side rods and continuous diagonal cross-rods spaces not more than 16" o.c.

For double wythe masonry, provide units fabricated as follows:

Truss type fabricated with two 9 guage side rods and a 9 guage continuous diagonal cross-rods with welded adjustable reinforcement not more than 16" o.c.

For use in exterior walls, hot-dip galvanized after fabrication with 1.5. oz. zinc coating complying with ASTM A153, Class B2.

Manufacturers offering products to comply with the requirements include the following:

AA Wire Products
Dur-O-Wal
Hohmann & Barnard

Submit sample for approval by architect.

Concrete Inserts for Masonry:

For installation of concrete inserts, see concrete sections of these specifications. Advise concrete installer of specific requirements

regarding his placement of inserts which are to be used by the masonry installer for anchoring for masonry work.

Control Joints: Provide, where shown on drawings, control joints of factory-extruded solid section rubber conforming to ASTM D-2000 2AA-805, with a durometer hardness of 70-80 when tested in conformance with ASTM D-2240.

Miscellaneous Masonry Accessories:

Reinforcing Bars: Deformed steel reinforcing bars complying with ASTM A615 Grade 60 of the sizes shown.

Bond Breaker Strips: 15 lb. asphalt roofing felt complying with ASTM D226, or 15 lb. coal tar roofing felt complying with ASTM D227.

Plastic weepholes: unless otherwise indicated, provide 1/4" round x 4" long medium density polyethylene plastic tubes to form weepholes.

PART 3. EXECUTION

Installation: See Section 04200 "Concrete Masonry" for installation of masonry accessories specified under this section.

04200 UNIT MASONRY

Part 1 - General

1.1 Related Documents
A. Requirements of Drawings, General and Supplementary Provisions and Division 1 apply to this Section

1.2 Scope
A. Provide all masonry work including but not necessarily limited to:
Face Brick
Concrete masonry units
Accessories to be provided in masonry work
Building into masonry, members provided by other trades

B. Related work specified elsewhere:

Concrete work	Section 03300
Waterproofing	Section 07100
Damproofing	Section 07150
Sheet metal flashing	Section 07600
Caulking & Sealants	Section 07900

1.3 Quality Assurance:
A. Construction tolerances:
Variation from plumb: For vertical lines and surfaces of columns, walls and arises do not exceed 1/4" in 10', or 3/8" in a story height not to exceed 20', nor 1/2" in 40' or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4" in any story or 20' maximum, not 1/2 in 40' or more.

Variation from level: For lines of exposed lintels, sills parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4" in any bay or 20' maximum, not 3/4" in 40' or more.

Variation of linear building line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/2" in any bay or 20' maximum, not 3/4" in 40' or more.

Variation in cross-sectional dimensions: For columns and thickness of walls, from dimensions shown, do not exceed 1/4" not = 1/2".

B. Prior to ordering material, the Contractor shall erect a 4 ft. x 4 ft. sample panel in mortar of each type of masonry, all as specified, at the jobsite for final approval consideration by the Architect. Locate mock-ups on the site in locations indicated or, if not indicated, as directed by the Architect. The approved panel shall remain on the jobsite, intact, as a visual criterion which the final construction shall match. When directed, demolish the sample panel and remove from site.

1.04 Submittals
A. Submit manufacturer's product data for each type of masonry unit, accessory and other manufactured products, including certifications that each type complies with specified requirements.
Colored masonry mortar samples showing full range of colors available.

B. For verification purposes, submit the following:
Face brick and concrete masonry unit samples for each type of exposed units required. Include in each set the full range of exposed color and texture to be expected in the completed work.

Colored masonry mortar samples for each color required showing full range of color which can be expected in finished work. Label samples to indicate type and amount of colorant used.

1.5 Job Conditions
A. Store and handle masonry units off the ground, under cover and in a dry location. If units become wet do not place until units are in an air dried condition. During erection, cover top of walls with 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" down both sides and hold cover securely in place.

B. Do not apply concentrated loads for at least three days after building masonry walls or columns.

C. Prevent grout or mortar from staining face of masonry to be left exposed or painted.. Remove immediately grout or mortar in contact with such masonry. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.

D. Protect sills, ledges and projections from droppings of mortar.

E. Protect masonry against freezing when temperature of surrounding air is 40 deg. F. and falling. Heat materials and provide temporary protection of completed portions of masonry work. Comply with requirements of governing Code and with "Construction & Protection Recommendations for Cold Weather Masonry Constructions of Technical Notes on Brick & Tile Construction by Brick Institute of America (BIA).

2.1 Masonry Units- General
A. Obtain masonry units from one manufacturer, of uniform texture and color for each kind required, for each continuous area and visually related areas.

2.2 Face Brick: N.I.C.
A. Provide nominal standard modular (3-5/8" X 2-1/4" X 7-5/8") ACME Brick Colors selected by Architect Bricks meeting the specified brick in quality, color, pattern, range by Elgin Butler Brick Co. or Henderson Brick Company may be substituted for substitutions and approved by the Architect. Provide special molded shapes where shown and for applications which cannot be sawn from standard brick sizes.

B. For sills, caps and similar applications resulting in exposure of brick surfaces which otherwise would be concealed from view, provide uncored or unfrogged units with all exposed surfaces finished.

C. Quality Standard: ASTM C 216, Grade SW, Type FBS.

2.3 Concrete Masonry Units:

A. Provide manufacturer's standard units with nominal face dimension of 16: long x 8
(15-5/8" X 7-5/8" actual), unless otherwise indicated. Provide special shapes where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.

B. Provide bull nose shapes for all exposed outside corners and edges, unless otherwise
indicated.

C. Provide hollow-load bearing units complying with ASTM C90, Grade N.

2.4 Mortar Materials: UNLESS NOTED OTHERWISE
A. Portland Cement: ASTM C 150, Type I, except Type III may be used for cold weather
construction. Provide white cement as required to produce required mortar color.

B. Hydrated Lime: ASTM C 207, Type S.
Aggregate for mortar: ASTM C144, except for joints less than 1/4", use aggregate graded with 100% passing No. 17 sieve.

Provide approved white and where necessary to obtain the required mortar color.

D. Aggregate for grout: ASTM C404.

E. Colored mortar pigments: commercial iron oxide, manganese dioxide, ultramarine blue, chromium oxide or carbon black, compounded for use in mortar mixes. Do not exceed pigment-to-cement ratios, by weight of 1 to 35 for carbon black 1 to 7 for other pigments. Provide color mortar for glazed accent brick. Provide white mortar for face
brick.

F. Water: Clean, fee of deleterious materials which would impair strength or bond.

G. Epoxy grout: as formulated and manufactured under license of the Tile Council of America- Formula UG-11.

H. Temperature and humidity range must be cited for control.

I. Use mortar and grout within 2-1/2 hours of initial mixing. Materials should only allowed on boards for no more than 45 minutes on days not exceeding 75 deg. F with humidity of 55% to 70%. On warmer days time should be reduced to no more than 30 minutes.

J. Bricks which are too dry and suck water from mortar will not have a compatible bond.

2.5 Masonry Accessories
A. C continuous wire reinforcing: Provide welded wire units prefabricated in straight lengths of not less than 10', with matching corner and tree units. Fabricate from stainless steel wire complying with ASTM, with deformed continuous side rods and plan cross-rods, and a unit width of 1/1/2" to 2" or less than thickness of wythe or wyythes being reinforced.

B. Individual wire ties for masonry: Fabricate from 1/8" stainless steel wire, ASTM, unless otherwise indicated, of length required from proper embedment in wythes of masonry.

C. For use with hollow masonry units laid with cells vertical, provide rectangular shaped ties.

D. For use with solid masonry units, provide ties with ends to 90 deg. angles to form hooks not less than 2" long.

E. Anchors and ties: Provide stainless steel straps, bars, bolts and rods fabricated from not less than 16 Ga. or 3/8" diameter rod stock, unless otherwise indicated.

Provide stainless steel anchors and ties all masonry installations. Do not use corrugated metal ties.

For concrete back-up construction, furnish dovetail slots with filler strips. Fabricate from 24 Ga. stainless steel unless otherwise indicated. Provide hot-dip galvanized steel dovetail anchors of size and type to suit construction requirements.

For installation of anchor slots, see Section 03300. Advise Concrete installer of specific requirements regarding his placement of slots which are to be used by Masonry Installer for anchoring of masonry work.

Reinforcing bars: Deformed steel ASTM A 615, Grade 60 of sizes shown.

G. Bond Breaker strips: 15-lb. asphalt roofing felt complying with ASTM D 266, or 15-lb. coal-tar roofing felt complying with ASTM D 227.

H. Plastic Weep holes: Unless otherwise indicated, provide 1/4" round x 4" long medium density polyethylene plastic tubes to form weep holes.

2.6 Insulation
A. Extruded polystyrene board insulation: Refer to Section 07200.

2.7 Cement Mortar Mixes
A. Do not lower freezing point of mortar by use of admixtures or antifreeze agents. Do not use calcium chloride in mortar or grout.

B. Comply with ASTM C270, Proportion Specifications, except limit materials to those specified herein, and limit cement/lime ratio (by volume) as follows:

Type N: Over 1/2 up to 1-1/4 parts lime per part of Portland cement- for all applications where another type is not indicated.

2.8 Epoxy Mortar Mix
A. Mix two components, place the material and clean up in conformance with manufacturer's directions.

Part 3 Execution
A. Build masonry construction to full thickness shown, except build single-wythe walls to actual thickness of masonry units using units of nominal thickness shown or specified.

B. Build chases and recesses as shown and as required for the work of other trades. Provide not less than 8" of masonry between chases or recess and jamb of openings and between adjacent chases and recesses.

C. Cut masonry units with motor-driven saw designed to cut masonry with clean, sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work neatly. Use full units without cutting wherever possible.

D. Do not wet concrete masonry units.

E. Do not use frozen materials and materials mixed or coated with ice or frost. For masonry which is specified to be wetted, comply with BIA recommendations. Do not build on frozen work. Remove and replace masonry work damaged by frost or freezing

F. Lay Exposed masonry in bond pattern shown, or if not shown, lay in running bond vertical joint in each course centered on units

in courses above and below. Lay concealed
masonry with all units in wythe bonded by lapping not less than 2". Bond and interlock each wythe at corners, unless otherwise shown.

G. Layout wills in advance for accurate spacing of surface bond patterns, with uniform joint widths and to properly locate openings, movement-type joints, returns and offsets. Avoid use of less-than-half size units at corners, jambs and wherever possible at other locations.

H. Lay-up walls plumb and true and with courses level, accurately spaced and coordinated with other work.

I. When stopping resuming work, rack back 1/2-masonry unit length in each course; so not tooth. dean exposed surfaces of set masonry, set units lightly (if specified to be wetted), and remove loose masonry units and mortar prior to laying fresh masonry.

J. As work progresses, build-in items specified under this and other Sections. Fill in solidly with masonry around built-in items. Fill space between hollow metal frames and masonry solidly with mortar. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in joint below and rod mortar or grout into core.

3.2 Mortar Bedding and Jointing
A. Measure and batch material either by volume or weight, such that required proportions for mortar can be accurately controlled and maintained. Measurement of sand exclusively by shovel will not be permitted.

B. Mix mortars with maximum amount of water consistent with workability to provide maximum tensile bond strength within capacity of mortar.

C. Mix mortar ingredients for a minimum for 5 minutes in a mechanical batch mixer. Use water clean and free of deleterious materials which would impair work. Do not use mortar which has begun to set, or if more than 2-1/2 hours has elapsed since initial mixing. Retemper mortar during 2-1/2 hour period as required to restore workability.

D. Lay brick and other solid masonry units with completely filled bed, head and collar joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.

E. Lay hollow masonry units with full mortar coverage on horizontal and vertical face shells; also bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or to be filled with concrete or grout.

F. Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not otherwise indicated, provide 3/8" joints. Cut joints flush for masonry walls which are to be concealed or be covered by other materials. Tool exposed joints slightly concave. Rake out mortar in preparation for application of sealants or epoxy grouts where required. Remove masonry units disturbed after laying; clean and relay in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

G. Set masonry units with 8" of outside corners or terminal ends of unit masonry sills, caps and coping in epoxy mortar for permanent bond of the unit. Tool joints same as for cement mortar joints.

3.3 Cavity Walls
A. Keep cavity clean of mortar droppings and other material during construction. Strike joints facing cavity, flush.

B. Tie exterior wythe to back-up with individual metal ties spaced not more than 24" o.c., unless otherwise indicated.

C. Provide weep holes in exterior wythe of cavity, composite and veneer walls located
immediately above ledges and flashing" spaced 2'-0" o.d., unless otherwise indicated.

D. At muiti-wythe walls, use individual metal ties embedded in horizontal joints to bond
wythes together. Provide ties as shown, but not less than one metal tie for 4 s.f. of wall area spaced not to exceed 24: o.c. horizontally and vertically. Stagger ties in alternate courses. Provide additional ties within 1'-0" of all openings and space not more than 2'-0" apart around perimeter of openings. At intersecting and abutting walls, provide ties at not more than 24" o.c. vertically.

3.4 Horizontal Joint Reinforcing
A. Provide continuous horizontal joint reinforcing in all concrete masonry wythes and in all block bonded wythes. Fully embed longitudinal side rods in mortar for their entire length with a minimum cover of 5/8" on exterior side of walls and 1/2" at other locations. Lap reinforcement at minimum of 6" at ends of units. Do no bridge control and expansion joints with reinforcing, as otherwise indicated. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

B. Space continuous horizontal reinforcing at 16" o.c. vertically, unless otherwise indicated.

C. For parapets, space reinforcing at 8" o.c. vertically, unless otherwise indicated.
Reinforce masonry openings greater that 1'-0" wide, with horizontal joint reinforcing placed in two horizontal joints approximately 8" apart, both immediately above lintel and below sill. Extend reinforcing a minimum of 2'-0" beyond jambs of openings, bridging control joints where provided.

3.5 Anchoring Masonry Work
A. Provide anchoring devices of type shown and specified. For conditions not shown or specified, provide standard type for facing and back-up involved.

B. Anchor masonry to structural members where masonry abuts or faces such members. Provide an open space filled with compressible filler between masonry and structural member, unless otherwise shown. Keep space free of mortar or other rigid materials. Anchor masonry to structural members with metal ties embedded in masonry joints and attached to structure. Provide anchors with flexible tie sections., unless otherwise indicated.. Space anchors as shown, but not more than 16" o.c. vertically and 16" o.c. horizontally.

C. Anchor single wythe masonry veneer to structural members with metal anchors embedded in masonry joints and attached to structure. Provide anchors with flexible tie section, unless otherwise indicated.

Anchor veneers to concrete back-up or concrete columns with dovetail anchors.

Anchor veneer to framed back-up with metal ties embedded in masonry joints and screwed to studs behind sheathing. Provide anchors with flexible tie section, unless otherwise indicated.

D. Space non-flexible veneer anchors as shown, or if not shown, space not more than 16" o.c. vertically and 24" o.c. horizontally. Provide additional anchors within 1'- 0" of openings and space not more than 2'-0" around perimeter.

3.6 Lintels
A. Install loose lintels of steel and other materials where shown.

B. Provide masonry lintels where shown and wherever openings of more than 1'-0" are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Thoroughly cure precast lintels before handling and installation. Temporarily support formed-in-place lintels.

C. For hollow masonry unit walls, use specially formed "U"-shaped lintel units with reinforcing bars placed as shown and filled with Type S mortar or concrete grout.

D. Provide minimum bearing at each jamb, of 4" for openings less than 6'-0" wide, and 8" for wider openings.

E. Provide continuous bond beams constructed in similar manner as described for lintels.

3.7 Control and Expansion Joints
A. Provide vertical expansion, control and isolation joints in masonry. Build-in related masonry accessory items as masonry work progresses.

B. If location of control joints is not shown, place vertical joints spaced not to exceed 30'-0" o.c. Review locations of joints with Architect before execution.

3.8 Miscellaneous
A. Install copper flashings, copper expansion bellows, copper regrets and nailers for flashing and other related work where shown to be built into masonry work in accordance with manufacturer's instructions.

B. Coordinate installation of unit masonry work with installation of limestone work.

3.9 Repair, Pointing and Cleaning
A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout pointed to eliminate evidence of replacement.

B. During tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints at corners, openings and adjacent work to provide a neat, uniform appearance, properly prepared for application of caulking or sealant.

C. After mortar is thoroughly set and cured, clean masonry as follows:

Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.

Test cleaning methods on sample wall panel; leave 1/2" panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.

D. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film or waterproof masking tape.

E. Saturate wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.

F. Use bucket and brush hand cleaning method described in BIA Technical Note No. 20 Revised to clean brick masonry made from clay or shale, except use masonry cleaner indicated below.

Detergent

Clean concrete unit masonry to comply with masonry manufacturer's directions and applicable NCMA Trek bulletins.

G. Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures unit masonry work being without damage and deterioration at time of substantial completion.

04230 REINFORCED UNIT MASONRY

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Requirements of Section "Unit Masonry" apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of each type of reinforced unit masonry work is indicated on drawings and in schedules.

1.3 SUBMITTALS

A. Shop Drawings: Submit shop drawings for fabrication, bending, and placement of reinforcement bars. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures". Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties and other arrangements and assemblies as required for fabrication and placement of reinforcement for unit masonry work.

2.1 MATERIALS

A. General: Refer to Section "Unit Masonry" for masonry materials and accessories not included in this section.

B. Reinforcement Bars: Provide deformed bars of following grades complying with ASTM A 615, except as otherwise indicated.

1. Provide Grade 60 for bars No. 3 to No. 18, except as otherwise indicated.

C. Shop-fabricate reinforcement bars which are shown to be bent or hooked.

3.1 PLACING REINFORCEMENT

A. General: Clean reinforcement of loose rust, mill scale, earth, ice or other materials which will reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes.

B. Position reinforcement accurately at the spacing indicated.

1. Support and secure vertical bars against displacement. Horizontal reinforcement may be placed as the masonry work progresses. Where vertical bars are shown in proximity, provide a clear distance between bars of not less than the nominal bar diameter or 1", whichever is greater.

2. For columns, piers and pilasters, provide a clear distance between vertical bars as indicated, but not less than 1-1/2 times the nominal bar diameter or 1-1/2", whichever is greater. Provide lateral ties as indicated.

3. Splice reinforcement bars where shown; do not splice at other points unless acceptable to the Architect. Provide lapped splices, unless otherwise indicated. In splicing vertical bars or attaching to dowels, lap ends, place in contact and wire tie.

4. Provide not less than minimum lap indicated, or if not indicated, as required by governing code.

5. Embed metal ties in mortar joints as work progresses, with a minimum mortar cover of 5/8" on exterior face of walls and 1/2" at other locations.

6. Embed prefabricated horizontal joint reinforcement as the work progresses, with a minimum cover of 5/8"

on exterior face of walls and 1/2" at other locations. Lap units not less than 6" at ends. Use prefabricated "L" and "T" units to provide continuity at corners and intersections. Cut and bend units as recommended by manufacturer for continuity at returns, offsets, column fire-proofing, pipe enclosures and other special conditions.

C. Anchoring: Anchor reinforced masonry work to supporting structure as indicated.

1. Anchor reinforced masonry walls to non-reinforced masonry where they intersect.

A. Refer to Section "Unit Masonry" for general installation requirements of unit masonry.

B. Temporary Formwork: Provide formwork and shores as required for temporary support of reinforced masonry elements.

C. Construct formwork to conform to shape, line and dimensions shown. Make sufficiently tight to prevent leakage of mortar, grout, or concrete (if any). Brace, tie and support as required to maintain position and shape during construction and curing of reinforced masonry.

D. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and all other reasonable temporary loads that may be placed on them during construction.

E. Allow not less than the following minimum time to elapse after completion of members before removing shores or forms, provided suitable curing conditions have been obtained during the curing period:

1. 10 days for girders and beams.
2. 7 days for slabs.
3. 7 days for reinforced masonry soffits.

3.3 INSTALLATION OF REINFORCED CONCRETE UNIT MASONRY

1. Do not wet concrete masonry units (CMU).

2. Lay CMU units with full-face shell mortar beds. Fill vertical head joints (end joints between units) solidly with mortar from face of unit to a distance behind face equal to not less than the thickness of longitudinal face shells. Solidly bed cross-webs of starting courses in mortar. Maintain head and bed joint widths shown, or if not shown, provide 3/8" joints.

1. Pattern Bond: Lay CMU wall units in 1/2-running bond with vertical joints in each course centered on units in courses above and below, unless otherwise indicated. Bond and interlock each course at corners and intersections. Use special-shaped units where shown, and as required for corners, jambs, sash, control joints, lintels, bond beams and other special conditions.

2. Maintain vertical continuity of core or cell cavities, which are to be reinforced and grouted, to provide minimum clear dimension indicated and to provide minimum clearance and grout coverage for vertical reinforcement bars. Keep cavities free of mortar. Solidly bed webs in mortar where adjacent to reinforced cores or cells.

3. Where horizontal reinforced beams (bond beams) are shown, use special units or modify regular units to allow for placement of continuous horizontal reinforcement bars. Place small mesh expanded metal lath or wire screening in mortar joints under bond beam courses over cores or cells of non-reinforced vertical cells, or provide units with solid bottoms.

3. Grouting Technique: At the Contractor's option, use either low-lift or high-lift grouting techniques subject to requirements which follow.

1. Provide minimum clear dimension of 2" and clear area of 8 sq. in. in vertical cores to be grouted.
2. Place vertical reinforcement prior to laying of CMU. Extend above elevation of maximum pour height as required for splicing. Support in position at vertical intervals not exceeding 192 bar diameters nor 10 ft.
3. Lay CMU to maximum pour height. Do not exceed 4' height, or if bond beam occurs below 4' height stop pour at course below bond beam.
4. Pour grout using chute or container with spout. Rod or vibrate grout during placing. Place grout continuously; do not interrupt pouring of grout for more than one hour. Terminate grout pours 1-

1/2" below top course of pour.

5. Bond Beams: Stop grout in vertical cells 1-1/2" below bond beam course. Place horizontal reinforcement in bond beams; lap at corners and intersections as shown. Place grout in bond beam course before filling vertical cores above bond beam.

D. HIGH-LIFT GROUTING

1. Do not use high-lift grouting technique for grouting of CMU unless minimum cavity dimension and area is 3" and 10 sq. in., respectively.

2. Provide cleanout holes in first course at all vertical cells which are to be filled with grout.

3. Use units with one face shell removed and provide temporary supports for units above, or use header units with concrete brick supports, or cut openings in one face shell.

4. Construct masonry to full height of maximum height grout pour specified, prior to placing grout.

5. Limit grout lifts to a maximum height of 4' and grout pour to a full height of wall, unless otherwise indicated.

6. Place vertical reinforcement before grouting. Place before or after laying masonry units, as required by job conditions. Tie vertical reinforcement to dowels at base of masonry where shown and thread CMU over or around reinforcement. Support vertical reinforcement at intervals not exceeding 192 bar diameters nor 10'.

7. Where individual bars are placed after laying masonry, place wire loops extending into cells as masonry is laid and loosen before mortar sets. After insertion of reinforcement bar, pull loops and bar to proper position and tie free ends.

8. Place horizontal beam reinforcement as the masonry units are laid.

E. PREPARATION OF GROUT SPACES

1. Prior to grouting, inspect and clean grout spaces. Remove dust, dirt, mortar droppings, loose pieces of masonry and other foreign materials from grout spaces. Clean reinforcement and adjust to proper position. Clean top surface of structural members supporting masonry to ensure bond. After final cleaning and inspection, close cleanout holes and brace closures to resist grout pressures.
2. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist displacement of masonry units and breaking of mortar bond. Install shores and bracing, if required, before starting grouting operations.
3. Place grout by pumping into grout spaces unless alternate methods are acceptable to the Architect.
4. Limit grout pours to sections which can be completed in one working day with not more than one hour interruption of pouring operation. Place grout in lifts which do not exceed 4ft. Allow not less than 30 minutes, nor more than one hour between lifts of a given pour. Rod or vibrate each grout lift during pouring operation.
5. Place grout in lintels or beams over openings in one continuous pour.
6. Where bond beam occurs more than one course below top of pour, fill bond beam course to within 1" of vertically reinforced cavities, during construction of masonry.
7. When more than one pour is required to complete a given section of masonry, extend reinforcement beyond masonry as required for splicing. Pour grout to within 1-1/2" of top course of first pour. After grouted masonry is cured, lay masonry units and place reinforcement for second pour section before grouting. Repeat sequence if more pours are required.

05 METALS

SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes fabrication and erection of structural steel work, as shown on drawings including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.

1. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.
2. Miscellaneous Metal Fabrications are specified elsewhere in Division 5.
3. Refer to Division 3 for anchor bolt installation in concrete, Division 4 for anchor bolt installation in masonry.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
2. High-strength bolts (each type), including nuts and washers.

a. Include Direct Tension Indicators if used.

3. Structural steel primer paint.
4. Shrinkage-resistant grout.

C. Shop drawings prepared under supervision of a licensed Structural Engineer, including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.

1. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.
2. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.

D. Test reports conducted on shop- and field-bolted and welded connections. Include data on type(s) of tests conducted and test results.

E. Certified copies of each survey conducted by a licensed Land Surveyor, showing elevations and locations of base plates and anchor bolts to receive structural steel and final elevations and locations for major members. Indicate discrepancies between actual installation and contract documents.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following, except as otherwise indicated:

1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges."

a. Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence:

1) "This approval constitutes the owner's acceptance of all responsibility for the design adequacy of any detail configuration of connections developed by the fabricator as a part of his preparation of these shop drawings."

2. AISC "Specifications for Structural Steel Buildings," including "Commentary."
3. "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Structural Connections.
4. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel."
5. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."

B. Qualifications for Welding Work: Qualify welding procedures and welding operators in accordance with AWS "Qualification" requirements.

1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.
2. If recertification of welders is required, retesting will be Contractor's responsibility.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.

B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not to delay work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and relubricate before use.

1. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.

B. Structural Steel Shapes, Plates, and Bars: ASTM A 36.

C. Cold-Formed Steel Tubing: ASTM A 500, Grade B.

D. Hot-Formed Steel Tubing: ASTM A 501.

E. Steel Pipe: ASTM A 53, Type E or S, Grade B; or ASTM A 501.

1. Finish: Black, except where indicated to be galvanized.

F. Steel Castings: ASTM A 27, Grade 65-35, medium-strength carbon steel.

G. Headed Stud-Type Shear Connectors: ASTM A 108, Grade 1015 or 1020, cold-finished carbon steel with dimensions complying with AISC Specifications.

H. Anchor Bolts: ASTM A 307, nonheaded type unless otherwise indicated.

I. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular low-carbon steel bolts and nuts.

1. Provide hexagonal heads and nuts for all connections.
2. Provide either hexagonal or square heads and nuts, except use only hexagonal units for exposed connections.

J. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:

1. Quenched and tempered medium-carbon steel bolts, nuts, and washers, complying with ASTM A 325.

a. Where indicated as galvanized, provide units that are zinc coated, either mechanically deposited complying with ASTM B 695, Class 50, or hot-dip galvanized complying with ASTM A 153.

2. Quenched and tempered alloy steel bolts, nuts, and washers, complying with ASTM A 490.

K. Direct Tension Indicators: ASTM F 959, type as required.

1. Use at Contractor's option.

L. Electrodes for Welding: Comply with AWS Code.

M. Structural Steel Primer Paint: GPA-313

N. Cement Grout: Portland cement (ASTM C 150, Type I or Type III) and clean, uniformly graded, natural sand (ASTM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum water required for placement and hydration.

O. Metallic Shrinkage-Resistant Grout: Premixed factory-packaged ferrous aggregate grouting compound.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. 100 Non-Shrink Grout (Metallic); Conspec, Inc.
b. Firmix; Euclid Chemical Co.
c. Vibra-Foil; W. R. Grace.
d. Ferrogrout; L & M Construction Chemicals, Inc.
e. Embeco 885; Master Builders.
f. Protalico; Protex Industries, Inc.
g. Kemox G; Sika Corporation.
h. Ferrolith G; Sonneborn/Rexnord.

P. Nonmetallic Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. 100 Non-Shrink Grout (Non-Metallic); Conspec, Inc.
b. Supreme Grout; Cormix, Inc.
c. Sure Grip Grout; Dayton Superior.
d. Euco N.S.; Euclid Chemical Co.
e. Crystex; L & M Construction Chemicals, Inc.
f. Masterflow 713; Master Builders.
g. Sealtight 588 Grout; W. R. Meadows.
h. Propak; Protex Industries, Inc.
i. Set Non-Shrink; Set Products, Inc.
j. Five Star Grout; U.S. Grout Corp.

2.2 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible.

Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.

1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

B. Connections: Weld or bolt shop connections, as indicated.

C. Bolt field connections, except where welded connections or other connections are indicated.

1. Provide high-strength threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.
2. Provide unfinished threaded fasteners for only bolted connections of secondary framing members to primary members (including purlins, girts, and other framing members taking only nominal stresses) and for temporary bracing to facilitate erection.

D. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts."

E. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.

F. Assemble and weld built-up sections by methods that will produce true alignment of axes without warp.

G. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld shear connectors in field, spaced as shown, to beams and girders in composite construction. Use automatic end welding of headed stud shear connectors in accordance with manufacturer's printed instructions.

H. Steel Wall Framing: Select members that are true and straight for fabrication of steel wall framing. Straighten as required to provide uniform, square, and true members in completed wall framing.

I. Build up welded door frames attached to structural steel framing. Weld exposed joints continuously and grind smooth. Plug-weld steel bar stops to frames, except where shown removable. Secure removable stops to frames with countersunk, cross-recessed head machine screws, uniformly spaced not more than 10 inches o.c., unless otherwise indicated.

J. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings.

K. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work.

L. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

M. Expansion Joints: Provide expansion joints in steel shelf angles when part of structural steel frame; locate at vertical brick expansion joints as indicated on drawings.

2.3 SHOP PAINTING

A. General: Shop-paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed on exposed portions and initial 2 inches of embedded areas only.

1. Do not paint surfaces to be welded or high-strength bolted with friction-type connections.
2. Do not paint surfaces scheduled to receive sprayed-on fireproofing.
3. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

B. Surface Preparation: After inspection and before shipping, clean steelwork 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:

1. SP-1 "Solvent Cleaning."

C. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide dry film thickness of not less than 1.5 mils. Use painting methods that result in full coverage of joints, corners, edges, and exposed surfaces.

D. Painting: Provide a one-coat, shop-applied paint system complying with Steel Structures Painting Council (SSPC) Paint System Guide No. 7.00.

2.4 SOURCE QUALITY CONTROL

A. General: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

1. Promptly remove and replace materials or fabricated components that do not comply.

B. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.

1. Promptly notify Engineer whenever design of members and connections for any portion of structure are not clearly indicated.

PART 3 - EXECUTION

3.1 ERECTION

A. Surveys: Employ a licensed land surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect. Do not proceed with erection until corrections have been made or until compensating adjustments to structural steel work have been agreed upon with Engineer.

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

C. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.

D. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.

1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of 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.
4. For proprietary grout materials, comply with manufacturer's instructions.

E. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

F. Level and plumb individual members of structure within specified AISC tolerances.

G. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.

H. Splice members only where indicated and accepted on shop drawings.

I. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.

1. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
2. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

J. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.

K. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

1. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

L. Touch-Up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint on structural steel is included in Division 9 under painting work.

3.2 QUALITY CONTROL

A. 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.

B. 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.

C. Testing agency shall conduct and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.

D. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.

E. Testing agency may inspect structural steel at plant before shipment.

F. Correct deficiencies in structural steel work that inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.

G. Shop-Bolted Connections: Inspect or test in accordance with AISC specifications.

1. Verify that gaps of installed Direct Tension Indicators are less than gaps specified in ASTM F 959, Table 2.

H. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
2. Perform visual inspection of all welds.
3. Perform tests of welds as follows. Inspection procedures listed are to be used at Contractor's option.

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
c. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
d. Ultrasonic Inspection: ASTM E 164.

I. Field-Bolted Connections: Inspect in accordance with AISC specifications.

1 For Direct Tension Indicators, comply with requirements of ASTM F 959. Verify that gaps are less than gaps specified in Table 2.

J. Field Welding: Inspect and test during erection of structural steel as follows:

2 Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

3 Perform visual inspection of all welds.

4 Perform tests of welds as follows:

a. Liquid Penetrant Inspection: ASTM E 165.

b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.

c. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."

d. Ultrasonic Inspection: ASTM E 164.

05220 STEEL JOISTS AND JOIST GIRDERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes steel joists and joist girders for floor and roof framing. Types of joists required include the following:

1. K-Series Open Web Steel Joists.
2. LH-Series Longspan Steel Joists.
3. DLH-Series Deep Longspan Steel Joists.
4. Joist Girders.

B. Refer to Division 3 Sections for installation of anchors set in concrete.

C. Refer to Division 4 Sections for installation of anchors set in masonry.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data and installation instructions for each type of joist and accessories.

1. Include manufacturer's certification that joists comply with SJI "Specifications."

C. Shop drawings showing layout of joist members, special connections, joining and accessories. Include mark, number, type, location and spacing of joists and bridging.

1. Provide templates or location drawings for installation of anchor bolts and metal bearing plates.

1.4 QUALITY ASSURANCE

A. General: Provide joists fabricated in compliance with Steel Joist Institute (SJI) "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with American Welding Society (AWS) "Structural Welding Code - Steel," AWS D1.1.

C. Inspection: Inspect joists and girders in accordance with SJI "Specifications."

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle steel joists as recommended in SJI "Specifications." Handle and store joists in a manner to avoid deforming members and to avoid excessive stresses.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel: Comply with SJI "Specifications" for chord and web sections.

B. Steel Bearing Plates: ASTM A 36.

C. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular hexagon type, low carbon steel.

D. Steel Prime Paint: Comply with SJI "Specifications."

E. Steel Prime Paint: Manufacturer's standard.

2.2 FABRICATION

A. General: Fabricate steel joists in accordance with SJI "Specification."

B. Holes in Chord Members: Provide holes in chord members where shown for securing other work to steel joists; however, deduct area of holes from the area of chord when calculating strength of member.

C. Extended End: Provide extended ends on joists where indicated, complying with SJI "Specifications" and load tables.

D. Ceiling Extension: Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord. Provide either an extended bottom chord element or a separate unit, to suit manufacturer's standards, of sufficient strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface, unless otherwise indicated.

E. Top Chord Extension: Provide top chord extensions ("S" type) on joists where indicated, complying with SJI "Specifications" and load tables.

F. Bridging: Provide horizontal or diagonal type bridging for joists and joist girders, complying with SJI "Specifications."

1. Provide bridging anchors for ends of bridging lines terminating at walls or beams.

G. End Anchorage: Provide end anchorages, including steel bearing plates, to secure joists to adjacent construction, complying with SJI "Specifications."

H. Header Units: Provide header units to support tail joists at openings in floor or roof system not framed with steel shapes.

I. Shop Painting: Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories before application of shop paint.

1. Apply one shop coat of steel prime paint to joists and accessories, by spraying, dipping, or other method to provide a continuous dry paint film thickness of not less than 0.50 mil.

PART 3 - EXECUTION

3.1 ERECTION

A. Place and secure steel joists in accordance with SJI "Specifications," final shop drawings, and as herein specified.

B. Anchors: Furnish anchor bolts, steel bearing plates, and other devices to be built into concrete and masonry construction.

1. Provide unfinished threaded fasteners for anchor bolts, unless high strength bolts indicated.

C. 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 locations and spacing before permanently fastening.

D. Provide temporary bridging, connections, and anchors to ensure lateral stability during construction.

1. 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 simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

F. Fastening Joists: Comply with the following:

1. Field weld joists to supporting steel framework and steel bearing plates where indicated in accordance with SJI "Specifications" for type of joists used. Coordinate welding sequence and procedure with placing of joists.
2. Bolt joists to supporting steel framework in accordance with SJI "Specifications" for type of joists used.

    a. Use unfinished threaded fasteners for bolted connections, unless otherwise indicated.

G. Touch-Up Painting: After joist installation, wire brush welded areas, abraded or rusty surfaces, and clean with solvent. Paint field-applied bolt heads and nuts and prepared surfaces on joists and steel supporting members. Use same type of paint as used for shop painting.

H. Touch-Up Painting: Cleaning and touch-up painting of field welds, abraded areas, and rust spots of shop painting is included under Division 9 painting work.

END OF SECTION 05220

05310 STEEL DECK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. This Section includes steel deck units for floor and roof applications.

B. Header Duct used in conjunction with cellular metal floor deck is specified in Division 16; it is not work of this section.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Product data including manufacturer's specifications and installation instructions for each type of decking and accessories.

a. Provide test data for mechanical fasteners used in lieu of welding for fastening deck to supporting structures.

2. Shop drawings showing layout and types of deck units, anchorage details, and conditions requiring closure strips, supplementary framing, sump pans, cant strips, cut openings, special jointing, and other accessories.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated:

1. American Iron and Steel Institute (AISI), "Specification for the Design of Cold-Formed Steel Structural Members."
2. American Welding Society (AWS), D1.3 "Structural Welding Code - Sheet Steel."
3. Steel Deck Institute (SDI), "Design Manual for Composite Decks, Form Decks and Roof Decks."

B. Qualification of Field Welding: Use qualified welding processes and welding operators in accordance with "Welder Qualification" procedures of AWS.

1. Welded decking in place is subject to inspection and testing. Owner will bear expense of removing and replacing portions of decking for testing purposes if welds are found to be satisfactory. Remove work found to be defective and replace with new acceptable work.

C. Underwriters' Label: Provide metal floor deck units listed in Underwriters' Laboratories "Fire Resistance Directory", with each deck unit bearing the UL label and marking for specific system detailed.

1. Provide cellular floor deck units listed in UL "Electrical Construction Materials Directory" with each cellular metal floor deck unit bearing UL labels and marking. Provide units that will permit use of standard header ducts and outlets for electrical distribution systems.

D. FM Listing: Provide steel roof deck units that have been evaluated by Factory Mutual System and are listed in "Factory Mutual Approval Guide" for "Class I" fire-rated construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include but are not limited to the following:

B. Manufacturers: Subject to compliance with requirements, provide products of one of the following:

1. Bowman Metal Deck Div., Cyclops Corp.
2. Consolidated Systems, Inc.
3. Epic Metals Corp.
4. Marlyn Steel Products, Inc.
5. H. H. Robertson Co.
6. Roll Form Products, Inc.
7. Roof Deck, Inc.
8. United Steel Deck, Inc.
9. Vulcraft Div., Nucor Corp.
10. Wheeling Corrugating Co.

2.2 MATERIALS

A. Steel for Painted Metal Deck Units: ASTM A 611, grade as required to comply with SDI specifications.

B. Steel for Galvanized Metal Deck Units: ASTM A 446, grade as required to comply with SDI specifications.

C. Miscellaneous Steel Shapes: ASTM A 36.

D. Shear Connectors: Headed stud type, ASTM A 108, Grade 1015 or 1020, cold-finished carbon steel, with dimensions complying with AISC specifications.

E. Shear Connectors: Strap type, ASTM A 570, Grade D, hot-rolled carbon steel.

F. Sheet Metal Accessories: ASTM A 526, commercial quality, galvanized.

G. Galvanizing: ASTM A 525, G60.

H. Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A 780.

I. Paint: Manufacturer's baked-on, rust-inhibitive paint, for application to metal surfaces that have been chemically cleaned and phosphate chemical treated.

J. Flexible Closure Strips: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.

K. Acoustic Sound Barrier Closures: Manufacturer's standard mineral fiber closures.

2.3 FABRICATION

A. General: Form deck units in lengths to span three or more supports, with flush, telescoped, or nested 2-inch laps at ends and interlocking or nested side laps, of metal thickness, depth, and width as indicated.

B. Roof Deck Units: Provide deck configurations that comply with SDI "Specifications and Commentary for Steel Roof Deck."

C. Acoustical Roof Deck Units:

1. Single-pan units: Single-pan fluted units with vertical webs perforated with approximate 5/32-inch-diameter holes staggered 3/8-inch o.c. Provide mineral fiber acoustical insulation strips of profile to fit void space between vertical ribs.
2. Multiple-pan cellular units: Composite units consisting of upper fluted section combined with lower flat plate section having interlocking side laps and approximate 5/32-inch perforations staggered on 3/8-inch centers under cells formed by upper unit. Provide mineral fiber acoustical insulation strips of profile to fit void space of each cell.

D. Non-Composite Steel Form Deck: Provide fluted sections of metal deck as permanent forms for reinforced concrete

slabs.

E. Cellular Metal Floor Deck Units:

1. Fabricate flat-bottom units with top fluted section cells combined on a lower flat plate, of metal thickness, depth, and width of unit, number of cells per unit, and width of cells as indicated.
2. Fabricate double-cell units with top fluted section cells combined with matching fluted bottom section, of metal thickness, depth, and width of units, number of cells per unit, and width of cells as indicated.
3. Provide sufficient welds, forming sheets into cellular floor deck units to develop full horizontal shear strength at plane where steel sheets are joined.

F. Composite Steel Floor Deck: Fabricate deck units with integral embossing or raised pattern to furnish mechanical bond with concrete slabs. Fabricate open-beam deck units with fluted section having interlocking side laps.

G. Metal Cover Plates: Fabricate metal cover plates for end-abutting floor deck units of not less than same thickness as decking. Form to match contour of deck units and approximately 6 inches wide.

H. Metal Closure Strips: Fabricate metal closure strips, for cell raceways and openings between decking and other construction, of not less than 0.045-inch min. (18 gage) sheet steel. Form to provide tight-fitting closures at open ends of cells or flutes and sides of decking.

I. Roof Sump Pans: Fabricate from single piece of 0.071-inch min. (14 gage) galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 3 inches wide. Recess pans not less than 1-1/2 inches below roof deck surface unless otherwise shown or required by deck configuration. Holes for drains will be cut in the field by others.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install deck units and accessories in accordance with manufacturer's recommendations, shop drawings, and as specified herein.

B. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.

C. Align deck units for entire length of run of cells and with close alignment between cells at ends of abutting units.

D. Place deck units flat and square, secured to adjacent framing without warp or deflection.

E. Do not place deck units on concrete supporting structure until concrete has cured and is dry.

F. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.

G. Do not use floor deck units for storage or working platforms until permanently secured.

H. Fastening Deck Units (U.N.O. on plans):

1. Fasten floor deck units to steel supporting members by nominal 5/8- inch puddle welds or elongated welds of equal strength, spaced not more than 12 inches o.c. with a minimum of two welds per unit at each support.
2. Tack weld or use self-tapping No. 8 or larger machine screws at 4 feet o.c. for fastening end closures.
3. Fasten roof deck units to steel supporting members by not less than 1/2-inch-diameter puddle welds or elongated welds of equal strength, spaced not more than 12 inches at every support, and at closer spacing where indicated. In addition, secure deck to each supporting member in ribs where side laps occur.
4. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.

   a. Use welding washers where recommended by deck manufacturer.

5. Mechanical fasteners, either powder-actuated or pneumatically driven, may be used in lieu of welding. Locate

mechanical fasteners and install in accordance with deck manufacturer's instructions.

6. Mechanically fasten side laps of adjacent deck units between supports, at intervals not exceeding 36 inches o.c., using self-tapping No. 8 or larger machine screws.
7. Uplift Loading: Install and anchor roof deck units to resist gross uplift loading of 45 lbs. psf at eave overhang and 30 lbs. psf for other roof areas U.N.O. on plans.

    a. Keep the interiors of cells that will be used as raceways free of welds having sharp points or edges.

I. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.

J. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work shown.

K. Hanger Slots or Clips: Provide UL-approved punched hanger slots between cells or flutes of lower element where floor deck units are to receive hangers for support of ceiling construction, air ducts, diffusers, or lighting fixtures.

1. Hanger clips designed to clip over male side lap joints of floor deck units may be used instead of hanger slots.
2. Locate slots or clips at not more than 14 inches o.c. in both directions, not over 9 inches from walls at ends, and not more than 12 inches from walls at sides, unless otherwise indicated.
3. Provide manufacturer's standard hanger attachment devices.

L. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units, except where taped joints are required.

M. Roof Sump Pans: Place over openings provided in roof decking and weld to top decking surface. Space welds not more than 12 inches o.c. with at least one weld at each corner.

N. Shear Connectors: Weld shear connectors to supports through decking units in accordance with manufacturer's instructions. Do not weld shear connectors through two layers (lapped ends) of decking units. Weld only on clean, dry deck surfaces.

O. Closure Strips: Provide metal closure strips at open uncovered ends and edges of roof decking and in voids between decking and other construction. Weld into position to provide a complete decking installation.

1. Provide flexible closure strips instead of metal closures, at Contractor's option, wherever their use will ensure complete closure. Install with adhesive in accordance with manufacturer's instructions.

P. Touch-Up Painting: After decking installation, wire brush, clean, and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members.

1. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.
2. Touch-up painted surfaces with same type of shop paint used on adjacent surfaces.

Q. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

R. Touch-Up Painting: Cleaning and touch-up painting of field welds, abraded areas, and rust spots, as required after erection and before proceeding with field painting, is included in Division 9 under "Painting."

END OF SECTION 05310

05400 COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. Types of cold-formed metal framing units include the following:

1. Load-bearing punched channel studs.
2. C-shaped load-bearing steel studs.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Product data and installation instructions for each item of cold-formed metal framing and accessories.

1.4 QUALITY ASSURANCE

A. Component Design: Calculate structural properties of studs and joists in accordance with American Iron and Steel Institute (AISI) "Specification for Design of Cold-Formed Steel Structural Members."

B. Welding: Use qualified welders and comply with American Welding Society (AWS) D1.3, "Structural Welding Code - Sheet Steel."

C. Fire-Rated Assemblies: Where framing units are components of assemblies indicated for a fire-resistance rating, including those required for compliance with governing regulations, provide units that have been approved by governing authorities that have jurisdiction.

D. Pre-Installation Conference: Prior to start of installation of metal framing systems, meet at project site with installers of other work including door and window frames and mechanical and electrical work. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.

1. Coordinate with provisions of Division 1 Section "Project Meetings."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include but are not limited to the following:

B. Manufacturers: Subject to compliance with requirements, provide products of one of the following:

1. Alabama Metal Industries Corp.
2. Dale Industries, Inc.
3. Dietrich Industries, Inc.
4. Marino Industries, Inc.
5. Superior Steel Studs, Inc.
6. USG Industries
7. United States Steel
8. Wheeling Corrugating Co.

2.2 METAL FRAMING

A. System Components: Manufacturers' standard load-bearing steel studs and joists of type, size, shape, and gage as indicated. With each type of metal framing required, provide manufacturer's standard, steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories for applications indicated, as needed to provide a complete metal framing system.

B. Materials and Finishes:

1. For 18-gage and lighter units, fabricate metal framing components of commercial quality steel sheet with a minimum yield point of 33,000 psi; ASTM A 446, A 570, or A 611.
2. Provide galvanized finish to metal framing components complying with ASTM A 525 for minimum G 60 coating.

   a. Finish of installation accessories to match that of main framing components, unless otherwise indicated.

3. Fasteners: Provide nuts, bolts, washers, screws, and other fasteners with corrosion-resistant plated finish.
4. Electrodes for Welding: Comply with AWS Code and as recommended by stud manufacturer.
5. Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A 780.

2.3 FABRICATION

A. General: Framing components may be prefabricated into assemblies before erection. Fabricate panels plumb, square, true to line, and braced against racking with joints welded. Perform lifting of prefabricated units to prevent damage or distortion.

B. Fabricate units in jig templates to hold members in proper alignment and position and to assure consistent component placement.

C. Fastenings: Attach similar components by welding. Attach dissimilar components by welding, bolting, or screw fasteners, as standard with manufacturer.

D. Wire tying of framing components is not permitted.

E. Fabrication Tolerances: Fabricate units to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install metal framing systems in accordance with manufacturer's printed or written instructions and recommendations.

B. Runner Tracks: Install continuous tracks sized to match studs. Align tracks accurately to layout at base and tops of studs. Secure tracks as recommended by stud manufacturer for type of construction involved, except do not exceed 24 inches o.c. spacing for nail or power-driven fasteners or 16 inches o.c. for other types of attachment. Provide fasteners at corners and ends of tracks.

C. Installation of Wall Studs: Secure studs to top and bottom runner tracks by either welding or screw fastening at both inside and outside flanges.

D. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

E. Where stud system abuts structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure.

F. Install supplementary framing, blocking, and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering weight or loading resulting from item supported.

G. Frame wall openings larger than 2 feet square with double stud at each jamb of frame except where more than two are either shown or indicated in manufacturer's instructions. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding, and space jack studs same as full-height studs of wall. Secure stud system wall opening frame in manner indicated.

H. Frame both sides of expansion and control joints with separate studs; do not bridge the joint with components of stud system.

I. Install horizontal stiffeners in stud system, spaced (vertical distance) at not more than 54 inches o.c. Weld at each intersection.

J. Erection Tolerances: Bolt or weld wall panels (at both horizontal and vertical junctures) to produce flush, even, true-to-line joints.

1. Maximum variation in plane and true position between prefabricated assemblies should not exceed 1/16 inch.

05500 METAL FABRICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes the following metal fabrications:

1. Rough hardware.
2. Loose steel lintels.
3. Miscellaneous framing and supports for the following:
   a. Suspended toilet partitions.
   b. Applications where framing and supports are not specified in other sections.
4. Pipe bollards.

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

1. Division 5 Section "Structural Steel" for structural steel framing system components.
2. Division 5 Section "Handrails and Railings" for the following:
   a. Ornamental metal handrails and railing systems.

1.3 DEFINITIONS

A. Definitions in ASTM E 985 for railing-related terms apply to this section.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. Structural Performance of Handrails and Railing Systems: Design, engineer, fabricate, and install handrails and railing systems to comply with requirements of ASTM E 985 for structural performance based on testing performed in accordance with ASTM E 894 and E 935.

B. Structural Performance: Design, engineer, fabricate, and install the following metal fabrications to withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each respective component of each metal fabrication.

1. Top Rail of Guardrail Systems: Capable of withstanding the following loads applied as indicated:

   a. Concentrated load of 300 lbf applied at any point nonconcurrently, vertically downward, or horizontally.
   b. Uniform load of 100 lbf per linear ft. applied nonconcurrently, vertically downward or horizontally.
   c. Concentrated and uniform loads above need not be assumed to act concurrently.
2. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:

   a. Concentrated load of 200 lbf applied at any point nonconcurrently, vertically downward or horizontally.
   b. Uniform load of 50 lbf per linear foot applied nonconcurrently, vertically downward or horizontally.
   c. Concentrated and uniform loads above need not be assumed to act concurrently.

3. Infill Area of Guardrail Systems: Capable of withstanding a horizontal concentrated load of 200 lbf applied to one sq. ft. at any point in the system including panels, intermediate rails balusters, or other elements composing the infill area.

   a. Above load need not be assumed to act concurrently with uniform horizontal loads on top rails of railing systems in determining stress on guard.

1.5 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for products used in miscellaneous metal fabrications, including paint products and grout.

C. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections.

1. Where installed metal fabrications are indicated to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and sealed by the qualified professional engineer who was responsible for their preparation.

D. Samples representative of materials and finished products as may be requested by Architect.

E. Welder certificates signed by Contractor certifying that welders comply with requirements specified under "Quality Assurance" article.

F. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project name, addresses, names of Architects and Owners, and other information specified.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Firm experienced in successfully producing metal fabrications similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.

B. Installer Qualifications: Arrange for installation of metal fabrications specified in this section by same firm that fabricated them.

C. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel," D1.3 "Structural Welding Code - Sheet Steel", and D1.2 "Structural Welding Code - Aluminum."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

D. Engineer Qualifications: Professional engineer licensed to practice in jurisdiction where project is located and experienced in providing engineering services of the kind indicated that have resulted in the successful installation of metal fabrications similar in material, design, and extent to that indicated for this Project.

1.7 PROJECT CONDITIONS

A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.

1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabrication of products without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

1.8 SEQUENCING AND SCHEDULING

A. Sequence and coordinate installation of wall handrails as follows:

1. Mount handrails only on completed walls. Do not support handrails temporarily by any means not satisfying structural performance requirements.
2. Mount handrails only on gypsum board assemblies reinforced to receive anchors, and where the location of concealed anchor plates has been clearly marked for benefit of Installer.

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Metal Surfaces, General: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.

B. Steel Plates, Shapes, and Bars: ASTM A 36.

C. Rolled Steel Floor Plates: ASTM A 786.

D. Steel Bars for Gratings: ASTM A 569 or ASTM A 36.

E. Wire Rod for Grating Cross Bars: ASTM A 510.

F. Steel Tubing: Product type (manufacturing method) and as follows:

1. Cold-Formed Steel Tubing: ASTM A 500, grade as indicated below:

a. Grade A, unless otherwise indicated or required for design loading.
b. Grade B, unless otherwise indicated or required for design loading.

2. Hot-Formed Steel Tubing: ASTM A 501.

a. For exterior installations and where indicated, provide tubing with hot-dip galvanized coating per ASTM A 53.

G. Uncoated Structural Steel Sheet: Product type (manufacturing method), quality, and grade, as follows:

1. Cold-Rolled Structural Steel Sheet: ASTM A 611, grade as follows:

a. Grade A, unless otherwise indicated or required by design loading.

2. Hot-Rolled Structural Steel Sheet: ASTM A 570, grade as follows:

a. Grade 30, unless otherwise indicated or required by design loading.

H. Uncoated Steel Sheet: Commercial quality, product type (method of manufacture) as follows:

1. Cold-Rolled Steel Sheet: ASTM A 366.

I. Galvanized Steel Sheet: Quality as follows:

1. Structural Quality: ASTM A 446; Grade A, unless another grade required for design loading, and G90 coating designation unless otherwise indicated.

J. Steel Pipe: ASTM A 53; finish, type, and weight class as follows:

1. Black finish, unless otherwise indicated.
2. Galvanized finish for exterior installations and where indicated.
3. Type F, standard weight (schedule 40), unless otherwise indicated, or another weight, type, and grade required by structural loads.

K. Gray Iron Castings: ASTM A 48, Class 30.

L. Malleable Iron Castings: ASTM A 47, grade 32510.

M. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

N. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.

O. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for the metal alloy to be welded.

2.2 STAINLESS STEEL

A. Bar Stock: ASTM A 276, Type 302 or 304.

B. Plate: ASTM A 167, Type 302 or 304.

2.3 ALUMINUM

A. Extruded Bars and Shapes: ASTM B 221, alloys as follows:

1. 6061-T6 or 6063-T6 for bearing bars of gratings and shapes.
2. 6061-T1 for grating cross bars.

B. Aluminum-Alloy Rolled Tread Plate: ASTM B 632, alloys as follows:

1. 6061-T6 for platforms.
2. 6061-T4 for treads.

C. Aluminum Rivets: ASTM B 316, alloy 6053-T4 or 6061-T6.

D. Aluminum Sheet for Expanded Aluminum Grating: ASTM B 209, alloy 5052-H32.

E. Fasteners for Aluminum Gratings: Use fasteners made of same basic metal as fastened metal except use galvanized fasteners complying with ASTM A 153 for exterior aluminum units, unless otherwise indicated. Do not use metals that are corrosive or incompatible with metals joined.

2.4 GROUT AND ANCHORING CEMENT

A. Nonshrink Metallic Grout: Premixed, factory-packaged, ferrous aggregate grout complying with CE CRD-C 621, specifically recommended by manufacturer for heavy duty loading applications of type specified in this section.

B. Nonshrink Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with CE CRD- C 621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.

C. Interior Anchoring Cement: Factory-prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Use for interior applications only.

D. Erosion-Resistant Anchoring Cement: Factory-prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without need for protection by a sealer or waterproof coating and is recommended for exterior use by manufacturer.

E. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include but are not limited to the following:

F. Products: Subject to compliance with requirements, provide one of the following:

1. Nonshrink Metallic Grouts:

a. "Metox RM"; Chem-Masters Corp.
b. "Hi Mod Grout"; Euclid Chemical Co.
c. "Embeco 885 and 636"; Master Builders.
d. "Ferrolith G Redi-Mix and G-NC"; Sonneborn Building Products Div., Rexnord Chemical Products, Inc.

e. "Stoncrete MG1"; Stonhard, Inc.

2. Nonshrink Nonmetallic Grouts:

a. "Bonsal Construction Grout"; W. R. Bonsal Co.
b. "Diamond-Crete Grout"; Concrete Service Materials Co.
c. "Euco N-S Grout"; Euclid Chemical Co.
d. "Kemset"; Chem-Masters Corp.
e. "Crystex"; L & M Construction Chemicals, Inc.
f. "Masterflow 713"; Master Builders.
g. "Sealtight 588 Grout"; W. R. Meadows, Inc.
h. "Sonogrout"; Sonneborn Building Products Div., Rexnord Chemical Products, Inc.
i. "Stoncrete NM1"; Stonhard, Inc.
j. "Five Star Grout"; U. S. Grout Corp.
k. "Vibropruf #11"; Lambert Corp.

3. Interior Anchoring Cement:

a. "Bonsal Anchor Cement"; W. R. Bonsal Co.
b. "Por-Rok"; Minwax Construction Products Division.

4. Erosion-Resistant Anchoring Cement:

a. "Super Por-Rok"; Minwax Construction Products Division.

2.5 FASTENERS

A. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

B. Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A.

C. Lag Bolts: Square head type, FS FF-B-561.

D. Machine Screws: Cadmium plated steel, FS FF-S-92.

E. Wood Screws: Flat head carbon steel, FS FF-S-111.

F. Plain Washers: Round, carbon steel, FS FF-W-92.

G. Drilled-In Expansion Anchors: Expansion anchors complying with FS FF-S-325, Group VIII (anchors, expansion, [nondrilling]), Type I (internally threaded tubular expansion anchor); and machine bolts complying with FS FF-B-575, Grade 5.

H. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class, and style as required.

I. Lock Washers: Helical spring type carbon steel, FS FF-W-84.

2.6 PAINT

A. Shop Primer for Ferrous Metal: Manufacturer's or fabricator's standard, fast-curing, lead-free, universal modified alkyd primer selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure complying with performance requirements of FS TT-P-645.

B. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint-20.

C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers.

D. Zinc Chromate Primer: FS TT-P-645.

2.7 CONCRETE FILL AND REINFORCING MATERIALS

A. Concrete Materials and Properties: Comply with requirements of Division 3 section "Concrete Work" for normal weight, ready-mix concrete with minimum 28-day compressive strength of 2,500 psi, 440 lb cement per cu. ft. minimum, and W/C ratio of 0.65 maximum, unless higher strengths indicated.

B. Nonslip Aggregate Finish: Factory-graded, packaged material containing fused aluminum oxide grits or crushed emery as abrasive aggregate; rust-proof and nonglazing; unaffected by freezing, moisture, or cleaning materials.

C. Reinforcing Bars: ASTM A 615, Grade 60, unless otherwise indicated.

2.8 FABRICATION, GENERAL

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

C. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 100 deg F (55.5 deg C).

D. Shear and punch metals cleanly and accurately. Remove burrs.

E. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

F. Remove sharp or rough areas on exposed traffic surfaces.

G. Weld corners and seams continuously to comply with AWS recommendations and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

H. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

J. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

K. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.

L. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.9 ROUGH HARDWARE

A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 sections.

B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

2.10 STEEL LADDERS

A. General: Fabricate ladders for the locations shown, with dimensions, spacings, details and anchorages as indicated. Comply with requirements of ANSI A14.3.

B. Siderails: Continuous steel flat bars, 1/2 inch x 2-1/2 inches, with eased edges, spaced 18 inches apart.

C. Bar Rungs: Round steel bars, 3/4 inch diameter, spaced 12 inches o.c.

D. Bar Rungs: Square steel bars, 3/4 inch, spaced 12 inches o.c.

E. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.

F. Support each ladder at top and bottom and at intermediate points spaced not more than 5'-0" o.c. by means of welded or bolted steel brackets.

1. Size brackets to support design dead and live loads indicated and to hold centerline of ladder rungs clear of the wall surface by not less than 7 inches.
2. Extend side rails 42 inches 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.

G. Provide non-slip surface on 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.

2.11 SHIP'S LADDERS

A. Provide ship's ladders where indicated. Fabricate of open type construction with structural steel channel or steel plate stringers, pipe handrails, and open steel grating treads, unless otherwise indicated. Provide all necessary brackets and fittings for installation.

B. Galvanize ladders, including, brackets and fasteners; in the following locations:

1. Exterior locations.
2. Interior locations where indicated.

2.12 LADDER SAFETY CAGES

A. General: Fabricate ladder safety cages to comply with ANSI A14.3; assemble by welding or riveting.

B. Primary Hoops: Steel bars, 5/16 inch x 4 inches, for top, bottom, and for cages longer than 20 feet, intermediate hoops spaced not more than 20'-0" o.c.

C. Secondary Intermediate Hoops: Steel bars, 5/16 inch x 2 inches hoops spaced not more than 4'-0" o.c. between primary hoops.

D. Vertical Bars: Steel bars, 5/16 inch x 2 inches, secured to each hoop, spaced approximately 9 inches o.c.

E. Fasten assembled safety cage to ladder rails and adjacent construction as indicated.

F. Galvanize ladder safety cages, including fasteners, in the following locations:

1. Exterior locations.
2. Interior locations, where indicated.

2.13 NOSINGS

A. Fabricate curb nosings from structural steel shapes as indicated, of all welded construction with mitered corners and continuously welded joints. Provide anchors welded to nosings for embedding in concrete or masonry construction, spaced not more than 6 inches from each curb end, 6 inches from corners and 24 inches o.c., unless otherwise indicated.

B. Galvanize nosings in the following locations:

1. Exterior locations.
2. Interior locations where indicated.

2.14 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

2.15 LOOSE STEEL LINTELS

A. Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

B. Weld adjoining members together to form a single unit where indicated.

C. Size loose lintels for equal bearing of one inch per foot of clear span but not less than 8 inches bearing at each side of openings, unless otherwise indicated.

D. Galvanize loose steel lintels located in exterior walls.

2.16 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports for applications indicated or which are not a part of structural steel framework, as required to complete work.

B. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. 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.

b. Except as otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide x 1/4 inch x 8 inches long.

C. Fabricate support for suspended toilet partitions as follows:

1. Beams: Continuous steel shapes of size required to limit deflection to L/360 between hangers, but use not less than C 8 x 11.5 channels or another shape with equivalent structural properties.
2. Hangers: Steel rods, 1/2 inch in diameter, spaced not more than 36 inches o.c. Thread rods to receive anchor and stop nuts. Fit hangers with wedge shape washers for full bearing on sloping flanges of support beam.
3. Braces and Angles: Steel angles of size required for rigid support of beam and for secure anchorage.

D. Galvanize miscellaneous framing and supports in the following locations:

1. Exterior locations.
2. Interior locations where indicated.

2.17 MISCELLANEOUS STEEL TRIM

A. Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, 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.

B. Galvanize miscellaneous framing and supports in the following locations:

1. Exterior locations.
2. Interior locations where indicated.

2.18 SHELF AND RELIEVING ANGLES

A. Fabricate shelf and relieving angles from steel angles of sizes indicated and for attachment to concrete framing. Provide slotted holes to receive 3/4 inch bolts, spaced not more than 6 inches from ends and not more than 24 inches o.c., unless otherwise indicated.

B. For cavity walls, provide vertical channel brackets to support shelf/relieving angles from back-up masonry and concrete. Align expansion joints in angles with indicated expansion joints in cavity wall exterior wythe.

C. Galvanize shelf angles to be installed on exterior concrete framing.

D. Furnish wedge-type concrete inserts, complete with fasteners, for attachment of shelf angles to cast-in-place concrete.

2.19 STEEL PIPE RAILINGS AND HANDRAILS

A. General: Fabricate pipe railings and handrails to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of pipe, post spacings, and anchorage, but not less than that required to support structural loads.

B. Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.

1. At tee and cross intersections, notch ends of intersecting members to fit contour of pipe to which end is joined and weld all around.

C. Form changes in direction of railing members as follows:

1. By insertion of prefabricated elbow fittings.
2. By radius bends of radius indicated.
3. By mitering at elbow bends.
4. By bending.
5. By any method indicated above, applicable to change of direction involved.

D. 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, cracking, or otherwise deforming exposed surfaces of pipe.

E. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.

F. Close exposed ends of pipe by welding 3/16 inch thick steel plate in place or by use of prefabricated fittings, except where clearance of end of pipe and adjoining wall surface is 1/4 inch or less.

G. Toe Boards: Where indicated, provide toe boards at railings around openings and at the edge of open-sided floors and platforms. Fabricate to dimensions and details indicated, or if not indicated, use 4 inches high x 1/8 inch steel plate welded to, and centered between, each railing post.

H. 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.

1. For railing posts set in concrete fabricate sleeves from steel pipe not less than 6 inches long and with an inside diameter not less than 1/2 inch greater than the outside diameter of post, with steel plate closure welded to bottom of sleeve.

   c. Provide friction fit, removable covers designed to keep sleeves clean and hold top edge of sleeve 1/2 inch below finished surface of concrete.

2. For removable railing posts, fabricate slip-fit sockets from steel pipe whose inside diameter is sized for a close fit with posts and to limit deflection of post without lateral load, measured at top, to not more than 1/12 of post height. Provide socket covers designed and fabricated to resist accidental dislodgement.

I. Fillers: Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses. Size fillers to produce adequate bearing to prevent bracket rotation and overstressing of substrate.

J. For exterior steel railings and handrails formed from steel pipe with galvanized finish, galvanize fittings, brackets, fasteners, sleeves, and other ferrous components.

K. For interior steel railings and handrails formed from steel pipe with galvanized finish, galvanize fittings, brackets, fasteners, sleeves, and other ferrous components.

L. For interior steel railings formed from steel pipe with black finish, provide nongalvanized ferrous metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.

2.20 CAST TREADS AND THRESHOLDS

A. Fabricate units of material, sizes, and configurations indicated. If not indicated, provide cast-iron units with integral abrasive finish. Furnish in lengths as required to accurately fit each opening or conditions.

   1. Cast units with an integral abrasive grit consisting of aluminum oxide, silicone carbide, or a combination of both.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   1. American Abrasive Metals Co.
   2. American Mason Safety Tread Co.
   3. American Safety Tread Co., Inc.
   4. Armstrong Products, Inc.
   5. Safe-T-Metal Co., Inc.
   6. Wooster Products Inc.

D. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with the manufacturer.

E. Drill for mechanical anchors with countersunk holes located not more than 4 inches from ends and not more than 12 inches o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by the manufacturer.

   1. Provide 2 rows of holes for units over 5 inches wide, with 2 holes aligned at ends and staggered intermediate holes.

F. Apply black asphaltic coating to concealed bottoms, sides, and edges of cast-iron units set into concrete.

G. Provide a plain surface texture, except where fluted or cross- hatched surfaces are indicated.

2.21 STEEL FRAMED STAIRS

A. 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.

1. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM "Metal Stair Manual" for class of stair designated, except where more stringent requirements are indicated:

   d. Commercial class, unless otherwise indicated.
   e. Architectural class where indicated.

2. Fabricate treads and platforms of exterior stairs to accommodate slopes to drain in finished traffic surfaces.

B. Stair Framing: Fabricate stringers 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 indicated. Bolt or weld headers to strings, newels, and framing members to strings and headers; fabricate and join so that bolts, if used, do not appear on finish surfaces.

1. Where masonry walls support steel stairs, provide temporary supporting struts designed for erection of steel stair components before installation of masonry.

C. 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.

1. Form metal pans of galvanized steel sheet, where indicated.
2. Directly weld risers and subtreads to stringers; locate welds on side of metal pans to be concealed by concrete fill.
3. 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.

   a. At Contractor's option, provide prefabricated stair assemblies with prefilled treads consisting of prepoured reinforced concrete fill, with non-slip aggregate finish, in welded sheet metal pan, attached to installed stringers using manufacturer's standard connection detail.

      2) Product: Subject to compliance with requirements, provide Speedstair by American Stair Corp., Inc.

4.. Provide subplatforms of configuration and construction indicated; if not indicated, of same metal as risers and subtreads, in thicknesses required to support design loading. Attach subplatform to platform framing members with welds.

   a. Smooth Soffit Construction: Construct subplatforms with smooth soffits.

D. Steel Floor Plate Treads and Platforms: Provide raised pattern steel floor plate in pattern indicated or, if not indicated, as selected from manufacturer's standard patterns.

1. Form treads of 1/4 inch thick raised pattern steel floor plate with integral nosing and back edge stiffener. Weld steel supporting brackets to stringers and treads to brackets.
2. Fabricate platforms of raised pattern steel floor plate of thickness indicated. Provide nosing matching that on treads at all landings. Secure to platform framing members with welds.

E. Floor Grating Treads and Platforms: Provide patterns, spacing, and bar sizes indicated; fabricate to comply with NAAMM "Metal Bar Grating Manual."

1. Finish: Shop prime paint.

F. Fabricate grating treads with steel plate nosing on one edge and with steel angle or steel plate carrier at each end for stringer connections. Secure treads to stringers with bolts.

G. Fabricate grating platforms, with nosing matching that on grating treads, at all landings. Provide toe plates at open-sided edges of grating platform. Secure grating to platform frame with welds.

H. Stair Railings and Handrails: Comply with applicable requirements specified elsewhere in this section for steel pipe railings and handrails, and as follows:

1. Fabricate newels of steel tubing and provide newel caps of gray-iron castings, as shown.
2. Railings may be bent at corners, rail returns, and wall returns, instead of using prefabricated fittings.
3. Connect railing posts to stair framing by direct welding, unless otherwise indicated.

2.22 WHEEL GUARDS

A. Provide wheel guards of 3/4 inch thick, hollow core, gray-iron castings, of size and shape indicated. Provide holes for countersunk anchor bolts and grouting.

2.23 PIPE BOLLARDS

A. Fabricate pipe bollards from Schedule 80 steel pipe. Cap bollards with 1/4 inch minimum thickness steel base plate.

B. Fabricate sleeves for bollard anchorage from steel pipe with 1/4 inch thick steel plate welded to bottom of sleeve.

2.24 FINISHES, GENERAL

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

B. Finish metal fabrications after assembly.

2.25 STEEL AND IRON FINISHES

A. Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process compliance with the following requirements:

1. ASTM A 153 for galvanizing iron and steel hardware.
2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick and heavier.

B. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B): SSPC-SP6 "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning:

C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.

1. Stripe paint all edges, corners, crevices, bolts, welds, and sharp edges.

2.26 ALUMINUM FINISHES

A. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.

B. As Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

C. Class I Clear Anodized Finish: AA-M12C22A41 (Mechanical Finish: as fabricated, nonspecular; Chemical Finish: etched, medium matte; Anodic Coating: Class I Architectural: clear film thicker than 0.7 mil) complying with AAMA 607.1.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

B. Center nosings on tread widths with noses flush with riser faces and tread surfaces.

C. Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

3.2 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

E. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint or zinc chromate primer.

3.3 SETTING LOOSE PLATES

A. Clean concrete and masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

B. 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.

1. Use metallic nonshrink grout in concealed locations where not exposed to moisture; use nonmetallic nonshrink grout in exposed locations, unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 INSTALLATION OF SUPPORTS FOR TOILET PARTITIONS

A. Anchor supports securely to, and rigidly brace from, overhead building structure.

3.5 INSTALLATION OF STEEL PIPE RAILINGS AND HANDRAILS

A. Adjust railings prior to anchoring to ensure matching alignment at 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:

1. Anchor posts in concrete by means of pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's directions.
2. Anchor posts in concrete by core drilling holes not less than 5 inches deep and 3/4 inch greater than outside diameter of post. Clean holes of all loose material, insert posts and fill annular space between post and concrete with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's directions.

   a Nonshrink, nonmetallic grout or anchoring cement.
   b Cover anchorage joint with a round steel flange attached to post as follows:

      2) Welded to post after placement of anchoring material.
      3) By set screws.

   c. Leave anchorage joint exposed, wipe off surplus anchoring material, and leave 1/8 inch build-up, sloped away from post. For installations exposed on exterior, or to flow of water, seal anchoring material to comply with grout manufacturer's directions.

3. 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.
4. 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.
5. Anchor rail ends to steel with steel oval or round flanges welded to rail ends and bolted to structural steel members, unless otherwise indicated.
6. Install removable railing sections where indicated in slip-fit metal sockets cast into concrete. Accurately locate sockets to match post spacing.

B. Secure handrails to wall with wall brackets and end fittings. Provide bracket with not less than 1-1/2 inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated, or if not indicated, at spacing required to support structural loads. Secure wall brackets and wall return fittings to building construction as follows:

1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
2. Use type of bracket with pre-drilled hole for exposed bolt anchorage.
3. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.
4. For hollow masonry anchorage, use toggle bolts having square heads.
5. For wood stud partitions, use lag bolts set into wood backing between studs. Coordinate with stud installations for accurate location of backing members.
6. For steel framed gypsum board assemblies, fasten brackets directly to steel framing or concealed anchors using self- tapping screws of size and type required to support structural loads.

C. Expansion Joints: Provide expansion joints at locations indicated, or if not indicated, at intervals not to exceed 40 feet. Provide slip joint with internal sleeve extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; locate joint within 6 inches of posts.

3.6 INSTALLATION OF CAST TREADS AND THRESHOLDS

A. Install cast treads and thresholds with anchorage system indicated to comply with manufacturer's recommendations.

B. Seal thresholds exposed to exterior with elastomeric sealant complying with Division 7 Section "Joint Sealers" to provide a watertight installation.

3.7 INSTALLATION OF WHEEL GUARDS

A. Anchor wheel guards to concrete or masonry construction to comply with manufacturer's instructions. Fill cores solidly with air- entrained concrete having a 28-day minimum compressive strength at 3,000 psi.

3.8 INSTALLATION OF BOLLARDS

A. Anchor bollards in concrete by means of pipe sleeves preset and anchored into concrete. After bollards have been inserted into sleeves, fill annular space between bollard and sleeve solid with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's directions.

3.9 ADJUSTING AND CLEANING

A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touch-up of field painted surfaces.

1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touch-Up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of the shop paint on miscellaneous metal is specified in Division 9 Section "Painting" of these specifications.

C. For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

06 WOOD

06100 ROUGH CARPENTRY

PART 1 - GENERAL

1.01 Related Documents
A. Requirements of Drawings, General and Special Conditions and DIVISION 1 apply to this section.

1.02 Scope
A. Provide all rough carpentry work including but not necessarily limited to:
Wood grounds, nailers and blocking.
Wood furring
Sheathing

B. Related work specified elsewhere:

Concrete formwork	SECTION 03010
Finish Carpentry	SECTION 06200
Architectural woodwork	SECTION 06400

1.02 Definitions
A. Rough carpentry includes carpentry work not specified as part of other sections and which is generally not exposed, except as otherwise indicated.

1.03 Submittals
A. Product Data: Submit manufacturer's specifications and installation instructions for materials listed below:
Insulating sheathing

Submit chemical treatment manufacturer's instructions for handling, storing installation and finishing of treated materials.

For each type preservative treatment specified, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained and conformance with applicable standards.

For water-borne treatment include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to project site.

For fire-retardant treatment, include certification by treating plant that treated material complies with specified standard and other requirements.

1.04 Product Handling
A. Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.

For lumber and plywood pressure treated with waterborne chemicals, provide spacers between each course to provide circulation.

1.05 Project Conditions
A. Fit Carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds and similar supports to allow attachment of other work.

PART 2 – PRODUCTS

2.01 Lumber
A. Comply, for each use, with the "Simplified Practice Recommendations R16, American Lumber Standards for Softwood Lumber" by the U.S. Department of Commerce, and with the rules of the applicable manufacturers' association of the authorized inspection bureau under which each species of lumber is produced.

2.02 Plywood
A. Comply for each use, with the requirements of the U.S. Product Standard PS-1 for "Softwood Plywood/Construction and Industrial", except as otherwise specified herein. Provide plywood of any PS-1 species classification group, except where particular species is shown or specified or where PS-1 limits groups for a particular grade specified.

2.03 Factory-mark
A. Each piece of lumber and plywood to identify the type, grade agency providing the inspection service, the producing mill and other qualities as specified herein. Omit markings and provide certificate of inspection for material shown or scheduled to receive transparent or natural finish, if markings would be visible after finishing.

2.04 Size and Shapes

A. Nominal sizes shown and specified refer to undressed lumber dimensions. Dress lumber 4 sides (S4S) unless otherwise shown or specified, and work to shapes and patterns shown. Detailed dimensions show actual lumber sizes required.

2.05 Coordination
A. Obtain measurements and verify dimensions shown and shop drawings details before proceeding with carpentry work, wherever possible.

B. Correlate location of furring, nailers, blocking, grounds and similar supports so that attached work will comply with design requirements.

C. Fit carpentry work to other work. Scribe and cope as required for accurate fit.

D. Time delivery and installation of carpentry work to avoid delaying other trades whose work is dependent on or affected by the carpentry work and to comply with protection and storage requirements.

E. Installer must examine all parts of the supporting structure and the conditions under which the carpentry work is to be installed and notify the Contractor in writing of any condition detrimental to the proper and timely completion of the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer. Keep carpentry materials dry during delivery, and/or storage. Store lumber and plywood in stacks with provision for air circulation within stacks. Protect bottom of stacks against contact with damp or wet surfaces. Protect Exposed materials against weather.

G. Advise Contractor of heating or cooling requirements for installation areas and for maintaining required temperature until Owner's acceptance of the work.

H. Protect installed carpentry work from damage by work of other trades until Owner's acceptance of the work. Advise Contractor of required protection procedures.

PART 3 - MATERIALS

3.01 Lumber
A. Construction Lumber: Standard Grade Douglas Fir/\/Western Larch, Western
Hemlock (WWPA or WCLA) or No. 2 Dimension Southern Pine (SPIB).

B. Wood for support or attachment of other work such as cant strips, bucks, nailers blocking furring, grounds, stripping and similar members: No. 2 Common Grade of any WWPA or WCLA Species or No. 2 Southern Pine Boards (SPIB). Lumber to be treated where noted on drawings. See Section 06300 Wood Treatment.

3.02 Backing panels for electrical or telephone equipment
A. Fire-retardant treated Standard Grade interior type plywood with exterior glue, 3/4" minimum thickness.

3.03 Anchorage and Fastening Materials
A. Select proper type, size, material and finish for each application.

PART 4 - EXECUTION

4.01 Installation
A. Use only sound, thoroughly seasoned, well-manufactured materials of the longest practical lengths and sized to minimize jointing.

B. Use materials free from warp which cannot be easily corrected by anchoring and attachment. Sort out and discard warped material and material with other defects which would impair the quality of the work. Remove from the site and replace with good quality material at no additional cost to the owner.

C. Securely attach carpentry work to substrates by anchoring and fastening as shown and as required by recognized standards. Provide washers under bolt heads and nuts in contact with wood.

D. Nail plywood to comply with recommendation of the American Plywood Association.

E. Countersink nail heads on exposed carpentry work and fill hoes.

F. Set carpentry work accurately to required levels and lines with members plumb and true and accurately cut and fitted. Shim with wood scraps for full-bearing on concrete or masonry substrates.

4.02 Attachment and Anchorage

A. Use galvanized nails, except as otherwise shown or specified herein. Use finishing nails for finish work. Do not wax or lubricate fasteners that depend on friction for holding power. Select fasteners of size that will not penetrate members where opposite side exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood. Pre-drill as required. Do not drive threaded friction type fasteners; turn into place. Tighten bolts and lag screws at installation and retighten as required for tight connections prior to closing in or at completion of work. Secure cedar with ring shank casing nails.

4.03 Wood Grounds, Nailers, Blocking and Sleepers
A. Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached.

B. Coordinate location with other work involved; refer to shop drawings of such work.

C. Attach to substrates securely with anchor bolts and other attachment devices as shown and as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise shown.

D. Set true to line and level, plumb, with intersections true to required angle. Built into masonry as work progresses, cutting to fit masonry unit sizes involved. Anchor to form work before concrete placement.

E. Provide grounds of dressed, preservative treated, key-beveled lumber not less than
1-1/2" wide and of the thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.

F. Fill and sand gouges, gaps and chipped edges with a hard setting patching compound recommended by panel manufacturer. Allow patched to dry and sand flush with a wide belt sander. Sand uneven joints between panels flush.

4.04 Wood Furring
A. Install plumb and level with closure strips at all edges and opening. Shim with wood as required.

4.05 Furring to receive Gypsum Drywall
A. Unless otherwise shown" provide a 2 x 2 furring at 16" O.C. vertically.

4.06 Plywood
A. Comply with the recommendations of the American Plywood Association (APA).

B. Provide thickness shown, or if not shown, provide as recommended by the
APA : "Guide to Plywood Sheathing for Floors, Walls, and Roofs" for the spacing
of supports or types of substrates involved in the work.

3.07 Optional Framing
A. The Contractor may, at his option, accomplish general framing work with metal studs in lieu of wood framing as indicated.
B. Applicable Standards

1. ASTM C150 and ASTM C33.
2. FS FF-N-105.

06400 INTERIOR ARCHITECTURAL WOODWORK

PART 1- GENERAL

1.01 Related Documents
A. Requirements of Drawings, General and Special Conditions and DIVISION 1 apply to this section.

1.02 Scope

A. Provide all interior architectural woodwork including but not necessarily limited to:
Standing and Running Trim
Laminate Clad Counters (Plastic Covered Casework)
Wood Cabinets
Cabinet Tops

B. Related work specified elsewhere:
Rough Carpentry SECTION 06100
Wood Treatment SECTION 06300

1.03 Submittals
A. Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of product and process specified in this section and incorporated into items of architectural woodwork during fabrication, finishing, and installation.

C. Shop drawings showing location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

D. Samples for initial selection purpose of the following in form of manufacturer's color charts consisting of actual units or sections of units showing full line of colors, textures, and patterns for each type of material indicated. Plastic laminate or as called for on plans.

Samples for verification purposes of the following:

Lumber with or for transparent finish, 50 square inches, for each species and cut, finished on one side and one edge.

Veneer leaves representative of and selected from flitches to be used for transparent finished woodwork.

Wood veneer faced panel products; with or for transparent finish, 8-1/2 inches by 11 inches, for each type species and cut with one half of exposed surface finished, with separate samples of unfaced panel product used for core. Provide sample of all joinery.

Laminate clad panel products, 8-1/2 inches, by 11 inches for each type, color, pattern, and surface finish, with separate samples of unfaced panel product used for core.

Corner pieces as follows:

Cabinet front frame joints between stiles and rail as well as exposed and pieces, 18 inches high by 18 inches wide by 6 inches deep.

Miter joints for standing trim.
Exposed cabinet hardware, one unit for each type and finish.

Product certificates signed by woodwork manufacturer certifying that products comply with specified requirements.

Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.
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1.04 Quality Assurance

A. Manufacturer Qualifications: Firm experienced in successfully producing architectural woodwork similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.

B. Single-Source Responsibility: Arrange for production by a single firm of architectural woodwork with sequence matched wood veneers. Include the veneering of wood doors in the single-firm production, where veneer matching extends across wood doors.

C. AWI Quality Standard: Comply with applicable requirements of "Architectural Wood Work Quality Standards" published by the Architectural Woodwork Institute (AWI) except as otherwise indicated.

1.05 Delivery, Storage, and Handling

A. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration.

B. Do not deliver woodwork until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation area. If woodwork must be stored in other that installation area, store only in areas whose environmental conditions meet
requirements specified in "Project Conditions".

1.06 Project Conditions

A. Environmental Conditions: Obtain and comply with Woodwork Manufacturer's and Installer's coordinated advice for optimum temperature and humidity conditions for woodwork during its storage and installation. Do not install woodwork until these conditions have been attained and stabilized so that woodwork is within plus or minus 1.0 percent of optimum moisture content from date of installation through remainder of construction period.

B. Field Measurements: Where Woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of Work. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with manufacture of woodwork without field measurements. Coordinate other construction to ensure that actual dimensions correspond to guaranteed dimensions.

PART 2 - PRODUCTS

2.01 High Pressure Decorative Laminate Manufacturers

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering acceptable high pressure decorative laminates include but are not limited to the following:

FORMICA CORP.
LAMI NART.
MICARTA DIV., WESTINGHOUSE ELECTRIC CORP.
NEVAMAR CORP.
RALPH WILSON PLASTICS CO.

2.02 Materials

A. General: Provide materials that comply with measurements of the AWI woodworking standard for each type of woodwork and quality grade indicated and, where the following products are part of woodwork, with requirements of the referenced product standards, that apply to product
characteristics indicated:

Hardboard: ANSI/AMA A135.4
High Pressure Laminate:NEMA LO 3.
Medium Density Fiberboard: ANSI A 208.2.
Particleboard: ANSI A 208.1
Softwood Plywood: PS 1.

B. Formaldehyde Emission Levels: Comply with formaldehyde emission requirements of each voluntary standard referenced below:
Particleboard: NPA 8.
Medium Density Fiberboard: NPA 9.
Hardwood Plywood: HPMA FE.

2.03 Fabrication, General

A. Wood Moisture Content: Comply with requirements of referenced quality standard for moisture content of lumber in relation to relative humidity conditions existing during time of fabrication and installation areas.

B. Fabricate woodwork to dimensions, profiles and details indicated. Ease edges to radius indicated for the following:
Comers of cabinets and edges of solid wood (lumber) members less than 1 inch in nominal thickness: 1/1 6 inch.

Edges of rails and similar members more than 1 inch in nominal thickness: 1/8 inch.

C. Complete fabrication, including assembly, finishing, and hardware application, before shipment to project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing,
trimming, and fitting.

D. Factory-cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing in diagrams to produce accurately sized and shaped opening. Smooth edges of cutouts and, where
located in countertops and similar exposures, seal edges of cutouts with a water resistant coating.

2.04 Laminate Clad Counters (Plastic-Covered Casework)

A. Quality Standard: Comply with AWI Section 400 and its Division 400B "Laminate Clad Cabinets.
Grade: Premium.
Type of Cabinet Construction: Raised Panels.

B. Laminate Cladding: High pressure decorative laminate complying with following requirements:

Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the selections of the Architect

C. Laminate Grade for Exposed Surfaces: Provide laminate cladding complying with the following requirements for type of surface and grade:

Horizontal Surfaces Other Than Tops: GP-50 (0.050-inch nominal thickness).
Postformed Surfaces: PF-42 (0.042-inch nominal thickness).
Vertical Surfaces: GP-50 (0.050-inch nominal thickness).
Edges: GP-50 (0.050-inch nominal thickness).

2.04 Cabinet Hardware and Accessory Materials

A. General: Provide cabinet Hardware and accessory materials associated with architectural cabinets, Except for items specified in Section 08710. Provide hardware for all cabinet doors and drawers. Submit samples for approval by Architect.

2.05 Architectural Cabinet Tops Countertops)

A. Quality Standard: Comply with AWI Section 400 and its Division 400C.

B. Type of Top: High pressure decorative laminate complying with the following:

Grade: Premium.
Laminate Cladding for Horizontal Surface: High pressure decorative laminate as follows:

Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following:

Submit complete range of colors from Wilsonart International to be approved by Architect.
Grade: GP-50 (0.50-inch nominal thickness.)
Edge Treatment: Same as laminate cladding on horizontal surfaces.
Edge Treatment: Lumber edge for transparent finish matching wood species and cut on cabinet surfaces.

2.06 Wood Paneling

A. Quality Standard: Comply with AWI Section 600

Grade: Premium

Veneer Species: Oak, Birch or Maple (Stained) Submit samples

Matching of Adjacent Veneer leaves: Slip match.

Veneer Matching within Panel Face: Balance match.

2.07 Fasteners and Anchors

A. Screws: Select material, type, size, and finisl1required for each use. Comply with FS FF-S-111 for applicable requirements. For metal framing supports, provide screws as recommended by metal framing manufacturer.

B. Nails: Select material, type, size, and finish required for each use. Comply with FS FF-N105 for applicable requirements.

C. Anchors: Select material, type, size, and finish required by each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for; corrosion resistance. Provide toothed steel or lead expansion bolt devised for drilled-in-place anchors. Furnish inserts and anchors, as required, to be set into concrete or masonry work for subsequent woodwork anchorage.

Part 3 - Execution

3.01 Preparation
A. Condition woodwork to average prevailing humidity conditions in installation area before installing. Deliver concrete inserts and similar anchoring devices to be built in substrates well in advance of time substrates are to be built.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including back priming and removal of packing.

3.02 Installation

A. Quality Standard: Install woodwork to comply with AWI Section 1700 for same grade specified in Part 2 of this section for type of woodwork involved.

B. Install woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims Install to a tolerance of 1/8-inch in 8'-0" for plumb and level (including tops) and with no variations in Lushness of adjoining surfaces. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.

C. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where pre-finished matching fastener heads are required, used fine finishing nails for exposed nailing, counter sunk and filled flush with woodwork and matching final finish where transparent finish is indicated.

D. Paneling: Anchor paneling to supporting substrate with concealed panel-hanger clips and by blind nailing on backup strips, splined-connection strips, and similar associated trim and framing. Do not use face nails unless otherwise indicated.

E. Tops: Anchor securely to base units and other support systems as indicated.

F. Complete the finishing work specified in this section to whatever extent not completed at shop or before installation of woodwork.

3.03 Adjustment and Cleaning

A. Repair damaged and defective woodwork where possible to eliminate defects functionally and visually; where not possible to repair, replace woodwork. Adjust -joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.04 Protection

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensures that woodwork is being without damage or deterioration at time of Substantial Completion.

06220 FINISH CARPENTRY AND MILLWORK

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Providing all finish carpentry items including, but not limited to:

1. Finish Carpentry
2. Millwork and Cabinetry
3. Plastic Laminate
4. Miscellaneous Millwork

B. Installation of:

1. Finish hardware
2. Plastic laminate faced wood doors

1.2 RELATED WORK

A. Section 06100 ~ Rough Carpentry
B. Section 08213- Plastic Laminate Faced Wood Doors
C. Section 08710 - Finish Hardware
D. Section 09900- Painting and Staining
E. Section 12300- Educational Casework

1.3 REFERENCES

A. American National Standards Institute:

1. ANSI Al56.9- Cabinet Hardware.
2. ANSI A161.1- Woodwork Testing Standards

B. Architectural Woodwork Institute:

1. A WI - Quality Standards Illustrated.

C. National Electrical Manufacturers Association:

1. NEMA LD 3 - High Pressure Decorative Laminates.

1.4 PERFORMANCE REQUIREMENTS

A. Unless otherwise indicated, perform work in accordance with AWI "Quality Standards Illustrated", Custom Grade, except where specification exceeds those standards, the more stringent shall govern.

B. Fabricate millwork and cabinetry in accordance with ANSI Al61.1, NEMA LD3, and general static load testing performed and certified by an independent testing agency, covering the following areas of product performance, with these minimum results:

a. Base cabinet construction/racking test: 800 lbs.
b. Cabinet front joint loading test: 425 lbs.

c. Wall cabinet static load test: 2000 lbs.
d. Drawer front joint loading test: 600 lbs.
e. Drawer construction/static load test: 750 lbs.
f. Cabinet adjustable shelf support device/static load test 300 lbs.

C. Shelf Loading: Comply with loading/deflection standards of the Composite Panel Association.

1.5 SUBMITTALS

A. Product Data:

1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
2. Manufacturer's preprinted product information for all hardware proposed on the project.
3. Manufacturer's preprinted maintenance instructions for the casework hardware.

B. Shop Drawings:

1. Indicate size, material and finish.
2. Show locations and installation procedures, including hardware, sinks, service fixtures, trim and other pertinent data for each unit.

C. Certification: Provide A WI Quality Certification Program certification for casework fabrication indicating manufacturer's registration with AWI Quality Certification Program.

D. Samples: Two (2) each, 6 inch by 6 inch by 3/4 inch sample of specified plywood core with grade stamp for use as verification of installed product.

1.6 QUALITY ASSURANCE

A. Manufacturer: Minimum of five (5) years experience in providing millwork systems for similar types of projects, produce evidence of financial stability, bonding capacity', and adequate facilities and personnel required to perform on this project.

B. Delivery conference: 48 hours prior to delivery, notify Architect of delivery date and time. At the Architect's discretion, a representative of the Architect may be present at the time of delivery. Casework not conforming to the specified requirements, as reasonably determined by the Architect's representative, shall be removed and returned to manufacturer for repair or replacement at no additional cost to the Owner or increase in time.

1.7 PRE-INSTALLATION CONFERENCE

A. Section 01110 -Notification of Architect Requirements.

1.8 PRODUCT HANDLING

A. Deliver completed laminate clad casework, countertops and related products only after wet operations in building are completed. Store in ventilated place, protected from the weather, with relative humidity range of20 to 50 percent.

B. Protect finished surfaces from soiling and damage during handling and installation with a protective covering.

1.9 JOB CONDITIONS

A. Environmental Requirements: do not install casework until permanent HV AC systems are operating and temperature and humidity have been stabilized for at least one (1) week.

1. Manufacturer/Supplier shall advise Contractor of temperature and humidity requirements for architectural casework installation areas.
2. After installation, control temperature and humidity to maintain relative humidity between 25 and *55* percent.

B. Conditions: Do not store or install casework in building until concrete, masonry, and drywall/plaster work is dry.

1.10 COORDINATION

A. Coordinate the Work of this Section with plumbing work specified in Division 15. Coordinate sink opening construction with sinks specified in Division 15.

B. Coordinate location of blocking in walls for installation and support of wall cabinets.

1.11 WARRANTY

A. Warranty the work specified herein for five (5) years against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

B. Defects shall include, but not be limited to the following:
1. Rough or difficult operation, or loose or missing parts.
2. Delamination of surfaces.
3. Noticeable deterioration of finish.
4. Warped or misaligned surfaces or telegraphing of subsurface imperfections.

PART 2- PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Refer to Section 12300, Educational Casework. Fabricators or manufactures listed are approved for use on the Project. Casework and Millwork shall be provided by a single manufacturer.

2.2 MILLWORK MATERIALS

A. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD3, and the following requirements:

1. Exterior Color Selection Available:
   a. Refer to Plastic Laminate Schedule below.
   b. If laminate has wood grain, direction of grain shall be vertical on door, end panels, fascia panels, and exposed backs; horizontal on drawer faces, aprons, and top rails.
2. Laminate grades:
   a. Exposed doors, finished end panels, and other vertical surfaces: GP28 (0.028 inch thick nominal)
   b. Horizontal surfaces other than top: GP28 (0.028 inch thick nominal)
   c. Cabinet Liner: CL20 (0.020 inch nominal), white.
   d. Work Surfaces and Countertops: GP50 (0.050 inch thick nominal) with BK20 (0.20 inch thick) backer sheet.
   e. Backsplash: PH42 (0.042 inch nominal) with nominally balanced backer sheet.
3. Adhesive: PV A water resistant adhesive. Contact adhesives not permitted.
4. Pressure Fused Laminate:

a. NEMA LD3 VOL, and NEMA LD3 CLS, Melamine resin impregnated, 120 gram PSM minimum, thermofused to core under pressure.

b. Color:

1) Closed interiors, underside of wall cabinets: White.

2) Exposed and Semi-exposed open cabinets: Match exterior.

c. Provide balanced construction with same thermofused melamine. Unsurfaced coreboard or simple backers not allowed.

B. Core Material:

1. Plywood: Exterior grade, hardwood faced, any species, with no defects affecting strength or utility. Overlay plywood not permitted.

2. Cabinet components shall be of the following minimum core thicknesses:

a. Cabinet backs, drawer body, and drawer bottoms: 112 inch plywood

b. Door and drawer face, base, wall, and tall cabinet tops and bottoms, cabinet sides, drawer spreaders, cabinet back rear hangstrips, structural dividers, and exposed cabinet backs: 3/4 inch plywood

c. Work surfaces and countertops: 1 inch plywood, except use plywood core at counters with sinks.

d. Shelves: 3/4 inch plywood core for 30 inches long or less, 1 inch thick plywood core for more than 30 inches long; 14" deep, unless otherwise noted. Provide vertical dividers for shelves over 36 inches long.

e. Cabinet Toe-Base: 3/4 inch plywood. No plywood within four (4) inches of floor.

3. Particleboard shall NOT be acceptable.

C. Countertops and Backsplashes:

1. Countertops: Provide post-formed countertops with waterfall edge at work surfaces and no-drip edge at tops with sinks in as long as practical continuous lengths. Provide field glued splines at joints. No joints closer than 24 inches either side of sink cutout.

2. Backsplash: Integral Post-formed with countertop. Full heights at all classroom countertops, 4 inch high elsewhere unless otherwise shown. No joint shall occur at sink openings.

3. At exposed countertop end comers, provide 1 inch radius, or similar safety treatment.

D. Sinks: Refer to Division 15. Sizes as shown on drawings. Provide sealant at sink cut-outs.

E. Service Fixtures: Refer to Division 15.

F. Toe Spaces: Leave toe spaces unfinished for installation of resilient base, unless otherwise shown:

G. End Panels and Filler Strips: Match adjacent case-piece.

H. Glazed Cabinet Fronts: Clear glazing on door fronts shall be *W'* thick polycarbonate.

I. Edging

1. Provide the following in accordance with "Edging Locations":
   a. Flat Edge PVC: 0.020 inch. Solid, high-impact, purified, color-thru, acid resistant, machine=applied with hot melt adhesives.
   b. 3 mm PVC: Solid, high-impact, purified, color-thru, acid resistant, prelamination primed edging, machine-applied with hot melt adhesives, and machine profiled to 118 inch radius.
2. Edging Locations:
   a. Cabinet body edge, including door/drawer front spacer rail: Flat Edge PVC, color matched to door/drawer face or as selected.
   b. Forward edge ofinterior body components, interior dividers, shelf, and top edges of drawer body: Flat Edge PVC to match cabinet interior surface color.
   c. Door/Drawer-Front edging: 3mm PVC, color matched to standard laminates.

J. Hardware: Refer to Section 12300, Educational Casework.

2.2 SPECIALTY ITEMS

A. Grommets:
   1. Size: 2-112 inches diameter with "Flip-Top"TM tab in cap.
   2. Colors: As selected by Architect from manufacturer's full range of available colors.
   3. Number/Location: Where electrical, telephone, and computer data wiring need to pass through tops whether shown or not. Consider no less than 30 for project.
   4. Approved Product/Manufacturer: Model No. EDP3 manufactured by Doug Mockett & Company, Inc., Manhattan Beach, CA; (800) 523-1269, or Architect approved equal.

2.3 SOLID STOCK

A. Moisture Content: Percent of moisture in relation to over-dry weight shall be between 8 percent and 13 percent at time of installation.

B. Natural Finish Hardwood:
   1. Occasional knot permitted provided it is tight and smooth.
   2. Grain Pattern: Rift-cut

3. Species: AWl "Premium" Grade, Birch.

C. Paint Grade Hardwood: Any species, including Parana Pine, Except do not use Oak, Elm or similar species which have coarse grain.

2.4 MISCELLANEOUS

A. Utility Shelving: A WI "Economy" grade.

B. Clothes Rod: 1-112 inch diameter smooth wooden dowel by length required, with end supports and fasteners of type recommended to suit application.

C. Use grade stamped DFPA, grade *AID,* paint as scheduled in Section 09900. Provide 3/4 inch plywood for telephone boards in mechanical; telephone rooms where needed. (RE: Electrical)

PART 3 -EXECUTION

3.1 MILLWORK INSTALLATION

A. Positioning: Place approximately level, plumb and at right angles to adjacent work.

B. Fitting: Where field cutting or trimming is necessary, perfonn in a neat, accurate, professional manner without damaging the products and adjacent work.

C. Anchorage: Attach securely so the products will perform to their maximum ability without damage from inadequate fastenings.

D. Fasten tops to frames with concealed clips, screws and glue.

E. Install simulated wood trim in locations shown on drawings and in accordance with manufacturer's instructions.

3.2 FINISH HARDWARE INSTALLATION

A. The supplier will mark each item hardware for location. Protect the markings until each item is installed. If any item is delivered to the job not properly marked, return it to the supplier for marking before attempting to install it.

B. Check markings on hardware for proper location. Install and make necessary adjustments for

proper working order. Any hardware damaged by improper adjustment or careless abuse will be replaced by the Contractor at his expense.

C. Provide clean, properly sized arid accurately placed mortises and drilled holes for all mortise hardware such as Iocksets and for cylindrical locks where specified only.

D. Fit all surface-applied hardware accurately.

E. After hardware is installed, protect exposed surfaces by use of heavy paper and masking tape and maintain until job completion.

F. Remove all finish hardware except that which is primed for painting before painter's finish is applied. Permanently replace and re-adjust for proper function after painter's finish has dried hard.

G. Millwork contractor shall be responsible for hardware on millwork.

3.3 PLASTIC LAMINATE FACED WOOD DOOR INSTALLATION

A. Protect all doors during handling.

B. Refer to Section 08710, Finish Hardware for hardware requirements.

C. Install doors in accordance with manufacturer's instructions.

D. Install and adjust doors for smooth, quiet operation.

END OF SECTION

07100 WATERPROOFING

PART 1. GENERAL

Underslab Waterproofing: Furnish and install all waterproofing shown and specified.
The general extent of the work shall be as follows:
Waterproofing under slab.
Wall waterproofing.
Related Work: Section 07150 Dampproofing

PART 2. MATERIALS

Felt: #45, perforated, asphalt saturated felt.

Six (6) mil polyethylene vapor barrier for slab on grade and air infiltration barrier at exterior walls.

PART 3. EXECUTION

Three Course Base Flashing: Applied at all steel lintels and beams, and at base of exterior walls at all typical locations shown.

Membrane to consist of one layer of 30# felt and two layers of mastic.

Felt shall be laid in a heavy coating of mastic, then mastic shall be applied on top of the layers of felt. Angle laps shall be made where felt is spliced. The felt shall be of sufficient width to cover wall within 1/2" of outside face.

Where flashings are applied on concrete, provide a first coat of concrete primer. Connect the flashing to the structure in such a manner as to prevent leakage.

The combined felt and mastic shall be sufficiently heavy to prevent leakage of water through the flashings.

Underslab Waterproofing: Underslab membrane shall be applied under all slabs and beams of enclosed spaces and exterior sidewalks, walks, and entry platforms.

Membrane shall consist of 6 mil polyethylene lap joints minimum of 12 inches and tape with waterproof tape, also, tape all patches, and penetration thru the slab.

Wall dampproofing of exterior masonry walls will be with Thompson's waterseal; shall be applied with a brush or spray. One gallon to cover 100-175 sq. ft. one coat to be applied.

Gyplap sheathing waterproofing provide one layer of 6 mil polyethylene film behind sheathing attached to metal stud wall. Film shall be lapped in a minimum of 12" and taped with waterproof tape at all joints and patches. Provide contnuous layer of gyplap sheathing with all joints mastic with cement for vertical applications above grade.

07150 DAMPPROOFING

PART 1. GENERAL

Subcontract the dampproofing work to an experienced firm which specializes in bituminous materials.

The installer must examine the substrates and the conditions under which the dampproofing is to be applied, and advise the contractor in writing o unsatisfactory conditions. Do not proceed with the dampproofing work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

Do not proceed with dampproofing work until blocking, nailers, piping, conduit and other projections through the substrate have been installed, with substrate properly patched and sealed or flashed to receive the dampproofing.

PART 2. MATERIALS

Obtain primary dampproofing materials from only one manufacturer.

Manufacturers offering bituminous dampproofing products to comply with the requirements include the following (each manufacturer does not necessarily offer every product required):

Barrett/Celotex
Philip Carey Corp.
Flintkote Co.
Gulf States Asphalt Co., Inc.

Asphalt Compound: Manufacturer's standard asphalt and solvent compound, recommended for below-grade exterior and for above-grade interior applications, compounded to penetrate the substrate and build to a moisture-resistant, firm, elastic coating. Provide semifibrated type semi-mastic compound where shown or specified.

Asphalt Dampproofing Materials:

Asphalt Mastic: Material shall be of trowelling consistency and shall form a tough and durable, yet elastic, coating.

PART 3. EXECUTION

General: Clean the substrate of dirt, oil, loose materials and other substances which would interfere with penetration, bond or performance of dampproofing materials.

When ambient temperature is 40 degrees F. or less and falling, do not proceed with dampproofing. Do not apply dampproofing materials to frozen substrates or to any substrate in a condition not complying with manufacturer's recommendations.

Protect other work from spillage of dampproofing materials, and prevent materials from penetrating and clogging drains and conductors. Replace or restore other work which is soiled or otherwise damaged by the installation of the dampproofing and associated work.

Cold Bitumen on exterior surfaces: Prime substrate if recommended by manufacturer's instructions, using type and quantity of primer recommended by manufacturer.

Apply coat of cold, fibrated mastic asphalt dampproofing material, by hand troweling onto the substrate at a uniform rate of 1.0 gal. per 15 sq. ft. to produce a uniform dry film, not less than 1/16" thick.

07200 INSULATION AND FIRE SAFING

PART 1. GENERAL

Installer: Subcontract each type of insulation and fire safing work in this section to the installer of the associated roofing or waterproofing, for individual responsibility.

Thermal Conductivity: The thicknesses shown are for the thermal conductivity (K-value at 75 degrees F.) specified for each material. Provide thicknesses as indicated on the plans.

Examination of Substrate: The installer must examine the substrate and the conditions under which the insulation work is to be performed, and notify the contractor in writing of any unsatisfactory conditions. Do not proceed with the insulation work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

Protection from deterioration: Do not allow insulation materials to become wet or soiled. Comply with manufacturer's recommendations for handling, storage and protection during installation.

Fire and Insurance Ratings: Comply with fire-resistance and flamability ratings as shown and specified, and comply with code interpretations by governing authorities and factory mutual requirements for methods of installation and systems.

PART 2. MATERIALS
Approved Manufacturers:

Owens-Corning Fiberglass Corp., San Antonio, Texas.
Manville Building Products, Denver, Colorado.
Partek North America, Inc., Englewood, Colorado
Dow Chemical Company, Midland, Michigan 48674

Wall Batt Insulation R-19, 3-1/2" thick for all drywall exterior walls.

Wall rigid board insulation R-6, 1" thick for all exterior walls over mastic.

Ceiling batt insulation R-30, 5-1/2" thick for all bottom of deck locations (between joists) secured with 2"x4" "hog" wire with white vinyl facings attached to batts.

Miscellaneous Materials:
Adhesive for bonding insulation: The type recommended by the insulation manufacturer, and complying with fire-resistance requirements.

Mastic Sealer: Type recommended by insulation manufacturer for bonding edge joints between units and filling voids in the work.

Mechanical Anchors: Type and size shown, or if not shown, as recommended by the insulation manufacturer for the type of deck used, and complying with fire and insurance rating requirements.

Acceptable fire barrier systems for thru-fire wall penetrations as follows:
3-M Fire Barrier Caulk CP-25 and putty 303.

3-M Fire Barrier Wrap/strip FS-195 installation as per manufacturers recommendations and specifications.

Provide for fire safing hand packed as required for positive fire protection to maintain separation of spaces.

PART 3. EXECUTION

Do not proceed with the installation of roof or deck insulation unless the materials, equipment and tradesmen required for the installation or the roofing or waterproofing membrane over the insulation are at the project site and ready to follow with this work immediately (same day) behind the insulation work. Do not install any more insulation each day than can be covered with waterproof membrane by the end of that working day.

Do not overload the building structure by storing any materials or the use of equipment on the deck. Consult the architect for allowance loading factors.

Extend insulation full thickness as shown over entire surface to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation and mastic. Form cant strips and tapered areas as shown and as required for proper drainage of the membrane.

Set units in adhesive, applied in accordance with the requirements of the applicable fire and insurance ratings, and applied in accordance with the recommendations of the manufacturers of both the insulation and adhesive.

Prime substrate as recommended by insulation manufacturer.

All building insulation shall be placed with sides and ends butted tight.

Any torn, trampled or otherwise damaged insulation shall be replaced.

Work shall be coordinated with other trades to insure proper installation.

Sub contractor to corrdinate the installation of all safing systems for penetrations thru fire walls, roofs, floors and all areas requiring a tenant to tenant or a tenant to mall, or a tenant to mechanical room separation.

Installation of fire safing systems will performed in strict accordance with the manufacturers specifications and recommendation. Contractor to submit 3 marked-up floor plans for locations of installations. All voids to be packed tight as per requirements, and struck smooth for a neat

appearance. Sub contractor to provide owners maintenance engineer with surplus materials in the event that future packings must be added, or existing packings must be changed.

Materials should be packed in original containers and labels intact and readable. Stored as required until such time as they are turned over to the owners representative.

PART 1 GENERAL

1.01 SUMMARY

A. Section includes rigid board insulation installed at cavity wall construction, exterior wall behind metal wall panels, and ceiling and soffit construction.

B. Related Sections:

1. Section 04 20 00 – Unit Masonry: Installation of board insulation between masonry veneer anchors.

a. Coordinate with masonry veneer anchors.

2. Section 04 20 19 – Veneer Unit Masonry: Board insulation installed in cavity wall.

a. Coordinate with masonry and or stone veneer anchors.

3. Section 04 42 13 – Masonry-Supported Stone Cladding: Installation of board insulation between masonry veneer anchors.

a. Coordinate with stone veneer anchors.

4. Section 04 42 16 – Steel-Stud-Supported Stone Cladding: Board insulation installed in cavity wall.

a. Coordinate with stone veneer anchors.

5. Section 07 27 26 – Fluid-Applied Membrane Air Barriers: Board insulation installed over air barrier.

a. Board insulation shall be compatible with the air barrier system.

1.02 REFERENCES

A. American Society for Testing and Materials:

1. ASTM C518 – Standard Test Method for Steady-State Heat Flux Measurement and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

2. ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

3. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

4. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.

1.03 SYSTEM DESCRIPTION

A. Materials of This Section: Provide thermal protection to air seal materials at building enclosure elements in conjunction with air barrier materials in Section 07 27 26.

1.04 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures.

B. Product Data: Submit data on product characteristics, performance criteria, limitations and adhesives.

C. Manufacturer's Installation Instructions.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements and are suitable for the use intended. Certify adhesive is compatible with air/water membrane specified.

E. Warranty: Provide manufacturer's "Life of the Product" thermal performance warranty and extruded polystyrene insulation will maintain performance requirements of ASTM C578 warranty.

F. Provide written certification from the manufacturer of the board insulation stating that the board insulation is compatible with the fluid applied membrane air barrier system specified in Section 07 27 26

G. Provide written testimony to compliance of: The American Recovery and Reinvestment Act (ARRA), enacted in 2009, Public Law 111-5, Title XVI, Section 1605, the "Buy American" requirement, and, The "Buy American" implementation language in the General Services Administration (GSA), Federal Acquisitions Regulation (FAR), Subpart 25.6.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 – Product Requirements.

B. Do not install adhesives when temperature or weather conditions are detrimental to successful installation.

1.06 SEQUENCING

A. Sequence Work to ensure air barrier materials are in place before beginning work of this section.

1.07 COORDINATION

A. Section 01 30 00 – Administrative Requirements: Coordination and project conditions.

B. Coordinate Work with Section 07 27 26 for air barrier materials. Board adhesive shall be compatible with air barrier materials.

1.08 QUALITY ASSURANCE

A. Sustainable Product Characteristics:

1. Must Be Greenguard Certified for Indoor Air Quality
2. Must be 3rd party Certified for = > 15% recycled content
3. Must have > 60% less Global Warming Potential

4. Must be 100% recyclable
5. Must have 0 ozone depletion

B. Source Limitations: Obtain building insulation through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide insulation possessing the surface burning characteristics indicated, determined by testing identical products in accordance with test method ASTM E 84.

D. Thermal Resistance: Shall be 5-year aged R-value determined by testing in accordance with test method ASTM C518.

E. Testing and Labeling: Shall be by Underwriters Laboratories or another testing and labeling agency acceptable to authorities having jurisdiction. All insulation shall be indentified with appropriate markings of applicable testing and inspecting agency.

1.09 PRODUCT HANDLING

A. Protect insulation from physical damage.

B. Comply with manufacturer's recommendations for handling, storage and protection.

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.

3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

4. When installing black/dark (non-white) tapes and/or waterproofing/air barrier membranes over extruded polystyrene insulation, avoid prolonged sun exposure of such surfaces. Provide daily final finish covering or temporary white opaque covering over black/dark (non-white) surfaces to avoid possible solar heat damage.

C. Handle boards carefully so that corners are not broken off or boards otherwise damaged. Damaged boards shall not be permitted to be installed.

1.10 WARRANTY

A. Provide written warranty that the actual thermal resistance of the extruded polystyrene insulation will not vary by more than 10% from its published thermal resistance.

B. Extruded polystyrene insulation will maintain performance requirements of ASTM C578.

C. Warranty period is for the Lifetime of the product.

07210 - BUILDING INSULATION(foamed-in-place insulation)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Foamed-in-place insulation in cavities of concrete masonry unit (CMU) walls, wythe area of exterior walls and cavity fill of interior and exterior stud framed walls.
2. Foamed-in-place sound insulation in masonry and stud framed walls.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
2. ASTM D2842 Standard Test Method for Water Absorption of Rigid Cellular Plastics.
3. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
4. ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
5. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
6. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials.
7. ASTM E413 Standard Classification for Rating Sound Insulation.

1.3 SYSTEM DESCRIPTION

A. Design Requirements: [**(ASTM E413): STC 44**] [**(ASTM E90): STC 52**].

B. Performance Requirements: Provide **Concrete masonry unit (CMU) walls**] which have been called out in plans.

1.4 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Product Data: Submit manufacturer's product data and installation instructions, including the following:

1. Product description, insulation properties, preparation and storage requirements.
2. Requirements and procedures for site installation, including equipment and accessories.

C. Quality Assurance/Control Submittals: Submit the following:

1. Test Reports: Provide product test reports upon request.
2. Certificates:

a. Manufacturer's certification that product meets or exceeds specified requirements.
b. Manufacturer's certification that applicator is trained in installation of product and is authorized by manufacturer to install product.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Applicator Qualifications: Utilize a qualified applicator with demonstrated experience in performing work comparable to the work of this section, and who is trained and authorized by the manufacturer to install the product.

B. Regulatory Requirements and Approvals:IBC code 2012.

C. Certifications: Manufacturer certification that product complies with requirements of this section.

1.6 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirement Section.

B. Delivery: Deliver materials to applicator in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer. Product should be stored in paper sacks and protected from any water source until blending by installer.

D. Recycling:

1. Ship materials in containers that are readily recyclable.
2. Waste insulation materials must be biodegradable, suitable for public landfill disposal.

1.7 PROJECT/SITE CONDITIONS

A. Environmental Requirements: Do not install foam insulation when product temperature is below 50 degrees F (10 degrees C).

PART 2 - PRODUCTS

2.1 FOAMED-IN-PLACE BUILDING INSULATION

A. Manufacturer: PolyMaster, Inc.

1. Contact: 10523 Lexington Drive, Knoxville, TN 37932-3210; Telephone: (800) 580-3626, (865) 966-3005; Fax: (865) 675-3300; E-mail: info@polymaster.com; website: www.polymaster.com.

B. Proprietary Products/Systems. Foamed-in-place building insulation, including the following:

1. PolyMaster R-501 Foam Insulation:

a. Formulation: 3 part polymer foamed-in-place plastic insulation consisting of a proprietary dry powder resin, mixed by the applicator with a catalyst and foamed with compressed air.
b. Thermal Properties: K-value and R-value per inch thickness at 25 degrees F (-4 degrees C) (ASTM C518): K-value 0.216 Btu/(ft^2 x h x deg F) (0.37 W/(m x K)). R-value 4.63 ft^2 x h x deg F/Btu (0.81 m^2 x K/W).
c. Thermal Properties: K-value and R-value per inch thickness at 75 degrees F (24 degrees C) (ASTM C518): K-value 0.244 Btu/(ft^2 x h x deg F) (0.42 W/(m x K)). R-value 4.09 ft^2 x h x deg F/Btu (0.72 m^2 x K/W).
d. Water Vapor Transmission (ASTM E96): 4.655 grains/hr x ft^2.
e. Permeance (ASTM E96): 6.631 perms/inch (381 ng/(Pa x s x m^2)).
f. Average Permeability (ASTM E96): 15.749
g. Water Vapor Absorption (ASTM D2842): 10% by volume at 24 hours, at 25 degrees F (-4 degrees C), at 100% relative humidity.
h. Surface Burning Characteristics (ASTM E84): Flamespread 25, smoke developed 40, thickness 1" (25.4 mm).
i. Building Code Surface Burning Classification: Class I or Class A.
j. Shrinkage: 2% maximum.
k. Corrosivity: Noncorrosive.
l. Asbestos or Glass Fiber Content: None.
m. Off-Gassing or Odors: None.
n. Formaldehyde or CFC Content: None.

o. Biodegradability: Biodegradable.

2.2 PRODUCT SUBSTITUTIONS

A. Substitutions: No substitutions permitted.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Comply with the instructions and recommendations of the foamed-in-place building insulation manufacturer.

3.2 EXAMINATION

A. Site Verification of Conditions:

1. Ensure cores or spaces are free of mortar or other restrictions to the free flow of foam insulation.
2. Verify that all work within the wall voids is complete prior to installation.
3. Verify that masonry cells do not contain water.

3.3 PREPARATION

A. Allow masonry mortar to set prior to installing insulation.

B. Select most aesthetically pleasing locations for foam injection, including:

1. Locations to be concealed where possible:

a. Masonry joints.
b. Wythe side of walls.
c. Covered side of walls.

C. For pressure fill installation, drill fill holes into CMU cores.

1. Drill Hole Size: Minimum diameter 5/8" (15.9 mm), maximum diameter 2" (51 mm).

D. For 8" (203 mm) CMU, drill every other core. For 12" (305 mm) CMU, drill every core.

3.4 INSTALLATION

A. Install foam insulation in CMU cores using [**Pressure fill method**] [**Top fill method**] to a uniform density. Completely fill all spaces, crevices and voids.

B. If pressure fill method is used, fill and point drill holes in exposed or concealed masonry units with mortar after installation, shaping and texturing to match existing materials.

3.5 FIELD QUALITY CONTROL

A. Site Tests: Verify insulation density of each foam batch by random sampling of foam before installation.

1. Fill a 1 gal (3.8 L) nonsealing plastic bag with foam.
2. The bag weight shall be between 285 - 325 grams.

B. Inspection: Verify complete filling of voids by drilling or removing block face upon request.

1. Fill and point drill holes in masonry with mortar after inspection.

C. Correct any foam installation found not to be in compliance with manufacturer's requirements.

Specifier Note: Coordinate article below with Division 1 Execution Requirements (Cleaning) Section.

3.6 CLEANING

A. After foam insulation sets, remove excess insulation outside of cavity. Properly and legally dispose of waste with other construction waste material.

Specifier Note: Coordinate article below with Division 1 Execution Requirements Section.

3.7 PROTECTION

A. Do not permit subsequent construction to damage or disturb installed foam insulation.

B. Do not paint masonry walls until at least 72 hours after installation of foam insulation.

END OF SECTION

07241 EXTERIOR INSULATION AND FINISH SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY
This Section includes the following:

Applications over masonry surfaces.
Applications over gypsum sheathing.

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

Division 3 Section "Cast-In-Place Concrete" for concrete substrates behind system.
Division 4 Section "Unit Masonry" for masonry substrates behind system.
Division 5 Section "Cold-Formed Metal Framing" for steel stud framing behind system.
Division 6 Section "Rough Carpentry" for gypsum sheathing and wood framing behind system.
Division 7 Section "Joint Sealants" for sealing joints in system with elastomeric joint sealants.
Division 9 Section "Gypsum Sheathing" for gypsum sheathing behind system.

1.3 DEFINITIONS
Exterior insulation and finish systems refer to exterior assemblies composed of an inner layer of board insulation and an outer layer composed of a glass-fiber-mesh-reinforced base coat applied directly to board insulation and a textured protective finish coat. These assemblies are applied to supporting substrates of construction indicated.

Designation PB for class of exterior insulation and finish systems specified in this Section is based on the classification developed by the EIFS Industry Members Association (EIMA).

System in this Section refers to Class PB exterior insulation and finish systems:.

System manufacturer refers to the manufacturer of exterior insulation and finish systems.

1.4 PERFORMANCE REQUIREMENTS
General: Provide systems that comply with the following performance requirements:

Bond Integrity: Free from bond failure within system components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.

Weather tightness: Resistant to water penetration from exterior into system and assemblies behind it or through them into interior of building that results in deterioration of thermal-insulating effectiveness or other degradation of system and assemblies behind system, including substrates, supporting wall construction, and interior finish.

Physical Properties of Class PB: Provide exterior insulation and finish systems whose physical properties and structural performance comply with the following requirements when tested per methods referenced. Accelerated Weathering Characteristics: Sample of size suitable for test equipment and consisting of 1-inch- (25.4-mm-) thick exterior insulation system mounted on 1/2-inch- (12.7-mm-) thick gypsum board, cured for 28 days, shows no evidence of cracking, flaking, or deleterious effects after testing for 2,000 hours per Method 1 of ASTM G 23.

Water Penetration: Sample, consisting of 1-inch- (25.4-mm-) thick exterior insulation and finish system mounted on 1/2-inch- (12.7-mm- thick gypsum board, cured for 28 days, shows no water penetration into the plane of the innermost face of the test specimen under 2.86 psf (137 Pa) of air pressure difference across the specimen during a 15-minute test period when tested per ASTM E 331.

Water Resistance: Sample, consisting of 1-inch- (25.4-mm-) thick exterior insulation and finish system mounted on 1/2-inch- (12.7-mm-) thick board, cured for 28 days, shows no deleterious effects after testing for 14 days per ASTM D 2247. Salt-Spray Resistance: Sample, consisting of 1-inch- (25.4-mm-) thick exterior insulation and finish system mounted on 1/2-inch- (12.7-mm-) thick gypsum board, cured for 28 days, shows no deleterious effects after testing for 300 hours per ASTM B 117.

Absorption-Freeze Resistance: Three samples, 4 by 8 by 1 inch (101.6 by 203.2 by 25.4 mm) in size, consisting of exterior insulation and finish system coated on all sides with base and finish coats including reinforcing fabric, cured for 28 days, show no visible change when subjected to 4 days' underwater soak followed by 60 cycles of alternating exposure for 2 hours to minus 10 deg C and 2 hours to plus 20 deg C.

Mildew Resistance: Sample, consisting of finish coat applied to 2 by 2 inch (50.8 by 50.8 mm) clean glass substrate, cured for 28 days, shows no mildew growth when tested per MIL Standard 810C, Method 508.

Abrasion Resistance: Sample, consisting of l-inch- (25.4-mm-) thick exterior insulation and finish system mounted on 1/2-inch- (12.7-mm-) thick gypsum board, cured for a minimum of 28 days, shows no evidence of cracking, checking, or loss of film integrity after exposure to 500 liters of sand when tested per ASTM D 968, Method A.

Impact Resistance: Sample, consisting of 1-inch- (25.4-mm-) thick exterior insulation and finish system when constructed, conditioned, and tested per EIMA 101.86, produces the following impact classification and range:

Standard Impact Resistance: 25-49 inch-lb.

High Impact Resistance: 90-150 inch-lb.

Negative Wind Load Performance: Sample assembly, 48 by 48 inches (1220 by 1220 mm) in size, consisting of studs, sheathing, and 1-inch- (25.4-mm-) thick exterior insulation and finish system, shows capability to withstand wind loads indicated when tested per:ASTM E 330. Normal thermal movement is defined as that resulting from the following maximum change (range) in ambient temperature. Base design calculations on actual surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

Temperature Change (Range): 100 deg F (56 deg C).
Wind Loads: Uniform pressure (velocity pressure) of 20 lb. per sq. ft. (960 Pa), acting inwards or outwards.
Deflection: Limit deflection of framing members to less than 1/240 of the span of the member.

1.5 SUBMITTALS
General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

Product data for each component of exterior insulation and finish systems specified.
Shop drawings showing fabrication and installation of system including plans, elevations, sections, details of components, joint locations and configurations within system and between system and construction penetrating it, and attachments to construction behind system.

Samples for initial selection in the form of manufacturer's color charts and small-scale samples consisting of actual units or sections of units showing the full range of colors, textures, and patterns available for each type of textural choices indicated.

Samples for verification in the form of 24-inch- (600-mm) square panels for each finish, color, texture, and pattern specified. Prepare samples using same tools and techniques intended for actual work.

Installer certificates signed by manufacturer certifying that Installers comply with requirements under the "Quality Assurance" Article.

Qualification data for firms and persons specified in the "Quality Assurance"
Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses-, names and address of architects and owners, and other information specified.
Product test reports from a qualified independent testing agency evidencing compliance of exterior insulation and finish systems with requirements based on comprehensive testing of current products.

Research reports or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence system's compliance with building code in effect for Project.

1.6 QUALITY ASSURANCE
Installer Qualifications: Engage an experienced Installer who is certified in writing by system manufacturer as qualified to install manufacturer's system.

Manufacturer Qualifications: Firm experienced in manufacturing systems similar to those indicated for this Project and that have a record of successful in-service performance.

Fire-Test-Response Characteristics: Provide materials and construction that are identical to those tested with the following fire-test-response characteristics, as determined by testing per ASTM test method indicated below, by UL or other testing and inspecting agencies acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting agency.

Flame Spread of Insulation Board and Finish Coats: 25 or less when tested individually per ASTM E 84.

Smoke Developed of Insulation Board and Finish Coats: 450 or less when tested individually per ASTM E 84.

Full-Scale Fire Test: Tested mockup, in the form indicated below, that represents completed wall assembly of which system is a part, shows no tendency to propagate flame over the surface or through finish to the core, or to cause delamination of finish when vertically mounted exterior face is exposed 15 minutes to a fire source using spread of flame test per ASTM E 108 modified for testing vertical walls as indicated below:

Provide 2 panels, 72 by 120 inches (1830 by 3050 mm), consisting of protective finish coating and 4-inch- (102-mm-) thick insulation applied to 1/2-inch-
(12.7 mm-) thick gypsum board, cured for 28 days, with protective finish coating removed to leave surface of insulation exposed on one panel in an area 4 inches (102 mm) high by 24 inches (610 mm) wide centered 24 inches (610 mm) above the bottom edge of panel.

Radiant Heat Exposure, Unrestricted Installation: Tolerable level of incident radiant heat energy of at least 12.5 kW/sq. m when tested according to BOCA National Building Code Section 1406.2.

Fire Resistance Characteristics: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has
been determined per ASTM E 119 by testing and inspecting agency acceptable
to authorities having jurisdiction.

Single-Source Responsibility: Obtain materials for system from one source and by a single manufacturer or by manufacturers approved by the system manufacturer as compatible with other system components.

Mockup: Prior to installing system, construct mockups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.

Locate mockups on site in the location and of the size indicated or, if not indicated, as directed by Architect.

Notify Architect one week in advance of the dates and times when mockups will be constructed.

Demonstrate the proposed range of aesthetic effects and workmanship.

Obtain Architect's acceptance of mockups before start of final unit of Work.

Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work. Protect mockups from weather and from construction activities. Brace to resist design wind loads and provide waterproof coverings for construction materials not intended to be permanently exposed to the weather. When directed, demolish and remove mockups from Project site.

Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

1.7 DELIVERY, STORAGE, AND HANDLING
Deliver products in original, unopened packages with manufacturer's labels identifying products legible and intact.

Store materials inside and under cover; keep them dry and protected from the weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, damage from construction traffic, and other causes. Stack insulation board flat and off the ground.

1.8 PROJECT CONDITIONS
Environmental Conditions: Do not install system when ambient outdoor air and substrate
temperatures are 40 deg F (4 deg C) and falling unless temporary protection and heat are
provided to maintain ambient temperatures above 40 deg F (4 deg C) during installation of wet materials and until they have dried thoroughly and become weather resistant, but for not less than 24 hours after installation.

1.9 COORDINATION AND SCHEDULING
Coordinate installation of system with related units of Work specified in other Sections to ensure that wall assemblies, including sheathing, flashing, trim, and joint sealers, are protected against damage from the effects of weather, age, corrosion, and other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Manufacturers: Subject to compliance with requirements, provide Class PB system by one of the following:

Dryvit Systems, Inc.
C-Cure Corporation
Parex Incorporated.
Pleko Products, Inc.
Senergy, Inc.
Simplex Products Div., Anthony Industries, Inc.
STO Industries.
Thoro System Products.
United States Gypsum Co.

2.2 MATERIALS

Compatibility: Provide adhesive, board insulation, reinforcing fabrics, base and finish coat materials, sealants, and accessories that are compatible with one another and approved for use by system manufacturer.

Colors and Textures of Finish Coat: Comply with the following requirements:

Provide Architect's selections from manufacturer's custom colors and textures for type of finish coat indicated.

Primer-Sealer: If required by system manufacturer, provide standard substrate conditioner designed to seal substrates from moisture penetration and to improve the bond between substrate of type indicated and adhesive used for application of insulation.

Adhesive for Application of Insulation: System manufacturer's standard formulation designed for indicated use, compatible with substrate, and complying with the following requirements:

Factory-mixed formulation designed for adhesive attachment of insulation to substrates of type indicated, as approved by system manufacturer.

Insulation Board: Expanded Polystyrene; ASTM C578, Type 1; Flame spread less than 25 smoke developed less than 450 per ASTM E84, UL 723; minimum density 14.412 kg/m3 (.9 lb./ft.3; K-6.09 per millimeter (0.24 inch); 19 mm (3/4") thickness minimum as indicated on Drawings; meeting the following:

1. Air dried (aged) six weeks, or equivalent prior to installation.
2. Edges: Square within 8 mm. per meter (1/32" per foot).
3. Thickness: Tolerance of plus or minus 1.6 mm (1/16").
4. Size: .6m x 1.22 m (2' x 4').
5. Length and width: Tolerance of plus or minus 1.6 mm (1/16").

Reinforcing Fabric: Balanced, alkali-resistant open-weave glass-fiber fabric treated for compatibility with other system materials, made from continuous multi-end strands with tensile strength of not less than 145 lb. (645 N) and 150 lb. (667 N) in warp and fill directions per ASTM D 5035, complying with ASTM D 578 and the following requirements for minimum weight:

Standard Reinforcing Fabric: 4.2 oz./sq. yd. (136 g/sq. m).
Intermediate Reinforcing Fabric: 10.3 oz./sq. yd. (322 g/sq. m).
Impact-Resistant Reinforcing Fabric: 15 oz./sq. yd. (508 g/sq. m).

Corner Grid: Intermediate weight, premarked for easy bending, for reinforcing at exterior corners.

Strip Reinforcing Fabric: 3.75 oz./sq. yd. (127 g/sq. m) for use at opening surrounds.

Base Coat Materials: System manufacturer's standard mixture complying with the following requirements for material composition and method of combining materials:

Job-combined formulation of manufacturer's standard polymer emulsion adhesive and manufacturer's standard dry mix containing Portland cement.
Job-mixed formulation of Portland cement complying with ASTM C 150, Type I, white or natural color; and system manufacturer's standard 100% acrylic adhesive designed for use indicated.

Finish Coat Materials: System manufacturer's standard mixture complying with the following requirements for material composition and method of combining materials:

Factory-mixed formulation of polymer emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.

Water: Clean and potable.
Trim Accessories: Type as designated or required to suit conditions indicated and to comply with system manufacturer's requirements.

2.3 MIXING

General: Comply with system manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as approved by system manufacturer. Mix materials in clean containers.
Use materials within time period specified by system manufacturer or discard.

PART 3 - EXECUTION

3.1 EXAMINATION
Examine substrates, with Installer present, to determine if they are in satisfactory condition for installation of system. Do not proceed with installation of system until unsatisfactory conditions have been corrected.

3.2 PREPARATION
Protect contiguous work from moisture deterioration and soiling resulting from application of systems. Provide temporary covering and other protection needed to prevent spattering of exterior finish coatings on other work.
Protect system, substrates, and wall construction behind them from inclement weather during installation. Prevent infiltration of moisture behind system and deterioration of substrates.
Prepare and clean substrates to comply with system manufacturer's requirements to obtain optimum bond between substrate and adhesive for insulation.
Apply primer-sealer over substrates where required by system manufacturer for improving adhesion or for protecting substrates from premature degradation.

3.3 INSTALLATION
Comply with manufacturer's current published instructions for installation of system as applicable to each type of substrate indicated.

Adhesively attach insulation to comply with the following requirements:

Apply adhesive to insulation by the ribbon and dab method or notched trowel method in a manner that results in adhesive coating the entire surface of gypsum sheathing once insulation is adhered to the sheathing.
Trowel shall be stainless steel with 3/8" x 3/8" notches spaced 3/8" apart.

Allow adhered insulation to remain undisturbed for period prescribed by system manufacturer, but not less than 24 hours, prior to beginning rasping and sanding insulation or application of base coat and reinforcing fabric.

Apply insulation boards over dry substrates in courses with long edges oriented horizontally. Begin first course at bottom of wall. Work from perimeter toward interior of panels when possible.

Stagger vertical joints in successive courses to produce running bond pattern. Locate joints so that no piece of insulation is less than 12 inches (300 mm) wide or 6 inches (l50 mm) high. Offset joints at least 6 inches t150 mm) from corners of window and door openings.

Offset joints of insulation at least 4 inches (100 mm) from joints in sheathing.

Interlock ends at internal and external corners.
Abut boards tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between insulation boards. If gaps occur, fill with insulation cut to fit gaps exactly; insert without use of adhesive.

Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes conforming to details indicated.
Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/32 inch (0.8 mm) from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch (1.6 mm).

Interrupt insulation where expansion joints are indicated in substrates behind exterior insulation and finish systems.

Form joints for sealant application with back-to-back casing beads for joints within system and with perimeter casing beads at dissimilar adjoining surfaces. Make gaps between casing beads and between perimeter casing beads and adjoining surfaces of width indicated.

Treat exposed edges of insulation board by back wrapping, including those forming substrates of sealed joints within system or between system and other work, by encapsulating with base coat, reinforcing fabric, and finish coat, unless otherwise indicated.

Coordinate flashing installation with installation of insulation to produce a wall system that does not allow water to penetrate behind protective coating.

Architect shall review the EPS foam installation prior to application of base coat.

Apply base coat to exposed surfaces of insulation in minimum thickness specified by system manufacturer. Embed reinforcing fabric of type indicated below in wet base coat to produce wrinkle-free installation with fabric continuous or lapped at corners and lapped or otherwise treated at joints to comply with system manufacturer's requirements.

Completely embed fabric, applying additional base coat material if necessary, so that reinforcing fabric pattern is not visible.

Standard reinforcing fabric, except for surfaces below 8'-0" A.F.F., at which provide high impact-resistant reinforcing fabric.

Additional Reinforcing Fabric: Apply strip reinforcing fabric around openings extending 4 inches (100 mm) beyond perimeter. Apply additional 8 by 16 inch (200 by 400 mm) strip reinforcing fabric diagonally at corners of openings (re-entrant corners). Apply 8-inch-(200-mm-) wide strip reinforcing at both inside and outside corners unless base layer of fabric is lapped at least 4 inches (100 mm) on each side of corners.

Embed strip reinforcing fabric in base coat before applying first layer of reinforcing fabric.

Double Base Coat Application: Where indicated, apply a second base coat in same manner as first application, except without reinforcing fabric. Do not apply until first base coat has cured.

Architect shall review base coat prior to application of finish coat.

Apply finish coat over dry base coat in thickness required by system manufacturer to produce a uniform finish of texture equal to Dryvit **"SANDPEBBLE FINE"** and color matching Architects color chip.

3.4 CLEANING AND PROTECTION

Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive system coatings.

Provide final protection and maintain conditions in a manner acceptable to Installer and system manufacturer that ensures system's being without damage or deterioration at time of Substantial Completion.

072720 FLUID-APPLIED VAPOR PERMEABLE MEMBRANE AIR BARRIER SYSTEM ASSEMBLY (June 2011)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Materials and installation methods supplementing a one-component vapor permeable, liquid applied, elastic air, and water barrier, vapor retarder materials and assemblies.

B. Materials and installation to bridge and seal the following air leakage pathways and gaps:

1. Connections of the walls to the roof air barrier.
2. Connections of the walls to the foundations.
3. Expansion joints.
4. Openings and penetrations of window frames, store front, curtain wall.
5. Barrier precast concrete and other envelope systems.
6. Door frames.
7. Piping, conduit, duct and similar penetrations.
8. Masonry ties, screws, bolts and similar penetrations.
9. All other air leakage pathways in the building envelope.
10. Sealing flashing to wall surface.

1.02 RELATED SECTIONS

A. Section 04 20 19 – Veneer Unit Masonry: Flexible through wall flashing membrane. Sealing flashing to wall surface.

B. Section 04 42 13 – Masonry-Supported Stone Cladding: Flexible through wall flashing membrane. Sealing flashing to wall surface.

C. Section 04 42 16 – Steel-Stud-Supported Stone Cladding: Flexible through wall flashing membrane. Sealing flashing to wall surface.

D. Section 06 10 53 – Miscellaneous Carpentry: Covering preservative-treated materials with self-adhering membranes.

E. Section 06 16 43 – Gypsum Sheathing: Installing air barrier membrane over glass-faced gypsum sheathing and structural roof decking and roof board.

F. Section 07 24 19 – Water-Drainage Exterior Insulation and Finish System.

G. Section 07 90 00 – Joint Protection: Sealants.

1.03 PERFORMANCE REFERENCES

A. ASTM E 2178-01: Standard Test for Determining the Air Permeability of Building Materials.

B. ASTM E 2357, Standard Test Method for Determining Air Leakage of Air Barrier Systems **(Full Scale Wall Testing of the Air Barrier System).** *Ensure tests were conducted on steel stud frame walls with penetrations (Specimen 2) as some air barrier systems are not tested in that critical mode.*

"ASTM E 2357 is the only test method that gives the user any information on the performance of an installed air barrier assembly. Every building contains multiple air barrier materials. It is only when a material is selected and combined into an assembly does it actually perform the function of an air barrier. ASTM E 2357 determines the air leakage rate after being conditioned under real world loads which provides the user with a precise air leakage rate and confidence that it will provide this performance when installed. Data from ASTM E 2357 is critical to every design professional."
Mr. Laverne Dalgleish, Executive Director of the Air Barrier Association of America

C. ASTM E283-91: Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

D. ASTM E330-90: Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

E. ASTM E96: Water Vapor Transmission of Materials, Procedure B

F. AATCC 127 Water Resistance

G. ASTM D 1970, Self Sealability

H. ICC-ES AC212, Freeze Thaw, Crack Bridging

I. Fire Testing: Air Barrier, as a component of a wall assembly, shall have passed a NFPA 285 complete wall fire test.

J. Listed as an evaluated system by Air Barrier Association of America at www.airbarriers.org/materials/assemblies_e.php

1.04 PERFORMANCE REQUIREMENTS

A. Provide an air barrier system constructed to perform as a continuous elastic air barrier, and as a liquid water drainage plane flashed to discharge to the exterior any incidental condensation or water penetration. Membrane shall accommodate movements of building materials by providing expansion and control joints as required, with accessory air seal materials at such locations, changes in substrate and perimeter conditions.

1. The air barrier shall have the following characteristics:

a. It must be continuous, with all joints made air-tight.
b. It shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:

1) Foundation and walls.
2) Walls and windows or doors.
3) Different wall systems.
4) Wall and roof.
5) Wall and roof over unconditioned space.
6) Walls, floor and roof across construction, control and expansion joints.
7) Walls, floors and roof to utility, pipe and duct penetrations.

8) Flashing to wall surface.

2. All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made air-tight.

3. Air Permeability: Maximum 0.04 cfm/sq.ft. @ 10.5 psf per ASTM E283.

4. Air Permeability: @ delta P of 0.3 inches water...0.002 CFM/ft² per ASTM E 2178

5. ASTM E 2357, Full Scale Wall Testing of the Air Barrier System

   a. System Air Leakage, Requirement – 0.0008 CFM/ft² maximum

   b. Penetration Check, Requirement – 0.00088 CFM/ft² maximum

6. ASTM E96 Water Vapor Permeance:10-20 Perms per Procedure B

7. Elongation: Minimum 75% per ASTM D412.

8. AATC 127 Water Resistance – Pass

9. ASTM D 1970 Self Sealability – Pass

10. ICC-ES AC212, Freeze Thaw, Crack Bridging – Pass

11. Fire Testing: Air Barrier, as a component of a wall assembly, shall have passed a NFPA 285 complete wall fire test.

12. Listed as an evaluated assembly by the Air Barrier Association at www.airbarriers.org/materials/assemblies_e.php

1.05 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures: Submittal Procedures.

B. Prior to commencing the Work, submit manufacturer's independent Laboratory Report for the Air Barrier Systems testing on ASTM E 2357 tested on a steel stud frame wall, results are to be based on Specimen 2 testing only.

C. Prior to commencing the Work, submit documentation certifying that the air barrier system has been tested independently, indicating compliance with the performance requirements of the Air Barrier Association of Association.

D. Prior to commencing the Work, submit copies of manufacturers' literature for the system, membrane, primers, sealants, adhesives and associated auxiliary materials shall be included as parts of the system that is listed by the Air Barrier Association of America evaluation.

E. Prior to commencing the Work, submit references clearly indicating that the materials proposed have been installed for not less than three years on projects of similar scope and nature.

F. Prior to commencing the Work, submit manufacturers' complete set of standard details for air barrier/vapor retarders. The manufacturer's representative shall review the contract drawings and note any modifications required to make the system air and water tight.

1.06 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Provide primary products, including each component of the air barrier membrane system, which has been commercially available for a minimum of 3 years.

B. Submit in writing, a document stating that the applicator of the primary air barrier membrane specified in this section is recognized by the manufacturer as suitable for the execution of the Work.

C. Perform Work in accordance with the printed requirements of the air barrier manufacturer and this specification.

D. Maintain one copy of manufacturer instructions on site.

E. At the beginning of the Work and at all times during the execution of the Work, allow access to Work site by the air barrier membrane manufacturer's representative.

F. Components used in this section shall be sourced from one manufacturer, including sheet membrane, air barrier sealants, primers, mastics, tapes and adhesives as listed as an evaluated air barrier assembly by the Air Barrier Association of America.

1.07 MOCK-UP

A. Construct mock-up in accordance with Section 01 40 00 – Quality Requirements: Requirements for a mock-up.

B. Provide mock-up of air barrier materials under provisions of Section 04 20 19 – Veneer Unit Masonry.

C. Items to be incorporated in mock-up include:

1. Where directed by Architect, construct typical exterior wall panel, _____ long by _____ high, incorporating masonry veneer system, through wall flexible flashing, glass-faced gypsum sheathing, wall ties, board insulation, metal studs, aluminum curtain wall frame, aluminium window frame, showing air barrier membrane application details and transition membranes.

2. Where directed by Architect, construct typical exterior wall panel, _____ long by _____ high, incorporating masonry veneer system, concrete masonry backup, wall ties, through wall flexible flashing, board insulation, aluminium window frame, showing air barrier membrane application details and transition membranes.

D. Allow 24 hours for inspection of mock-up by Architect before proceeding with air barrier work.

1.08 PRE-INSTALLATION CONFERENCE

A. Convene four weeks prior to commencing work of this section, under provisions of Section 01 30 00 – Administrative Requirements: Pre-Installation Meeting. Attendance by the manufacturer's representative along with the installer is **mandatory**.

DO NOT PROCEED WITH THE INSTALLATION OF THE AIR BARRIER MEMBRANE AND THE THROUGH WALL FLASHING MEMBRANE PRIOR TO THE PRE-INSTALLATION CONFERENCE.

1.09 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.

B. All pail goods shall bear the ABAA Evaluated Air Barrier label

C. Store roll materials on end in original packaging.

D. Keep all products stored at above 40˚F. Apply to a substrate with a surface T˚F of 40˚F and rising. **DO NOT ALLOW PRODUCT TO FREEZE.**

E. Protect rolls from direct sunlight until ready for use.

F. Do not double stack pail goods.

1.10 COORDINATION

A. Ensure continuity of the air seal throughout the scope of this section.

PART 2 PRODUCTS

2.01 MEMBRANES

A. Liquid air barrier: One component elastomeric membrane, spray, trowel or brush applied, having the following characteristics and have passed all evaluations by the Air Barrier Association of America (ABAA) and be listed on their web site as having passed all the evaluations :

1 Air permeability:
   a. Air Leakage Thru Cured Films: <0.04 cfm/ft^2 @ 10.5 lbs/ ft^2 or <0.005 L/sm^2 @ 75 Pa to ASTM E283 (Modified) 24 hours, +/- 10%.
   b. Air Leakage per ASTM E 2178, dry film, delta P of 0.3 inches of water, 0.002 +/- 10%

2 Air Barrier System Test on Full Scale Wall Assembly, ASTM E 2357
   a. System Air Leakage, 0.0008 CFM/ft^2 +/- 10%
   b. Penetrations Check, MUST PASS ASTM E 2357 requirements

3. Water Vapor permeance: (704 ng/Pa.m^2.s.) 10 to 20 perms, ASTM E96 Method B. NOTE: **THE MATERIAL SPECIFIED IS VAPOR PERMEABLE.**

4. Elongation (ASTM D412: >75%)

5. Low temperature flexibility and crack bridging: Pass – ICC-ES AC212

6. ASTM D 1970, Self Sealability – Pass

7. AATCC 127 Water Resistance – Pass

B. Acceptable Manufacturers

1. STS Coatings, Wall Guardian, 830-995-5177
   www.wallguardian.com, *a Certified Texas HUB*
   a. FW-100A, a non-asphaltic product

2. W.R. Grace, Perm-a-Barrier VP a non-asphaltic product

C. Transition Membrane, Self-Adhering: Polymer-based, sheet membrane complete with polyester facing, and having the following physical properties:

1 Thickness: 35 mils (0.5 mm) min.

2. Vapor permeance: <0.1

3. Low temperature flexibility: -20 F to CGSB 37-GP-56M;

4. Elongation: >90% to ASTM D412-modifed;

a. Acceptable material:
1) UT-40 by STS Coatings for use with the FW-100 system.
2) Others as recommended by manufacturer

D. Approved Applicators

1. Alamo Waterproofing, San Antonio, TX 210-648-2100
2. Alpha Insulation & Waterproofing, all offices in TX, 210-599-3333
3. Aquatech, Austin, TX, 512-251-2724
4. Diversified Thermal, Austin, TX, 512-267-1532
5. Kin Seal, Austin, TX, 512-252-8461
6. Turner Roofing Co., San Antonio, TX, 210-496-2256

2.02 PRIMER

A. Primer for self-adhering membranes: Synthetic polymer-based adhesive type, quick setting, having the following characteristics:

a. Acceptable material: As manufactured and/or recommended by the Air Barrier System manufacturer. **Note: Primer shall be compatible with specified glass faced gypsum sheathing.**
b. Verify compatibility of self-adhering membranes with preservative treated materials specified in Section 06 10 53. Prime preservative treated materials as required using primer recommended by self-adhering membrane manufacturer or use the non-chemical thermally modified wood known as EcoPrem.

2.03 SEALANTS

A. Sealants shall be compatible with air barrier systems and shall be approved by the air barrier manufacturer.

B. Products:

1. STS Coatings LT-100 Liquid Tape for concealed applications only and Great Seal PE-150 for concealed and exposed applications.

C. Primers: As recommended by manufacturer for surfaces to be sealed.

D. Backer Rods: As recommended by sealant manufacturer.

E. Others as recommended by manufacturer

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions are ready to accept the Work of this section. Notify Architect in

writing of any discrepancies. Commencement of the work or any parts thereof shall mean acceptance of the prepared substrate.

3.02 PREPARATION

A. All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar or other contaminants. Fill spalled areas in substrates to provide an even plane.

B. Mortar joints in concrete block and form tie holes/voids in poured concrete shall be filled flush and smooth and allowed to be cured for a minimum of 24 hours.

C. All joints between gypsum sheathing, roof board, masonry and concrete and other substrate joints up to 1/4" wide shall be treated:

1. STS Coatings LT-100 Liquid Tape, www.stscoatings.com.
2. York Manufacturing, US-100, www,yorkmfg.com
3. Others as recommended by manufacturer

D. All joints between gypsum sheathing, roof board, masonry and concrete and other substrates wider than 1/4" shall be sealed with:

1. UT-40, overlapping each side of joint a minimum of 3 inches
2. Others as recommended by manufacturer

E. Install backer rod and sealant at the following joints:

1. All expansion/control/erection joints between concrete wall panels.

2. All expansion/control joints in concrete block back-up.

3. All joints between concrete wall panels and concrete block back-up.

3.03 PRIMER FOR TRANSITION MEMBRANE (SELF-ADHERING TYPE ONLY)

A. Apply primer for self-adhering membranes at rate recommended by manufacturer.

B. Apply primer to all areas to receive transition sheet membrane as indicated in Drawings by roller or spray and allow minimum 30 minute open time. Primed surfaces not covered by transition membrane during the same working day must be re-primed.

3.04 TRANSITION MEMBRANE (SELF-ADHERING TYPE)

A. Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inch overlap at all end and side laps unless otherwise noted.

B. Tie-in to roofing system and at the interface of dissimilar materials as indicated in Drawings.

C. Promptly roll all laps and membrane with a counter top roller to affect seal.

D. Ensure all preparatory work is complete prior to applying liquid membrane.

3.05 PRIMARY AIR BARRIER

A. Apply by spray or roller, a complete and continuous unbroken film at a temperature of 40˚F and rising with less than a 30% chance of rain in the next 18 hours and apply at the same rate as listed in

the Air Barrier Association of America evaluation

1. Exterior Gypsum Sheathing, Plywood or OSB

   a. Wall Guardian FW-100A at a minimum of 2.5 gallons per 100 ft^2 (40 ft^2/gallon) (40 wet mils)
   b. Perm-a-Barrier VP at a minimum rate of 5.5 gallons per 100 ft^2 (18 ft^2/gallon) (90 mils wet)
   c. Spray around all projections, including masonry veneer anchors, ensuring a complete and continuous air seal.

2. Concrete Masonry Unit (CMU), Concrete

   a. Wall Guardian FW-100A at a minimum of 2,5 gallons per 100 ft^2 (40 ft^2/gallon) (equal to 40 wet mils on a smooth surface)
   b. Perm-A-Barrier VP at a minimum rate of 5.5 gallons per 100 ft^2 (18 ft^2/gallon) (equal to 90 wet mils on a smooth surface)
   c. Spray around all projections including masonry veneer anchors ensuring a complete and continuous air seal.

3.06 INSPECTION

A. Notify Architect when sections of work are complete so as to allow for review prior to installing insulation. The manufacturer's representative shall be on site to review the installation along with the Architect.

3.07 PROTECTION OF FINISHED WORK

A. Liquid membranes are not designed for permanent exposure. Cover the liquid membrane, as recommended by the manufacturer, within the following time frames. Contractor shall verify the number of calendar days with the air barrier manufacturer:

   1. Cover the Wall Guardian material within 180 calendar days after installation. The nature of this product is such that some surface weathering may become apparent during exposure. This is a surface effect only and does not impact air barrier system performance.

   2. Transition membranes shall be covered within 180 days after installation

B. Prepare, treat and seal vertical and horizontal surfaces at terminations and penetrations through the air barrier and at protrusions according to air barrier manufacturer's written instructions.

3.08 SCHEDULE

A. Install liquid membrane system over the entire surface of the glass faced sheathing in the following area. Seal any masonry anchor penetrations air tight.

   1. In the masonry cavity wall.

B. Install liquid membrane system over the entire surface of the outer surface of the inner wythe of masonry. Seal any masonry anchor penetrations air tight.

C. Install liquid membrane system over the entire surface of the outer surface of the concrete wall panels. Seal any masonry anchor penetrations air tight.

D. Install liquid membrane system over the entire surface of the glass faced gypsum sheathing and/or roof board in the following area:

1. Behind the metal parapet panels.
2. Behind the metal wall and soffit panels.

E. Hollow Metal Door Frames: Seal door frame to wall surface with transition membrane.

F. Wall and Roof Junction: Seal wall to roof with transition membrane.

G. Seal joints in glass-faced sheathing with tape in the following areas:

1. Cement plaster soffit.

H. Seal the top of sheathing to the underside of the roof systems with foam or LT-100.

I. Openings: Seal around the perimeter of all openings with transition membrane.

J. Perimeter wood nailers at wall openings: Cover all exposed surfaces of wood nailers with transition membrane. Extend membrane over sheathing, masonry and metal framing as shown.

K. Aluminum window frames with nailing flanges: Seal the nailing flanges to the wall surface with transition membrane.

L Aluminum window frames without nailing flanges: Seal frames to the wall surface with transition membrane.

M. Aluminum storefront frames: Seal frames to the wall surface with transition membrane.

N. Aluminum curtain wall frames: Seal frames to wall surface with transition membrane.

END OF SECTION

April 2011

074113 METAL ROOF PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Mechanically-seamed, standing seam metal roof panels, with related metal trim and accessories.

1.2 RELATED REQUIREMENTS

Specifier: If retaining this optional article, edit list below to correspond to Project.

A. Division 01 Section "Sustainable Design Requirements" for related LEED general requirements.

B. Division 05 Section "Structural Steel Framing" for structural steel framing supporting metal panels.

C. Division 05 Section "Steel Decking" for continuous metal decking supporting metal panels.

D. Division 05 Section "Cold-Formed Metal Framing" for cold-formed metal framing supporting metal panels.

E. Division 05 Section "Cold-Formed Metal Trusses" for cold-formed metal trusses supporting metal panels.

F. Division 07 Section "Roof Insulation" for thermal insulation installed under metal panels.

G. Division 07 Section "Air Barriers" for air barriers within roof assembly and adjacent to roof assembly.

H. Division 07 Section "Metal Wall Panels" for factory-formed metal wall and soffit panels.

I. Division 07 Section "Sheet Metal Flashing and Trim" for formed sheet metal copings, flashings, reglets, and roof drainage items in addition to items specified in this Section.

J. Division 07 Section "Manufactured Roof Specialties" for manufactured copings, reglets, and roof drainage items in addition to items specified in this Section.

K. Division 07 Section "Joint Sealants" for field-applied Joint Sealants.

L. Division 13 Section "Metal Building Systems" for steel framing supporting metal panels.

1.3 REFERENCES

Specifier: If retaining this optional article, edit list below to correspond to Project.

A. American Architectural Manufacturer's Association (AAMA): www.aamanet.org:

1. AAMA 621 - Voluntary Specifications for High Performance Organic Coatings on Coil

Coated Architectural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates.

2. AAMA 809.2 - Voluntary Specification Non-Drying Sealants.

B. American Society of Civil Engineers (ASCE): www.asce.org/codes-standards:

1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

C. ASTM International (ASTM): www.astm.org:

1. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

2. ASTM A 755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.

3. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

4. ASTM A 980 - Standard Specification for Steel, Sheet, Carbon, Ultra High Strength Cold Rolled.

5. ASTM C 645 - Specification for Nonstructural Steel Framing Members.

6. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

7. ASTM D 1003 - Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics.

8. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

9. ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.

10. ASTM E 1514 - Standard Specification for Structural Standing Seam Steel Roof Panel Systems.

11. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

12. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

13. ASTM E 1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.

14. ASTM E 1980 - Practice for Calculating Solar Reflectance Index of Horizontal and Low-

Sloped Opaque Surfaces.

D. Cool Roof Rating Council (CRRC): www.coolroofs.org/productratingprogram.html:

1. CRRC-1-2008 - CRRC Product Rating Program.

E. FM Global (FM): www.fmglobal.com:

1. ANSI/FM 4471 - Approval Standard for Class 1 Panel Roofs.

F. International Accreditation Service (IAS):

1. IAS AC 472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems, Part B.

G. Underwriters Laboratories, Inc. (UL): www.ul.com:

1. UL 580 - Tests for Uplift Resistance of Roof Assemblies

H. US Environmental Protection Agency: www.energystar.gov/index.cfm:

1. Energy Star Reflective Roof Products.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Prior to erection of framing, conduct preinstallation meeting at site attended by Owner, Architect, manufacturer's technical representative, inspection agency and related trade contractors.

1. Coordinate building framing in relation to metal panel system.

2. Coordinate openings and penetrations of metal panel system.

3. Coordinate work of Division 07 Sections "Roof Specialties" and "Roof Accessories" and openings and penetrations and manufacturer's accessories with installation of metal panels.

1.5 QUALITY ASSURANCE

A. Manufacturer/Source: Provide metal roof panel assembly and accessories from a single manufacturer providing fixed-base roll forming, and accredited under IAS AC 472 Part B.

B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum five years experience in manufacture of similar products in successful use in similar applications.

1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:

a. Product data, including certified independent test data indicating compliance with requirements.

b. Samples of each component.

c. Sample submittal from similar project.

d. Project references: Minimum of five installations not less than five years old, with Owner and Architect contact information.

e. Sample warranty.

f. IAS AC 472 certificate.

2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.

3. Approved manufacturers must meet separate requirements of Submittals Article.

C. Installer Qualifications: Experienced Installer certified by metal panel manufacturer with minimum of five years experience with successfully completed projects of a similar nature and scope.

1. Installer's Field Supervisor: Experienced mechanic certified by metal panel manufacturer supervising work on site whenever work is underway.

D. **Buy American Compliance**: Materials provided under work of this Section shall comply with the following requirements:

1. Buy American Act of 1933 BAA-41 U.S.C §§ 10a – 10d.

2. Buy American provisions of Section 1605 of the American Recovery and Reinvestment Act of 2009 (ARRA).

1.6 ACTION SUBMITTALS

A. Product Data: Manufacturer's data sheets for specified products.

B. Shop Drawings: Show layouts of metal panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot of edge conditions, joints, fastener and sealant placement, flashings, openings, penetrations, roof accessories, lightning arresting equipment, and special details. Make distinctions between factory and field assembled work.

1. Indicate points of supporting structure that must coordinate with metal panel system installation.

2. Include data indicating compliance with performance requirements.

3. Include structural data indicating compliance with requirements of authorities having jurisdiction.

C. Samples for Initial Selection: For each exposed product specified including sealants.

Provide representative color charts of manufacturer's full range of colors.

D. Samples for Verification: Provide 12-inch- (305 mm-) long section of each metal panel profile. Provide color chip verifying color selection.

1.7 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Indicating compliance of products with requirements, witnessed by a professional engineer.

B. Qualification Information: For Installer firm and Installer’s field supervisor.

C. IAS Accreditation Certificate: Indicating that manufacturer is accredited under provisions of IAS AC 472.

D. **Buy American Certification**: Manufacturers' letters of compliance acceptable to authorities having jurisdiction, indicating that products comply with requirements.

E. **IBC Building Code Certificate**.

F. Manufacturer's Warranty: Sample copy of manufacturer's standard warranty.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Manufacturer's Warranty: Executed copy of manufacturer's standard warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect products of metal panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage. Protect panels and trim bundles during shipping.

1. Deliver, unload, store, and erect metal panel system and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.

2. Store in accordance with Manufacturer's written instructions. Provide wood collars for stacking and handling in the field.

1.10 COORDINATION

A. Coordinate sizes, profiles, and locations of roof curbs and other roof-mounted equipment and roof penetrations, based upon sizes of actual selected equipment.

1.11 WARRANTY

A. Special Manufacturer’s Warranty: On manufacturer’s standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail in materials and workmanship within one year from date of Substantial Completion.

B. **Special Weathertightness Warranty**: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail to remain weathertight, including leaks, without monetary limitation within 20 years from date of Substantial Completion.

C. Special Panel Finish Warranty: On Manufacturer's standard form, in which Manufacturer agrees to repair or replace metal panels that evidence deterioration of factory-applied finish within 25 years from date of Substantial Completion, including:

a. Color fading in excess of 10 Hunter units per ASTM D 2244.

b. Chalking in excess of No. 8 rating per ASTM D 4214.

c. Failure of adhesion, peeling, checking, or cracking.

2. Modified Silicone-Polyester Two-Coat System:

a. Color fading in excess of 7 Hunter units per ASTM D 2244, for vertical applications.

b. Color fading in excess of 7 Hunter units per ASTM D 2244, for non-vertical applications.

c. Chalking in excess of No. 8rating per ASTM D 4214, for vertical applications.

d. Chalking in excess of No 6 rating per ASTM D 4214, for non-vertical applications.

e. Failure of adhesion, peeling, checking, or cracking.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: **MBCI Metal Roof and Wall Systems, Division of NCI Group, Inc.**; Houston TX. Tel: (877)713-6224; Email: info@mbci.com; Web: www.mbci.com.

1. Provide basis of design product or comparable product approved by Architect prior to bid.

2.2 PERFORMANCE REQUIREMENTS

A. General: Provide metal roof panel system meeting performance requirements as determined by application of specified tests by a qualified testing facility on manufacturer's standard assemblies.

B. Recycled Content: For Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than **[**25**]**percent.

C. Radiative Property Performance:

1. **Solar Reflectance Index**: Minimum 78 for roof slopes of 2:12 or less and 29 for roof slopes greater than 2:12 under medium wind conditions, per ASTM E 1980.

2. **Energy Star Qualified**: Listed on USDoE ENERGY STAR Roof Products Qualified Product List.

3. **Energy Performance**: Listed in CRRC Rated Products Directory, with minimum properties as required by applicable Energy efficiency or High-Performance Green Building standard.

D. System Performance: Comply with ASTM E 1514 and requirements of this Section.

E. Structural Performance: Provide metal panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated:

1. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings.

a. Wind Uplift Testing: Certify capacity of metal panels by actual testing of proposed assembly per ASTM E 1592.

2. Deflection Limits: Withstand inward and outward wind-load design pressures in accordance with applicable building code with maximum deflection of **[**1/120**] [**1/180**] [**1/240**]** of the span with no evidence of failure.

3. Seismic Performance: Comply with ASCE 7, Section 9, "Earthquake Loads."

F. Wind Uplift Resistance: Comply with UL 580 for wind-uplift class **[**UL-30**] [**UL-60**] [**UL-90**]**.

G. **FM Approvals Listing**: Comply with FM Approvals 4471 as part of a panel roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 construction. Identify materials with FM Approvals markings.

1. Fire/Windstorm Classification: **[**Class 1A-60**] [**Class 1A-75**] [**Class 1A-90**] [**Class 1A-105**]**.
2. Hail Resistance Rating: SH.

H. **Florida State Building Code Compliance**: Comply with requirements of Florida State Building Code.www.floridabuilding.org/pr/pr_app_srch.aspx

I. Air Infiltration, ASTM E 1680: Maximum 0.09 cfm/sq. ft.(0.457 L/s per sq. m) at static-air-pressure difference of 6.24 lbf/sq. ft.(300 Pa).

J. Water Penetration Static Pressure, ASTM E 1646: No uncontrolled water penetration at a static pressure of 12 lbf/sq. ft. (575 Pa).

K. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction. Allow for deflection and design for thermal stresses caused by temperature differences from one side of the panel to the other.

2.3 METAL ROOF PANELS

A. Mechanically-seamed, Concealed Fastener, Metal Roof Panels: Structural metal roof panel consisting of formed metal sheet with vertical ribs at panel edges, installed by lapping and mechanically interlocking edges of adjacent panels, and attaching panels to supports using concealed clips and fasteners in a weathertight installation.

1. Basis of Design: **MBCI, SuperLok,** www.mbci.com/superlok.html.

2. **Aluminum-Zinc Alloy-Coated Steel Sheet**: ASTM A 792/A 792M, structural quality, Grade 50, Coating Class AZ50 (Grade 340, Coating Class AZM150), prepainted by the coil-coating process per ASTM A 755/A 755M.

3. **Aluminum-Zinc Alloy-Coated Steel Sheet**: ASTM A 792/A 792M, structural quality, Grade 50, Coating Class AZ55 (Grade 340, Coating Class AZM165) unpainted Galvalume Plus coating.

a. Nominal Coated Thickness 22 gage.

b. Panel Surface: Smooth with striations in pan

c. Exterior Finish: **[**Modified silicone-polyester two-coat system**]**

d. Color: **[**As selected by Architect from manufacturer's standard colors**]**

4. Panel Width: **[**12 inches (305 mm)**]**

5. Panel Seam Height: 2 inch (50.8 mm).

6. Joint Type: Mechanically seamed.

2.4 METAL ROOF PANEL ACCESSORIES

A. General: Provide complete metal roof panel assembly incorporating trim, copings, fasciae, gutters and downspouts, and miscellaneous flashings, in **[**manufacturer's standard profiles**]** Provide required fasteners, closure strips, thermal spacers, splice plates, support plates, and sealants as indicated in manufacturer's written instructions.

B. Flashing and Trim: Match material, thickness, and finish of metal panel face sheet.

C. Panel Clips: Provide panel clip of type specified, at spacing indicated on approved shop drawings.

1. **Two-piece Floating**: ASTM C 645, with ASTM A 653/A 653M, G90(Z180) hot-dip galvanized zinc coating, configured for concealment in panel joints, and identical to clips utilized in tests demonstrating compliance with performance requirements.

2. **Single-Piece Fixed**: ASTM C 645, with ASTM A 653/A 653M, G90(Z180) hot-dip

galvanized zinc coating, configured for concealment in panel joints, and identical to clips utilized in tests demonstrating compliance with performance requirements.

D. Panel Fasteners: Self-tapping screws and other acceptable fasteners recommended by roof panel manufacturer. Where exposed fasteners cannot be avoided, supply long life fasteners with EPDM or neoprene gaskets, with heads matching color of metal panels by means of factory-applied coating.

E. Joint Sealers: Manufacturer's standard or recommended liquid and preformed sealers and tapes, and as follows:

1. Factory-Applied Seam Sealant: Manufacturer's standard hot-melt type.

2. Tape Sealers: Manufacturer's standard non-curing butyl tape, AAMA 809.2.

F. **Steel Sheet Miscellaneous Framing Components**: ASTM C 645, with ASTM A 653/A 653M, G60 (Z180) hot-dip galvanized zinc coating.

G. **Light Transmitting Panel**: Manufacturer's standard UV-resistant translucent panel, 16 inch (406 mm) wide, white.

H. **Roof Accessories**: Approved by metal roof panel manufacturer. Refer to Section 07 72 00 "Roof Accessories" for requirements for curbs, equipment supports, roof hatches, heat and smoke vents, ventilators, and preformed flashing sleeves.

I. **Snow Guards**: Approved by metal roof panel manufacturer. Refer to Section 07 72 53 "Snow Guards" for requirements for snow guards attached to metal roof panels.

2.5 FABRICATION

A. General: Provide factory fabricated and finished metal panels and accessories meeting performance requirements, indicated profiles, and structural requirements.

B. Fabricate metal panel joints configured to accept factory-applied sealant providing weathertight seal and preventing metal-to-metal contact and minimizing noise resulting from thermal movement.

C. Form panels in continuous lengths for full length of detailed runs, except where otherwise indicated on approved shop drawings.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings. Form from materials matching metal panel substrate and finish.

2.6 FINISHES

A. Finishes, General: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

B. **Modified Silicone-Polyester Two-Coat System**: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat, meeting solar reflectance index requirements.

1. Basis of Design: **MBCI, Signature 200**.

C. **Fluoropolymer Two-Coat System**: 0.2 – 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 621, meeting solar reflectance index requirements.

1. Basis of Design: **MBCI, Signature 300**.

D. **Fluoropolymer Two-Coat Metallic System**: 0.2 – 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF metallic fluoropolymer color coat, AAMA 621, meeting solar reflectance index requirements.

1. Basis of Design: **MBCI, Signature 300 Metallic**.

E. Interior Finish: 0.5 mil total dry film thickness consisting of primer coat and wash coat of manufacturer's standard light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine metal panel system substrate and supports with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal panel installation.

1. Inspect metal panel support substrate to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable supports at recommended spacing to match installation requirements of metal panels.

2. Panel Support Tolerances: Confirm that panel supports are within tolerances acceptable to metal panel system manufacturer but not greater than the following:

a. 1/4 inch (6 mm) in 20 foot (6.1 m) in any direction.

b. 3/8 inch (9 mm) over any single roof plane.

B. Correct out-of-tolerance work and other deficient conditions prior to proceeding with insulated metal roof panel system installation.

3.2 PREPARATION

A. **Miscellaneous Supports**: Install subframing, girts, furring, and other miscellaneous panel support members according to ASTM C 754 and manufacturer's written instructions.

B. Flashings: Install flashings to cover exposed underlayment per Section 07 62 00 "Sheet Metal Flashing and Trim."

3.3 METAL PANEL INSTALLATION

A. Mechanically-Seamed, Standing Seam Metal Roof Panels: Install weathertight metal panel system in accordance with manufacturer's written instructions, approved shop drawings, and project drawings. Install metal roof panels in orientation, sizes, and locations indicated, free of waves, warps, buckles, fastening stresses, and distortions. Anchor panels and other components securely in place. Provide for thermal and structural movement.

B. Attach panels to supports using clips, screws, fasteners, and sealants recommended by manufacturer and indicated on approved shop drawings.

1. Fasten metal panels to supports with concealed clips at each location indicated on approved shop drawings, with spacing and fasteners recommended by manufacturer.

2. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

3. Provide weatherproof jacks for pipe and conduit penetrating metal panels of types recommended by manufacturer.

4. Dissimilar Materials: Where elements of metal panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.

3.4 ACCESSORY INSTALLATION

A. General: Install metal panel trim, flashing, and accessories using recommended fasteners and joint sealers, with positive anchorage to building, and with weather tight mounting. Provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel assembly, including trim, copings, flashings, sealants, closure strips, and similar items.

2. Comply with details of assemblies utilized to establish compliance with performance requirements and manufacturer's written installation instructions.

3. Provide concealed fasteners except where noted on approved shop drawings.

4. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently weather resistant.

B. Joint Sealers: Install joint sealers where indicated and where required for weathertight performance of metal panel assemblies, in accordance with manufacturer's written instructions.

1. Prepare joints and apply sealants per requirements of Division 07 Section "Joint Sealants."

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage an independent testing and inspecting agency acceptable to Architect to perform field tests and inspections and to prepare test reports.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective films immediately in accordance with metal roof panel manufacturer's instructions. Clean finished surfaces as recommended by metal roof panel manufacturer.

B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.

END OF SECTION

074213 METAL WALL PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Designer Series-Flat concealed fastener metal wall panels, with related metal trim and accessories.

1.2 RELATED REQUIREMENTS

A. Division 05 Section "Structural Steel Framing" for steel framing supporting metal panels.

B. Division 05 Section "Cold-Formed Metal Framing" for cold-formed metal framing supporting metal panels.

C. Division 07 Section "Thermal Insulation" for thermal insulation installed behind metal panels.

D. Division 07 Section "Air Barriers" for air barriers within wall assembly and adjacent to wall assembly.

E. Division 07 Section "Metal Soffit and Wall Liner Panels" for soffit and wall liner panels installed with metal panels.

F. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal flashing items in addition to items specified in this Section.

G. Division 13 Section "Metal Building Systems" for steel framing supporting metal panels.

1.3 REFERENCES

Specifier: If retaining this optional article, edit list below to correspond to Project.
A. American Architectural Manufacturer's Association (AAMA): www.aamanet.org:

1. AAMA 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates.

2. AAMA 809.2 Voluntary Specification Non-Drying Sealants.

B. American Society of Civil Engineers (ASCE): www.asce.org/codes-standards:

1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

C. ASTM International (ASTM): www.astm.org:

1. ASTM A755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.

2. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

3. ASTM C920 - Specification for Elastomeric Joint Sealants.

4. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

5. ASTM D4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.

6. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

D. International Accreditation Service (IAS):

1. IAS AC472 Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems, Part B.

1.4 QUALITY ASSURANCE

A. Manufacturer/Source: Provide metal panel assemblies and accessories from a single manufacturer accredited under IAS AC472, Part B.

B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum five years experience in manufacture of similar products in successful use in similar applications.

1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:

a. Product data, including certified independent test data indicating compliance with requirements.

b. Samples of each component.

c. Sample shop drawings from similar project.

d. Project References: Minimum of five installations not less than three years old, with Owner and Architect contact information.

e. Sample warranty.

f. Certificate of accreditation under IAS AC472 Part B.

2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.

3. Approved manufacturers must meet separate requirements of Submittals Article.

C. Installer Qualifications: Experienced Installer certified by metal panel manufacturer with minimum of five years experience with successfully completed projects of a similar nature and scope.

1. Installer's Field Supervisor: Experienced mechanic certified by metal panel manufacturer supervising work on site whenever work is underway.

D. **Buy American Compliance**: Materials provided under work of this Section shall comply with the following requirements:

1. Buy American Act of 1933 BAA-41 U.S.C §§ 10a – 10d.

2. Buy American provisions of Section 1605 of the American Recovery and Reinvestment Act of 2009 (ARRA).

E. Steel Construction Publications: Comply with published recommendations in the following, unless more stringent requirements are indicated.

1. American Institute of Steel Construction (AISC): "Steel Construction Manual."

2. American Iron and Steel Institute (AISI): "Cold Formed Steel Design Manual."

1.5 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Prior to erection of framing, conduct preinstallation meeting at site attended by Owner, Architect, metal panel installer, metal panel manufacturer's technical representative, inspection agency and related trade contractors.

1. Coordinate building framing in relation to metal panel system.

2. Coordinate openings and penetrations of metal panel system.

3. Coordinate work of Division 07 Sections "Roof Specialties" and "Roof Accessories" and openings and penetrations and manufacturer's accessories with installation of metal panels.

1.6 ACTION SUBMITTALS

A. Product Data: Manufacturer's data sheets for specified products. Include data indicating compliance with performance requirements.

B. Shop Drawings: Show layouts of metal panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot of edge conditions, joints, fastener and sealant placement, flashings, openings, penetrations, and special details. Make distinctions between factory and field assembled work.

1. Indicate points of supporting structure that must coordinate with metal panel system installation.

2. Include structural data indicating compliance with performance requirements and requirements of local authorities having jurisdiction.

C. Samples for Initial Selection: For each exposed product specified including sealants. Provide representative color charts of manufacturer's full range of colors.

D. Samples for Verification: Provide 12-inch- (305 mm-) long section of each metal panel profile. Provide color chip verifying color selection.

1.7 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Indicating compliance of products with requirements.

B. Qualification Information: For Installer firm and Installer's field supervisor.

C. IAS Accreditation Certificate: Indicating that manufacturer is accredited under provisions of IAS AC472 Part B.

D. **Buy American Certification**: Manufacturers' letters of compliance acceptable to authorities having jurisdiction, indicating that products comply with requirements.

E. **Florida State Building Code Certificate**: Indicating that products comply with requirements of Florida State Building Code.www.floridabuilding.org/pr/pr_app_srch.aspx

F. Manufacturer's warranty: Unexecuted sample copy of manufacturer's warranty.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Manufacturer's Warranty: Executed copy of manufacturer's warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect products of metal panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage. Protect panels and trim bundles during shipping.

1. Deliver, unload, store, and erect metal panels and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.

2. Store in accordance with Manufacturer's written instruction. Provide wood collars for stacking and handling in the field.

3. Shield foam insulated metal panels from direct sunlight until installation.

1.10 WARRANTY

A. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail in materials and workmanship within one year from date of Substantial Completion.

B. Special Panel Finish Warranty: On Manufacturer's standard form, in which Manufacturer agrees to repair or replace metal panels that evidence deterioration of factory-applied finish within the warranty period, as follows:

1. **Modified Silicone-Polyester** Two-Coat System:

a. Basis of Design System: **MBCI, Signature 200**.

b. Color fading in excess of 7 Hunter units per ASTM D 2244.

c. Chalking in excess of No. 6 rating per ASTM D 4214.

d. Failure of adhesion, peeling, checking, or cracking.

e. Warranty Period: [30] years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: **MBCI Metal Roof and Wall Systems, Division of NCI Group, Inc.**; Houston TX. Tel: (877)713-6224; Email: info@mbci.com; Web: www.mbci.com.

1. Provide basis of design product or comparable product approved by Architect prior to proposal.

2.2 PERFORMANCE REQUIREMENTS

A. General: Provide metal panel system meeting performance requirements as determined by application of specified tests by a qualified testing facility on manufacturer's standard assemblies.

B. Structural Performance: Provide metal panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated, as determined by ASTM E1592:

1. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings. Refer to 2012 IBC Code

a. Wind Negative Pressure: Certify capacity of metal panels by actual testing of proposed assembly. Refer to 2012 IBC Code

2. Deflection Limits: Withstand inward and outward wind-load design pressures in accordance with applicable building code with maximum deflection of 1/120 of the span with no evidence of failure. Refer to 2012 IBC Code

3. Seismic Performance: Comply with ASCE 7 Sections 9, "Earthquake Loads."

C. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction. Allow for deflection and design for thermal stresses caused by temperature differences from one side of the panel to the other.

2.3 FORMED METAL WALL PANELS

A. **Flush-Profile, Concealed Fastener Metal Wall Panels**: Structural metal panels consisting of formed metal sheet with vertical panel edges and flat pan, with flush joints between panels, field assembled with nested lapped edges, and attached to supports using concealed fasteners.

1. Basis of Design: **MBCI, Designer Series 12.0 Flat Panel**.

2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, structural quality, Grade 50, Coating Class AZ50 (Grade 340, Coating Class AZM150), prepainted by the coil-coating process per ASTM A755/A755M.

a. Nominal Thickness= [22 gage] coated thickness, with [smooth] surface.

1) Exterior Finish: Modified Silicone-Polyester Two-Coat System

2) Color: AS selected by Architect from manufacturer's standard colors.

3. Panel Width: 12 inches (305 mm).

4. Panel Thickness: 1-3/4 inch (44 mm).

2.4 MISCELLANEOUS MATERIALS

A. General: Provide complete metal panel assemblies incorporating trim, copings, fasciae, gutters and downspouts, and miscellaneous flashings. Provide required fasteners, closure strips, and sealants as indicated in manufacturer's written instructions.

B. Flashing and Trim: Match material, thickness, and finish of metal panels.

C. Panel Fasteners: Self-tapping screws and other acceptable fasteners recommended by metal panel manufacturer. Where exposed fasteners cannot be avoided, supply corrosion-resistant fasteners with heads matching color of metal panels by means of factory-applied coating, with weathertight resilient washers.

D. Panel Sealants:

1. VOC Content of Interior Sealants: Sealants used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. Architectural Sealants: 250 g/L.

2.5 FABRICATION

A. General: Provide factory fabricated and finished metal panels, trim, and accessories meeting performance requirements, indicated profiles, and structural requirements.

B. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings.

2.6 FINISHES

A. Finishes, General: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

B. Modified Silicone-Polyester Two-Coat System: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat, meeting solar reflectance index requirements.

1. Basis of Design: **MBCI, Signature 200**.

C. Fluoropolymer Two-Coat System: 0.2 – 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 621, meeting solar reflectance index requirements.

1. Basis of Design: **MBCI, Signature 300**.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine metal panel system substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal panels.

1. Inspect framing that will support insulated metal panels to determine if support components are installed as indicated on approved shop drawings and are within tolerances acceptable to metal panel manufacturer and installer. Confirm presence of acceptable framing members at recommended spacing to match installation requirements of metal panels.

B. Correct out-of-tolerance work and other deficient conditions prior to proceeding with insulated metal panel installation.

3.2 METAL PANEL INSTALLATION

A. Concealed-Fastener Formed Metal Panels: Install metal panel system in accordance with manufacturer's written instructions, approved shop drawings, project drawings, and referenced publications. Install metal panels in orientation, sizes, and locations indicated. Anchor panels and other components securely in place. Provide for thermal and structural movement.

B. Fasten metal panels to supports with fasteners at each location indicated on approved shop drawings, at spacing and with fasteners recommended by manufacturer. Fasten panel to support structure through leading panel flange. Snap-fit back flange of subsequent panel into secured flange of previous panel. Where indicated, fasten panels together through flush-fitted panel sides.

1. Cut panels in field where required using manufacturer's recommended methods.

2. Dissimilar Materials: Where elements of metal panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by metal panel manufacturer.

C. Attach panel flashing trim pieces to supports using recommended fasteners.

3.3 ACCESSORY INSTALLATION

A. General: Install metal panel accessories with positive anchorage to building and weather tight mounting; provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel assembly, including trim, copings, flashings, sealants, closure strips, and similar items.

2. Comply with details of assemblies utilized to establish compliance with performance requirements and manufacturer's written installation instructions.

3. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently weather resistant.

3.4 CLEANING AND PROTECTION

A. Clean finished surfaces as recommended by metal panel manufacturer.

B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.

END OF SECTION

076510 UNITIZED FLEXIBLE FLASHING/DRAINAGE SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes combination flashing, mortar deflection, and weep as complete one step system. Using this system deletes requirement for mortar deflection devices and may lessen requirements for weep spacing.

EDIT RELATED SECTIONS TO INCLUDE ONLY SECTIONS IN PROJECT MANUAL.

B. Related sections:
1. 04 05 23 Masonry Accessories.
2. 04 21 13 Brick Masonry
3. 04 22 00 Concrete Unit Masonry
4. 04 22 23 Architectural Concrete Unit Masonry
5. 04 42 00 Exterior Stone Cladding.
6. 04 72 00 Cast Stone Masonry.
7. 05 40 00 Cold Formed Metal Framing.
8. 06 10 00 Rough Carpentry.
9. 07 11 10 Dampproofing or Liquid Applied Air Barrier
10. 07 60 00 Flashing and Sheet Metal.
11. 07 65 00 Flexible Flashing.

C. Alternates: This Section is alternative method replacing mortar deflection device specified in Masonry Accessories Section and flashing specified in Flexible Flashing Section; includes deletion of accessory metal drip edge where specified or required.

1.02 REFERENCES

A. Standards of the following as referenced:
1. ASTM.
2. Brick Industry Association (BIA).
3. Copper Development Association, Inc. (CDA).

B. Industry standards:
1. BIA *Technical Notes on Brick Construction No. 7, Water Penetration Resistance- Design and Detailing*, August 2005.
2. BIA *Technical Notes on Brick Construction No. 28B, Brick Veneer/Steel Stud Walls*, August 2005.

1.03 DEFINITIONS

A. Terms:
1. Cavity wall flashing: Same as flexible flashing.
2. Foundation sill flashing: Same as flexible flashing.
3. Flexible flashing: Water-proof material typically used in cavity wall construction to contain and assist in the proper water drainage that may penetrate wall system veneer. Other materials may be required to constitute the system.
4. Head and sill flashing: Same as flexible flashing.
5. Through-wall flashing:
   a. Generally considered the same as flexible flashing.
   b. Rare definition referred to full width cap flashing under copings or wall caps.

1.04 SUBMITTALS

A. Product data: Indicate material type, composition, thickness, and installation procedures.

B. Samples: 3" by 5" flashing material.

C. **Product Quality & Environmental submittals:**

1. **Certificates:**
   a. Indicate materials supplied or installed are asbestos free.
   b. Indicate recycled content: 90% total recycled material; based on 80% Post Industrial Recycled Content and 10% Post Consumer Recycled Content.
2. Critical Performance Attributes:
   a. Tensile Strength, 31,500 psi minimum average
   b. Puncture Resistant, >285 pound average
   c. When tested as manufactured, product resists growth of mold pursuant to test method ASTM D 3273-94.

3. Specifier's Note: Products/systems that meet/exceed the above listed Certificates and/or performance criteria **come with a *Life of the Wall Warranty***

1.05 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturer: Provide flashing materials by single manufacturer with not less than ten years of experience in manufacturing flexible flashing products.

1.06 WARRANTY

A. Special warranty:
1. Manufacturer: **Warrant flexible flashing/drainage system material for life of the wall**.
2. Begin warranty at Date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURED UNITS

A. Copper core flexible flashing with wicking fabric:
1. Product standard of quality:
   a. York Manufacturing, Inc.; York Flash-Vent SS, (www.yorkmfg.com)
   b. STS Coatings: Gorilla Flash FV, (www.stscoatings.com)
   c. BMWCO: EvacuFlash, (www.evacuflash.com)
2. Characteristics:
   a. Type: Copper core with non-asphalt adhesive fabric laminated to one copper face and non-woven wicking fabric laminated to opposing face with non-asphalt adhesive.
   b. Copper type, ASTM B248-06: CDA Alloy 110, 060 temper.
   c. Fabrics:
      1) Fiberglass or polypropylene fabric; laminated back face copper core with core weight manufacturer identified on product with color coded laminate.
      2) Non-woven wicking fabric: Fabric laminated to front face.
   d. Size: Manufacturer's standard width rolls.
   e. Polyether sealant: Suggested manufacturers: York Manufacturing UniverSeal LT
      STS Coatings GreatSeal LT-100
   f. Corner and splice material: York Multi-Flash 500/Gorilla Flash MF, 3 ounce, or pre-manufactured corners.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
   1. Install where indicated, specified, or required in accord with flashing manufacturer's written instructions and as follows.
      a. Splicing material on material width to manufacture wider pieces is prohibited unless flashing detail requires material wider than normally manufactured.
      b. Prohibited practice: Bonding or splicing copper to non-woven wicking fabric or non-woven wicking fabric to non-woven wicking fabric.
   2. Extend flashing 6" minimum, beyond opening, each side without stretching flashing material. Fold flashing ends at end of openings or horizontal flashing terminations to form end dam.
   3. Flashing width: Width required starting flush with outside face of exterior wythe, extending through cavity, rising height required to extend above lintel steel at least 2".
   4. Splice end joints by butting ends together over 12" wide piece of Multi-Flash copper flashing and sealing lap joint with UniverSeal LT polyether sealant.
   5. Masonry back up:
      a. Surface apply after dampproofing installation specified in Dampproofing Section in accord with manufacturer’s installation instructions.
      b. Apply flashing with wicking surface to outside.
      c. Fasten to masonry back-up surface at top by embedding in layer of UniverSeal LT polyether sealant using manufacturer’s recommended nozzle.
   6. Concrete back up:
      a. Surface apply after dampproofing installation specified in Dampproofing Section in accord with manufacturer’s installation instructions.
      b. Apply flashing with wicking surface to outside.
      c. Fasten to concrete surface at top by embedding in bead of UniverSeal LT polyether sealant using manufacturer’s recommended nozzle.
   7. Stud back up with sheathing:
      a. Apply flashing with wicking surface to outside.
      b. Fasten to stud back-up at top by embedding in bead of UniverSeal LT polyether sealant using manufacturer’s recommended nozzle.
   8. Leave ready for building felt or air barrier installation lapping flashing top installed in another Section.
   9. Lay flashing in continuous bead of UniverSeal LT polyether sealant on masonry supporting steel.
   10. Fold ends of flashing at end of opening to form dam; seal with UniverSeal LT polyether sealant.
   11. Inside corners: Make in industry accepted manner using corner and splice material or purchase manufactured corners from manufacturer.
   12. Outside corners: Make in industry accepted manner using corner and splice material or purchase manufactured corners from manufacturer.

3.02 SCHEDULES

A. Locations:
   1. Exterior door heads.
   2. Window heads and sills.
   3. Storefront heads.
   4. Horizontal control joints.
   5. Changes in veneer materials, vertically.
   6. Other wall openings.
   7. Other locations indicated.

END OF SECTION 07 65 10

07900 CAULKING AND SEALANTS

PART 1. GENERAL

Samples: Color samples shall be submitted to Architects for approval prior to installation. Caulking compound shall be compatible with adjacent materials and be of non-staining type. Caulking and sealants at exterior walls to match color of adjacent face brick. Submit a sample length of a joint between two pieces of metal or a sample area on the site for the approval of the architect.

PART 2. MATERIALS

Joint Fillers and Gaskets:
Size and Shape: Provide the sizes and shapes of units as shown or, if not shown, and recommended by the manufacturer for the joint size and conditions shown. Wherever joint movement is a factor in the determination of size, consult with the Architects to determine the nature and magnitude of anticipated joint movements for the temperature and condition of the project at the time of installation.

Caulking and Sealants:
At all exterior location, at all exterior doors and glass frames (both exterior and interior of frames) and windows, at exterior joints in walls and at all other locations where sealant is indicated, provide products manufactured by Tremco, for the appropriate application.

At all locations other than those noted, or where noted "caulk", provide Tremco Dymonic.

Bituminous and fiber joint filler: Provide flexible, compressible, closed cell polyethylene of not less than 10 psi compression deflection (25%); except provide higher compression deflection strength as may be necessary to withstand installation forces and provide proper support for sealants; surface water absorption of not more than 0.1 lbs. per sq. ft.

Ethafoam SB; Dow Chemical
Ethafoam, Permaglaze Co.
Sonofoam; Sonneborn
Joint Backing; Tremco

PART 3. EXECUTION

Joint surfaces shall be clean, dry and free of dirt, oil, grease, water or frost. Follow compound manufacturer's recommended procedure for joint preparation.

Back up material shall be inserted in the joints and detailed or as required to allow the correct balance of joint and sealant dimensions.

Prior to application of compound all joint surfaces shall be primed in accordance with manufacturer's recommendations.
Apply the compound with gun nozzle of proper size and shape for the joint. The finished joint shall conform to the size, shape and color of the approved sample. Do not trim edges of caulking with knife or other instruments if joints are tooled. Do not permit excess caulking or priming material to remain on the exposed faces of materials or on adjacent surfaces.

Color: Provide each concealed material in manufacturer's standard color which has the best overall performance characteristics for the application shown. Color as selected by architect.

Compatibility: Before purchase of any filler or gasket material, confirm that it is compatible with the substrate, sealants and other materials used in the joint system.

Adhesives: Pressure sensitive adhesives, compatible with each material in the joint system, may be applied (at installers option) to one face of joint fillers and gaskets to facilitate installation and permanent anchorage in place. Do not allow adhesives to contaminate sealant bond surfaces in the joint system.

Apply sealant with a gun with proper size nozzles or with a knife as required. Use sufficient pressure to fill all voids and joints solid to the back-up material.

Surface of sealant shall be a full smooth bead, free of ridges, wrinkles, sags, air pockets and imbedded purities.

After all joints have been completely filled, they shall be neatly tooled to eliminate air pockets or voids, and to provide a smooth, neat appearance.

Immediately clean adjacent materials which have been soiled, leave work in a neat, clean condition. All joints to be watertight at completion of the project.

079201 JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of Contract, including General and any Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. The extent of each form and type of joint sealer is indicated on drawings and by provisions of this section.

B. The applications for joint sealers as work of this section include but are not limited to the following:

Paving joints.

C. General Performance: Except as otherwise indicated, joint sealers are required to establish and maintain airtight and water proof continuous seals on a permanent basis, within recognized limitations of wear and aging as indicated for each application. Failures of installed sealers to comply with this requirement will be recognized as failures of materials and workmanship.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's product specifications handling/installation/ curing instructions and performance tested data sheets for each elastomeric product required.

1.4 JOB CONDITIONS:

A. Installation Conditions: Do not proceed with installation of liquid sealants under unfavorable conditions. Install elastomeric sealants when temperature is in lower third of temperature range recommended by manufacturer for installation.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. General: Manufacturers listed in this article include those known to produce the indicated category of prime joint sealer material, either as a nominally pure generic product or as an equivalent-performance modification thereof or proprietary product.

B. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

Manufacturers of Elastomeric Sealants (Liquid):

Pecora Corp.; Harleysville, PA
Sonneborn/Contech, Inc.; Minneapolis, MN
Tremco, Inc.; Cleveland, Ohio

Manufacturers of Sealant Backers:

As Recommended by Sealant Manufacturer.

2.2 MATERIALS:

A. General Sealer Requirements: Provide colors indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors. Select materials for compatibility with joint surfaces and other indicated exposures, and except as otherwise indicated select modulus of elasticity and hardness or grade recommended by manufacturer for each application indicated. Where exposed to foot traffic, select nontracking materials of sufficient strength and hardness to withstand stiletto heel traffic without damage or deterioration of sealer system.

B. Elastomeric Sealants:

C. Multi-Component Polyurethane Sealant: Except as otherwise indicated, provide manufacturer's standard, non-modified, 2-or-more-part, polyurethane-based, elastomeric sealant; complying with either ASTM C 920 Type M Class 25, or FS TT-S-00227E Class A; self-leveling grade/type where used in joints of surfaces subject to traffic, otherwise nonsag grade/type.

D. Single-Component Polyurethane Sealant: Except as otherwise indicated, provide manufacturer's standard, nonmodified, one-part polyurethane-based, air-curing, elastomeric sealant; complying with either ASTM C 920 Type S Class 25, or FS TT-S-00230C Class A; self-leveling grade/type where used in joints of surfaces subject to traffic, otherwise nonsag grade/type.

E. Miscellaneous Materials:

F. Joint Primer/Sealer: Provide type of joint primer/sealer recommended by sealant manufacturer for joint surfaces to be primed or sealed.

G. Bond Breaker Tape: Provide polyethylene tape or other plastic tape as recommended by sealant manufacturer, to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape where applicable.

H. Sealant Backer Rd: Provide compressible rod stock of polyethylene foam, polyurethane foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable nonabsorptive material as recommended by sealant manufacturer for back-up of and compatibility with sealant.

3.1 INSPECTION:

A. Installer must examine substrates, (joint surfaces) and conditions under which joint sealer work is to be performed, and must notify Contractor in writing of unsatisfactory conditions. Do not proceed with joint sealer work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 JOINT PREPARATION:

A. Clean joint surfaces immediately before installation of gaskets, sealants or caulking compounds. Remove dirt, insecure coatings, moisture and other substrates which could interfere with seal of gasket or bond of sealant or caulking compound. Etch concrete and masonry joint surfaces as recommended by sealant manufacturer. Roughen vitreous and glazed joint surfaces as recommended by sealant manufacturer.

B. Prime or seal joint surfaces where indicated, and where recommended by sealant manufacturer. Confine primer/sealer to areas of sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION:

A. Elastomeric Sealant Installation Standard: Comply with ASTM C 962.

B. Comply with manufacturer's printed instructions except where more stringent requirements are shown or specified, and except where manufacturer's technical representative directs otherwise.

C. Install sealant backer rod for liquid-applied sealants, except where shown to be omitted or recommended to be omitted by sealant manufacturer for application indicated.

D. Install bond breaker tape where required by manufacturer's recommendations to ensure that liquid-applied sealants will perform as intended.

E. Employ only proven installation techniques, which will ensure that sealants are deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.

F. Install liquid-applied sealant to depths as recommended by sealant manufacturer.

G. Spillage: Do not allow sealants or compounds to overflow from confines of joints, or to spill onto adjoining work, or to migrate into voids of exposed finishes. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.

3.4 CURE AND PROTECTION:

A. Cure sealants in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability. Advise Contractor of procedures required for cure and protection of joint sealers during construction period, so that they will be without deterioration or damage (other than normal wear and weathering) at time of substantial completion. Cure and protect sealants in a manner which will minimize increases in modulus of elasticity and other accelerated aging effects. Replace or restore sealants which are damaged or deteriorated during construction period.

END OF SECTION 07901

079200 JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of Contract, including General and any Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. The extent of each form and type of joint sealer is indicated on drawings and by provisions of this section.

B. The applications for joint sealers as work of this section include but are not limited to the following:

Paving joints.

C. General Performance: Except as otherwise indicated, joint sealers are required to establish and maintain airtight and water proof continuous seals on a permanent basis, within recognized limitations of wear and aging as indicated for each application. Failures of installed sealers to comply with this requirement will be recognized as failures of materials and workmanship.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's product specifications handling/installation/ curing instructions and performance tested data sheets for each elastomeric product required.

1.4 JOB CONDITIONS:

A. Installation Conditions: Do not proceed with installation of liquid sealants under unfavorable conditions. Install elastomeric sealants when temperature is in lower third of temperature range recommended by manufacturer for installation.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. General: Manufacturers listed in this article include those known to produce the indicated category of prime joint sealer material, either as a nominally pure generic product or as an equivalent-performance modification thereof or proprietary product.

B. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

Manufacturers of Elastomeric Sealants (Liquid):

Pecora Corp.; Harleysville, PA
Sonneborn/Contech, Inc.; Minneapolis, MN
Tremco, Inc.; Cleveland, Ohio

Manufacturers of Sealant Backers:

As Recommended by Sealant Manufacturer.

2.2 MATERIALS:

A. General Sealer Requirements: Provide colors indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors. Select materials for compatibility with joint surfaces and other indicated exposures, and except as otherwise indicated select modulus of elasticity and hardness or grade recommended by manufacturer for each

application indicated. Where exposed to foot traffic, select nontracking materials of sufficient strength and hardness to withstand stiletto heel traffic without damage or deterioration of sealer system.

B. Elastomeric Sealants:

C. Multi-Component Polyurethane Sealant: Except as otherwise indicated, provide manufacturer's standard, non-modified, 2-or-more-part, polyurethane-based, elastomeric sealant; complying with either ASTM C 920 Type M Class 25, or FS TT-S-00227E Class A; self-leveling grade/type where used in joints of surfaces subject to traffic, otherwise nonsag grade/type.

D. Single-Component Polyurethane Sealant: Except as otherwise indicated, provide manufacturer's standard, nonmodified, one-part polyurethane-based, air-curing, elastomeric sealant; complying with either ASTM C 920 Type S Class 25, or FS TT-S-00230C Class A; self-leveling grade/type where used in joints of surfaces subject to traffic, otherwise nonsag grade/type.

E. Miscellaneous Materials:

F. Joint Primer/Sealer: Provide type of joint primer/sealer recommended by sealant manufacturer for joint surfaces to be primed or sealed.

G. Bond Breaker Tape: Provide polyethylene tape or other plastic tape as recommended by sealant manufacturer, to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape where applicable.

H. Sealant Backer Rd: Provide compressible rod stock of polyethylene foam, polyurethane foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable nonabsorptive material as recommended by sealant manufacturer for back-up of and compatibility with sealant.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Installer must examine substrates, (joint surfaces) and conditions under which joint sealer work is to be performed, and must notify Contractor in writing of unsatisfactory conditions. Do not proceed with joint sealer work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 JOINT PREPARATION:

A. Clean joint surfaces immediately before installation of gaskets, sealants or caulking compounds. Remove dirt, insecure coatings, moisture and other substrates which could interfere with seal of gasket or bond of sealant or caulking compound. Etch concrete and masonry joint surfaces as recommended by sealant manufacturer. Roughen vitreous and glazed joint surfaces as recommended by sealant manufacturer.

B. Prime or seal joint surfaces where indicated, and where recommended by sealant manufacturer. Confine primer/sealer to areas of sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION:

A. Elastomeric Sealant Installation Standard: Comply with ASTM C 962.

B. Comply with manufacturer's printed instructions except where more stringent requirements are shown or specified, and except where manufacturer's technical representative directs otherwise.

C. Install sealant backer rod for liquid-applied sealants, except where shown to be omitted or recommended to be omitted by sealant manufacturer for application indicated.

D. Install bond breaker tape where required by manufacturer's recommendations to ensure that liquid-applied sealants will perform as intended.

E. Employ only proven installation techniques, which will ensure that sealants are deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.

F. Install liquid-applied sealant to depths as recommended by sealant manufacturer.

G. Spillage: Do not allow sealants or compounds to overflow from confines of joints, or to spill onto adjoining work, or to migrate into voids of exposed finishes. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.

3.4 CURE AND PROTECTION:

A. Cure sealants in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability. Advise Contractor of procedures required for cure and protection of joint sealers during construction period, so that they will be without deterioration or damage (other than normal wear and weathering) at time of substantial completion. Cure and protect sealants in a manner which will minimize increases in modulus of elasticity and other accelerated aging effects. Replace or restore sealants which are damaged or deteriorated during construction period.

END OF SECTION 07900

08 DOORS & WINDOWS

08100 HOLLOW METAL DOORS AND FRAMES

Part 1. General

Scope of Work:

Furnish and install all door frames, transom frames, window frames and doors indicated on the drawings as hollow metal. Include all reinforcement for hardware, anchors, clips, screws, fasteners, cutouts, louvers and other accessories indicated or required. This contractor shall examine the drawings and shall provide doors and frames of proper size and type for each opening whether specifically scheduled or not. Where no specific door or frame is scheduled, provide doors and frames of type scheduled for similar openings.

Part 2. Products

Standards: Comply with the requirements of steel door institute "recommended specifications for standard steel doors and frames" (SDI-100), and as herein specified.

Submittals: With manufacturer's standard details and specifications for hollow metal work, submit shop drawings showing application to project, as required.

Manufacturer: A recognized producer of hollow metal work complying with the requirements, including any one of the following:

Amweld bldg. products div.
Ceco corp.
Dittco national steel products co.
Mesker ind., inc.
Republic steel corp.
Steel craft mfg. co.

Fire rated assemblies: Provide units that display appropriate ul labels for fire-rating indicated.

Materials: Comply with SDI-100 and unless otherwise indicated shall be as follows:

Interior doors and frames: Hot-rolled, pickled oiled and per ASTM A 569; cold-rolled per ASTM A 366 and A 568.

Interior borrowed lites and frames: Cold rolled carbon steel of commercial quality complying with ASTM A366-72- not less than 14 GA., phosphate treated and baked with factory primer. exterior doors and frames: galvanized sheets, ASTM A 526 with ASTM A 525, G 60 zinc coating, mill phosphatized.

Anchors and Accessories: Manufacturer's standard units.
Use galvanized items for units built into exterior walls, complying with ASTM A 153.

Fabrication: Fabricated units shall be rigid, neat in appearance, and free from defects, warp or buckle. Weld exposed joints continuously, grind, dress and make smooth, flush and invisible. door edges may be continuous lock hemmed.

Prepare hollow metal units to receive mortised and concealed finish hardware, including cutouts, reinforcing, drilling and tapping, complying with ANSI 115 "specifications for door and frame preparation for hardware".

Reinforce units to receive surface-applied finish hardware to be field applied.

Locate finish hardware as indicated or, if not indicated, per NBHA "recommended locations for builder's hardware.

Shop paint exposed surfaces of hollow metal units, including galvanized surfaces, shall be phosphatized and given one coat of baked-on rust-inhibitive primer.

Doors: doors shall be of the type indicated on the door schedule and unless otherwise noted shall be the following gauges:

Exterior doors 18 gage
Interior doors 20 gage

Core construction shall be polystyrene slab, honeycomb or foamed urethane with a tested u valve of not greater than 0.24 and an STC rating of not less than 35.

Provide sight proof louvers for interior doors where indicated, constructed of 24 gage steel v-shaped or y-shaped blades, set into 20 gage steel frame.

For fire-rated doors, provide tightly fitted, spring loaded, automatic closing louvers, with operable blades retained by fusible links. Rating label same as door units.

Provide 14 GA. weatherproof astragals for all exterior pairs of doors.

Frames: Shall be of the types and styles indicated on the door schedule and unless otherwise indicated shall be the following gages:

Exterior doors 16 gage
Interior doors 18 gage

Frames for drywall partitions shall be of the return bend type, equipped with floor runner anchors and screw.

Adjustable anchors one each jamb. Overall frame width shall be one inch greater than the net finished wall thickness to be accommodated.

Frames for masonry and similar walls where frame width is less than wall thickness shall be (5 3/4"for 6"cmu & 7-3/4' for 8" cmu 11-3/4" for 12" cmu) wide double rabbeted or 4" wide single rabbeted, unless otherwise indicated.

Frames shall be fitted with three anchors per jamb of proper type for wall construction indicated.

Provide standard hollow metal frames for doors, transoms, sidelights, borrowed lights, and other openings as indicated.

Prepare frames to receive three silencers on strike jambs of single-swing frames and on heads of double-swing frames.

Provide 26 gage steel plaster guards or mortar boxes, welded to frame, at back of hardware cutouts where installed in concrete, masonry or plaster openings.

Protect inside faces of frames in plaster or masonry with high-build fibered asphalt emulsion coating.

Part 3 Execution

Installation: Install hollow-metal units in accordance with manufacturer's instructions and final shop drawings. fit doors to frames and floors with clearances specified in SDI-100.

Install fire-rated units in accordance with NFPA standard NO. 80.

Finish hardware is specified elsewhere in this division.

08213 - PLASTIC LAMINATE FACED WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General, Supplementary and Special Conditions and other Division 1 Specification Sections, apply to this Section.
B. Refer to Instructions to Proposers for substitutions of materials and products.
C. Addenda issued during the proposal period that affect this section of the specifications.

1.2 SUBMITTALS

A. Manufacturer's specifications and other data of all products proposed to be furnished as needed to prove compliance with specified requirements. Submit Manufacturer's data sheets, completely describing door construction.

C. Shop Drawings: show or schedule location, size, thickness, elevation, details of construction, location and extent of hardware blocking, fire rating and other pertinent data for each door required.
D. Manufacturer's installation instructions.

E. Samples of plastic laminate colors and patterns for Architect's approval.

1.3 RELATED WORK

A. Section 08110 – Hollow Metal doors and Frames
B. Section 08710 – Finish Hardware

1.4 REFERENCES

A. Underwriters Laboratories:

01 UL Label Fire Door

B. National Fire Protection Association:

01 NFPA Pamphlet No. 80 "Fire Doors and Windows"

C. Architectural Woodwork Institute

1.5 QUALITY ASSURANCE

A. High pressure decorative laminate faced doors shall conform to the latest edition of the following standards:

01 WDMA I.S. 1-A
02 AWI Standards and requirements for "Premium Grade".

B. Tolerances for warp, telegraphing, squareness, and pre-fitting dimensions as per the latest edition of WDMA I.S. 1-A

C. Each door shall bear an identifying label indicating the manufacturer, door number and order number, as well as fire rating where applicable.

D. Where fire rated doors are required, provide labeled doors. Construction details and hardware application shall be as approved by the labeling agency.

1.6 WARRANTY

A. All doors shall be warranted for the life of the door under normal use against material defects, warping, and delamination of laminate facing and becoming unserviceable.

B. Any defects noted during the warranty period shall be corrected at no cost to the building owner. Such corrective work shall include all labor and material for repair, replacement, refinishing and re-hanging as required.

C. Provide manufacturer's executed, written lifetime warranty with close-out documentation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Solid Core Wood Doors:
01 Thickness: 1-3/4 inch
02 Core Material: Particle Board Core for non-rated and 20-minute fire-rated doors; mineral for 1-1/2 hour-rated doors.
03 Density: 28-32 lb PCF. Comply with particleboard standard ANSI A208.1, Grade 1-LD-2.
04 Door Stiles: minimum 1-3/8 inch Structural Composite Lumber (SCL) with minimum 1/16" hardwood veneer suitable for staining or painting to approximate plastic laminate finish as selected by the Architect. HDPL stiles shall not be acceptable.
05 Door Rail: minimum 1-3/8 inch Structural Composite Lumber (SCL). Minimum 5 inch head rail at all doors to receive a closer. Rails shall be sealed with a clear sealer. Where head rail may be visible from a second story vantage point, head rail shall be stained or painted to match stiles.
06 Glass Lite Frames / Stops: Metal type with painted finish. Coordinate with other trades as required.
07 Seal top, bottom and cut surface of openings at factory with two coats of varnish.
08 Vertical door edges shall be factory painted / stained to match door face. Factory shall supply matching paint / stain and edges shall be touched-up in field.

B. Plastic Laminate

01 Vertical grade, 1/16 inch thick.

02 Finish shall be as selected by the Architect from manufacturer's full range of colors and finishes.

03 Laminate shall be applied to the core by a hot press method using Type 1 exterior grade, water resistant adhesive.

2.2 MANUFACTURERS

A. Doors:

01 Alfab, Inc.
02 Marlite
03 Mengel Wood Industries, Inc.
04 Ragland Manufacturing Co.
05 VT Industries, Inc.
06 Weyerhaeuer
07 Laminating, Inc.
08 Graham Manufacturing Co.

B. Plastic Laminate:

01 Ralph Wilson Plastics, "Wilsonart"
02 Formica Corp., "Formica"

PART 3 - EXECUTION

3.1 INSTALLATION

A. Carefully verify that doors are properly installed at intended door location and that door prep for finish hardware is accurate and complete.

B. Install all doors plumb and square to frame with +/- 1/8" clearance between door and frame.

C. Install finish hardware in accordance with approved templates.

D. Verify that top and bottom rails are sealed prior to door installation.

E. Take all necessary precautions to protect door finishes before, during and after installation. In the event of damage to the plastic laminate surfacing, replace door.

F. Do not strip heads of Phillips head screws. Remove and replace all stripped screws.

G. Upon completion of door installation, cycle door several times to confirm that door, frame and hardware are all installed and functioning correctly.

END OF SECTION

08360 SECTIONAL OVERHEAD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Insulated Sectional Overhead Doors.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-In-Place Concrete: Prepared opening in concrete. Execution requirements for placement of anchors in concrete wall construction.

B. Section 04810 - Unit Masonry Assemblies: Prepared opening in masonry. Execution requirements for placement of anchors in masonry wall construction.

C. Section 05500 - Metal Fabrications: Steel frame and supports.

D. Section 06114 - Wood Blocking and Curbing: Rough wood framing and blocking for door opening.

E. Section 07900 - Joint Sealers: Perimeter sealant and backup materials.

F. Section 08710 - Door Hardware: Cylinder locks.

G. Section 09900 - Paints and Coatings: Field painting.

H. Section 11150 - Parking Control Equipment: Remote door control.

I. Section 16130 - Raceway and Boxes: Empty conduit from control station to door operator.

J. Section 16150 - Wiring Connections: Electrical service to door operator.

1.3 REFERENCES

A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

B. ASTM A 123 – Zinc hot-dipped galvanized coatings on iron and steel products.

C. ASTM A 216 - Specifications for sectional overhead type doors.

D. ASTM A 229 - Steel wire, oil-tempered for mechanical springs.

E. ASTM A 653 - Steel sheet, zinc-coated galvanized by the hot-dipped process, commercial quality.

F. ASTM D 1929 - Ignition temperature test to determine flash and ignition temperature of foamed plastics.

G. ASTM E 84 - Tunnel test for flame spread and smoke developed index.

H. ASTM E 330 - Structural performance of exterior windows, curtain walls, and doors by uniform static air pressure difference.

I. ASTM E 413 - Classification for Rating Sound Insulation

J. ASTM E 1332 - Standard Classification for Rating Outdoor-Indoor Sound Attenuation.

K. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
1. Shall Comply w/ IBC Code 2012 for Windloads

B. Wiring Connections: Requirements for electrical characteristics.
1. 115 volts, single phase, 60 Hz.
2. 230 volts, single phase, 60 Hz.
3. 230 volts, three phase, 60 Hz.
4. 460 volts, three phase, 60 Hz.

ASK MEP

C. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Operation and Maintenance Data.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened labeled packaging until ready for installation.

B. Protect materials from exposure to moisture until ready for installation.

C. Store materials in a dry, ventilated weathertight location.

1.8 PROJECT CONDITIONS

A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1.9 WARRANTY

A. Warranty: Manufacturer's limited door and operators System warranty for 10 year against cracking, splitting or deterioration of steel skin due to rust-through for 7 years.

B. Warranty: Manufacturer's limited door and operators System warranty for 10 year against cracking, splitting or deterioration due to rust-through.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer:
1. Wayne Dalton; 2501 S. State Highway 121 Business, Suite 200, Lewisville, TX 75067. ASD. Phone: (800) 827-3667; Web Site: www.wayne-dalton.com. Email: info@wayne-dalton.com.
2. Door Engineering & Manufacturing LLC: 400 W Cherry St, Kasota, MN 56050, Phone: (507) 931-6910 Web Site: http://doorengineering.com/
3. Overhead Door : 2501 South State Highway 121 Bus. Suite 200 Lewisville, TX 75067, Phone: **800-275-3290** Web Site: http://www.overheaddoor.com

B. Substitutions: Contractor shall submit substitutions that comply with spec.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 INSULATED SECTIONAL OVERHEAD DOORS

A. Insulated Steel Sectional Overhead Doors: Wayne Dalton ThermoMark 5150 insulated sectional overhead steel doors. Units shall have the following characteristics: Type D2: Flush Panel Sectional Door w/ Clear I Glazing Model 5150 and Type D3: Flush Panel Sectional Door Model 5150 Re Sheet A-400
1. Door Sections: Shall be of steel/polyurethane/steel sandwich type construction with thermal break.
a. Panel Thickness: 1-3/8 inches (34.92 mm).
b. Exterior Surface: Raised panel with non-repeating wood grain texture.
c. Exterior Steel: .015 inch (0.38 mm), hot-dipped galvanized.
d. Sections roll formed with two 1-3/4 inch integral struts sealed with polypropylene rib caps per section.
e. Thermal Values: R-value of 12.12; U-value of 0.0825.
f. Air Infiltration: 0.23 cfm at 15 mph.

g. Sound transmission class 20 when tested in accordance with ASTM E 413.
h. Outdoor-indoor transmission class 20 when tested in accordance with ASTM E 1332.
i. Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.
1) Insulated sections tested in accordance with ASTM E 84 and achieve a Flame spread Index of 10 or less, and a Smoke Developed Index of 210 or less.
2) Insulation material tested in accordance with ASTM D 1929 and achieve a minimum Flash Ignition temperature of 734 degrees F, and a minimum Self Ignition temperature of 950 degrees F.
3) Insulated sections shall meet all requirements of the UBC 17-5 corner burn.
j. Ends: Hot-dipped galvanized steel, full height with end caps.
1) 16 gauge.
k. Spring Counterbalance: Sized to weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of die cast aluminum with high strength galvanized aircraft cable. Sized with a minimum 5 to 1 safety factor.

1) High cycle spring: 100,000 cycles.

l. Pass-Door:
1) Provide with optional pass door.
m. ThermoLite Glazing of Steel Panels:
1) 1/8 inch (3 mm) Double Strength glass.
2) 1/8 inch (3 mm) Acrylic (Plexiglass) glazing.
3) 1/8 inch (3 mm) Tempered glass.
4) 1/8 inch (3 mm) Polycarbonate (Lexan) glazing.
5) 1/4 inch (6 mm) Tempered glass.
6) 1/4 inch (6 mm) Acrylic (Plexiglass) glazing.
7) 1/4 inch (6 mm) Polycarbonate (Lexan) glazing.
8) 1/2 inch (12.5 mm) Double Insulating glass.
9) 1/2 inch (12.5 mm) Tempered Double Insulating glass.
10) 1/4 inch (6 mm) Plate glass.
11) 1/4 inch (6 mm) Polished wire glass.
12) 1/4 inch (6 mm) Twin-Wall Polycarbonate (clear, bronze, white).
13) 3/8 inch (9.5 mm) Twin-Wall Polycarbonate (clear, bronze, white).
14) 5/8 inch (15.87 mm) Triple-Wall Polycarbonate (clear, bronze, white).
n. Partial Glazing of Steel Panels:
1) Thermolite double insulated SSB set in 2-piece high-impact polymer frame.
2) Tempered Thermolite.
3) StyleLine Lite Colonial SSB.
o. Single Panel Lite:
1) 1/4 inch (6 mm) Tempered glass.
2) 1/4 inch (6 mm) Acrylic (Plexiglass) glazing.
3) 1/4 inch (6 mm) Polycarbonate (Lexan) glazing.
4) 1/4 inch (6 mm) Polished wire glass.
p. Colonial Style SSB with High Impact Polymer Frame:
2. Finish and Color:
a. Two coat baked-on polyester:
1) Interior color, white.
2) Exterior color, white.
3. Windload Design: Provide to meet the Design/Performance requirements specified.
4. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.

5. Lock:
   e. Locking mechanism designed to maintain security for exterior while permitting break out when impacted from the inside.
6. Weatherstripping:
   a. Flexible bulb-type strip at bottom section.
   b. Flexible Jamb seals.
   c. Flexible Header seal.
7. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
   a. Size:
      1) 2 inch (51 mm).
      2) 3 inch (76 mm).
   b. Type:
      1) Standard lift.
      2) Vertical lift.
      3) High lift.
      4) Low headroom.
      5) Follow roof slope.
   c. Horizontal track shall be reinforced with continuous angle of adequate length and gauge to minimize deflection.
   d. Vertical track shall be graduated to provide wedge type weathertight closing with continuous angle mounting for steel or wood jambs, and shall be fully adjustable to seal door at jambs.
8. Electric Motor Operation: Provide UL listed electric operator, equal to Genie Commercial Operators, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.
   a. Medium Duty
      1) Model MH – hoist
      2) Model MT – trolley
      3) Model MJ - jackshaft
   b. Standard Duty
      1) Model H – hoist
      2) Model T – trolley
      3) Model J – jackshaft

   c. Heavy Duty
      1) Model GT - trolley
   d. Entrapment Protection: Required for momentary contact, includes radio control operation.
      1) Photoelectric sensors monitored to meet UL 325/2010.
   e. Operator Controls:
      1) Push-button operated control stations with open, close, and stop buttons.
      4) Flush mounting.
      5) Surface mounting.
      6) Interior location.
      7) Exterior location.
      8) Both interior and exterior location.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until openings have been properly prepared.

B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

C. Verify electric power is available and of correct characteristics.

D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.

B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.

C. Anchor assembly to wall construction and building framing without distortion or stress.

D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

E. Fit and align door assembly including hardware.

F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

G. Instruct Owner’s personnel in proper operating procedures and maintenance schedule.

3.4 ADJUSTING

A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion

B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

A. Clean doors, frames and glass using non-abrasive materials and methods recommended by manufacturer.

B. Remove labels and visible markings.

C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

B. Protect installed products until completion of project.

END OF SECTION

084113 ALUMINUM-FRAMED ENTRACES AND STOREFRONTS (190/350/500 ENTRANCES)

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS (500 ENTRANCES)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes Kawneer Aluminum Entrances, glass and glazing, and door hardware and components.

1. Types of Kawneer Aluminum Entrances include:
   a. 500 Swing Door; Wide stile, 5" (127 mm) vertical face dimension, 1-3/4" (44.5 mm) depth, high applications.

B. Related Sections:

1. Division 084113 "Aluminum-Framed Entrances and Storefronts"
2. Division 084313 "Aluminum-Framed Storefronts"
3. Division 084413 "Glazed Aluminum Curtain Walls"
4. Division 087000 "Hardware"
5. Division 088000 "Glazing"

1.3 DEFINITIONS

A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural
Manufactures Association (AAMA) – AAMA Glossary (AAMA AG).

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed storefront system shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Design Wind Loads: Determine design wind loads applicable to the Project from basic wind speed indicated in miles per hour, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
   a. Basic Wind Speed (MPH): 120
   b. Exposure Category (A, B, C, D): C

B. Aluminum Framed Entrance Performance Requirements:

1. Wind loads: Provide storefront system; include anchorage, capable of withstanding adequate wind load design pressures in accordance with International Building Code;

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2. Air Infiltration: For single acting offset pivot or butt hung entrances in the closed and locked position, the test specimen shall be tested in accordance with ASTM E 283 at a pressure differential of 6.24 psf (300 Pa) for single doors and 1.567 psf (75 PA) for pairs of doors. A single 3'0" x 7'0" (915 mm x 2134 mm) entrance door and frame shall not exceed 0.50 cfm per square foot. A pair of 6'0" x 7'0" (1830 mm x 2134 mm) entrance doors and frame shall not exceed 1.0 cfm per square foot.
3. Structural Performance: Corner strength shall be tested per the Kawneer dual moment load test procedure and certified by an independent testing laboratory to ensure weld compliance and corner integrity [Testing procedure and certified test results available upon request].

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, and fabrication methods, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum-framed entrance door indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.

C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.

D. Samples for Verification: For sliding aluminum-framed glass door and components required.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type, class, grade, and size of aluminum-framed entrance doors. Test results based on use of downsized test units will not be accepted.

F. Warranty: Special warranty specified in this Section.

G. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12" (300 mm) lengths of full-size components and showing details of the following:

1. Joinery, including welds.
2. Anchorage.
3. Expansion provisions.
4. Glazing.

H. Other Action Submittals:

1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of

similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum-framed entrance doors and storefronts that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Source Limitations: Obtain sliding aluminum-framed glass door through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum-framed glass entrance doors and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements." Do not modify size and dimensional requirements.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup for type(s) of swing entrance door(s) indicated, in location(s) shown on Drawings.

F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of sliding aluminum-framed glass door openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.8 WARRANTY

A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty.

1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product:

1. Kawneer Company Inc.

2. The door stile and rail face dimensions of the 500 entrance door will be as follows

Door	**Vertical Stile**	**Top Rail**	**Bottom Rail**
500	5" (127 mm)	5" (127 mm)	10" Minimum

3. Major portions of the door members to be 0.125" (3.2) nominal in thickness and glazing molding to be 0.05" (1.3) thick.

4. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.

5. Provide adjustable glass jacks to help center the glass in the door opening.

B. Substitutions: Refer to Substitutions Section for procedures and submission requirements

1. Pre-Contract (Bidding Period) Substitutions: Submit written requests ten (10) days prior to

Proposal date.

2. Post-Contract (Construction Period) Substitutions: Submit written request in order to avoid storefront installation and construction delays.
3. Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
4. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for storefront system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum storefronts for a period of not less than ten (10) years. (Company Name)

5. Test Reports: Submit test reports verifying compliance with each test requirement required by the project.
6. Samples: Provide samples of typical product sections and finish samples in manufacturer's standard sizes.

C. Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by sliding aluminum-framed glass door manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.090" wall thickness at any location for the main frame and sash members.

B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with sliding aluminum-framed glass door members, trim hardware, anchors, and other components.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

1. Weather Seals: Provide weather stripping with integral barrier fin or fins of semi-rigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.

2.3 STOREFRONT FRAMING SYSTEM

A. Storefront Entrance Framing (Trifab® VG 450/451):
   1. Thermally Broken entrance Framing - Kawneer IsoLock® Thermal Break with a 1/4" (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.
      a. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.
B. Non-Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.
D. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
E. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
F. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

2.4 GLAZING

a. Glazing: As specified in Division 08 Section "Glazing."
b. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.
c. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
d. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

2.5 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely aluminum-framed entrance doors.

B. Standard Hardware:
   1. Weatherstripping:
      a. Meeting stiles on pairs of doors shall be equipped with an adjustable astragal utilizing wool pile with polymeric fin.
      b. The door weathering on a single acting offset pivot or butt hung door and frame (single or pairs) shall be Kawneer Sealair® weathering. This is comprised of a thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.
   2. Sill Sweep Strips: EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners

(Necessary to meet specified performance tests).

3. Threshold: Extruded aluminum, one piece per door opening, with ribbed surface.
4. All other hardware to be provided and installed by door hardware provider. Ref. to Door Hardware section herein. Coordinate any and all required cutouts, holes, electrical wiring, etc.. with hardware provider;

2.6 FABRICATION

A. Fabricate aluminum-framed glass entrance doors in sizes indicated. Include a complete system for assembling components and anchoring doors.

B. Fabricate aluminum-framed glass doors that are reglazable without dismantling perimeter framing.

1. Door corner construction shall consist of mechanical clip fastening, SIGMA deep penetration plug welds and 1-1/8" (29 mm) long fillet welds inside and outside of all four corners. Glazing stops shall be hook-in type with EPDM glazing gaskets reinforced with non-stretchable cord.
2. Accurately fit and secure joints and corners. Make joints hairline in appearance.
3. Prepare components with internal reinforcement for door hardware.
4. Arrange fasteners and attachments to conceal from view.

C. Weather Stripping: Provide weather stripping locked into extruded grooves in door panels or frames as indicated on manufactures drawings and details.

2.7 FINISHES, GENERAL

A. Comply with AAMA-AFPA "Anodic Finishes/Painted Aluminum" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Factory Finishing:

1. Kawneer Permanodic® AA-M10C22A31, AAMA 611, Architectural Class II Clear Anodic Coating (Color #17 Clear) (Standard).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other

conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight sliding door installation.

1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.
3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum swing entrance doors, hardware, accessories, and other components.

B. Install aluminum swing entrance doors level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill threshold in bed of sealant, as indicated, for weather tight construction.

D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Clean aluminum surfaces immediately after installing aluminum framed storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

08710 DOOR HARDWARE

PART 1 – GENERAL:

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including general and supplementary conditions and Division 01 specification sections, apply to this section.

1.2 SUMMARY

A. General – this section includes items known commercially as finish or door hardware that are required for swing, sliding, overhead and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed. This section includes (but is not limited to) the following:

1. Hinges and pivots
2. Key control system
3. Lock cylinders and keys
4. Lock and latch sets
5. Bolts and coordinators
6. Exit devices
7. Push/pull units
8. Closers, door control devices, and electromagnetic hold open devices
9. Stops and overhead holders
10. Door trim units
11. Protection plates
12. Weatherstripping, fire, and smoke seals
13. Astragals and meeting seals on pairs of doors
14. Thresholds, gasketing, and door bottoms
15. Miscellaneous devices
16. Electrified hardware devices, controls, power supplies, transfers, and wiring diagrams

B. Related sections – contain requirements that relate to this section (but are not limited to those listed):

1. Division 00 and 01 section(s) for sustainable material requirements, windstorm/hurricane code compliance, and blast resistance.
2. Division 06 section(s) for interior architectural woodwork cabinet hardware.
3. Division 08 and 10 section(s) for <u>all</u> opening hardware requirements including but not limited to coordination and matching efforts, template requirements, and keyed security.
   a. <u>All hardware for aluminum storefront swinging doors shall be supplied by this section's Supplier if not specifically specified in aluminum storefront section.</u>
   b. <u>All cylinders for locks on overhead type doors, folding doors, wire-mesh sliding doors, accordion type doors, and gates to be provided under this section, unless specifically called out to be provided by others in respective sections.</u>
4. Divisions 13 and 16 section(s) for access control, fire alarm integrated systems, electrical provisions, and radiation/radio frequency shielding requirements for hardware.

C. References – as specified in this section are subject to the following standards in the most recent code revisions as approved by local building code and as applicable to plan:

1. ADA. The Americans with Disabilities Act – "Title III – Public Accommodations".
2. ANSI-A117.1. American National Standards Institute – "Accessible and Usable Buildings and Facilities".

3. ANSI/BHMA-156 Series. American National Standards Institute/Builders Hardware Manufacturing Association – "Builders Hardware Standards".
4. ANSI A250.13. American National Standards Institute – "Testing and Rating of Severe Windstorm Resistant Components for Swinging Door Assemblies."
5. ASTM E330/E1886/E1996. American Society for Testing and Materials – "Uniform Static Air Pressure Difference" / "Cyclic Pressure Differentials"/ "Impacted by Windborne Debris in Hurricanes".
6. IBC. International Building Code.
7. NEC. National Electrical Code.
8. NFPA-80. National Fire Protection Agency – "Standard for Fire Doors and Windows".
9. NFPA-101. National Fire Protection Agency – "Life Safety Code".
10. State and Local Codes including Authority Having Jurisdiction.
11. UFAS. Uniform Federal Accessibility Standards.
12. UL. Underwriter's Laboratories Testing Services.
13. UL-10C. Underwriter's Laboratories – "Positive Pressure Tests of Door Assemblies".
14. WHI. Warnock Hersey International Testing Services.

1.3 HARDWARE SUPPLIER RESPONSIBILITIES

A. Under the direction of Architect and Hardware Door Consultant to:

1. Pre-install meeting – provide a pre-installation training meeting for hardware Installer(s) and General Contractor at the job site one (1) week prior to installation of finish hardware.

2. Instruct Owner – provide a minimum of four (4) hours of key control instructions per project for training Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes at project conclusion training.

3. Certify install – at the completion of all work, with Installer(s), General Contractor, and manufacturer's representative(s), inspect and supervise the adjustment of any piece of hardware not operating or installed correctly, certify in writing that all hardware has been installed per manufacturer's requirements, and provide a written punch list directly to Architect of all outstanding items not completed.

4. Follow-up inspection – approximately six (6) months after the date of substantial completion, meet with representatives of the General Contractor, Installer(s), Owner, and lock, exit, and closer manufacturers, at project site for the following:

   a. Examine and re-adjust each item of door hardware as necessary to restore function of doors and hardware to comply with specified requirements.
   b. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures.
   c. Replace hardware items that have deteriorated or failed due to faulty design, materials, or installation of hardware units.
   d. Prepare a written report for Owner and Architect of current and predictable problems (of substantial nature) in the performance of the hardware.

1.4 SUBMITTALS

A. Submittals – submit the following in accordance with conditions of contract and Division 01 specification sections within two (2) weeks of receipt of an executed purchase order and contract documents.

1. Product data – manufacturer's technical data for each item of door hardware, installation and mounting instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

   a. Include templates for doors, frames, and other work specified to be factory prepared for the installation and preparation of door hardware. Contractor to check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

2. Schedule layout – coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

3. Schedule content – based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of each item required for every door or opening. Include the following information:

   a. Type, style, function, size, and finish of each hardware item.
   b. Model name and manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of each hardware set cross-referenced to indications on drawings both on floor plans and in door and frame schedule.
   e. Explanation of all abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for hardware.
   g. Degree of opening required for all doors with closers.
   h. Door and frame handing, sizes, and materials.
   i. Keying information.
   j. Supplier performance responsibilities.

4. Samples – as requested by Architect for each type of exposed hardware unit in finish indicated and tagged with full description for coordination with schedule.

   a. Samples will be returned to supplier. Units that are acceptable and remain undamaged though submittal, review, and field comparison process may, after final check of operation, be incorporated in the work, within limitations of keying coordination requirements.

5. Electronic security hardware – coordinate the installation of electronic security with Architect and provide installation and technical data to Architect and other related sub-contractor(s).

   a. Provide complete wiring diagrams for each opening requiring electrified hardware, except openings where only magnetic hold-opens are specified. Provide a copy with each hardware schedule submitted after approval. Provide a copy with delivery of hardware to job site and another copy to Owner at time of job completion.

B. Finals – supply the approved schedule and templates for all finish hardware within two (2) weeks of receipt of approved submittal for use by Architect, General Contractor, and affected supplier(s) for all other products. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.

1.5 QUALITY ASSURANCE

A. Single source responsibility – obtain each type of hardware for latch and lock sets, hinges, closers, exit devices, and flat goods from a single manufacturer.

B. Supplier qualifications – a recognized architectural door hardware supplier, that has exact knowledge and experience with Owner's current material hardware requirements and supplier performance requirements, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this project, and that employs an experienced hardware consultant who is available to Owner, Architect, and Contractor as requested at reasonable times during the course of the work, for consultation at the jobsite.

C. Fire-rated openings – provide door hardware scheduled or required for fire-rated openings that complies with UL, NFPA-80, and requirements of Authority Having Jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by UL, Warnock Hersey, Factory Mutual or other testing and inspecting organization acceptable to Authority Having Jurisdiction for use

on types and sizes of doors indicated in compliance with requirements of fire-rated door and door frame labels.

1. All required finish hardware components of a fire-rated opening shall be incorporated into any door assembly located within a fire-rated partition.

2. Doors and frames used in positive pressure opening assemblies shall meet IBC and UL-10C in areas where this specification includes gasketing for smoke rated openings.

D. General compliance – Supplier to certify and submit documentation that all hardware supplied complies with all Federal ADA, State TAS, Local IBC Code, Fire Life Safety Code, and additional requirements of doors. Provide a complete list of discrepancies and possible solutions to any opening not meeting requirements.

1.6 PRODUCT HANDLING

A. Packaging – door hardware is the responsibility of Supplier. As material is received by Supplier from various manufacturers, sort, tag, and repackage in containers clearly marked with appropriate hardware set number or correct item code to match set numbers or item code of approved hardware schedule. Include basic installation instructions with each item or package.

B. Delivery – Supplier to deliver packaged door hardware items promptly to location as directed by General Contractor.

C. Inventory – General Contractor to inventory door hardware jointly with representatives of Supplier and Installer(s) at job site at delivery until each is satisfied that count of the delivery is correct.

D. Site control – General Contractor to provide secure lock-up for door hardware delivered but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the work will not be delayed by hardware losses both before and after installation. Replace any hardware lost or misplaced at own expense to meet construction schedule.

1.7 MAINTENANCE

A. Supplier to furnish a complete set of as-built hardware schedule, installation instructions, specialized tools, and maintenance instructions for all products supplied for Owner's continued adjustment, maintenance, and removal and replacement of door hardware at the Owner key control training. Final payment will not be released until this item has been completed fully.

1.8 WARRANTY

A. All finish hardware shall be supplied with a minimum two (2) year warranty against defects in materials and workmanship commencing with substantial completion of the project except as follows:

1. All closers to have a minimum ten (10) year written warranty.
2. All exit devices to have a minimum five (5) year written warranty.
3. All locksets to have a minimum five (5) year written warranty.

PART 2 – PRODUCTS:

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

1. Butt hinges and pivots:

a. Stanley, div. Stanley Works

2. Cylinders and :

a. Best, div. Stanley Works

b. Medeco High Security Locks, Inc.

3. Key cabinet:

a. Key Control Systems, Inc.

b. Telkee, Inc.

c. MMF Co.

4. Locks and latches:

a. Best, div. Stanley Works

5. Exit and panic devices:

a. Von Duprin, div. Ingersoll-Rand

6. Overhead and smoke-activated closers:

a. Stanley/Ryobi, div. Stanley Works

7. Push/Pull trim, protection plates, bolts, and other auxiliary hardware:

a. Hager Hinge Co.

8. Weatherstripping, seals, astragals and thresholds:

a. Hager Hinge Co.

9. Miscellaneous items:

2.2 MATERIALS AND FABRICATION

A. Base metals – produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units as determined by respective ANSI/BHMA A156 series standards for each type of hardware item and by ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods other than those indicated, except as otherwise specified.

B. General fasteners – provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.

1. Furnish screws for installation with each item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish, or if exposed in surfaces of other work, to match finish as closely as possible including "prepared for paint" surfaces to receive painted finish.

2. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent that no standard units of type specified are available with concealed fasteners. Do not use through-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means to fasten the hardware securely. Where through-bolts are used as a means of reinforcing the work, provide sleeves for each though-bolt or use sex screw fasteners.

2.3 HINGES, BUTTS, AND PIVOTS

A. Locations – except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units. For fire-rated doors provide steel or stainless steel bearing type. Tips shall be flat button and matching plug, finished to match leaves, except where hospital tips () are indicated. Provide ball bearing () on all of the following door types: exterior non-means of egress, doors with closers, restrooms, fire-rated, and sound sealed doors.

1. B1 – Part #. Non-removable pins and non-ferrous material. Provide at reverse-hand exterior doors that are not means of egress.

2. B2 – Part #. Continuous hinge, non-ferrous material. Provide at reverse-hand exterior doors that are a means of egress.

3. B3 – Part #. Non-removable pins. Provide at reverse hand interior corridor doors with lockable devices.

4. B4 – Part #. Non-rising pins. Provide at all other interior doors.

5. SH1 – Part #. Spring pins. Provide (2) at wood or hollow metal toilet stall doors.

B. Sizes – except as otherwise indicated, provide hinges as follows: 5 knuckle heavy duty full mortise template type 4.5" x 4.5" standard weight for all 1-3/4" doors up to and including 3'4" wide. For all doors over 3'4" wide, provide 4.5" x 4.5" heavy weight hinges. For all doors over 1-3/4" through 2" thick provide 5" x 5" hinges.

C. Number of hinges – provide number of hinges indicated, but not less then one (1) continuous or three (3) mortise butt hinges per door leaf for doors 90" (86" at fire-rated doors) or less in height and one (1) additional hinge for each 30" of additional height.

D. Screws – provide Phillips flat head screws complying with the following requirements with screw head finish to match surface of hinges or pivots:

1. Metal doors and frames – install machine screws into drilled and tapped holes or self-drilling screws on continuous hinges.

2. Non fire-rated wood doors and frames – install wood screws.

3. Fire-rated wood doors – install #12 x 1-1/4", threaded-to-the-head steel wood screws.

2.4 LOCK CYLINDERS AND KEYING

A. Keying system – equip locks with cylinders for .

B. Key ways – provide all lockable devices with keyway to be compatible with Owner's that comply with performance requirements for Grade 1 as listed in ANSI/BHMA A156.5, have been tested for pick and drill resistance requirements of UL 437, and which are UL listed for fire resistance.

C. Key structure – comply with Owner's instructions for master keying, and, except as otherwise indicated, provide individual change keys for each lock that is not designated to be keyed alike with a group of related locks. .

1. Permanently inscribe each key with cylinder manufacturer's key symbol and notation "DO NOT DUPLICATE".

2. .

D. Key material – provide keys of nickel silver only.

E. Key quantity – provide three (3) change keys for each lock, five (5) master keys for each master system, and five (5) grandmaster keys for each grandmaster system, or in quantities as directed by Owner at the key meeting for multi-use rooms.

1. Provide one (1) extra key blank for each lockable device.

2.

3. Provide key quantities equal to 125% of all classrooms for staff common use rooms.

4. Provide two (2) additional copies of all master keys directly to Owner or district.

F. Cylinder housing and cores – provide for all keyable exit device trim and applicable keyed options, keyed removable mullions, aluminum storefronts, overhead, accordion, wire partitions, package doors, and folding doors as required by each specific door or hardware type.

1. CY1 – Part #. Mortise Cylinder.

2. CY2 – Part #. Rim Cylinder.

G. Key cabinet – provide key cabinet(s) including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of the total number of keyable devices required for the project. Provide hinged-panel type cabinet(s) for wall mounting.

1. KC1 – Part #201-8390-03, MMF. Key Cabinet.

H. Electronic index – provide complete electronic cross index system. Index to include architectural door mark number, key symbol, bitting, tag number, Owner's door designation name or number, and number of keys provided.

2.5 LOCKS, LATCHES, BOLTS, ASTRAGALS, AND EXIT DEVICES

A. Locks and latches – All locks shall have passed over 3 million cycle test and Supplier shall provide test data for verification at submittal. Provide locks and latches with function as required per room. Provide on all doors without push/pulls, exit devices, hospital latches, and flush bolts.

1. Lock functions – lever design shall be lever design. Default to a single keyed function (office, classroom, or storeroom) if required function for any opening is in question. Where rabbet door stiles are indicated, provide special rabbet front on locks and latch units and bolts. At locations provided with card readers (as specified or as required by WEBB COUNTY requirements), provide electrified locksets with similar lock function as noted below.

   a. L1 – Part #. Storeroom lock. Provide at all perimeter doors, storerooms, electrical rooms and mechanical rooms.

   b. L2 – Part #. Office lock. Provide at all single user, non-staff restrooms and wood or hollow metal toilet stall doors.

   c. L3 – Part #. Double keyed storeroom lock. Provide at all hold rooms and search rooms.

2. Strikes – provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set, unless otherwise indicated.

   a. Provide extra long strike lips for locks used on frames with applied wood or aluminum casing trim.

   b. Provide roller type strikes where recommended by manufacturer of the latch and lock units.

   c. Provide standard strike plates for interior doors of residential units where wood door frames are used.

3. Lock throw – provide ½" minimum latch throw for other bored and pre-assembled locks and ¾" minimum latch throw for mortise locks. Provide 5/8" minimum latch throw on pairs of doors. Provide 1" minimum throw for all dead bolts. Comply with UL requirements for throw of bolts and latch bolts on fire-rated openings.

B. Flush bolts, overlapping astragals, and coordinators – provide minimum of ½" diameter rods of brass, bronze, or stainless steel with minimum 12" long rod for inactive leaf of pairs up to 7'0" in height. Provide longer rods as necessary for doors exceeding 7'0" in height. Provide recess type top strikes for bolts locking into head frames, unless otherwise indicated.

1. FB1 – Part #. Manual flush bolt. Provide on non-rated inactive leafs of pairs without exit devices, sized to accommodate the door height.

2. FB2 – Part #. Constant-latching flush bolt. Provide with automatic bottom bolt at all fire-rated pairs without exit devices.

3. DP1 – Part #. Dust-proof strike. Provide for foot bolts, except where special threshold construction provides non-recessed strike for bolt.

4. AST1 – Part #. Overlapping astragal. Provide at all inactive leafs of pairs without exit devices or push/pulls.

5. COR1 – Part #. Bar coordinator. Provide with carry bars on all self-closing pairs with overlapping astragals sized to fit entire width of opening.

C. Exit devices – provide lockable lever trim panic devices on all means of egress doors, door exiting from rooms of assembly, and electrical closets that contain more then 1200 amps as required by NEC, with device style, fire-rating, and size to be per door requirements. Provide double egress doors with panic devices with non-lockable trim. Provide all required components to insure all labeling and code requirements are satisfied. Provide shims where devices are required to span across glass lites which would interfere with level installation. All devices shall be though-bolted with sex bolts to the door and contain a sound deadening feature. Provide non-rated openings with keyed cylinder dogging to keep latch bolt retracted when engaged Rim exit devices are to be used at all doors except double egress where surface vertical rod devices shall be used, or fire-rated pairs requiring a combination of mortise and vertical rod type as required by labeling authority. Pairs of doors at locations with mullion to have mullions equipped with "keyed cylinder" option and be furnished with mullion storage kits and applicable mullion stabilizers.

1. E1 – Part #. Rated rim exit.
2. E2 – Part #. Non-rated rim exit.
3. E3 – Part #. Rated surface vertical rod exit.
4. E4 – Part #. Rated mortise exit.
5. E5 – Part #. Provide at storefront doors requiring exit devices by hardware supplier.
6. RM1 – Part #. Removable mullion. Provide at pairs of doors requiring mullion for panic devices specified.
7. MS1 – Part #
8. MS2 – Part #

2.6 PUSH/PULLS AND HOSPITAL LATCHES WITH ADDITIONAL DEADBOLTS

A. Provide push/pulls on all non-rated entry foyer, atrium, multi-use restrooms, kitchen to serving, and cafeteria/dining to serving doors. Provide hospital latches on rated doors in lieu of push/pulls unless doors are a means of egress. Provide all doors with push/pulls or hospital latches with a classroom deadbolt. Provide manufacturer's standard exposed fasteners for installation.

1. P1/P2 – Part #. Push/Pull set.
2. P3 – Part #. Push bar/offset pull set. Provide on storefront doors without panic devices.
3. HL1 – Part #. Hospital latch.

2.7 CLOSERS AND DOOR CONTROL DEVICES

A. Manual closers – provide with full covers on all door openings in fire/smoke rated partitions, means of egress, interior storage/mechanical/electrical rooms, rooms with sound seals, all rooms with a toilet, and exterior conditions. Provide closers at all corridor doors, except non-rated classrooms.

1. Special considerations – closers shall be added to all out-swinging doors in exit access or secondary communicating corridors (corridors other than exit access). Doors swinging from secondary communicating corridors shall require closers if:

   a. Doors and/or partitions are indicated as fire-rated.
   b. Room function defined elsewhere in this specification requires a closer.
   c. The corridor provides egress travel to an exit access for an occupant load greater than fifty (50) persons.

2. Sizes of units – except as otherwise specifically indicated furnish "multi-sized" closers with "barrier-free delayed closing" option to meet ADA and TAS requirements. Where manual closers are indicated for all doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A117.1 provisions for door opening force and delayed action closing where indicated. Provide mounting brackets suitable for the style and swing of the door. Installer shall mount all closers on room side unless instructed otherwise by Architect. On doors with coordinators provide mounting brackets to span the coordinator. On aluminum storefront doors provide a drop mounting plate to accommodate the narrow top rail, if required.

a. C1 – Part #. Exterior closer.

b. C2 – Part #. Interior closer.

c. MB1 – Part #. Coordinator mounting bracket.

d. MB2 – Part #. Storefront mounting drop plate for exterior closers.

e. MB3 – Part #. Storefront mounting drop plate for interior closers.

B. Electro-magnetic holders – provide units designed to hold door in open position under normal usage and to release and close door automatically under fire conditions. Incorporate an integral electromagnetic holder mechanism designed for use with UL 288 listed fire detectors, provided with normally closed switching contacts.

1. EM1 – Part #997 SA, Rixson. Magnetic holder. Provide at the following fire-rated locations: cross corridor pairs, cafeteria-dining to serving-tray line area, interior cafeteria, gym entrances, and vending.

2. SC1 – Part #. Smoke detector and closer device. Provide at doors noted to receive an electromagnetic holder that do not have a wall suitable for electromagnetic holder.

2.8 DOOR TRIM AND PROTECTION UNITS

A. Edge trim – stainless steel to fit door thickness and 36" in height at kitchen to serving and custodial closets.

1. ET1 – Part #. Edge Trim.

B. Protection plates – fabricate face protection plates not more than 1-1/2" less than door width on push side of door by height indicated on single doors and 1" on each leaf for pairs. Provide protection plates for all doors with closers a minimum of 8" height, except provide 36" height at non-rated custodial closets and kitchen to serving. All metal protection plates to be of stainless steel, 0.050" thick. (U.S. 18 gage). Provide manufacturer's standard exposed fasteners for door trim units consisting of either matching screws or self-tapping screws.

1. KP1 – Part #. Kick plate.

2. AP1 – Part #. Armor plate.

2.9 WEATHERSTRIPPING AND SEALS

A. Provide continuous weatherstripping on all exterior, mechanical room, and electrical room doors. Provide light or sound seals on light or sound sensitive doors. Provide non-corrosive fasteners for exterior applications. Size weatherstripping and seals to opening size. Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.

1. Weatherstripping at exterior jambs, mullions, and heads – provide bumper-type resilient insert and metal retainer strips, surface applied unless shown as mortise or semi-mortised, and of the following metal finish and resilient bumper material. Extruded aluminum with natural anodized finish, manufacturer's standard color selections, or finish to match. Minimum 0.062" thickness of main walls and flanges.

a. WS1 – Part #. Screw applied weatherstrip.

2. Smoke seals – provide at interior openings as required by IBC on 3 sides to accommodate door sizes for all fire-rated doors. Intumescent fire seals on 3 sides to accommodate door sizes for all fire-rated wood doors over 20 minute fire-ratings to meet IBC requirements if wood door specification does not require seals to be built into the edges of doors.

a. FS1 – Part #. Smoke seal.

b. FS2 – Part #. Intumescent fire seal.

3. Silencers – all doors not utilizing seals should be provided with mutes in design as required by frame manufacturer.

   a. Z1 – Part #. Door silencer.

4. Sound seals – provide at sound sensitive doors, including interview rooms, search rooms and officer rooms.

   a. SS – Part #. Sound seal.

   b. ADB – Part #. Automatic Door Bottom Seal.

5. Light seals – provide at light sensitive doors.

   a. LS1 – Part #. Light seal.

   b. ADB – Part #. Automatic Door Bottom Seal.

2.10 THRESHOLDS AND DOOR BOTTOM SWEEPS

A. Except as otherwise indicated, provide standard metal threshold unit of type, size, and profile required at all exterior, mechanical, electrical, interview, search, officer rooms and interior doors separating non-conditioned and conditioned spaces. Provide units that meet ADA and TAS requirements. Undercut on doors to be adjusted to function as intended with applicable thresholds. Provide rain drips for all frames exposed directly to rain (no overhang on building).

   1. Thresholds and door bottom sweeps – provide threshold consisting of metal, design, and finish sized to entire opening width. Extruded aluminum with color anodized finish as selected from manufacturer's standard color, range, natural, or finished to match. Provide units not less then 4" wide, formed to accommodate change in floor elevation where indicated, fabricated to accommodate door hardware and to fit entire door width. Provide units with saddle threshold and exterior surface mounted door bottom drip-sweep combination unit except where auto door bottoms are being provided.

      a. TH1 – Part #. Saddle threshold.

      b. DB1 – Part #. Door bottom sweep.

   2. Drip cap – provide with width four (4)" wider then the size of the door at locations indicated.

      a. DC1 – Part #. Rain drip.

2.11 DOOR STOPS AND VIEWERS

A. Door stops – provide wall stops at all doors that can open without hitting an obstruction and where a wall exists within the width of the door at 180° of open. Where obstruction exists, provide overhead surface mounted stops and with hold-open feature for all exterior non-means of egress doors. Provide dome type floor stop at hold rooms. At exterior means of egress doors provide a heavy-duty floor stop projecting into the floor epoxy installed. This requirement is in addition to all closer requirements.

   1. S1 – Part #. Wall stop.

   2. S2 – Part #. Overhead stop.

   3. S3 – Part #. Overhead stop with hold open.

   4. S4 – Part #. Heavy duty floor stop.

   5. S5 – Part #FS436 626, Ives. Floor stop.

B. Viewers – provide door viewers at all kitchen vendor back door entrances and where indicated by plans. Mount door viewer(s) to allow a minimum 180° viewing angle.

   1. DV1 – Part#. Door Viewer.

2.12 HARDWARE FINISHES

A. Acceptable finishes – plated 630, 626, 652, painted, and powder coated. Anodized is acceptable where plating is not available or the commercially recognized standard.

1. General – provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with the manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

2. Standard – The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes", including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.

a. Provide finishes that match those established by BHMA or, if none established, match Architect's sample.

3. Lacquers – provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix "-NL" is used with standard finish designations to indicate "no lacquer".

B. Matching and coordination – match items to the manufacturer's standard color and texture finish for the latch and locksets (or push/pull units if no latch/locksets).

1. Hardware components for storefront/specialty doors shall be coordinated with Architect/Owner and are to be compatible to the door finish as indicated in respective section(s), regardless of finish designations indicated herein.

2.13 MISCELLANEOUS ITEMS

A. Door position switches – Provide Schlage #7764 magnetic switches at locations as indicated (including exterior doors, interior controlled access doors, etc.)

B. Power transfers – At each door scheduled with a card reader, provide Von Duprin #EPT-10 power transfer to provide power to the electric lock.

C. Power supplies – At each door scheduled with a card reader, provide Schlage #902 power supply to provide power for the electric lock.

PART 3 – EXECUTION:

3.1 INSTALLATION

A. Pre-Install meeting – please reference section HARDWARE SUPPLIER RESPONSIBILITIES for pre-installation meeting requirements.

B. Standards – mount hardware units at heights indicated in the following applicable publications, except as specifically indicated by Architect or required to comply with governing regulations:

1. Door Hardware Institute – "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" and "Recommended Locations for Builders Hardware for Custom Steel Doors and Frames".

2. NWWDA Industry Standard I.S.1.7 – "Hardware Locations for Wood Flush Doors".

C. Coordination – install each hardware item in compliance with the manufacturer's instructions and recommendations and hardware submittal requirements.

1. General – set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation

2. Painting/Finishes – where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in Division 09 "Paintings and Coatings". Do not install surface mounted items until finishes have been completed on the substrates involved. Remove all protective film prior to

installation of mounting screws. Protect all finishes as required during construction to maintain original finish

3. Fasteners – drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

4. Thresholds – set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Division 07 "Joint Sealers".

5. Weatherstripping – comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated for weatherstripping and seals.

D. Electronic hardware – upon completion of any electronic security hardware installation, Contractor to verify that all components are working properly and state in the required guarantee that this inspection has been performed.

E.

3.2 ADJUSTING, CLEANING, AND DEMONSTRATING

A. Adjusting – adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.

1. Where door hardware is installed more than one (1) month prior to acceptance or occupancy of a space or area, Installer(s) shall return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

B. Cleaning – clean adjacent surfaces soiled by hardware installation. Clean all hardware finishes and return to new condition or replace prior to Owner's occupancy.

C. Instruct Owner and Follow-up – please reference section HARDWARE SUPPLIER RESPONSIBILITIES for demonstration/follow-up requirements.

PART 4 – JOB SPECIFIC DETAILS:

4.1 MEANS OF EGRESS DOORS

A. All door openings that have an "EXIT" sign as indicated on the electrical drawings.

08711 HARDWARE SCHEDULE

Not used. Refer to allowance

08800 GLASS AND GLAZING

PART 1. GENERAL
Scope: Provide all labor, material and equipment required to accomplish all glass and glazing work indicated, including, but not limited to, field glazing for exterior windows, borrowed lights, and unframed mirrors.

Part 2. Products

Standards: Provisions of this section are in reference to the following standards, which are applicable except as otherwise indicated:

prime nonprocessed glass: FS DD-G-451.

heat treated glass: FS DD-G-1403.

cpsc safety glazing standard: 16 CFR 1201.

ansi safety glazing: ANSI Z97.1

Submittals: submit manufacturer's product specifications and handling / installation / protection instructions for each type of glass and glazing material required. Submit samples of each colored (tinted), coated or patterned glass required.

Glass Types and Qualities:

1. 1/4" clear float glass
2. 1/4" clear tempered glass
3. 1/4" reflective solar bronze glass
4. 1/4" reflective solar bronze spandrel glass
5. 1/4" reflective solar bronze tempered glass
6. 1/4" clear wire glass
7. 3/8" clear plexigloss w/ 1/4" diameter holes at 1" staggered centers each, see plans for locations.

All glazing shall conform to PPG standards or equal.

Mirror glass: 1/4" quality Q2 (mirror glazing) clear float glass; with manufacturer's standard full silver coating, plus copper coating, plus organic coating, as per interior elevations, refer to drawings.

Sealant-type glazing materials: Provide colors indicated or as selected by architect, black if not otherwise indicated/selected. Except as otherwise indicated, comply with manufacturer's recommendations for selection of hardnesses and other product variations to meet compatibility requirements and project/installation circumstances.

Silicone sealant: FS TT-S-001543, class a, acid type; except where one or both bond surface are porous, provide non-acid type.

Butyl rubber glazing tape: Partly-vulcanized self-adhesive, non-staining, 98% solids, elastomeric performance for 35% compression; passing 3,000-hr. atlas weatherometer test; plain or pre-shimmed, as required for installation.

Acrylic sealant: fs tt-s-00230, class b, type ii, solids 95% acrylic, solvent-based.

Butyl rubber sealant: fs tt-s-001657, type i, solvent-based, 75% solids, 24-hr. tack-free, paintable, non-staining.

Gaskets and miscellaneous glazing materials:

Structural rubber gaskets: ASTM c 542, neoprene with molded corners and zipper lock strips.

PVC gaskets: ASTM d 2287, flexible.

Vinyl foam tape: ASTM d 1667; flexible, closed-cell, self-adhesive, non-extruding.

Setting blocks: 70 - 90 durometer hardness; neoprene unless otherwise selected for compatibility.

Spacers: 40 - 50 durometer hardness; neoprene unless otherwise selected for compatibility.

Fuller rod: Flexible, resilient, closed-cell or jacketed foam, compatible with sealants required, 5-10 psi compression for 25% deflection.

Joint cleaners, primers, sealers: Type recommended by manufacturer of sealants/gaskets for use on indicated glazing channel surfaces.

Mirror mastic: Type recommended by mirror manufacturer for up-to-25% coverage on mirror coating, 1/8" - 1/2" thick.

Part 3. Execution

Glass installation (glazing): Except as otherwise

Indicated, comply with glass manufacturer's instructions, and "glazing manual" by fgma and other technical publications of recognized authorities in the industry. install each piece to achieve watertight and airtight performance, and to minimize breakage. for insulating glass, comply with sigma recommendations.

Clean channel surfaces and prime or seal surfaces where recommended by sealant manufacturer.

Cut glass to proper size, except cut processed.

09 FINISHES

09100 LATH, PLASTER AND STUCCO

PART 1. GENERAL

Description: Supply and install all Lath and Plaster Work as shown on drawings and as specified herein.

Coordination: Work herein under requires coordination with trades whose work connects with, is affected, or concealed by lathing and plastering. Before proceeding, make certain all required inspections have been made.

Inspection: Inspect surfaces to receive lath and plaster
before starting work and do not start until surfaces are acceptable. Starting work under this section implies acceptance of surfaces.

Delivery and Storage: Deliver all manufactured materials in original packages bearing manufacturer's name and brand. Use only one brand of each material throughout job. Store materials in dry areas.

General Requirements: Comply with all applicable requirements of the Texas Bureau for Lathing and Plastering, Inc. "Manual for Lathing and Plastering", and Texas Lathing and Plastering Contractor's Assoc. Standards, except where more stringent requirements are called for herein or in Local Building Codes. Do all cutting and patching required to accommodate work of other trades.

PART 2. MATERIALS

Metal Lath: Expanded type, diamond shaped, copper bearing steel, weighing 3.4#/sq. yd., painted. Use galvanized lath for exterior surfaces.

Installation: Apply to true surfaces, straight, without warps or buckles, long dimension of lath at right angles to supports; lower sheet lapped over upper sheet where used on walls. Secure lath to supports at 6 inch intervals. Secure the side laps to supports, and tie between supports. Lap 1/2 inch at sides and 1 inch at ends; and laps must be staggered and supported. No sheet ends allowed less than one support distant from any angle or corner. Bend sheets for internal corners or use corner laths. Install strip lath over joints between dissimilar base materials where surfaces lie in the same plane and where base materials cannot be effectively bonded together. Fasten securely at 6 inches o.c. Fasten lath to light gauge drywall studs with specified screws at 6 inch centers.

Accessories: Install all accessories to plumb, true and level lines, and backing plates as located by the Trade furnishing these items.

Corner Beads: #1 type, expanded metal flanges integral with nose of bead, galvanized, weighing 208 #/1000 l.f.
Install at all external corners. Use single length except where standard length is not sufficient. Miter or cope as required; fasten with tie wire at 6 inches o.c., both sides.

Corner laths: As specified for expanded metal lath 3 inches legs bent to a 105 degree corner, weighing 140#/1000 l.f.
Install at interior angles and where one or both abutting surfaces are metal lath. Corner laths are not required where metal lath is continued around corner at junction of walls and where ceiling lath turns down wall.

Casing Beads: #66 type, expanded metal flange, galvanized, depth as required by plaster thickness, weighing approximately 289 #/100 l.f. for 3/4 inch and 7/8 inch types.
Install at all edges of plaster, continuously, including where plaster butts all other materials, by securing to lath at 6 inches o.c.

Control Joints: 7/8 inch ground, expanded metal flanges, galvanized minimum 28 gauge (type #15).

Expansion Joints: #40 type, 7/8 inch ground, expanded metal flanges, galvanized, weighing 417 #/1000 L.F.
Install where indicated on drawings, tied to lath at 6 inches o.c. Cut lath passing under expansion joints.

Channels: 3/4 inch furring channel weighing 300 #/1000 l.f. and 1-1/2" runner channel weighing 500 #/1000 l.f., 16 gauge painted. Use galvanized channels for exterior surfaces.

Wire: Soft, annealed, galvanized steel; 8 gauge for hangers, 16 gauge for channel ties and 18 gauge for lath ties.

Miscellaneous Items: Furnish all miscellaneous components not specified herein but shown on drawings and any other items required to complete the installation.

Water: Clean and free of deleterious matter.

Hydrated Lime: Conforming to ASTM C-206, Type S.

Quick Lime: Conforming to ASTM C-5.

Gypsum Plaster: Conforming to ASTM C-28.
Lightweight aggregate, perlite.
Lime Putty: Shake quick lime in watertight box, run through #8 sieve of 16 gauge wire, and let stand a minimum of 14 days; or prepare from hydrated lime as recommended by the manufacturer of the hydrated lime, soaking in water for 16 to 24 hours. Keep moist and screen through a #10 sieve before using.

Scratch Coat: Apply full and thick with sufficient force to form good keys; deeply cross-hatched; set firm and hard before brown coat is applied.

Brown Coat: Apply with sufficient pressure to force plaster into scratches; built out to within 1/16 inch of screeds and grounds; rod, darby, and float to true, plumb surfaces and angles; leave rough for finish coat.

Thickness: 7/8 inch thick, measured from back of metal lath.

Plaster Type
Scratch Coat: 1 part gypsum plaster and 2 parts light weight aggregate.
Brown Coat: 1 part gypsum plaster and 3 parts light weight aggregate.
Light Weight Float Finish: 1 part gypsum plaster and not more than 2 parts light weight aggregate by weight.
Apply light weight float finish to approximately 1/8 inch thickness, free from blemishes and devoid of directional marks.

Portland Cement Plaster
Portland Cement: Conforming to ASTM C-150, Type 1.
Sand for Cement Plaster: Conforming to ASA A42.2.
Exterior, Cement Plaster:
Scratch Coat: 1 part Portland cement, 4 parts sand and hydrated lime equal to 25% of volume of cement.

Apply with sufficient material and pressure to shove material through metal lath and form a good key; 3/8 inch minimum thickness, score in horizontal direction with metal scorer with clipped teeth to provide good mechanical key for second coat.

Brown Coat: 1 part Portland cement, 5 parts sand and hydrated lime equal to 25% of the volume of cement.

Finish Coat: Provide three samples, 3' x 3' of various finish textures to Architect for approval.

Curing: Keep each base coat moist for at least 48 hours; commence moistening as soon as plaster has hardened sufficiently so to prevent injury; apply water in a fine fog spray; avoid soaking; curing shall proceed over holidays, Saturdays and Sunday if necessary. If atmospheric conditions are hot and dry, curing time shall be extended as necessary at no additional cost to the Owner. Allow plaster base coats to cure for a minimum of 7 days before applying finish coat.

Thickness: 7/8 inch thick; measured from back of lath.

PART 3. INSTALLATION

General: Provide ventilation to properly dry plaster during and subsequent to application. In glazed buildings accomplish by keeping windows open sufficiently to provide air circulation; in enclosed areas lacking normal ventilation, mechanically remove moisture laden air.

Lathing: Apply lath with long dimension at right angles to supports; lap sides and ends as recommended by manufacturer. Stagger vertical laps. Make no vertical joints at any corner, bend lath around all corners, internal and external.

Attach lath to studs by fastening at spacings required by Local Building Codes. All attachments; corrosion resistant.

Accessories: install all accessories to plumb, true and level lines, and backing plates as located by Trade furnishing items.

Install beads, corner laths, control joints, reglets, screeds and like items, using single lengths wherever possible. Provide corner beads at all exterior corners shown, mitering or coping as required, and fastening at 6 inches on center, both sides. Provide casing beads wherever interior plaster angles are shown and wherever one or both abutting surfaces are metal lathed, except corner laths are not required where metal lath is continuous around corner at junctions of walls, or where ceiling lath turns down a walls. Tie outer edges only to adjoining lath at 6 inches on center.

Plastering: Do not apply plaster below 55 degrees F. temperature. Apply no plaster to frosty surfaces. Dampen any surfaces on which suction must be reduced with fog-spray. Maintain all screeds plumb and true. Fill fissures or breaks in brown coat before application of finish coat. Make coats uniform in thickness with average thickness about 1/8 inch; minimum thickness anywhere; 1/16 inch. Apply finish coats to partially dry base coat, or to a thoroughly dry base coat that has been evenly wetted by brushing or spraying; avoid use of excessive water. Trowel all finish surfaces of plaster to perfectly true and even surface without scratches, ridges, voids, cracks, etc. Except when hand mixing small batches is approved, use approved mechanical mixers. Clean mixers, mixing boxes and tools after mixing each batch. Thoroughly mix with water until uniform in color and consistency. Re tempering not permitted.

Discard plaster which has begun to stiffen. Mixed in strict accordance with manufacturer's printed directions.

Except in the case of specifically formulated plasters which require only water added at job site, proportion by volume as specified.

Cleaning and Patching: Clean floors of droppings immediately after each coat is applied. At any exterior locations, remove droppings or splashes from all concrete, masonry or other finish surfaces.

Patch after all other work except painting has been completed. Cut out damaged or broken plaster to straight lines with clean, sharp edges. Cut out cracks to width of at least 1 inch. Fill areas to be patched with base materials then give a finish coat of same material as adjoining plaster. Patched areas shall match adjoining work in finish and texture. Joinings shall be flush and smooth so joints between patch and existing plaster are imperceptible.

Clean-up: At completion of work, remove excess plaster from beads, screeds, etc., and leave work clean and ready for painting. Promptly remove plaster, rubbish, surplus material, scaffolding and other equipment from job site. Leave areas broom clean.

09255 GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL
1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY
A. This Section includes the following:

1. Non-load-bearing steel framing members for gypsum board assemblies.
2. Gypsum board assemblies attached to steel framing.
3. Glass-mat, water-resistant gypsum backing board installed with gypsum board assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Steel Framing and Furring:
    a. Alabama Metal Industries Corp.
    b. Consolidated Systems, Inc.
    c. Dale Industries, Inc.
    d. Dietrich Industries, Inc.
    e. Marino Industries Corp.
    f. Gold Bond Building Products Div Co .
    g. Unimast Inc..

2. Grid Suspension Assemblies:
    a. Chicago Metallic Corp.
    b. National Rolling Mills Co.
    c. USG Interiors, Inc.
  Gypsum Board and Related Products:

3. Gypsum Board and Related Products:
    a. Domtar Gypsum.
    b. Georgia-Pacific Corp.
    c. Gold Bond Building Products Div., National Gypsum Co .
    d. United States Gypsum Co.

2.2 STEEL FRAMING COMPONENTS FOR SUSPENDED AND FURRED CEILINGS

A. General: Provide components complying with ASTM C 754 for materials and sizes unless otherwise indicated.

B. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper.

C. Hanger Rods: Mild steel and zinc-coated or protected with rust-inhibitive paint.

D. Channels: Cold-rolled steel, 0.05980-inch-minimum thickness of base (uncoated) metal and 7/16-inch-wide flanges, and as follows:

1. Carrying Channels: 1-1/2 inch deep, 475 LB per 1000 feet, unless otherwise indicated.
2. Furring Channels: 3/4 inch deep, 300 LB per 1000 feet, unless otherwise indicated.
3. Finish: Rust-inhibitive paint, unless otherwise indicated.
4. Finish: G-60 hot-dip galvanized coating per ASTM A 525 for framing for exterior soffits and where indicated.

E. Steel Studs for Furring Channels: ASTM C 645, with flange edges bent back 90 deg and doubled over to form 3/16-inch minimum lip (return), minimum thickness of base (uncoated) metal and minimum depth as follows:

1. Thickness: 0.0329 inch, unless otherwise indicated.
2. Depth: As indicated.
F. Grid Suspension System for Interior Ceilings: ASTM C 645, manufacturer's standard direct-hung grid suspension system composed of main beams and cross furring members that interlock to form a modular supporting network.

2.3 STEEL FRAMING FOR WALLS AND PARTITIONS
A. General: Provide steel framing members complying with the following requirements:

1. Component Sizes and Spacings: As indicated but not less than that required to comply with ASTM C 754 under the following maximum deflection and lateral loading conditions:
a. Maximum Deflection: L/120 at 10 lbf per sq. ft.

B. Steel Studs and Runners: ASTM C 645, with flange edges of studs bent back 90 deg and doubled over to form 3/16-inch-wide minimum lip (return) and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

C. Fasteners for Metal Framing: Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.
1. Base Plates - As recommended by manufacturer.
2. Studs - As recommended by manufacturer.
3. Thickness: As indicated.
4. Depth: 3-5/8 inches, at interior walls.
5. Depth: 6 inches, at exterior walls.

2.4 GYPSUM BOARD PRODUCTS
A. General: Provide gypsum board of types indicated in maximum lengths available to minimize end-to-end butt joints.

1. Thickness: Provide gypsum board in thicknesses indicated or, if not otherwise indicated, 5/8 inch thicknesses to comply with ASTM C 840 for application system and support spacing indicated.

B. Gypsum Wallboard: ASTM C 36 and as follows:
1. Type: Regular for vertical surfaces, unless otherwise indicated.
2. Type: Foil-backed where indicated.
3. Type: Type X where required for fire-resistive-rated assemblies.
4. Type: Sag-resistant type for ceiling surfaces.
5. Type: Proprietary type as required for specific fire-resistive-rated assemblies.
6. Edges: Tapered.
7. Thickness: 5/8 inch where indicated.
8. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work where proprietary gypsum wallboard is indicated include, but are not limited to, the following:
9. Products: Subject to compliance with requirements, provide one of the following products where proprietary gypsum wallboard is indicated:

a. Gyprock Fireguard C Gypsum Board, Dombar Gypsum.
b. Firestop Type C, Georgia-Pacific Corp.
c. Fire-Shield G, Gold Bond Building Products Div., National Gypsum Co.
d. SHEETROCK Brand Gypsum Panels, FIRECODE C Core, United States Gypsum Co.
e. SHEETROCK Brand Gypsum Panels, ULTRACODE Core, U. S. Gypsum Co.

C. Water-Resistant Gypsum Backing Board: ASTM C 630 and as follows:
1. Type: Regular, unless otherwise indicated.
2. Type: Type X where required for fire resistive-rated assemblies.
3. Thickness: 5/8 inch, unless otherwise indicated

D. Exterior Gypsum Soffit Board: ASTM C 931, with manufacturer's standard edges, of type and thickness indicated below:
1. Type: Regular, unless otherwise indicated.
2. Thickness: 5/8 inch, unless otherwise indicated.

E. Glass-Mat Water-Resistant Gypsum Backing Board: ASTM C 1178, of type and thickness indicated below.

1. Type and Thickness: Type X, 5/8 inch thick, for fire-resistive-rated assemble.

2. Available Product: Subject to compliance with requirements, a product that may be incorporated in the Work is Dens-Shield Tile Backer units manufactured by
Georgia Pacific Corp.

2.5 TRIM ACCESSORIES
A. Accessories for Interior Installation: Corner beads, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:

2.6 JOINT TREATMENT MATERIALS

A. General: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

2.7 TEXTURE FINISH PRODUCTS
A. Primer: Of type recommended by texture finish manufacturer.

B. Polystyrene Aggregated Finish for Ceilings: Factory-packaged proprietary powder product formulated with polystyrene aggregates for mixing with water at Project site to produce the texture indicated below by spray application, with flame-spread and smoke-developed ratings of not more than 25 per ASTM E 84:

1. Fine textured finish.

PART 3 - EXECUTION

3.1 INSTALLING STEEL FRAMING, GENERAL
A. Steel Framing Installation Standard: Install steel framing to comply with ASTM
C 754 and with ASTM C 840 requirement that apply to framing installation.

3.2 INSTALLING STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS
A. Screw furring members to wood framing.

B. Suspend ceiling hangers from building structural members and as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

C. For exterior soffits, install cross-bracing and additional framing to resist wind uplift.

3.3 INSTALLING STEEL FRAMING FOR WALLS AND PARTITIONS
A. Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction.

B. **Installation Tolerances:** Install each steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch from the plane formed by the faces of adjacent framing.

C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Cut studs 1/2 inch short of full height. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

1. For STC-rated and fire-resistive-rated partitions requiring partitions to extend to the underside of floor/roof slabs and decks or other continuous solid structural surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed, to support gypsum board closures needed to make partitions continuous from floor to underside of solid structure.

D. Terminate partition framing at suspended ceilings where indicated.

E. Install steel studs and furring in sizes and at spacings indicated but not less than that required by the referenced steel framing installation standard to comply with maximum deflection and minimum loading requirements specified:

1. Single-Layer Construction: Space studs at 16 inches O. C .

3.4 APPLYING AND FINISHING GYPSUM BOARD, GENERAL
A. Gypsum Board Application and Finishing Standards: Install I and finish gypsum panels to comply with ASTM C 840 and GA-216.

09300 TILE

PART 1 GENERAL

1.1 RELATED-DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Unglazed ceramic mosaic tile.
2. Glazed wall tile.
3. Porcelain tile.

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

1. Division 3 Section "Concrete Work" for monolithic slab finishes specified for tile substrates.
2. Division 7 Section Joint Sealers for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
3. Division 9 Section "Gypsum Drywall" for cementitious backer units installed as part of gypsum wallboard systems.

C. Allowance

1. Contractor to provide a unit price allowance of $5 per square foot to cover the tile itself and shipping costs associated with the tile.
2. All labor, equipment, adhesives and any necessary items and/or manpower to accomplish the installation of the tile is to be provided by contractor.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
B. Product data for each type of product specified.
C. Shop drawings indicating tile patterns and locations and widths of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
1. Locate precisely each joint and crack in tile substrates by measuring, record measurements on shop drawings, and coordinate them with tile joint locations, in consultation with Architect.
D. Samples for initial selection purposes in form of manufacturer's color charts consisting of actual tiles or sections of tile showing full range of colors, textures, and patterns
Available for each type and composition of tile indicated. Include samples of grout and accessories involving color selection.
E. Samples for verification purposes (three each) of each item listed below, prepared on samples of size and construction indicated, products involve color and texture variations, in sets showing full range of variations expected.

1. Each type and composition of tile and for each color and texture required, at least 12 inches square, mounted on plywood or hardboard backing and grouted.
2. Full-size units of each type of trim and accessory for each color required.

F. Master grade certificates for each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
G. Material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of tile and tile setting and grouting products with requirements indicated.
H. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, plus other information specified.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
B. Single-Source Responsibility for Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.
C. Installer Qualifications: Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.
D. Field-Constructed Mock-Up: Before installing tile, erect mock-ups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mock-ups to comply with the following requirements, using materials indicated for final unit of Work.

1. Locate mock-ups on site in location and size indicated or, if not indicated,

directed by Architect.
2. Demonstrate the proposed range of aesthetic effects and workmanship.
3. Obtain Architect's acceptance of mock-ups before start of final unit of Work.
4. Retain and maintain mock-ups during construction in undisturbed condition as a standard for judging completed unit of Work.
a. When directed, demolish and remove mock-ups from Project site.
b. Accepted mock-ups in undisturbed condition at time of Substantial Completion may become part of completed unit of Work.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings".

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.

B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.
B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.
C. Maintain temperatures at 50 deg F (10 deg C) or more in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced standard or manufacturer's instructions.

1.7 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials that match products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.
1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Manufacturers/Products: Subject to compliance with requirements, provide products by one of the following:
1. Tile:
As per Room Finish Plan

2. Mortar and Grout:
a. American Olean Tile Co., Inc.
b. Bostik Construction Products Div.
c. L & M Mfg. Inc.
d. Mapei Corp.
e. Summitville Tiles, Inc.

2.2 PRODUCTS, GENERAL
A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile for types, compositions, and grades of tile indicated.
1. Furnish tile complying with Standard Grade" requirements unless otherwise indicated.
B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.
C. Colors, Textures, and Patterns: Where manufacturer's standard and premium products are indicated for tile, grout, and other products requiring selection of colors, surface textures,

patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
1. Match color, texture, and pattern indicated by reference to manufacturer's standard and premium designations for these characteristics.

D. Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.

2.3 TILE PRODUCTS
A. Unglazed Porcelain Tile: Provide factory-mounted flat tile complying with the following requirements:

1. Composition: As indicated.
2. Nominal Facial Dimensions: 2 x 2 inch with coved and straight base.
3. Nominal Thickness: As indicated.
4. Face: As indicated.

B. Glazed Wall Tile: Provide flat tile complying with the following requirements:
1. Nominal Facial Dimensions: As indicated.
2. Nominal Thickness: As indicated.
3. Face: As indicated.

C. Unglazed Porcelain Tile: Provide flat tile complying with the following requirements:
1. Nominal Facial Dimensions: S x 8 and 12 x 12 inch
2. Nominal Thickness: As indicated.

D. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and lo comply with following requirements:
1. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile where applicable.
2. Shapes: As follows, selected from manufacturer's standard shapes:
a. Base for Thin set Mortar Installations: Straight.
b. External Corners for Thin set Installations: Surface bullnose.
c. Internal Corners: Field-butted square corners, except use coved base and cap angle pieces designed to member with stretcher shapes.
d. Tapered Transition Tile: Shape designed to effect transition between thickness of tile floor and adjoining floor finishes of different thickness, tapered to provide a reduction in thickness from 1/2 inch to 1/4 inch across nominal 4 inch dimension.

2.4 WATERPROOFING FOR THIN SET FLOOR TILE INSTALLATIONS

A. Latex Rubber Waterproofing: Manufacturer's standard factory-prepackaged, job mixed, proprietary two-part formulation consisting of liquid latex rubber and powder for trowel application and glass fiber fabric reinforcing.

B. Available Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:

C. Products: Subject to compliance with requirements, provide one of the following:
1. Latex Rubber Waterproofing:
a. "Laticrete 301/335 Waterproof Membrane"; Laticrete International Inc.

2.5 SETTING MATERIALS

A. Portland Cement Mortar Installation Materials (thick set tile): Provide materials complying with ANSI A108.1 and as specified below.
1. Cleavage Membrane: Asphalt felt, ASTM D 226, Type I (No. 15), or polyethylene sheeting ASTM D 4397, 4.0 mils thick.
2. Reinforcing Wire Fabric: Galvanized welded wire fabric, 2 inches by 2 inches W0.3 by W0.3 (16 ASW gage or 0.0625 inch diameter); comply with ASTM A 185 and ASTM A 82 except for minimum wire size.

B. Latex-Portland Cement Mortar (thin set tile): ANSI A118.4, composition as follows:
1. Prepackaged dry mortar mix composed of Portland cement, graded aggregate, and the following dry polymer additive in the form of a reemulsifiable powder to which only water is added at job site.

C. Chemical-Resistant, Water-Cleanable Ceramic Tile Setting and Grouting Epoxy (food preparation areas): ANSI A118.3.
1. Provide product capable of resisting continuous and intermittent exposure to temperatures of up to 140 deg F (60 deg C) and 212 deg F (100 deg C), respectively, as certified by mortar manufacturer for intended use.

2.6 GROUTING MATERIALS

A. Latex-Portland Cement Grout: ANSI A118.¢, color as selected from manufacturer's premium range, composition as follows:
1. Latex additive (water emulsion) serving as replacement for part or all of gauging water, added at job site with dry grout mixture, with type of latex and dry grout mix as follows:
a. Latex Type: Manufacturer's custom.

B. Chemical-Resistant Epoxy Grout: ANSI A118.3, color as selected from manufacturer's

premium range.

1. Provide product capable of resisting continuous and intermittent exposure to temperatures of up to 140 deg F (60 deg C) and 212 deg F (100 deg C), respectively, as certified by mortar manufacturer for intended use.

2.7 ELASTOMERIC SEALANTS

A.General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with requirements of Division 7 Section "Joint Sealers, including ASTM C 920 as referenced by Type, Grade, Class, and Uses.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

C. One-Part Mildew-Resistant Silicone Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and temperature extremes.

D. Chemical-Resistant Sealants: For chemical-resistant floors, provide sealants compatible with chemical-resistant mortars and grouts, approved for use indicated by manufacturers of both mortar/grout and sealant and with chemical-resistance properties equivalent to mortar/grout.

E. Multipart Pourable Urethane Sealant for Use T: Type M; Grade P; Class 25; Uses T. M, A, and as applicable to joint substrates indicated, O.

F. Products: Subject to compliance with requirements, provide one of the following:

1. One-Part Mildew-Resistant Silicone Sealant (for vertical surfaces):
   a. "Dow Corning 786"; Dow Corning Corp.
   b. "SCS 1702"; General Electric Co.
   c."863 #345 Whiter; Pecora Corp.
   d. "Rhodorsil 6B White"; Rhone-Poulenc Inc.
   e."Proglaze White"; Tremco Corp.
2. Multipart Pourable Urethane Sealant (for horizontal surfaces):
   a. "Chem-Calk 550"; Bostik Construction Products Div.
   b. "Vulkem 245"; Mameco International, Inc.
   c. "Urexpan NR-200"; Pecora Corp.
   d. "THC-900"; Tremco Corp.

2.8 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and areas where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, and free from oil or waxy films and curing compounds.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tiles that apply to type of setting and grouting materials and methods indicated.

B. TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installations; complywith TCA installation methods indicated.

C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.

E. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.

F. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.

1. Locate joints in tile surfaces directly above joints in concrete substrates.
2. Prepare joints and apply sealants to comply with requirements of Division 7 Section "Joint Sealers."

G. Grout tile to comply with the requirements of the following installation standards:

1. For ceramic tile grouts (sand-portland cement, dry-set, commercial Portland cement, and latex-portland cement grouts), comply with ANSI A108.10.
2. For chemical-resistant epoxy grouts, comply with ANSI A108.6.

3.4 WATERPROOFING FOR THIN SET FLOOR TILE INSTALLATIONS

A. Install waterproofing in compliance with waterproofing manufacturer's instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.

B. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 FLOOR INSTALLATION METHODS

A. Ceramic Tile: Install tile to comply with requirements indicated below for setting bed methods, TCA installation methods related to types of subfloor construction, and grout types:

1. Water-Cleanable Tile-Setting Epoxy Adhesive: ANSI A108.6.
   a. Grout: Chemical-resistant epoxy.
2. Latex-Portland Cement Mortar: ANSI A108.5.

3.6 WALL TILE INSTALLATION METHODS

A. Install types of tile designated for wall application to comply with requirements indicated below for setting-bed methods, TCA installation methods related to subsurface wall conditions, and grout types:

1. Latex-Portland Cement Mortar: ANSI A108.5.

3.7 CLEANING AND PROTECTION

A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.
2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbended, and otherwise defective tile work.

C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures that tile is without damage or deterioration at time of Substantial Completion.

1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work

with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

09512 ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL
1.1 RELATED DOCUMENTS
A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY
A. This Section includes the acoustical panel ceilings installed with exposed silhouette 9/16" bolt-slot grid suspension systems.

1.3 SUBMITTALS
A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
1. Product data for each type of product specified.
2. Samples for initial selection purposes in form of manufacturer's color charts consisting of actual acoustical units or sections of units showing full range of colors, textures, and patterns available for each type of unit indicated.

1.4 PROJECT CONDITIONS
1. Space Enclosure: Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet work in space is completed and nominally dry, work above ceilings is complete, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

1.5 EXTRA MATERIALS
A. Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with appropriate labels.
1. Acoustical Ceiling Units: Furnish ten (10) of full-size units, store as directed by Architect.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Non-Fire-Resistance-Rated Narrow-Face Double-Web Steel Suspension Systems:
    a. Armstrong World Industries, Inc.
    b. Chicago Metallic Corporation.
    d. USG Interiors, Inc.
2. Non-Fire-Resistance-Rated Double-Web Aluminum-Capped Hot-Dip Galvanized
Steel Suspension Systems:
    a. Armstrong World Industries, Inc.
    b. USG Interiors, Inc.
3. Edge Moldings:
    a. Armstrong World Industries, Inc.
    b. Chicago Metallic Corporation.
    c. Fry Reglet Corp.
    d. USG Interiors, Inc.
4. Acoustical Ceilings:
    a. Armstrong World Industries, Inc.
    b. Celotex Corp.
    d. USG Interiors, Inc. Similar design

2.2. MINERAL BASE PANELS (Typical)
A. Type and Finish: Wet formed mineral fiber with vinyl latex finish that comply with pattern and other requirements indicated.

B. Perforated Pattern: Units matching pattern indicate by reference to manufacturer's standard pattern designations, with other characteristics as follows.
1. Color/Light Reflectance Coefficient: White/LR 0.85
2. Noise Reduction Coefficient: NRC 0.55
3. Ceiling Sound Transmissions Class: CSTC 40.
4. Edge Detail: Beveled Tegular Tundra.
5. Size: 24 inches by 24 inches by 5/8 inch.
6. Panel Density: 1.05 lbs/s.f.
7. Acceptable Product: Armstrong Beveled Tegular Tundra #306
Celotex Corp. - Similar Design.
USG Interiors, Inc. - Similar Design.

2.3 METAL SUSPENSION SYSTEMS, GENERAL

A. Standard for Metal Suspension Systems: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 requirements.

B. Finishes and Colors: Provide manufacturer's standard factory-applied finish for type of system indicated. Attachment Devices: Size for 5 times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

1. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attachment of hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing laboratory.

D. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper.

1. Gage: Provide wire sized so that stress at 3 times hanger design load (ASTM C 635, Table 1, Direct-Hung), will be less than yield stress of wire, but provide not less than 0.106-inch diameter (12 gage).

E. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit type of edge detail and suspension system indicated.

1. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.

2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

3. For acoustical tile adhered to substrate, provide edge moldings at ceiling perimeters and where indicated.

4. For narrow faced suspension systems, provide suspension system manufacturer's standard edge moldings that match width and configuration of exposed runners.

F. Hold-Down Clips for Non-Fire-Resistance-Rated Ceilings: For interior ceilings composed of lay-in panels weighing less than 1 lb per sq. ft., provide hold-down clips spaced 2'-0" o.c. on all cross-tees.

2.4 NON-FIRE-RESISTANCE-RATED DIRECT-HUNG SUSPENSION SYSTEMS

A. Narrow-Face Slotted Steel Suspension System (Typical): Main and cross-members roll-formed from prepainted electrolytic zinc-coated cold-rolled steel sheet to produce structural members with 9/16-inch-wide faces; other characteristics as follows:

1. Face Design: Bolt slot, with mitered interface.
2. Structural Classification: Intermediate-Duty System.
3. Finish: Painted White.
4. Acceptable Products: Armstrong Silhouette Bolt Slot.
5. Punch main "T" runners at 9" o.c. both sides of existing route holes at 2'-0" o.c.
6. Stiffen (or otherwise "stitch" together with metal deformations) main beam and cross "T" members for rigidity.

2.5 MISCELLANEOUS MATERIALS

A. Concealed Acoustical Sealant: Nondrying, nonhardening, nonskinning, nonstaining, nonbleeding, gunnable sealant complying with requirement specified in Division 7 Section "Joint Sealers".

B. Neoprene Closure Strips: Closed cell sponge neoprene foam strips, SAE Grade SCE-41/RE-41, equal to Ensolite IV1 by Uniroyal Plastics Co., Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and structural framing to which ceiling system attaches or abuts, with Installer present, for compliance with requirements specified in this and other sections that affect installation and anchorage of ceiling system. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half-width units at borders, and comply with reflected ceiling plans.

3.3 INSTALLATION

A.General: Install acoustical ceiling systems to comply with installation standard referenced below, per manufacturer's instructions and CISCA Ceiling Systems Handbook..

1. Standard for Installation of Ceiling Suspension Systems: Comply with ASTM C636.

Arrange acoustical units and orient directionally patterned units in a manner shown by reflected ceiling plans. Suspend ceiling hangers from building structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

4. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices that are secure and appropriate for structure to which hangers are attached as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.

5. Do not attach hangers to steel deck tabs.

6. Do not attach hangers to steel roof deck. Attach hangers to structural members.

7. Space hangers not more than 4'-0 o.c. along each member supported directly from hangers, unless otherwise shown, and provide hangers not more than 8 inches from ends of each member.

D. Install edge moldings of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical units.

1. Sealant Bed: Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing moldings in rooms so designated.

2. Screw-attach moldings to substrate at intervals not over 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of 1/8 inch in 12'-0. Miter corners accurately and connect securely.

E. Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.

1. Install hold-down clips within 20' of an exterior door and in other areas indicated and in areas where required by governing regulations or for fire-resistance ratings; space as recommended by panel manufacturer, unless otherwise indicated or required.

F. Install resilient neoprene closure strips in grid slot above each condition where top of wall is attached directly to grid. Install full width of wall head track.

3.4 CLEANING

A. Clean exposed surfaces of acoustical ceilings, inducing trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

09650 VINYL FLOORING AND BASE

PART 1. GENERAL

Scope: Provide all labor, materials and equipment to accomplish all resilient flooring work indicated; including, but not limited to, composition tile, set-on base, resilient edge strips, adhesives, and other appurtenances and accessories indicated or required for a complete job ready for occupancy.

PART 2. PRODUCTS

Submittals: with manufacturer's data and installation instructions, submit the following:

3 sets of samples of each type, color and pattern of resilient flooring and accessories; full size for tile and 6" long accessories. Two copies of manufacturer's instructions for recommended maintenance practices for each type of flooring.

Replacement material in the amount of one box for every 50 installed for tile for each type, color and pattern.

VCT is to be laid in a simple geometric pattern to be provided to the contractor after approval of colors by the owner. Colors are to be selected from Azrock VCT "Standard Tile" sample box or approved equals.

VCT Color Schedule & Pattern: See Sheets A209, A210, A211 & A212

Vinyl Composition Tile: fs ss-t-312, type iv; 12" x 12" size; 1/8 gage; unless otherwise indicated. Coloring shall be uniform throughout the entire thickness of tiles.

Installation: Comply with flooring manufacturer's recommendations for type of materials, project conditions, and intended use.

Inspect areas to receive resilient flooring for soundness and trueness of substrate. inform general contractor of unsatisfactory conditions. Start of resilient flooring work constitutes acceptance of substrate conditions in the room or area started.

Clean floors and apply substrate primer in accordance with flooring manufacturer's instruction.

Level floor surfaces as required by grinding or filling with mastic underlayment (ardex
K-15 or equal), use with flooring by flooring manufacturer.

Lay tile flooring from center marks established with principal walls; adjust as required to avoid use of cut units less than 1/2 tile wide at perimeters. Match tiles for color and pattern by using in manufactured and packaged sequence. Lay tile with grain running in same direction.

Apply resilient base in as long lengths as practicable to walls, columns, and all permanent fixtures where indicated. Mitered outside corners not acceptable.

On masonry or other irregular surfaces, fill voids behind base and along top edge with manufacturer's recommended adhesive filler.

Install resilient edge strips at all unprotected edges of flooring, unless otherwise indicated.

Clean floors and accessories after installation and apply protective wax coatings in accordance with flooring manufacturer's instructions, prior to turning over to owner.

09678 RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

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

1.2 SUMMARY

A. This Section includes the following:
1. Resilient wall base.
2. Resilient flooring accessories.
3. Resilient carpet accessories.

1.3 SUBMITTALS
A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
B. Product data for each type of product specified.
C. Samples for initial selection purposes of manufacturer's standard sample sets in form of pieces cut from each type of product specified showing full range of colors and patterns available.

1.4 PROJECT CONDITIONS

A. Maintain a minimum temperature of 70 deg F (21 deg C) in spaces to receive products specified in this Section for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. After this period, maintain a temperature of not less than 55 deg F (13 deg C).

1.5 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage, and identified with labels clearly describing contents.

1. Furnish not less than 10 linear feet for each 500 linear feet or fraction thereof of each different type and color of resilient wall base installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, those specified in each Product Data Sheet at end of this Section.

2.2 RESILIENT WALL BASE

A. Rubber Wall Base: Products complying with FS SS-W-40, Type I, and requirements specified in the Rubber Wall Base Product Data Sheet at end of this Section.

2.3 RESILIENT ACCESSORIES

A. Rubber Accessories: Products complying with requirements specified in Rubber Accessory Product Data Sheet at end of this Section.

2.4 INSTALLATION ACCESSORIES

A. Concrete Slab Primer: Non staining type as recommended by flooring manufacturer.

B. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by flooring manufacturer for applications indicated.

C. Adhesives: Water-resistant type recommended by manufacturer to suit resilient flooring product and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where installation of products specified in this Section will occur, with Installer present, to verify that substrates and conditions are satisfactory for installation and comply with manufacturer's requirements and those specified in this Section.

3.2 PREPARATION

A. General: Comply with manufacturer's installation specifications for preparing substrates indicated to receive products indicated.

B. Use trowelable leveling and patching compounds per manufacturers directions to fill cracks, holes, and depressions in substrates.
C. Use stair tread nose filler per tread manufacturer's directions to fill nosing substrates not conforming to tread contours.

D. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush.

B. Broom or vacuum clean substrates to be covered immediately before installing products specified in this Section. Following cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.

C. Apply concrete slab primer, if recommended by flooring manufacturer, prior to applying adhesive. Apply according to manufacturer's directions.

3.3 INSTALLATION

A. General: Install products specified in this Section using methods indicated according to manufacturer's installation directions.

B. Apply resilient wall base to walls, columns, pilasters, casework, and other permanent fixtures in rooms and areas where base is required. Install wall base in lengths as long as practicable. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

1. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
2. Install inside and exterior corners before installing straight piece.
3. Form inside corners on job from straight pieces of maximum lengths possible by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce snug fit to substrate.
4. Form outside corners on job from straight pieces of maximum lengths possible by shaving back of base at point where bending will occur. Remove a strip perpendicular to length of base and only deep enough to produce a snug fit without bends whitening or removal of more than half the thickness of wall base.

C. Place resilient accessories so they are butted to adjacent materials of type indicated and bond to substrates with adhesive. Install reducer strips at edges of flooring that otherwise would be exposed.

RUBBER WALL BASE PRODUCT DATA SHEET

Rubber Wall Base Designation: RWB-[1]
Style: [Cove with top-set toe.]
Minimum Nominal Thickness: 1/8 inch.
Height: [4 inches.]
Lengths: [Coils in lengths standard with manufacturer but not less than 100 feet.]
Exterior Corners: [Premolded.]
Interior Corners: [Premolded.]
Color and Pattern: [As selected by Architect from manufacturer's full range of colors and patterns produced for rubber wall base complying with requirements indicated.]

09900 PAINTING

PART 1 - GENERAL

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

1.2 SUMMARY
A. This Section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop-priming and surface treatment specified under other Sections.

B. Paint exposed surfaces whether or not colors are designated in schedules, except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.

1. Painting includes field-painting exposed pipes and hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment. Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.

1.3 SUBMITTALS
A. Samples for Verification Purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate.

1. Submit samples on the following substrates for the Architect's review of color and texture only:

a. Concrete: Provide two 4-inch-square samples for each color and finish.

b. Concrete Masonry: Provide two 4-by-8-inch samples of masonry, with mortar joint in the center, for each finish and color.

c. Painted Wood: Provide two 12-inch-square samples of each color and material on hardboard.

d. Stained or Natural Wood: Provide two 4-by-8-inch samples of natural and stained wood finish on actual wood surfaces.
e. Ferrous Metal: Provide two 4-inch-square samples of flat metal and two 8-inch-long samples of solid metal for each color and finish.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

1. Benjamin Moore and Co. (Moore).
2. Coronado Company.
3. Devoe and Reynolds Co. (Devoe).
4. PPG Industries, Pittsburgh Paints (PPG)
5. Pratt and Lambert (P & L).
6. The Glidden Company (Glidden).
7. The Sherwin-Williams Company (S-W).

2.2 PAINT MATERIALS, GENERAL
A. Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

B. Material Quality: Provide the manufacturer's best-quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

C. Colors: Provide custom colors of the finished paint systems to match the Architect's samples.

2.3 MASONRY BLOCK FILLER
A. Filler Coat Materials: Provide the manufacturer's Painting recommended factory-formulated, latex-type concrete masonry block fillers that are compatible with the finish materials indicated. Provide Loxon block surfacer (A24W200) by Sherwin Williams for interior cmu walls or equal.

2.4 PRIMERS
A. Primers: Provide the manufacturer's recommended factory-formulated primers that are compatible with the substrate and finish coats indicated.

2.5 UNDERCOAT MATERIALS
A. Undercoat Materials: Provide the manufacturer's recommended factory-formulated
undercoat materials that are compatible with the substrate and finish coats indicated.
Provide Loxon Exterior Acrilic Masonry Primer by Sherwin Williams or equal.

2.6 EXTERIOR FINISH PAINT MATERIAL
A. Finish Paint: Provide the manufacturer's recommended factory-formulated finish-coat materials that are compatible with the substrate and undercoats indicated. Provide Elastomeric Coating (A5 Series) by Sherwin Williams or equal.

2.7 INTERIOR FINISH PAINT MATERIAL
A. Finish Paint: Provide the manufacturer's recommended factory-formulated finish-coat materials that are compatible with the substrate and undercoats indicated.

2.8 MISCELLANEOUS WOOD-FINISHING MATERIALS
A. Wood-Finishing Materials: Provide the manufacturer's recommended factory-formulated, wood-finishing materials that are compatible with the substrate and undercoats indicated.

1. Varnish-Type Surface Sealer:
a. Sherwin Williams (A66-300 Series) Oil Varnisg or equal.

2. Oil-Type Interior Wood Stain: Slow-penetrating, oil-type wood stain.
a. Moore: 241 Moore's Interior Wood Finishes Penetrating Stain or equal.

3. Cut Shellac: Quick-drying, rosin-free, clear, general-purpose shellac varnish.
a. Sherwin Williams (B26V34 Series) FastDry Sanding Sealer or equal.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates and conditions under which painting will be performed for compliance with paint application requirements. Surfaces receiving paint must be thoroughly dry before paint is applied.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items, if necessary, to completely paint the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to the manufacturer's instructions for each particular substrate condition and as specified.

3 . 3 APPLICATION
A. General: Apply paint according to manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

3.4 EXTERIOR PAINT SCHEDULE
A. General: Provide the following paint systems for the various substrates indicated.

B. Exterior Stucco - Provide Elastomeric Coating (A5 Series) by Sherwin Williams or equal as per manufacturer recomendation.

1. Lusterless (Flat) Acrylic Finish: Two coats with total dry film thickness not less than 2.5 mile.

a. First and Second Coats: Exterior acrylic emulsion.

2. Concrete Floor Sealer - follow manufacturers printed preparation and application instructions.

a. Sherwin Williams (B90 Series) ArmorSeal Floor Coatongs @ Mechanical Room (109)& Apparatus Bay (114) or equal.

C. Concrete Masonry Units:

1. Semi-gloss Acrylic Finish: Two coats over block filler with total dry film thickness not less than 2.5 mils, excluding the block filler.

a. Block Filler: High-performance, latex block filler.
1) Provide Loxon Exterior Acrilic Masonry Primer by Sherwin Williams or equal.

b. First and Second Coats: Exterior acrylic emulsion

D. Ferrous Metal: Primer is not required on shop-primed items.

1. Full-Gloss Alkyd Enamel: Two finish coats over primer.

a. Primer: Synthetic rust-inhibiting primer) Moore: Ironclad Retardo
Rust-Inhibitive Paint #163.

b. First and Second Coats: Gloss alkyd enamel.

1) Moore: Impervo High-Gloss Enamel #133.

E. Galvanized Metal:

1. Galvanized Metal Primers:
a. Moore: Ironclad Galvanized Metal Latex Primer #155.

2. First and Second Coats: Gloss alkyd enamel: Weather-resistant, high-gloss enamel.
a. Moore: Impervo High-Gloss Enamel #133.

3.5 INTERIOR PAINT SCHEDULE
A. General: Provide the following paint systems for the various substrates, as indicated.

B. Concrete and Masonry (other than concrete masonry units):

1. Semigloss Latex Finish: Three coats with total dry film thickness not less than
3.5 mile by Sherwin Williams or equal..

a. Undercoat: Interior enamel undercoat:

1) Provide Loxon block surfacer (A24W200) by Sherwin Williams for interior cmu walls or equal.

b. Finish Coat: Interior, semigloss, odorless, Latex.
1) By Sewin Williams or equal..

C. Concrete Masonry Units:

1. Semigloss, Latex Finish: Two coats over filled surface with total dry film thickness not less than 3.5 miles, excluding filler coat.

a. Block Filler: High-performance latex block filler.
1) Provide Loxon Exterior Acrilic Masonry Primer by Sherwin Williams or equal.

b. Undercoat: Interior enamel undercoat.
1) Moore: Moore's Alkyd Enamel Underbody #217.

c. Finish Coat: Interior, semigloss, Latex)
1) Sherwin Williams or equal. Color to be selected by Architect.

D. Gypsum Drywall Systems and Plaster:

1. Odorless Semigloss Latex Finish: Three coats with total dry film thickness not less than 2.5 mile.

a. Primer: White, interior, latex-based primer.
1) Moore: Moore's Latex Quick-Dry Prime Seal #201 or equal.

b. First and Second Coats: Interior, semigloss, Latex
1) By Sherwin Williams or equal.

E. Woodwork and Hardboard:

1. Semigloss Enamel Finish: Three coats.
a. Undercoat: Interior enamel undercoat.
1) Moore: Moore's Alkyd Enamel Underbody #217.

b. First and Second Coats: Interior, semigloss, odorless, alkyd enamel.
1) Moore: Moore's Satin Impervo Enamel #235.

F. Stained Woodwork:

1. Stained-Varnish Rubbed Finish: Three finish coats over stain plus filler on open-grain wood. Wipe filler before applying first varnish coat.

a. Stain Coat: Oil-type interior wood stain.
1) Moore: 241 Moore's Interior Wood Finishes Penetrating Stain.

b. First Coat: Cut shellac.
1) Moore: 413 Moore's Interior Wood Finishes Quick-Dry Sanding Sealer.

G. Ferrous Metal:
1. Semi-gloss Enamel Finish: Two finish coats over primer with total dry film thickness not less than 2.5 mils.

a. Primer: Synthetic, quick-drying, rust-inhibiting primer.
1) Moore: Ironclad Retardo Rust-Inhibitive Paint #163.

2. Semigloss Enamel Finish: Two coats over primer with total dry film thickness not less than 2.5 mils.

a. Primer: Synthetic, quick-drying, rust-inhibiting
1) Moore: Ironclad Retardo Rust-Inhibitive Paint #163.

b. Undercoat: Interior enamel undercoat) Moore: Moore's Alkyd Enamel
Underbody #217.

c. Finish Coat: Interior, semigloss, odorless, alkyd enamel.
1) Moore: Moore's Satin Impervo Enamel #235.

H. Concrete Sealer - All interior finished spaces, parking decks are not included.

1. Sherwin Williams.
2. Thoro Company.
3. Cornado.
4. Huls America, Inc. CHem-Trete.
5. Tnemec Company.

SCHEDULE

Interior Finishes

Concrete Block (CMU)

Primer: B42W00046 - Heavy Duty Block Filler White
Coat 1: B66W00651 - Pro Industrial 0 VOC Acrylic Semi-Gloss Extra White
Coat 2: B66W00651 - Pro Industrial 0 VOC Acrylic Semi-Gloss Extra White

END OF SECTION

SURFACE PREPARATION

1) Block (Cinder and Concrete)
Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement, and hardeners. Concrete and mortar must be cured at least 30 days at 75°F.The pH of the surface should be between 6 and 9,unless the products to be used are designed to be used in high pH environments such as Loxon. On tilt-up and poured-in-place concrete, commercial detergents and abrasive blasting may be necessary to prepare the surface. Fill bug holes, air pockets, and other voids with a patching compound such as ConSeal.

END OF SPECIFICATION

Protective & Marine Coatings

HEAVY DUTY BLOCK FILLER

B42W46

Revised 5/12

PRODUCT INFORMATION

1.01

PRODUCT DESCRIPTION

HEAVY DUTY BLOCK FILLER is an acrylic resin block filler for use on interior and exterior poured and precast concrete, concrete block, and cinder block.

- Excellent moisture resistance
- Excellent filling characteristics
- Suitable for use in USDA inspected facilities
- Resurface spalled and deteriorated concrete walls and ceilings
- Low odor, low VOC

PRODUCT CHARACTERISTICS

Finish:	Flat
Color:	White
Volume Solids:	53% ± 2%
Weight Solids:	73% ± 2%
VOC (EPA Method 24):	<50 g/L ; 0.42 lb/gal

Recommended Spreading Rate per coat:
(varies with application, surface irregularities, and degree of sealing and filling desired.)

	Minimum		Maximum	
Wet mils (microns)	**18.0**	(450)	**34.0**	(850)
Dry mils (microns)	**10.0**	(250)	**18.0**	(450)
~Coverage sq ft/gal (m^2/L)	**50**	(1.2)	**88**	(8.2)
Theoretical coverage sq ft/gal (m^2/L) @ 1 mil / 25 microns dft	**848**	(21)		

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 18.0 mils wet (450 microns):

	@ 55°F/13°C	@ 77°F/25°C *50% RH*	@ 95°F/35°C
To touch:	1.5 hours	1 hour	30 minutes
To handle:	8 hours	6 hours	1 hour
To recoat:			
itself	3 hours	1 hour	30 minutes
water borne	48 hours	18 hours	6 hours
solvent borne	48 hours	48 hours	24 hours
To cure:	30 days	30 days	10 days

Drying time is temperature, humidity, and film thickness dependent.

Shelf Life:	36 months, unopened Store indoors at 40°F (4.5°C) to 100°F (38°C)
Flash Point:	>200°F (>93°C), PMCC
Reducer/Clean Up:	Water

RECOMMENDED USES

For use over prepared masonry surfaces in:

- Dairies
- Mining Industry
- Chemical Plants
- Hospitals
- Schools
- Bottling Plants
- Tunnels
- Paper Mills
- Jails
- Power Plants
- Equipment Foundations
- Water and Sewage Treatment Facilities
- Industrial concrete ceilings and walls
- Petroleum Refineries
- Acceptable for use in high performance architectural applications

PERFORMANCE CHARACTERISTICS

Substrate*: Concrete
Surface Preparation*: SSPC-SP3
System Tested*:
1 ct. Heavy Duty Block Filler @ 10 mils dft/ct
*Unless otherwise noted below

Test Name	Test Method	Results
Adhesion	ASTM D4541	200 psi
Direct Impact	ASTM D2794	6 in. lbs.
Dry Heat Resistance	ASTM D2485	200°F (93°C)
Flexibility (cold rolled steel)	ASTM D522, 180° bend, 1" mandrel	Passes
Moisture Resistance	TT-C-555B	No failure
Pencil Hardness	ASTM D3363	5B
Thermal Shock	ASTM D2246 (5 cycles)	Excellent
Winder Driven Rain Resistance	TT-C-555b	Passes
Wet Heat Resistance	Non-immersion	120°F (49°C)

Provides performance comparable to products formulated to federal specification: TT-F-1098D Type 1

Data Pages

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Protective & Marine Coatings

HEAVY DUTY BLOCK FILLER

B42W46

PRODUCT INFORMATION

1.01

RECOMMENDED SYSTEMS

		Dry Film Thickness / ct. Mils	(Microns)
Untopcoated, light service			
Interior:			
1 ct.	Heavy Duty Block Filler	10.0-18.0	(250-450)
Exterior:			
2 cts.	Heavy Duty Block Filler	10.0-18.0	(250-450)
Acrylic Finishes:			
1 ct.	Heavy Duty Block Filler	10.0-18.0	(250-450)
2 cts.	DTM Acrylic Coating	2.5-4.0	(63-100)
or	Metalatex Semi-Gloss Coating	0.5-4.0	(13-100)
or	Sher-Cryl HPA	2.5-4.0	(62.5-100)
Alkyd Finishes:			
1 ct.	Heavy Duty Block Filler	10.0-18.0	(250-450)
2 cts.	Industrial Enamel HS	2.0-4.0	(63-100)
or	Metalastic DTM	3.0-5.0	(75-125)
or	Waterbased Industrial Enamel	1.5-3.0	(38-75)
Catalyzed Epoxy, Solvent based:			
1 ct.	Heavy Duty Block Filler	10.0-18.0	(250-450)
2 cts.	Tile-Clad HS Epoxy	2.5-4.0	(63-100)
or	Macropoxy 646	5.0-10.0	(125-250)
Catalyzed Epoxy, Water based:			
1 ct.	Heavy Duty Block Filler	10.0-18.0	(250-450)
2 cts.	Water Based Catalyzed Epoxy	2.5-4.0	(63-100)
or	Waterbased Tile Clad Epoxy	2.0-4.0	(63-100)
or	Pro Industrial HB Epoxy	4.0-6.0	(100-150)
Polyurethane:			
1 ct.	Heavy Duty Block Filler	10.0-18.0	(250-450)
1 ct.	Macropoxy 646	5.0-10.0	(125-250)
2 cts.	Hi-Solids Polyurethane	3.0-4.0	(75-100)
or	Sherthane 2K Urethane	2.0-4.0	(63-100)
or	Acrolon 218 HS Polyurethane	3.0-6.0	(75-150)

The systems listed above are representative of the product's use, other systems may be appropriate.

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SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:
Concrete & Masonry: SSPC-SP13/NACE 6,or ICRI No. 310.2, CSP 1-3

Surface Preparation Standards

	Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal		Sa 3	Sa 3	SP 5	1
Near White Metal		Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast		Sa 2	Sa 2	SP 6	3
Brush-Off Blast		Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	C St 2	SP 2	-
	Pitted & Rusted	D St 2	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	C St 3	SP 3	-
	Pitted & Rusted	D St 3	D St 3	SP 3	-

TINTING

Do not tint.

To provide color as a guide coat, or when color is required for exterior exposure, mix 4 parts by volume of Heavy Duty Block Filler with 1 part by volume of A-100 Exterior Latex Flat, A6 series. For interior exposures, mix 4 parts by volume of Heavy Duty Block Filler with 1 part by volume of ProMar 200 Interior Latex Flat Wall Paint, B30W200 Series.

APPLICATION CONDITIONS

Temperature: 55°F (13°C) minimum, 95°F (35°C) maximum
(air, surface, and material)
At least 5°F (2.8°C) above dew point

Relative humidity: 85% maximum

PRODUCT CHARACTERISTICS

Packaging: 5 gallon (18.9L) containers
Weight: 14.25 ± 0.2 lb/gl 1.71 kg/L

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Protective & Marine Coatings

HEAVY DUTY BLOCK FILLER

B42W46

Revised 5/12

APPLICATION BULLETIN

1.01

SURFACE PREPARATIONS

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Concrete/Masonry
New
For surface preparation, refer to SSPC-SP13/NACE 6, or ICRI No. 310.2, CSP 1-3. Surface must be clean, dry, sound, and offer sufficient profile to achieve adequate adhesion. Minimum substrate cure is 28 days at 75°F (24°C). Remove all form release agents, curing compounds, salts, efflorescence, laitance, and other foreign matter by sandblasting, shotblasting, mechanical scarification, or suitable chemical means. Refer to ASTM D4260. Rinse thoroughly to achieve a final pH between 6.0 and 10.0. Allow to dry thoroughly prior to coating.

Old
For surface preparation, refer to SSPC-SP13/NACE 6, or ICRI No. 310.2, CSP 1-3. Surface preparation is done in much the same manner as new concrete; however, if the concrete is contaminated with oils, grease, chemicals, etc., they must be removed by cleaning with a strong detergent. Refer to ASTM D4258. Form release agents, hardeners, etc. must be removed by sandblasting, shotblasting, mechanical scarification, or suitable chemical means.

Fill all cracks, voids, and bugholes with Steel-Seam FT910.

Follow the standard methods listed below when applicable:
ASTM D4258 Standard Practice for Cleaning Concrete.
ASTM D4259 Standard Practice for Abrading Concrete.
ASTM D4260 Standard Practice for Etching Concrete.
ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete.
SSPC-SP 13/Nace 6 Surface Preparation of Concrete
ICRI No. 310.2

Do not apply over existing coatings.

Surface Preparation Standards

	Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal		Sa 3	Sa 3	SP 5	1
Near White Metal		Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast		Sa 2	Sa 2	SP 6	3
Brush-Off Blast		Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	C St 2	SP 2	-
	Pitted & Rusted	D St 2	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	C St 3	SP 3	-
	Pitted & Rusted	D St 3	D St 3	SP 3	-

APPLICATION CONDITIONS

Temperature:	55°F (13°C) minimum, 95°F (35°C) maximum (air, surface, and material) At least 5°F (2.8°C) above dew point
Relative humidity:	85% maximum

APPLICATION EQUIPMENT

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

Reducer/Clean up .....Water

Airless Spray
Pressure.....2000 psi
Hose.....1/4" - 3/8" ID
Tip .....028"
Filter.....30 mesh
Reduction.....not recommended

Conventional Spray
Gun .....Binks 95
Fluid Nozzle 67
Air Nozzle.....67PD
Atomization Pressure.....50 psi
Fluid Pressure.....20-25 psi
Reduction.....as needed up to 12½% by volume

Brush
Brush.....Nylon/Polyester
Reduction.....not recommended

Roller
Cover .....1/2" - 1 1/2" synthetic
Reduction.....not recommended

Squeegee also acceptable

If specific application equipment is not listed above, equivalent equipment may be substituted.

continued on back

444 WEBB COUNTY FIRE STATION
HICKEY PEÑA | ARCHITECTS

Protective & Marine Coatings

HEAVY DUTY BLOCK FILLER

B42W46

APPLICATION BULLETIN

1.01

APPLICATION PROCEDURES

Surface preparation must be completed as indicated.

Heavy Duty Block Filler is ready-to-spray (airless) and does not require thinning. Mix material thoroughly to a uniform consistency with power agitation and apply by brush, roller, or spray. Follow by squeegee, trowel, or roller, being careful to force material into pores in order to produce a relatively smooth surface. In severe wet areas, a smooth continuous pinhole-free appearance is necessary for proper protection before topcoating. Two coats will provide the most uniform surface.

Apply paint at the recommended film thickness and spreading rate as indicated below:

Recommended Spreading Rate per coat:
(varies with application, surface irregularities, and degree of sealing and filling desired.)

	Minimum		Maximum	
Wet mils (microns)	**18.0**	(450)	**34.0**	(850)
Dry mils (microns)	**10.0**	(250)	**18.0**	(450)
~Coverage sq ft/gal (m^2/L)	**50**	(1.2)	**88**	(8.2)
Theoretical coverage sq ft/gal (m^2/L) @ 1 mil / 25 microns dft	**848**	(21)		

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 18.0 mils wet (450 microns):

	@ 55°F/13°C	@ 77°F/25°C *50% RH*	@ 95°F/35°C
To touch:	1.5 hours	1 hour	30 minutes
To handle:	8 hours	6 hours	1 hour
To recoat:			
itself	3 hours	1 hour	30 minutes
water borne	48 hours	18 hours	6 hours
solvent borne	48 hours	48 hours	24 hours
To cure:	30 days	30 days	10 days

Drying time is temperature, humidity, and film thickness dependent.

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

CLEAN UP INSTRUCTIONS

Clean spills and spatters immediately with soap and warm water. Clean hands and tools immediately after use with soap and warm water. After cleaning, flush spray equipment with Mineral Spirits to prevent rusting of the equipment. Follow manufacturer's safety recommendations when using Mineral Spirits.

DISCLAIMER

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PERFORMANCE TIPS

When using spray application, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.

Excessive reduction of material can affect film build, appearance, and adhesion.

Make sure material is forced into pores and bugholes in order to provide a pinhole free surface.

Do not use below grade as a hydrostatic waterproofer or in immersion service.

Rolling will provide a textured finish. Squeegee will provide a smoother finish.

For better filling results, apply by airless spray and immediately back roll.

Refer to Product Information sheet for additional performance characteristics and properties.

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

PRO INDUSTRIAL™

SHERWIN WILLIAMS

113.03

Zero VOC Acrylic

B66-600 Series	Gloss
B66-650 Series	Semi-Gloss
B66-660 Series	Eg-Shel

As of 11/11/2011, Complies with:

OTC	Yes	LEED® 09 CI	Yes
SCAQMD	Yes	LEED® 09 NC	Yes
CARB	Yes	LEED® 09 CS	Yes
NGBS	Yes	LEED® S	Yes

MPI #114,147,153,154,163,164

Children & Schools GREENGUARD® Indoor Air Quality Certified

CHARACTERISTICS

Pro Industrial Zero VOC Acrylic is an ambient cured, single component acrylic coating. It is designed for interior and exterior industrial and commercial applications

- Chemical resistant
- Superior color and gloss retention
- Outstanding early moisture resistance
- Flash rust/early rust resistant
- Suitable for use in USDA inspected facilities
- Low odor
- Fast dry
- HAPS free

Color: most colors

Recommended Spread Rate per coat:

Wet mils:	6.0 - 12.0
Dry mils:	2.5 - 4.0
Coverage:	140 - 225 sq ft/gal approximate

Note: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Time @ 7.0 mils wet 50% RH:

	@ 50°F	@ 77°F	@ 120°F
To touch:	1 hr	30 min	5 min
Tack free:	8 hrs	5 hrs	15 min
To recoat:	8 hrs	5 hrs	15 min
To cure:	30 days	30 days	30 days

Drying time is temperature, humidity, and film thickness dependent.

Finish: Gloss, Semi-Gloss, Eg-Shel

Flash Point: 499°F, Seta Flash

Shelf Life: 36 months, unopened
Store indoors at 40°F to 100°F.

Tinting:

Base	oz/gal	Strength
Extra White	0-4	100%
Deep Base	8-12	100%
Ultradeep Base	8-12	100%

B66W00611 (may vary by color)

VOC (EPA Method 24): Unreduced: 0 g/L; trace

Volume Solids: 35 ± 2%

Weight Solids: 44 ± 2%

Weight per Gallon: 9.51 lb/gal ±2%

RECOMMENDED SYSTEMS

Steel*:
2 cts. Pro Industrial Zero VOC Acrylic

Steel:
1 ct. Pro Industrial Pro-Cryl Universal Primer
or DTM Acrylic Primer/Finish
or Kem Bond HS
or Zinc Clad Primer
1-2 cts. Pro Industrial Zero VOC Acrylic

Aluminum:
2 cts. Pro Industrial Zero VOC Acrylic

Aluminum:
1 ct. Pro Industrial Pro-Cryl Universal Primer
1-2 cts. Pro Industrial Zero VOC Acrylic

Concrete Block:
1 ct. Loxon Block Surfacer
1-2 cts. Pro Industrial Zero VOC Acrylic

Concrete/Masonry:
1 ct. Loxon Masonry Primer
1-2 cts. Pro Industrial Zero VOC Acrylic

Drywall
1 ct. ProMar 200 Zero Int. Primer
1-2 cts. Pro Industrial Zero VOC Acrylic

Galvanizing:
2 cts. Pro Industrial Zero VOC Acrylic

Prefinished Siding: (Baked-on finishes)
1 ct. DTM Bonding Primer
1-2 cts. Pro Industrial Zero VOC Acrylic

Wood, exterior:
1 ct. Exterior Wood Primer
1-2 cts. Pro Industrial Zero VOC Acrylic

Wood, interior:
1 ct. Premium Wall & Wood Primer
1-2 cts. Pro Industrial Zero VOC Acrylic

*Application of coating on unprimed steel may cause pinpoint rusting. Safety Colors, Deep Base, and Ultradeep colors require a prime coat for maximum durability, adhesion, and corrosion protection.

System Tested: (unless otherwise indicated)
Substrate: Steel
Surface Preparation: SSPC-SP10
Finish: 2 cts. Pro Industrial 0 VOC Acrylic

Adhesion:
Method: ASTM D4541
Result: 1386 psi

Corrosion Weathering 8:
Method: ASTM D5894, 1500 hours, 5 cycles
Result: Rating 10, per ASTM D714 for blistering
Rating 9 per ASTM D1654 for corrosion

Direct Impact Resistance:
Method: ASTM D2794
Result: >160 in. lb

Dry Heat Resistance:
Method: ASTM D2485
Result: 250°F

Flexibility:
Method: ASTM D522, 180° bend, 1/8" mandrel
Result: Passes

Humidity Resistance*:
Method: ASTM D4585, 1500 hours
Result: Rating 10 per ASTM D714 for blistering
Rating 10 per ASTM D1654 for corrosion

Pencil Hardness:
Method: ASTM D3363
Result: 2B

Salt Fog Resistance*:
Method: ASTM B117, 1500 hours
Result: Rating 10 per ASTM D714 for blistering
Rating 9 per ASTM D1654 for corrosion

Thermal Cycling:
Method: ASTM D2246, 5 cycles
Result: Passes

***over Pro Industrial Pro-Cryl Primer**

continued on back

PRO INDUSTRIAL™ ZERO VOC ACRYLIC

SHERWIN-WILLIAMS®

SURFACE PREPARATION

WARNING! Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other adverse health effects, especially in children or pregnant women. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as a properly fitted respirator (NIOSH approved) and proper containment and cleanup. For more information, call the National Lead Information Center at 1-800-424-LEAD (in US) or contact your local health authority.

Do not use hydrocarbon solvents for cleaning.

Iron & Steel - Minimum surface preparation is Hand Tool Clean per SSPC-SP2. Remove all oil and grease from surface per SSPC-SP1. For better performance, use Commercial Blast Cleaning per SSPC-SP6. Primer recommended for best performance.

Aluminum - Remove all oil, grease, dirt, oxide and other foreign material per SSPC-SP1.

Galvanizing - Allow to weather a minimum of six months prior to coating. Solvent Clean per SSPC-SP1. When weathering is not possible, or the surface has been treated with chromates or silicates, first Solvent Clean per SSPC-SP1 and apply a test patch. Allow paint to dry at least one week before testing adhesion. If adhesion is poor, brush blasting per SSPC-SP7 is necessary to remove these treatments. Rusty galvanizing requires a minimum of Hand Tool Cleaning per SSPC-SP2, prime the area the same day as cleaned.

Concrete and Masonry - For surface preparation, refer to SSPC-SP13/NACE 6 or ICRI 03732, CSP 1-3. Surfaces should be thoroughly cleaned and dry. Surface temperatures must be at least 55°F before filling. If required for a smoother finish, use the recommended filler/surfacer. The filler/surfacer must be thoroughly dry before topcoating per manufacturer's recommendations.
Weathered masonry and soft or porous cement board must be brush blasted or power tool cleaned to remove loosely adhering contamination and to get to a hard, firm surface. Apply one coat Loxon Conditioner, following label recommendations.

Wood - Surface must be clean, dry and sound. Prime with recommended primer. No painting should be done immediately after a rain or during foggy weather. Knots and pitch streaks must be scraped, sanded and spot primed before full coat of primer is applied. All nail holes or small openings must be properly caulked.

Previously Painted Surfaces - If in sound condition, clean the surface of all foreign material. Smooth, hard or glossy coatings and surfaces should be dulled by abrading the surface. Apply a test area, allowing paint to dry one week before testing adhesion. If adhesion is poor, additional abrasion of the surface and/or removal of the previous coating may be necessary. Retest surface for adhesion. If paint is peeling or badly weathered, clean surface to sound substrate and treat as a new surface as above.

APPLICATION

Temperature: 50°F minimum
120°F maximum
(Air, surface, and material)
At least 5°F above dew point
Relative humidity: 85% maximum

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compatible with the existing environmental and application conditions.

Reducer Water

Airless Spray
Pressure ..... 1500 psi
Hose ..... 1/4" ID
Tip ..... .017" - .021"
Filter ..... 60 mesh
Reduction ..... Not recommended

Conventional Spray
Gun ..... Binks 95
Fluid Nozzle 66
Air Nozzle 63PB
Atomization Pressure ..... 50 psi
Fluid Pressure ..... 15-20 psi
Reduction ... As needed up to 12½%by volume

Brush ..... Nylon / polyester
Reduction ..... Not recommended
Roller ..... 3/8" woven
Reduction ..... Not recommended

If specific application equipment is listed above, equivalent equipment may be substituted.

CLEANUP INFORMATION

Clean spills and spatters immediately with soap and warm water. Clean hands and tools immediately after use with soap and warm water. After cleaning, flush spray equipment with Mineral Spirits to prevent rusting of the equipment. Follow manufacturer's safety recommendations when using Mineral Spirits.
NOTE: If coating is allowed to "set-up", Reducer #54 may be required for cleaning. Follow manufacturer's safety recommendations when using Reducer #54.

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Material Safety Data Sheets

MATERIAL SAFETY DATA SHEET

B42W46
33 00

DATE OF PREPARATION
Dec 14, 2011

SECTION 1 — PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NUMBER
B42W46
PRODUCT NAME
Heavy Duty Block Filler
MANUFACTURER'S NAME
THE SHERWIN-WILLIAMS COMPANY
101 Prospect Avenue N.W.
Cleveland, OH 44115

Telephone Numbers and Websites

Product Information	(800) 524-5979 www.sherwin-williams.com
Regulatory Information	(216) 566-2902 www.paintdocs.com
Medical Emergency	(216) 566-2917
Transportation Emergency*	(800) 424-9300
**for Chemical Emergency ONLY (spill, leak, fire, exposure, or accident)*	

SECTION 2 — COMPOSITION/INFORMATION ON INGREDIENTS

% by Weight	CAS Number	Ingredient	Units	Vapor Pressure
8	**1332-58-7**	**Kaolin**		
		ACGIH TLV	2 mg/m3 as Resp. Dust	
		OSHA PEL	10 mg/m3 Total Dust	
		OSHA PEL	5 mg/m3 Respirable Fraction	
56	**471-34-1**	**Calcium Carbonate**		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	15 mg/m3 Total Dust	
		OSHA PEL	5 mg/m3 Respirable Fraction	
0.9	**13463-67-7**	**Titanium Dioxide**		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	10 mg/m3 Total Dust	
		OSHA PEL	5 mg/m3 Respirable Fraction	

SECTION 3 — HAZARDS IDENTIFICATION

HMIS Codes

Health	1*
Flammability	0
Reactivity	0

ROUTES OF EXPOSURE
INHALATION of vapor or spray mist.
EYE or SKIN contact with the product, vapor or spray mist.
EFFECTS OF OVEREXPOSURE

EYES:	Irritation.
SKIN:	Prolonged or repeated exposure may cause irritation.
INHALATION:	Irritation of the upper respiratory system.

In a confined area vapors in high concentration may cause headache, nausea or dizziness.
SIGNS AND SYMPTOMS OF OVEREXPOSURE
Redness and itching or burning sensation may indicate eye or excessive skin exposure.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
None generally recognized.
CANCER INFORMATION
For complete discussion of toxicology data refer to Section 11.

SECTION 4 — FIRST AID MEASURES

EYES:	Flush eyes with large amounts of water for 15 minutes. Get medical attention.
SKIN:	Wash affected area thoroughly with soap and water. Remove contaminated clothing and launder before re-use.
INHALATION:	If affected, remove from exposure. Restore breathing. Keep warm and quiet.
INGESTION:	Do not induce vomiting. Get medical attention immediately.

SECTION 5 — FIRE FIGHTING MEASURES

FLASH POINT	LEL	UEL	FLAMMABILITY CLASSIFICATION
> 200 °F PMCC	N.A.	N.A.	Not Applicable

EXTINGUISHING MEDIA

Carbon Dioxide, Dry Chemical, Alcohol Foam

UNUSUAL FIRE AND EXPLOSION HAZARDS

Closed containers may explode (due to the build-up of pressure) when exposed to extreme heat.

During emergency conditions overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Obtain medical attention.

SPECIAL FIRE FIGHTING PROCEDURES

Full protective equipment including self-contained breathing apparatus should be used.

Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

SECTION 6 — ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all sources of ignition. Ventilate the area.

Remove with inert absorbent.

SECTION 7 — HANDLING AND STORAGE

STORAGE CATEGORY

DOL Storage Class IIIB

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Keep container closed when not in use. Transfer only to approved containers with complete and appropriate labeling. Do not take internally. Keep out of the reach of children.

SECTION 8 — EXPOSURE CONTROLS/PERSONAL PROTECTION

PRECAUTIONS TO BE TAKEN IN USE

Use only with adequate ventilation.

Avoid contact with skin and eyes. Avoid breathing vapor and spray mist.

Wash hands after using.

This coating may contain materials classified as nuisance particulates (listed "as Dust" in Section 2) which may be present at hazardous levels only during sanding or abrading of the dried film. If no specific dusts are listed in Section 2, the applicable limits for nuisance dusts are ACGIH TLV 10 mg/m3 (total dust), 3 mg/m3 (respirable fraction), OSHA PEL 15 mg/m3 (total dust), 5 mg/m3 (respirable fraction).

VENTILATION

Local exhaust preferable. General exhaust acceptable if the exposure to materials in Section 2 is maintained below applicable exposure limits. Refer to OSHA Standards 1910.94, 1910.107, 1910.108.

RESPIRATORY PROTECTION

If personal exposure cannot be controlled below applicable limits by ventilation, wear a properly fitted organic vapor/particulate respirator approved by NIOSH/MSHA for protection against materials in Section 2.

When sanding or abrading the dried film, wear a dust/mist respirator approved by NIOSH/MSHA for dust which may be generated from this product, underlying paint, or the abrasive.

PROTECTIVE GLOVES

Wear gloves which are recommended by glove supplier for protection against materials in Section 2.

EYE PROTECTION

Wear safety spectacles with unperforated sideshields.

450 WEBB COUNTY FIRE STATION
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SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

PRODUCT WEIGHT	14.26 lb/gal	1708 g/l
SPECIFIC GRAVITY	1.72	
BOILING POINT	212 - 213 °F	100 - 100 °C
MELTING POINT	Not Available	
VOLATILE VOLUME	47%	
EVAPORATION RATE	Slower than ether	
VAPOR DENSITY	Heavier than air	
SOLUBILITY IN WATER	N.A.	
pH	9.0	

VOLATILE ORGANIC COMPOUNDS (VOC Theoretical - As Packaged)

0.38 lb/gal	45 g/l	Less Water and Federally Exempt Solvents
0.20 lb/gal	25 g/l	Emitted VOC

SECTION 10 — STABILITY AND REACTIVITY

STABILITY — Stable

CONDITIONS TO AVOID

None known.

INCOMPATIBILITY

None known.

HAZARDOUS DECOMPOSITION PRODUCTS

By fire: Carbon Dioxide, Carbon Monoxide

HAZARDOUS POLYMERIZATION

Will not occur

SECTION 11 — TOXICOLOGICAL INFORMATION

CHRONIC HEALTH HAZARDS

IARC's Monograph No. 93 reports there is sufficient evidence of carcinogenicity in experimental rats exposed to titanium dioxide but inadequate evidence for carcinogenicity in humans and has assigned a Group 2B rating. In addition, the IARC summary concludes, "No significant exposure to titanium dioxide is thought to occur during the use of products in which titanium is bound to other materials, such as paint."

TOXICOLOGY DATA

CAS No.	Ingredient Name				
1332-58-7	**Kaolin**				
		LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available
471-34-1	**Calcium Carbonate**				
		LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available
13463-67-7	**Titanium Dioxide**				
		LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available

SECTION 12 — ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

No data available.

SECTION 13 — DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD

Waste from this product is not hazardous as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261.

Incinerate in approved facility. Do not incinerate closed container. Dispose of in accordance with Federal, State/Provincial, and Local regulations regarding pollution.

SECTION 14 — TRANSPORT INFORMATION

Multi-modal shipping descriptions are provided for informational purposes and do not consider container sizes. The presence of a shipping description for a particular mode of transport (ocean, air, etc.), does not indicate that the product is packaged suitably for that mode of transport. All packaging must be reviewed for suitability prior to shipment, and compliance with the applicable regulations is the sole responsibility of the person offering the product for transport.

US Ground (DOT)

Not Regulated for Transportation.

Canada (TDG)
Not Regulated for Transportation.
IMO
Not Regulated for Transportation.
IATA/ICAO
Not Regulated for Transportation.

SECTION 15 — REGULATORY INFORMATION

SARA 313 *(40 CFR 372.65C)* SUPPLIER NOTIFICATION

CAS No.	CHEMICAL/COMPOUND	% by WT	% Element

No ingredients in this product are subject to SARA 313 (40 CFR 372.65C) Supplier Notification.
CALIFORNIA PROPOSITION 65
WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.
TSCA CERTIFICATION
All chemicals in this product are listed, or are exempt from listing, on the TSCA Inventory.

SECTION 16 — OTHER INFORMATION

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.

MATERIAL SAFETY DATA SHEET

B66W651
09 00

DATE OF PREPARATION
Mar 16, 2012

SECTION 1 — PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NUMBER
B66W651
PRODUCT NAME
PRO INDUSTRIAL™ 0 VOC Acrylic Coating - Semi-Gloss, Extra White
MANUFACTURER'S NAME
THE SHERWIN-WILLIAMS COMPANY
101 Prospect Avenue N.W.
Cleveland, OH 44115

Telephone Numbers and Websites

Product Information	(800) 524-5979 www.sherwin-williams.com
Regulatory Information	(216) 566-2902 www.paintdocs.com
Medical Emergency	(216) 566-2917
Transportation Emergency*	(800) 424-9300
**for Chemical Emergency ONLY (spill, leak, fire, exposure, or accident)*	

SECTION 2 — COMPOSITION/INFORMATION ON INGREDIENTS

% by Weight	CAS Number	Ingredient	Units	Vapor Pressure
13	**13463-67-7**	**Titanium Dioxide**		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	10 mg/m3 Total Dust	
		OSHA PEL	5 mg/m3 Respirable Fraction	

SECTION 3 — HAZARDS IDENTIFICATION

HMIS Codes

Health	2*
Flammability	0
Reactivity	0

ROUTES OF EXPOSURE
INHALATION of vapor or spray mist.
EYE or SKIN contact with the product, vapor or spray mist.
EFFECTS OF OVEREXPOSURE

EYES:	Irritation.
SKIN:	Prolonged or repeated exposure may cause irritation.
INHALATION:	Irritation of the upper respiratory system.

SIGNS AND SYMPTOMS OF OVEREXPOSURE
Redness and itching or burning sensation may indicate eye or excessive skin exposure.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
None generally recognized.
CANCER INFORMATION
For complete discussion of toxicology data refer to Section 11.

SECTION 4 — FIRST AID MEASURES

EYES:	Flush eyes with large amounts of water for 15 minutes. Get medical attention.
SKIN:	Wash affected area thoroughly with soap and water.
INHALATION:	If affected, remove from exposure. Restore breathing. Keep warm and quiet.
INGESTION:	Do not induce vomiting. Get medical attention immediately.

SECTION 5 — FIRE FIGHTING MEASURES

FLASH POINT	LEL	UEL	FLAMMABILITY CLASSIFICATION
Not Applicable	N.A.	N.A.	Not Applicable

EXTINGUISHING MEDIA
Carbon Dioxide, Dry Chemical, Alcohol Foam

UNUSUAL FIRE AND EXPLOSION HAZARDS

Closed containers may explode (due to the build-up of pressure) when exposed to extreme heat.

During emergency conditions overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Obtain medical attention.

SPECIAL FIRE FIGHTING PROCEDURES

Full protective equipment including self-contained breathing apparatus should be used.

Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

SECTION 6 — ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all sources of ignition. Ventilate the area.

Remove with inert absorbent.

SECTION 7 — HANDLING AND STORAGE

STORAGE CATEGORY

Not Applicable

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Keep container closed when not in use. Transfer only to approved containers with complete and appropriate labeling. Do not take internally. Keep out of the reach of children.

SECTION 8 — EXPOSURE CONTROLS/PERSONAL PROTECTION

PRECAUTIONS TO BE TAKEN IN USE

Use only with adequate ventilation.

Avoid contact with skin and eyes. Avoid breathing vapor and spray mist.

Wash hands after using.

This coating may contain materials classified as nuisance particulates (listed "as Dust" in Section 2) which may be present at hazardous levels only during sanding or abrading of the dried film. If no specific dusts are listed in Section 2, the applicable limits for nuisance dusts are ACGIH TLV 10 mg/m3 (total dust), 3 mg/m3 (respirable fraction), OSHA PEL 15 mg/m3 (total dust), 5 mg/m3 (respirable fraction).

VENTILATION

Local exhaust preferable. General exhaust acceptable if the exposure to materials in Section 2 is maintained below applicable exposure limits. Refer to OSHA Standards 1910.94, 1910.107, 1910.108.

RESPIRATORY PROTECTION

If personal exposure cannot be controlled below applicable limits by ventilation, wear a properly fitted organic vapor/particulate respirator approved by NIOSH/MSHA for protection against materials in Section 2.

When sanding or abrading the dried film, wear a dust/mist respirator approved by NIOSH/MSHA for dust which may be generated from this product, underlying paint, or the abrasive.

PROTECTIVE GLOVES

Required for long or repeated contact.

EYE PROTECTION

Wear safety spectacles with unperforated sideshields.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

PRODUCT WEIGHT	9.52 lb/gal	1141 g/l
SPECIFIC GRAVITY	1.15	
BOILING POINT	212 - 213 °F	100 - 100 °C
MELTING POINT	Not Available	
VOLATILE VOLUME	63%	
EVAPORATION RATE	Slower than ether	
VAPOR DENSITY	Heavier than air	
SOLUBILITY IN WATER	N.A.	
pH	9.0	

VOLATILE ORGANIC COMPOUNDS (VOC Theoretical - As Packaged)

0.00 lb/gal	0 g/l	Less Water and Federally Exempt Solvents
0.00 lb/gal	0 g/l	Emitted VOC

SECTION 10 — STABILITY AND REACTIVITY

STABILITY — Stable

CONDITIONS TO AVOID

None known.

INCOMPATIBILITY

None known.

454 WEBB COUNTY FIRE STATION
HICKEY PEÑA | ARCHITECTS

HAZARDOUS DECOMPOSITION PRODUCTS
By fire: Carbon Dioxide, Carbon Monoxide
HAZARDOUS POLYMERIZATION
Will not occur

SECTION 11 — TOXICOLOGICAL INFORMATION

CHRONIC HEALTH HAZARDS
IARC's Monograph No. 93 reports there is sufficient evidence of carcinogenicity in experimental rats exposed to titanium dioxide but inadequate evidence for carcinogenicity in humans and has assigned a Group 2B rating. In addition, the IARC summary concludes, "No significant exposure to titanium dioxide is thought to occur during the use of products in which titanium is bound to other materials, such as paint."
TOXICOLOGY DATA

CAS No.	Ingredient Name			
13463-67-7	**Titanium Dioxide**			
		LC50 RAT	4HR	Not Available
		LD50 RAT		Not Available

SECTION 12 — ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION
No data available.

SECTION 13 — DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD
Waste from this product is not hazardous as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261.
Incinerate in approved facility. Do not incinerate closed container. Dispose of in accordance with Federal, State/Provincial, and Local regulations regarding pollution.

SECTION 14 — TRANSPORT INFORMATION

Multi-modal shipping descriptions are provided for informational purposes and do not consider container sizes. The presence of a shipping description for a particular mode of transport (ocean, air, etc.), does not indicate that the product is packaged suitably for that mode of transport. All packaging must be reviewed for suitability prior to shipment, and compliance with the applicable regulations is the sole responsibility of the person offering the product for transport.
US Ground (DOT)
Not Regulated for Transportation.
Canada (TDG)
Not Regulated for Transportation.
IMO
Not Regulated for Transportation.
IATA/ICAO
Not Regulated for Transportation.

SECTION 15 — REGULATORY INFORMATION

SARA 313 *(40 CFR 372.65C)* SUPPLIER NOTIFICATION

CAS No.	CHEMICAL/COMPOUND	% by WT	% Element

No ingredients in this product are subject to SARA 313 (40 CFR 372.65C) Supplier Notification.
CALIFORNIA PROPOSITION 65
WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.
TSCA CERTIFICATION
All chemicals in this product are listed, or are exempt from listing, on the TSCA Inventory.

SECTION 16 — OTHER INFORMATION

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.

10 SPECIALTIES

10400 IDENTIFYING DEVICES & EXTERIOR LETTERS

PART 1 - GENERAL

1.1 SUMMARY
A. Identifying Devices required for this work includes Room Signs & Exterior Letters.

B. Provide all labor, materials, accessories and incidentals necessary for a complete installation. Locate all items where indicated by Architect.

1.2 QUALITY ASSURANCE
A. For installation use only personnel who are skilled in the work required.

1.3 SUBMITTALS
A. Shop drawings and manufacturer's data are required for work in this Section.

B. Submit color selection charts where required. Unless otherwise indicated, all required color selections shall be made by the Architect from manufacturer's standard range of available colors.

1.4 DELIVERY, STORAGE AND HANDLING
A. Deliver in manufacturer's unopened, undamaged packages with manufacturer's labels and content description intact and legible.

B. Storage and handling until installation to be in undamaged, original packages.

C. Remove protective covers at final clean-up.

1.5 JOB CONDITIONS
A. Install these items after finish work is complete or substantially approved by the Architect.

1.6 GUARANTEE
A. Provide manufacturer's standard warranty for each scheduled item.

PART 2 - PRODUCTS

2.1 ROOM SIGNS (MANUFACTURER "SOUTHWELL" OR EQUAL)
A. Graphics: Interior spaces shall be identified with the following spaces named on individual sign: (The Owner reserves the right to change the wording of room names listed below.)

As per drawing A902 Signage Graphics and Schedules

2.2 MATERIALS: EXTERIOR GRADE
A. As per drawing A902 Signage Graphics and Schedules

2.3 HANDICAP IDENTIFICATION

A. Character Proportion: Letters and numbers on signs to have a width-to-width ratio between 3:5 and 1:1 and a stroke width-to-height ratio between 1:5 and 1:10 utilizing and utilizing an upper case "X" for measurement.

B. Tactile Characters and Symbols: Characters, symbols, or pictographs on signs required to be tactile, shall be raised 1/32" minimum. Letters and numbers shall be Helvetica Regular Characters; shall be at least 5/8" high, but should be no higher than 2", and shall be proportioned as noted above.

C. Mounting Height: Tactile signage used for room identification shall be mounted on the wall on the latch side of doors at a height of 60" above the floor and 8" from door frame. Locate on door where no wall space is available.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:
1. Inspect installed work of other trades and that such work is complete to a point where this work may commence.
2. Verify that installation may be made in accordance with approved shop drawings and manufacturer's instructions.

B. Discrepancies:
1. In the event of discrepancy notify Architect.
2. Do not proceed with installation until discrepancies have been resolved.

3.2 INSTALLATION

A. Install where indicated, anchoring all components firmly in place in complete accordance with approved Shop Drawings and the manufacturer's recommendations.

3.3 ADJUST AND CLEAN

A. Not more than three (3) days prior to final inspection for acceptance, clean and adjust all hardware. Clean all surfaces.

PART 4 - CAST EXTERIOR LETTERS

As per drawing A902 Signage Graphics and Schedules

4.1 MANUFACTURER

A. Cast letters where shown on the drawings shall be those manufactured by CPB approved MFR

4.1 MATERIALS

A. Material: Aluminum alloy and surfaced smooth.
Size: 12 inches high.
Style: Garmond H-444
Finish: Baked Enamel
Color: Medium Orange
Mounting: P-8 Projected Mounting

10520 FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY
A.Related Documents: Conditions of the Contract, Division 1 - General Requirements, and Drawings apply to Work of this Section.

B.Section Indudes
1. Fire Extinguishers.
2. Fire Extinguisher Cabinets.
3. Mounting Hardware.

1.2 DEFINITIONS
A.Where indicated on the Drawings the abbreviation "F.E.C." defines a fire extinguisher and cabinet and the abbreviation "F.E." is for fire extinguisher without cabinet.

1.3 SUBMITTALS
A. General: Submit in accordance with Section 01300.
B. Product Data: Include physical dimensions, operational features, color and finish, anchorage details, material descriptions and type of hardware.
C. Shop Drawings: Indude rough-in measurements, locations, and details for cabinets.
D. Samples: Submit sample of manufacturer's standard Mush and color.

1.4 QUALITY ASSURANCE
A. Single Source Responsibility Obtain products in this Section from one manufacturer.
B. Certifications
1. Provide extinguishers which are U.L. listed and bear the U.L. Listing World for type, rating, and classification.
2. Conform to NFPA-10 requirements for extinguishers.

1.5 DELIVERY, STORAGE, AND HANDLING.
A. Deliver, store and handle products in accordance with Sections 01600.

1.6 PROJECT/SITE CONDITIONS
A. Environmental Requirements: Do not store products subject to freeze damage in environments where damage could occur.

PART 2 PRODUCTS

2.1 MANUFACTURERS
A. Acceptable Manufacturers
1. J. L. Industries, Bloomington, MN
2. Larsens Manufacturing Co., Minneapolis, MN
3. Kidde & Co., Belleville, NJ
4. Substitutions: Submit under provisions of Section 01600.
5. Note: Larsen's used as a standard of quality in products below where model numbers or styles are indicated.

2.2 FIRE EXTINGUISHERS
A. Multi-purpose dry chemical type (amonium phosphate), with pressure gauge
1. Capacity: 10.0 Ibs.
2. U.L. Rating: 4A-60B:C
3. Acceptable product: MP10

2.3 CABINETS
A. Cabinet: Steel 20 gage thck, Architectural Series Vertical Duo Model # FS 2409-RA. Size to accommodate accessories.
B. Trim: Steel
C. Trim Projection: Semi-Recessed 3-1/2" .
E. Door: Steel 20 gage thick, reinforced for flatness and rigidity, latch access.
F. Glass: 1/8 inch thick float glass.
G. Mounting Hardware: Appropriate to cabinet.

2.4 ACCESSORIES
A. Fire Extinguisher Brackets: "B" series full length wall brackets, size as required for cylinder used.

2.5 FABRICATION
A. Form body of cabinet with tight inside corners and seams.
B. Predrill holes for anchorage.

C. Form perimeter trim and door stiles by welding, filling, and grinding smooth.
D. Hinge doors for 180 degree opening with continuous piano hinge. Provide nylon roller type catch.

2.6 FINISHES
A. Extinguisher: Red enamel.
B. Cabinet Trim and Door: Steel.
C. Cabinet Interior: Baked enamel.

PART 3 EXECUTION

3.1 EXAMINATION
A. Examine conditions and proceed with Work in accordance with Section 01405.
Verify rough openings for cabinets are correctly sized and located.

3.2 INSTALLATION
A. Install using skilled workmen in accordance with manufactuer's printed instructions.
B. Install cabinets plumb and level in wall openings 54 inches from finish floor to inside bottom of cabinets and in locations as shown on the Drawings.
C. Securely attach cabinets and mounting brackets in place to framed rough opening.

3.3 SCHEDULE

A. Provide one extinguisher in locations shown on Drawings.

3.4 IDENTIFICATION
A. Identify fire extinguisher locations with the following methods
1. Identify fire extinguisher locations without cabinets, use vertical decal spelling FIRE EXTINGUISHER applied to adjacent wall surface.

10800 BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED WORK
A. Rough Carpentry Section 06100

1.2 SUBMITTALS
A. Submit manufacturer's product data, specifications and installation instruction. Indicate mounting heights and locations for each accessory type. Indicate finishes and fastener type.

1.3 DELIVERY, STORAGE, AND HANDLING
A. Deliver materials to the job site in manufacturer's protective packaging.

B. Store Materials as instructed by the manufacturer, protected from weather and construction damage.

C. Remove protective covers at final clean-up.

1.4 WARRANTY
A. Provide manufacturer's standard warranty for each scheduled item.

PART 2 – PRODUCTS

PRE-Approved PRODUCTS:

As per Architectural DWGS.

2.1 MATERIALS
A. Unless otherwise indicated, accessories to be ASTM A167, Type 304 stainless steel sheet. Sheet steel components (non-exposed) to be fabricated from commercial quality ASTM 366. Finishes to be No. 4 satin for stainless steel ASTM B 456 type SC 2 satin for Chrome/Nickel plated fabrications, one coat primer plus two coats electrostatically applied baked on enamel for painted finishes.

B. Furnish all necessary anchors and fasteners appropriate to and as recommended by the manufacturer for application at the particular location and materials indicated. Fasteners to be Tamper-Proof.

C. Remove manufacturer's standard warranty for each scheduled item.

2.2 MANUFACTURERS

A. Approved Manufacturers: In addition to any manufacturer whose materials and/or products are identified by brand name or number within the test of this section as the basis for minimum required quality, equivalent materials and/or products of the following manufacturers will be acceptable. All others will require prior approval.

2.3 ACCESSORIES (Refer to drawings for locations)

***All accessories are to be stainless steal with full-length brackets and hinges**

As per Architectural DWGS.

10800 TOILET PARTITIONS & BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED WORK
A. Rough Carpentry Section 06100

1.2 SUBMITTALS
A. Submit manufacturer's product data, specifications and installation instruction. Indicate mounting heights and locations for each accessory type. Indicate finishes and fastener type.

1.3 DELIVERY, STORAGE, AND HANDLING
A. Deliver materials to the job site in manufacturer's protective packaging.

B. Store Materials as instructed by the manufacturer, protected from weather and construction damage.

C. Remove protective covers at final clean-up.

1.4 WARRANTY
A. Provide manufacturer's standard warranty for each scheduled item.

PART 2 – PRODUCTS

Basis of Design:

1**. Scranton Products**, Inc. Stainless Steal Color Hammered Texture, Floor Mounted, overhead braced partitions with aluminum hardware.

2.1 MATERIALS
A. Unless otherwise indicated, accessories to be ASTM A167, Type 304 stainless steel sheet. Sheet steel components (non-exposed) to be fabricated from commercial quality ASTM 366. Finishes to be No. 4 satin for stainless steel ASTM B 456 type SC 2 satin for Chrome/Nickel plated fabrications, one coat primer plus two coats electrostatically applied baked on enamel for painted finishes.

B. Furnish all necessary anchors and fasteners appropriate to and as recommended by the manufacturer for application at the particular location and materials indicated. Fasteners to be Tamper-Proof.

C. Remove manufacturer's standard warranty for each scheduled item.

2.2 MANUFACTURERS

Approved Manufacturers: In addition to any manufacturer whose materials and/or products are identified by brand name or number within the test of this section as the basis for minimum required quality, equivalent materials and/or products of the following manufacturers will be acceptable. All others will require prior approval.

2.3 BATHROOM ACCESSORIES (Refer to drawings for locations)

*All accessories are to be stainless steal with full length brackets and hinges. RE: Architectural plans

PART 3 - EXECUTION

3.1 INSPECTION

A. Check opening scheduled to receive recessed units for correct dimension Plumb blocking or frames that would affect installation of accessories. Check areas to receive surface mounted units for conditions that would affect quality and execution of work. Verify spacing of plumbing fixtures and toilet partitions that affect installation of accessories. Do not begin installation of accessories until openings and surfaces are acceptable.

3.2 FABRICATION

A. Fabricate recessed units with seamless on-piece flange on exposed face. Weld corners, leaving no open miters.

3.3 INSTALLATION

A. All details of installation to be in strict accordance with manufacturer's instruction.

B. Mount recessed accessories into wall openings with wood screws through cabinet side into wood blocking or sheet metal screws into metal frames. Mount surface mounted accessories with screws or toggle bolts plumb and align.

C. Verify all mounting heights and locations with Architect prior to installation and location of blocking, cut-outs etc.

3.4 ADJUST AND CLEAN

A. Adjust accessories for proper operation.

B. Three (3) days prior to final inspection, remove protective covers, lean and polish all exposed surfaces.

105126 SOLID PLASTIC LOCKERS

PART 1 **GENERAL**

1.1 SUMMARY

-Section Includes:
1. Solid plastic lockers.

-Related Sections:
1. Division 01: Administrative, procedural, and temporary work requirements..

1.2 SUBMITTALS

- Submittals for Review:
  1. Shop Drawings: Include dimensioned layout, elevations, trim, closures, and accessories.
  2. Product Data: Manufacturer's descriptive data.
  3. Samples: 3X3 inch samples showing available colors.

1.3 QUALITY ASSURANCE

- Manufacturer Qualifications: Minimum 5 years experience in manufacture of solid plastic lockers with products in satisfactory use under similar service conditions.

- Installer Qualifications: Minimum 5 years experience in work of this Section.

1.4 WARRANTIES

- Provide manufacturer's 25 year warranty against breakage, corrosion, and delamination under normal conditions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- Contract Documents are based on products by Scranton Products. (www.scrantonproducts.com)

- Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- Solid Plastic Panels:
  1. Lockers:
     a. High impact, high density polyethylene (HDPE) formed under high pressure into solid plastic components with homogeneous color throughout, with smooth orange peel finish.
     b. Edges machined to accept assembly brackets.
  2. Locker benches:
     a. High density polyethylene (HDPE), fabricated from polymer resins compounded under high pressure, forming single thickness panel.
     b. Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.

3. Color: Stainless-Rotary brushed or To be selected from manufacturer's full color range.

2.3 COMPONENTS – LOCKERS: 18"X 18" X 72" DOUBLE TIER LOCKER, TUFFTEC INDUSTRIAL LOCKERS AND 18"X 18" X 72"SINGLE TIER LOCKER, TUFFTEC EMERGENCY LOCKERS W/ DOOR BY SCRANTON PRODUCTS. LOCKERS SHALL INCLUDE: HORIZONTAL VENTING STYLE/SLOPE TOP/ PADLOCK/ METAL J-HOOK/END PANELS AND LEVELER PLATE

-Locker Doors and Frames: 1/2 inch thick.

-Sides, Tops, Bottoms, Backs, and Shelves: 3/8 inch thick.

-Latch: Continuous type, manufactured from HDPE, capable of accepting various locking mechanisms, fastened to entire length of door.

-Door Hinge: Heavy duty extruded aluminum, full length, assembled onto door and locker front.

-Assembly Profile: Full height of lockers, PVC plastic, snap fit assembled onto locker sides.

-Coat Hooks: Two-prong, high impact plastic, mounted to bottom of shelf or divider, one per door opening.

2.4 COMPONENTS - LOCKER BENCHES: N/A

2.5 FABRICATION

- Fabricate locker components square and rigid, finish free from scratches and chips.

- Fabricate locker components for snap-together assembly or slide-together dovetail connections providing solid and secure, anti-racking construction.

- Fabricate adjacent lockers with common side panel.

- Fabricate locker units for assembly in maximum of three adjacent lockers.

- Fabricate locker benches to sizes indicated in single lengths.

PART 3 EXECUTION

3.1 INSTALLATION

-Install lockers in accordance with manufacturer's instructions and approved Shop Drawings.

- [Set lockers directly on floor.] [Set lockers on prepared locker base.]

- Set plumb, level, rigid, and aligned.

- Attach lockers to supporting construction with anchors best suited to substrate conditions.

- Attach locker benches to floor.

3.2 ADJUSTING

- Adjust doors and latches to operate correctly.

END OF SECTION

13122 METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. It is the intent of these documents to allow the General Contractor to utilize pre-engineered metal building components, i.e. straight-leg columns or tapered leg columns, beams, and purlins provided that all structural and architectural design limitations are met. All columns shown as round columns are to remain as round columns.

B. This Section includes single-story, rigid-frame-type pre-engineered metal buildings of the nominal length, width, eave height, and roof pitch indicated, and secondary framing members for roof purlins at conventional steel framed buildings as shown on drawings.

1. Roof system consists of the manufacturer's standard standing-seam insulated roof.
2. Manufacturer's standard building components and accessories may be used, provided components, accessories, and complete structure conform to design indicated and specified requirements.

A. Refer to Division 5 for steel panels.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. General: Engineer, design, fabricate and erect the pre-engineered metal building system to withstand loads from winds, gravity, structural movement including movement thermally induced, and to resist in-service use conditions that the building will experience, including exposure to the weather, without failure.

1. Design each member to withstand stresses resulting from combinations of loads that produce the maximum allowable stresses in that member as prescribed in MBMA's "Design Practices Manual."

B. Design Loads: Basic design loads, as well as auxiliary and collateral loads, are indicated on the drawings and shall be in compliance with Standard Building Codes.

1. Basic design loads include live load and wind load, in addition to the dead load.
2. Auxiliary loads include dynamic live loads such as those generated by cranes and material handling equipment.
3. Collateral loads include additional dead loads over and above the weight of the metal building system such as plumbing and mechanical systems.

C. Structural Framing and Roof and Siding Panels: Design primary and secondary structural members and exterior covering materials for applicable loads and combinations of loads in accordance with the Metal Building Manufacturers Association's (MBMA) "Design Practices Manual."

1. Structural Steel: Comply with American Institute of Steel Construction's (AISC) "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" for design requirements and allowable stresses.
2. Light Gage Steel: Comply with the American Iron and Steel Institute's (AISI) "Specification for the Design of Cold Formed Steel Structural Members" and "Design of Light Gage Steel Diaphragms" for design requirements and allowable stresses.
3. Welded Connections: Comply with the American Welding Society's (AWS) "Standard Code for Arc and Gas Welding in Building Construction" for welding procedures.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.

B. Submittal Conference: The shop drawing submittal will be presented in a meeting held at project site at a mutually acceptable time and attended by the General Contractor's representative, the metal building company Engineer, who is familiar with all building components, the Architect and Structural Engineer.

C. Product data consisting of: metal building system manufacturer's product information for building components and accessories.

D. Shop drawings for metal building structural framing system, roofing, and other metal building system components and accessories that are not fully detailed or dimensioned in manufacturer's product data.

1. Structural Framing: Furnish complete erection drawings prepared by or under the supervision of a professional engineer legally authorized to practice in the jurisdiction where the Project is located. Include details showing fabrication and assembly of the metal building system. Show anchor bolts settings and sidewall, end wall, and roof framing. Include transverse cross-sections.

E. Samples for initial selection purposes in form of manufacturer's color charts or chips showing full range of colors, textures, and patterns available for metal roofing and siding panels with factory-applied finishes.

F. Installer certificates signed by metal building manufacturer written certification certifying that the installer complies with requirements included under the "Quality Assurance" Article.

G. Professional engineer's certificate prepared and signed by a Professional Engineer, legally authorized to practice in the jurisdiction where Project is located, verifying that the structural framing and covering panels meet indicated loading requirements and codes of authorities having jurisdiction.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer to erect the pre-engineered metal building who has specialized in the erection and installation of types of metal buildings systems similar to that required for this project and who is certified in writing by the metal building system manufacturer as qualified for erection of the manufacturer's products.

B. Manufacturer's Qualifications: Provide pre-engineered metal buildings manufactured by a firm experienced in manufacturing metal buildings systems that are similar to those indicated for this project and have a record of successful in-service performance.

C. Single-Source Responsibility: Obtain the metal building system components, including structural framing, wall and roof covering, and accessory components, from one source from a single manufacturer.

D. Design Criteria: The drawings indicate sizes, profiles, and dimensional requirements of the pre-engineered metal building system. Metal building systems having equal performance characteristics with deviations from indicated dimensions and profiles may be considered, provided deviations do not change the design concept or intended performance. The burden of proof for equality is on the proposed.

1.5 WARRANTY

A. Roofing and Siding Panel Finish Warranty: Furnish the roofing and siding panel manufacturer's written warranty, covering failure of the factory-applied exterior finish on metal wall and roof panels within the warranty period. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

1. Warranty period for factory-applied exterior finishes on wall and roof panels is 20 years after the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, manufacturers offering metal building systems that may be incorporated in the work include but are not limited to the following:

B. Manufacturer: Subject to compliance with specified requirements, provide metal building systems provided by one of the following:

1. MBCI.

2. Tri-City Steel Co.
3. American Steel Building Co., Inc.
4. Armco Steelox Building Systems.
5. Atlantic Building Systems.
6. Behlen Manufacturing Co.
7. Bigbee Steel Buildings, Inc.
8. Butler Manufacturing Co.
9. Ceco Buildings Division.
10. Chief Industries, Inc.
11. Dean Steel Buildings, Inc.
12. Garco Building Systems.
13. Gulf States Manufacturers, Inc.
14. Kirby Building Systems, Inc.
15. Mesco Metal Buildings Corp.
16. Package Steel Buildings Corp.
17. Pascoe Building Systems.
18. Southern Structures, Inc.
19. Space Master Buildings.
20. Star Buildings Division, H. H. Robertson Co.
21. United Structures of America.
22. Varco-Pruden Buildings.
23. Whirlwind Steel Buildings, Inc.

2.2 STRUCTURAL FRAMING

A. Rigid Frames: Fabricate from hot-rolled structural steel shapes. Provide factory-welded, shop-painted, built-up "I-beam"-shape frames consisting of tapered or parallel flange beams and parallel columns. Furnish frames with attachment plates, bearing plates, and splice members. Factory drill field-bolted assembly.

1. Provide length of span and spacing of frames indicated. Slight variations in length of span and frame spacing may be acceptable if necessary to meet manufacturer's standard.
2. Provide rigid frames at end walls where indicated.
3. Maximum and/or minimum dimensions of Rigid Frames are indicated on the drawings.
4. Maximum horizontal deflections of the Rigid Frames at the highest eave are as indicated on the General Notes of the Structural drawings (Sheet S-1.1).
5. End wall columns: Provide factory welded, shop painted end wall columns not less than 14-ga. built-up shape or cold-formed sections.
6. Horizontal Wind Braces: Portal frames with straight leg columns. Refer to Structural Drawings for location.

B. Secondary Framing: Provide the following secondary framing members:

1. Roof Purlins, Sidewall and End wall Girts: "C"-or "Z"-shaped sections fabricated from 14 gage min. shop-painted roll-formed steel.
2. Eave Struts: Unequal flange "C"-shaped sections formed to provide adequate backup for both wall and roof panels. Fabricate from 14-gage (0.0598-inch) shop-painted roll-formed steel.
3. Flange and Sag Bracing: as designed by MFG. engineer.
4. Base or Sill Angles: Fabricate from 14-gage (0.0747-inch) cold-formed galvanized steel sections.

C. Wind Bracing: Provide wind bracing without using steel rods U.N.O. on plans. Use vertical straight leg columns where necessary.

D. Bolts: Provide shop-painted bolts except when structural framing components are in direct contact with roofing and siding panels. Provide zinc-plated or cadmium-plated bolts when structural framing components are in direct contact with roofing and siding panels. Provide anchor bolts and setting templates for installation into foundation.

E. Shop Painting: Clean surfaces to be primed of loose mill scale, rust, dirt, oil, grease, and other matter precluding paint bond. Follow procedures of SSPC-SP3 for power-tool cleaning, SSPC-SP7 for brush-off blast cleaning, And SSPC-SP1 for solvent cleaning.

1. Prime structural steel primary and secondary framing members with the manufacturer's standard rust-inhibitive primer.

2.3 ROOFING PANELS

A. Face Sheets: Fabricate wall and roof panel face sheets to the profile or configuration indicated from 24-gauge, structural quality, Grade D, zinc-coated steel sheets. Finish shall be equal to MBCI's Galvalume Plus. All sheets shall have a uniform finish.

1. Clips: Provide 16-gage (0.0598-inch) panel clips.
2. Clips: height to be determined by manufacturer to accommodate insulation.
3. Cleats: Factory-calked, mechanically seamed cleats from 24-gage (0.0239-inch), Grade C, zinc-coated steel sheets.

B. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets, self-locking bolts, end-welded studs, and other suitable fasteners designed to withstand loads.

1. Provide metal-backed neoprene washers under heads of fasteners bearing on weather side of panels.

2. Use aluminum or stainless steel fasteners for exterior application and galvanized or cadmium-plated fasteners for interior applications.
3. Locate and space fastenings in true vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of neoprene washer.
4. Provide fasteners with heads matching color of roofing or siding sheets by means of plastic caps or factory-applied coating.

C. Accessories: Provide the following sheet metal accessories factory-formed of the same material in the same finish as roof and wall panels:

1. Flashings.
2. Closers.
3. Fillers.
4. Metal expansion joints.
5. Ridge covers.
6. Fascias.

D. Closers shall be metal with finish to match roof.

E. Sealing Tape: Pressure-sensitive 100 percent solids grey polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape 7/8 inch wide and 3/16 inch thick.

F. Joint Sealant: One-part elastomeric polyurethane.

2.4 SHEET METAL ACCESSORIES

A. General: Provide coated steel sheet metal accessories with coated steel roofing panels.

B. Gutters: Form in 20' foot-long sections, complete with end pieces, outlet tubes, and other special pieces as required. Size in accordance with SMACNA. Join sections with riveted and soldered or sealed joints. Furnish gutter supports spaced 48" on center, constructed of 18 gauge galvalume.

C. Downspouts: Form in 10-foot-long sections, complete with elbows and offsets. Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely; locate fasteners at top and bottom and at approximately 5 feet on center in between. Finish to match wall panels.

D. Pigsnout or Downspout Elbow shall be of color & finish matching the gutter.

15900 INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.

B. This Section includes digital control, BAS, and energy management equipment for HVAC systems, including, but not limited to, split-system air conditioning units and exhaust fans. The resulting system shall either build upon the existing Invensys Technologies system or equal. Integrating different manufacturers is not acceptable under any circumstances; all microprocessor-based controllers shall be of the same manufacturer. Refer to the drawings for additional requirements.

C. Field verify necessary routing to point of connection with existing DDC system.

1.3 DEFINITIONS

A. DDC: Direct digital control.

B. I/O: Input/output.

C. MS/TP: Master slave/token passing.

D. PC: Personal computer.

E. PID: Proportional plus integral plus derivative.

F. RTD: Resistance temperature detector.

1.4 SYSTEM PERFORMANCE

A. Comply with the following performance requirements:

1. Graphic Display: Display graphic with minimum 20 dynamic points with current data within 10 seconds.

2. Graphic Refresh: Update graphic with minimum 20 dynamic points with current data within 8 seconds.

3. Object Command: Reaction time of less than two seconds between operator command of a binary object and device reaction.

4. Object Scan: Transmit change of state and change of analog values to control units or workstation within six seconds.

5. Alarm Response Time: Annunciate alarm at workstation within 45 seconds. Multiple workstations must receive alarms within five seconds of each other.

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6. Program Execution Frequency: Run capability of applications as often as five seconds, but selected consistent with mechanical process under control.

7. Performance: Programmable controllers shall execute DDC PID control loops, and scan and update process values and outputs at least once per second.

8. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:

a. Water Temperature: Plus or minus 1 deg F (0.5 deg C).

b. Water Flow: Plus or minus 5 percent of full scale.

c. Water Pressure: Plus or minus 2 percent of full scale.

d. Space Temperature: Plus or minus 1 deg F (0.5 deg C).

e. Ducted Air Temperature: Plus or minus 1 deg F (0.5 deg C).

f. Outside Air Temperature: Plus or minus 2 deg F (1.0 deg C).

g. Dew Point Temperature: Plus or minus 3 deg F (1.5 deg C).

h. Temperature Differential: Plus or minus 0.25 deg F (0.15 deg C).

i. Relative Humidity: Plus or minus 5 percent.

j. Airflow (Pressurized Spaces): Plus or minus 3 percent of full scale.
k. Airflow (Measuring Stations): Plus or minus 5 percent of full scale.
l. Airflow (Terminal): Plus or minus 10 percent of full scale.
m. Air Pressure (Space): Plus or minus 0.01-inch wg (2.5 Pa).
n. Air Pressure (Ducts): Plus or minus 0.1-inch wg (25 Pa).
o. Carbon Dioxide: Plus or minus 50 ppm.
p. Electrical: Plus or minus 5 percent of reading.

1.5 SUBMITTALS

A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.

1. DDC System Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for operator workstation equipment, interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels, and operator interface equipment.
2. Control System Software: Include technical data for operating system software, operator interface, color graphics, and other third-party applications.
3. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data. Include written description of sequence of operation including schematic diagram.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Bill of materials of equipment indicating quantity, manufacturer, and model number.
2. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
3. Wiring Diagrams: Power, signal, and control wiring.
4. Details of control panel faces, including controls, instruments, and labeling.
5. Written description of sequence of operation.
6. Schedule of dampers including size, leakage, and flow characteristics.
7. Schedule of valves including flow characteristics.
8. DDC System Hardware:
   a. Wiring diagrams for control units with termination numbers.
   b. Schematic diagrams and floor plans for field sensors and control hardware.
   c. Schematic diagrams for control, communication, and power wiring, showing trunk data conductors and wiring between operator workstation and control unit locations.
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9. Control System Software: List of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule, and operator notations.
10. Controlled Systems:
   a. Schematic diagrams of each controlled system with control points labeled and control elements graphically shown, with wiring.
   b. Scaled drawings showing mounting, routing, and wiring of elements including bases and special construction.
   c. Written description of sequence of operation including schematic diagram.
   d. Points list.

C. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with ASHRAE 135.

D. Software and Firmware Operational Documentation: Include the following:

1. Software operating and upgrade manuals.
2. Program Software Backup: On a magnetic media or compact disc, complete with data files.

3. Device address list.
4. Printout of software application and graphic screens.
5. Software license required by and installed for DDC workstations and control systems.

E. Software Upgrade Kit: For Owner to use in modifying software to suit future systems revisions or monitoring and control revisions.
F. Qualification Data: For Installer.
G. Field quality-control test reports.
H. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Maintenance instructions and lists of spare parts for each type of control device and compressed-air station.
2. Interconnection wiring diagrams with identified and numbered system components and devices.
3. Keyboard illustrations and step-by-step procedures indexed for each operator function.
4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
5. Calibration records and list of set points.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Automatic control system manufacturer's authorized representative who is trained and approved for installation of system components required for this Project. The installer must have a minimum of five (5) continuous years experience with the manufacturer and have an established service office within 100 miles of the project site.
B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
C. Comply with ASHRAE 135 for DDC system components.
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1.7 DELIVERY, STORAGE, AND HANDLING

A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.
B. System Software: Update to latest version of software at Project completion.

1.8 COORDINATION

A. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.
B. Coordinate equipment with Division 13 Section "Fire Alarm" to achieve compatibility with equipment that interfaces with that system.
C. Coordinate supply of electrical branch circuits for control units and operator workstation.
D. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-Place Concrete."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 CONTROL SYSTEM

A. Manufacturers:

1. Invensys Technologies

B. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories, and software connected to distributed controllers operating in multiuser, multitasking environment on token-passing network and programmed to control mechanical systems. An operator workstation permits interface with the network via dynamic color graphics with each mechanical system, building floor plan, and control device depicted by point-and-click graphics.

2.3 DDC EQUIPMENT

A. Operator Workstation: One PC-based microcomputer(s) with minimum configuration as follows:

1. Motherboard: With 8 integrated USB 2.0 ports, integrated Intel Pro 10/100 (Ethernet), integrated audio, bios, and hardware monitoring.

2. Processor: Intel Core 2 Duo Processor, 3.0 GHz.

3. Random-Access Memory: 2 GB.

4. Graphics: Video adapter, minimum 1600 x 1200 pixels, 128-MB video memory.

5. Monitor: 19 inches (480 mm), flat panel LCD, color.

6. Keyboard: QWERTY, 105 keys in ergonomic shape.

7. Hard-Disk Drive: 80 GB, SATA, 3.0 Gb/s.

8. CD-ROM Read/Write Drive: 48x24x48.

9. Mouse: Three button, optical.

10. Uninterruptible Power Supply: 2 kVa.

11. Operating System: Microsoft Windows Vista Business with high-speed Internet access.

a. ASHRAE 135 Compliance: Workstation shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.

12. Application Software:

a. Graphical User Interface (GUI): Thin client or browser based meeting the following criteria:

1) Web Browser's for PC's: Only a 5.x browser (Internet Explorer or Netscape Navigator) will be required as the GUI, and a valid connection to the server network. No installation of any custom software shall be required on the operator's GUI workstation/client. Connection shall be over an intranet or the Internet. A firewall shall be installed (as necessary) to protect the owner’s Intranet.

2) Secure Socket Layers: Communication between the Web Browser GUI and control system server shall be encrypted using 128 bit encryption technology within Secure Socket Layers (SSL). Communication protocol shall be Hyper Text Transfer Protocol (HTTP).

b. Cross Platform Capability: The controls software (client and server) shall be operating system and hardware agnostic, compatible with Microsoft Windows, Sun Microsystems Solaris and Red Hat Linux.

c. Database creation and support with the following:

1) Database Open Connectivity: The BAS server database shall be Java DataBase Connectivity (JDBC) compatible, allowing real time access of data

via the following standard mechanisms:
a) Common Object Request Broker Architecture (CORBA).
b) OLE/OPC (for Microsoft Client's/Server platform only).
c) Import/Export of the database from or to XML (extensible Mark up Language).
2) Automatic and manual database save and restore.
d. System security for each operator via software password and access levels.
e. Automatic system diagnostics; monitor system and report failures.
f. Tree navigation.
g. Dynamic color graphic displays with up to 10 screen displays at once.
h. Custom graphics generation and graphics library of HVAC equipment and symbols.
i. Alarm processing, messages, and reactions.
j. Trend logs retrievable in spreadsheets and database programs.
k. Alarm and event processing.
l. Object and property status and control.
m. Automatic restart of field equipment on restoration of power.
n. Data collection, reports, and logs. Include standard reports for the following:
1) Current values of all objects.
2) Current alarm summary.
3) Disabled objects.
4) Alarm lockout objects.
5) Logs.
o. Custom report development.
p. Utility and weather reports.
q. ASHRAE Guideline 3 report.
r. Workstation application editors for controllers and schedules.
s. Maintenance management.
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13. Custom Application Software:
a. English language oriented.
b. Full-screen character editor/programming environment.
c. Allow development of independently executing program modules with debugging/simulation capability.
d. Support conditional statements.
e. Support floating-point arithmetic with mathematic functions.
f. Contains predefined time variables.
B. Control Units: Modular, comprising processor board with programmable, nonvolatile, randomaccess memory; local operator access and display panel; integral interface equipment; and backup power source.
1. Units monitor or control each I/O point; process information; execute commands from other control units, devices, and operator stations; and download from or upload to operator workstation or diagnostic terminal unit.
2. Stand-alone mode control functions operate regardless of network status. Functions include the following:
a. Global communications.
b. Discrete/digital, analog, and pulse I/O.
c. Monitoring, controlling, or addressing data points.
d. Software applications, scheduling, and alarm processing.
e. Testing and developing control algorithms without disrupting field hardware and controlled environment.
3. Standard Application Programs:
a. Electric Control Programs: Demand limiting, duty cycling, automatic time scheduling, start/stop time optimization, night setback/setup, on-off control with differential sequencing, staggered start, antishort cycling, PID control, DDC with fine tuning, and trend logging.

b. HVAC Control Programs: Optimal run time, supply-air reset, and enthalpy switchover.
c. Chiller Control Programs: Control function of condenser-water reset, chilled-water reset, and equipment sequencing.
d. Programming Application Features: Include trend point; alarm processing and messaging; weekly, monthly, and annual scheduling; energy calculations; run-time totalization; and security access.
e. Remote communications.
f. Maintenance management.
g. Units of Measure: Inch-pound and SI (metric).
4. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
5. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.
C. Local Control Units: Modular, comprising processor board with electronically programmable, nonvolatile, read-only memory; and backup power source.
1. Units monitor or control each I/O point, process information, and download from or upload to operator workstation or diagnostic terminal unit.
2. Stand-alone mode control functions operate regardless of network status. Functions include the following:
a. Global communications.
b. Discrete/digital, analog, and pulse I/O.
c. Monitoring, controlling, or addressing data points.
3. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
4. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.
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D. I/O Interface: Hardwired inputs and outputs may tie into system through controllers. Protect points so that shorting will cause no damage to controllers.
1. Binary Inputs: Allow monitoring of on-off signals without external power.
2. Pulse Accumulation Inputs: Accept up to 10 pulses per second.
3. Analog Inputs: Allow monitoring of low-voltage (0- to 10-V dc), current (4 to 20 mA), or resistance signals.
4. Binary Outputs: Provide on-off or pulsed low-voltage signal, selectable for normally open or normally closed operation with three-position (on-off-auto) override switches and status lights.
5. Analog Outputs: Provide modulating signal, either low voltage (0- to 10-V dc) or current (4 to 20 mA) with status lights, two-position (auto-manual) switch, and manually adjustable potentiometer.
6. Tri-State Outputs: Provide two coordinated binary outputs for control of three-point, floating-type electronic actuators.
7. Universal I/Os: Provide software selectable binary or analog outputs.
E. Power Supplies: Transformers with Class 2 current-limiting type or overcurrent protection; limit connected loads to 80 percent of rated capacity. DC power supply shall match output current and voltage requirements and be full-wave rectifier type with the following:
1. Output ripple of 5.0 mV maximum peak to peak.
2. Combined 1 percent line and load regulation with 100-mic.sec. response time for 50 percent load changes.
3. Built-in overvoltage and overcurrent protection and be able to withstand 150 percent overload for at least 3 seconds without failure.
F. Power Line Filtering: Internal or external transient voltage and surge suppression for workstations or controllers with the following:
1. Minimum dielectric strength of 1000 V.
2. Maximum response time of 10 nanoseconds.
3. Minimum transverse-mode noise attenuation of 65 dB.

4. Minimum common-mode noise attenuation of 150 dB at 40 to 100 Hz.

2.4 UNITARY CONTROLLERS

A. Unitized, capable of stand-alone operation with sufficient memory to support its operating system, database, and programming requirements, and with sufficient I/O capacity for the application.
1. Configuration: Local keypad and display; diagnostic LEDs for power, communication, and processor; wiring termination to terminal strip or card connected with ribbon cable; memory with bios; and 72-hour battery backup.
2. Operating System: Manage I/O communication to allow distributed controllers to share real and virtual object information and allow central monitoring and alarms. Perform scheduling with real-time clock. Perform automatic system diagnostics; monitor system and report failures.
3. ASHRAE 135 Compliance: Communicate using read (execute and initiate) and write (execute and initiate) property services defined in ASHRAE 135. Reside on network using MS/TP datalink/physical layer protocol and have service communication port for connection to diagnostic terminal unit.
4. Enclosure (interior): Dustproof rated for operation at 32 to 120 deg F (0 to 50 deg C).
5. Enclosure (exterior): NEMA 3R.

2.5 ALARM AND OCCUPANT INTERFACE PANELS

A. Unitized cabinet with suitable brackets for wall or floor mounting. Fabricate of 0.06-inch- (1.5-mm-) thick, furniture-quality steel or extruded-aluminum alloy, totally enclosed, with hinged
Section D IV. Mechanical, Electrical, & Plumbing - 15900
doors and keyed lock and with manufacturer's standard shop-painted finish. Provide common keying for all panels.
B. Alarm Panels: Indicating light for each alarm point, single horn, acknowledge switch, and test switch, mounted on hinged cover.
1. Alarm Condition: Indicating light flashes and horn sounds.
2. Acknowledge Switch: Horn is silent and indicating light is steady.
3. Second Alarm: Horn sounds and indicating light is steady.
4. Alarm Condition Cleared: System is reset and indicating light is extinguished.
5. Contacts in alarm panel allow remote monitoring by independent alarm company.

2.6 ANALOG CONTROLLERS

A. Step Controllers: 6- or 10-stage type, with heavy-duty switching rated to handle loads and operated by electric motor.
B. Electric, Outdoor-Reset Controllers: Remote-bulb or bimetal rod-and-tube type, proportioning action with adjustable throttling range, adjustable set point, scale range minus 10 to plus 70 deg F (minus 23 to plus 21 deg C), and single- or double-pole contacts.
C. Electronic Controllers: Wheatstone-bridge-amplifier type, in steel enclosure with provision for remote-resistance readjustment. Identify adjustments on controllers, including proportional band and authority.
1. Single controllers can be integral with control motor if provided with accessible control readjustment potentiometer.
D. Fan-Speed Controllers: Solid-state model providing field-adjustable proportional control of motor speed from maximum to minimum of 55 percent and on-off action below minimum fan speed. Controller shall briefly apply full voltage, when motor is started, to rapidly bring motor up to minimum speed. Equip with filtered circuit to eliminate radio interference.

2.7 ELECTRONIC SENSORS

A. Description: Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.
B. Thermistor Temperature Sensors and Transmitters:
1. Available Manufacturers:
a. BEC Controls Corporation.
b. Ebtron, Inc.
c. Heat-Timer Corporation.
d. I.T.M. Instruments Inc.
e. MAMAC Systems, Inc.
f. RDF Corporation.
2. Accuracy: Plus or minus 0.5 deg F (0.3 deg C) at calibration point.
3. Wire: Twisted, shielded-pair cable.
4. Insertion Elements in Ducts: Single point, 8 inches (200 mm) long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft. (0.84 sq. m).
5. Averaging Elements in Ducts: 36 inches (915 mm) long, flexible; use where prone to temperature stratification or where ducts are larger than 10 sq. ft. (1 sq. m).
6. Insertion Elements for Liquids: Brass or stainless-steel socket with minimum insertion length of 2-1/2 inches (64 mm).
7. Room Sensor Cover Construction: Manufacturer's standard locking covers.
Section D IV. Mechanical, Electrical, & Plumbing - 15900
a. Set-Point Adjustment (where indicated): Exposed.
b. Set-Point Indication (where indicated): Exposed.
c. Thermometer: Concealed.
d. Color: Manufacturer’s standard.
8. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
9. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.
C. RTDs and Transmitters:
1. Available Manufacturers:
a. Automation Components, Inc. (ACI)
b. Building Automation Products, Inc. (BAPI)
2. Accuracy: Plus or minus 0.2 percent at calibration point.
3. Wire: Twisted, shielded-pair cable.
4. Insertion Elements in Ducts: Single point, with length equal to 1/3-distance of duct width, minimum; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft. (0.84 sq. m).
5. Averaging Elements in Ducts: 24 inches (610 mm) long, rigid; use where prone to temperature stratification or where ducts are larger than 9 sq. ft. (0.84 sq. m); length as required.
6. Insertion Elements for Liquids: Brass socket with minimum insertion length of 2-1/2 inches (64 mm).
7. Room Sensor Cover Construction: Manufacturer's standard locking covers.
a. Set-Point Adjustment (where indicated): Exposed.
b. Set-Point Indication (where indicated): Exposed.
c. Thermometer: Concealed.
d. Color: Manufacturer’s standard.
8. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
9. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.
D. Humidity Sensors: Bulk polymer sensor element.
1. Available Manufacturers:
a. BEC Controls Corporation.
b. General Eastern Instruments.

c. MAMAC Systems, Inc.
d. ROTRONIC Instrument Corp.
e. TCS/Basys Controls.
f. Vaisala.
2. Accuracy: 2 percent full range with linear output.
3. Room Sensor Range: 20 to 80 percent relative humidity.
4. Room Sensor Cover Construction: Manufacturer's standard locking covers.
5. Duct Sensor: 20 to 80 percent relative humidity range with element guard and mounting plate.
6. Outside-Air Sensor: 20 to 80 percent relative humidity range with mounting enclosure, suitable for operation at outdoor temperatures of 32 to 120 deg F (0 to 50 deg C).
7. Duct and Sensors: With element guard and mounting plate, range of 0 to 100 percent relative humidity.
E. Pressure Transmitters/Transducers:
1. Available Manufacturers:
a. BEC Controls Corporation.
b. General Eastern Instruments.
c. MAMAC Systems, Inc.
d. ROTRONIC Instrument Corp.
e. TCS/Basys Controls.

f. Vaisala.
2. Static-Pressure Transmitter: Nondirectional sensor with suitable range for expected input, and temperature compensated.
a. Accuracy: 2 percent of full scale with repeatability of 0.5 percent.
b. Output: 4 to 20 mA.
c. Building Static-Pressure Range: 0- to 0.25-inch wg (0 to 62 Pa).
d. Duct Static-Pressure Range: 0- to 5-inch wg (0 to 1240 Pa).
3. Water Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig (1034-kPa) operating pressure; linear output 4 to 20 mA.
4. Water Differential-Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig (1034-kPa) operating pressure and tested to 300-psig (2070-kPa); linear output 4 to 20 mA.
5. Differential-Pressure Switch (Air or Water): Snap acting, with pilot-duty rating and with suitable scale range and differential.
6. Pressure Transmitters: Direct acting for gas, liquid, or steam service; range suitable for system; linear output 4 to 20 mA.

2.8 STATUS SENSORS

A. Status Inputs for Fans: Differential-pressure switch with pilot-duty rating and with adjustable range of 0- to 5-inch wg (0 to 1240 Pa).
B. Status Inputs for Pumps: Differential-pressure switch with pilot-duty rating and with adjustable pressure-differential range of 8 to 60 psig (55 to 414 kPa), piped across pump.
C. Status Inputs for Electric Motors: Comply with ISA 50.00.01, current-sensing fixed- or split-core transformers with self-powered transmitter, adjustable and suitable for 175 percent of rated motor current.
D. Voltage Transmitter (100- to 600-V ac): Comply with ISA 50.00.01, single-loop, self-powered transmitter, adjustable, with suitable range and 1 percent full-scale accuracy.
E. Power Monitor: 3-phase type with disconnect/shorting switch assembly, listed voltage and current transformers, with pulse kilowatt hour output and 4- to 20-mA kW output, with maximum 2 percent error at 1.0 power factor and 2.5 percent error at 0.5 power factor.
F. Current Switches: Self-powered, solid-state with adjustable trip current, selected to match current and system output requirements.
G. Electronic Valve/Damper Position Indicator: Visual scale indicating percent of travel and 2- to

10-V dc, feedback signal.
H. Water-Flow Switches: Bellows-actuated mercury or snap-acting type with pilot-duty rating, stainless-steel or bronze paddle, with appropriate range and differential adjustment, in NEMA 250, Type 1 enclosure.
1. Available Manufacturers:
a. BEC Controls Corporation.
b. I.T.M. Instruments Inc.

2.9 GAS DETECTION EQUIPMENT

A. Manufacturers:
1. General Monitors.
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B. Carbon Dioxide Sensor and Transmitter: Single detectors using solid-state, non-dispersive, infrared sensors; suitable over a temperature range of 23 to 130 deg F (minus 5 to plus 55 deg C) and calibrated for 0 to 2 percent, with continuous or averaged reading, 4- to 20-mA output.
1. Operating Range: 0 to 2,000 ppm.
2. Exposure Range: 0 to 140 deg F (without damage).
3. Operating Humidity: 5 to 95% relative humidity.
4. Repeatability: plus or minus 20 ppm.
5. Maximum Drift: plus or minus 25 ppm per year.
C. Hydrocarbon Sensors: Model #S4000CH by General Monitors (no exceptions). Provide stainless steel (316) slip-stream sampling accessories (supply/return sampling tubes, sealed sensor housing, mounting plates, hardware, etc) as necessary for duct mounting in a readily accessible location. Provide with all accessories necessary for periodic testing and calibration. Coordinate with mechanical contractor.
D. Hydrogen Sulfide (H2S) Sensors: Model #S4000T by General Monitors (no exceptions). Provide stainless steel (316) slip-stream sampling accessories (supply/return sampling tubes, sealed sensor housing, mounting plates, hardware, etc) as necessary for duct mounting in a readily accessible location. Provide with all accessories necessary for periodic testing and calibration. Coordinate with mechanical contractor.

2.10 AIRFLOW MEASURING STATIONS (AFMS)

A. Duct Airflow Station: Combination of air straightener and multiport, self-averaging pitot tube station.
1. Manufacturers:
a. Air Monitor Corporation.
b. Ruskin.
2. Model: IAQ50 (Ruskin).
3. Frame: 6 inches Å~ 1-3/8 inches Å~ minimum 0.125-inch extruded aluminum.
a. Entire assembly frame shall be flanged.
4. Blades:
a. Modulating Air Control:
1) Style: Airfoil-shaped, single-piece.
2) Action: Parallel.
3) Orientation: Horizontal.
4) Material: Heavy gage 6063-T5 extruded aluminum.
5) Width: Maximum 5 inches (127 mm).
b. Stationary Sensing:
1) Style: Airfoil-shaped, single-piece.
2) Orientation: Horizontal.
3) Material: Heavy gage 6063-T5 extruded aluminum.
4) Width: Maximum 5-1/4 inches (133 mm).

5) Finish: Anodized.
5. Bearings: Self-lubricating molded synthetic sleeve, turning in extruded hole in frame.
6. Seals:
a. Blade: Extruded rubber type for ultra-low leakage. Mechanically attached to blade edge.
b. Jamb: Stainless steel, flexible metal compression type.
7. Linkage: Concealed in frame.
8. Axles: Minimum 1/2 inch (13 mm) diameter plated steel, hex-shaped, mechanically attached to blade.
9. Mounting: Vertical.

10. Electric Actuator: 24 V, 60 Hz, modulating, with position feedback.
11. Digital Controller: Application specific controller. Programming logic and calibration in nonvolatile EPROM. Controller uses generic 0 - 10 vdc inputs and outputs for interface to building automation system.
12. Flow Straightener: Aluminum honeycomb, 3/4-inch (20-mm) parallel cell, 3 inches (75 mm) deep, contained in a 5 inch deep sleeve attached to airflow frame.
13. Finish: Mill aluminum.
14. Assembly: Factory assembled damper/airflow monitor, actuator, and accessories, and furnish as a single factory-calibrated unit.
15. The maximum depth of the assembly shall be no greater than 11 inches. Refer to plans for overall duct dimensions and sizes.
16. Electrical: The airflow station shall run off of 24V power.
17. Performance Data:
a. Temperature Rating: Withstand -40 to 140 degrees F.
b. Capacity: Demonstrate capacity of damper/airflow monitor.
1) Monitor airflow within accuracy of 5 percent.
2) Perform sensing requirements in HVAC systems with velocities from 300 to 2,000 feet per minute.
c. Leakage: Maximum 2.0 cubic feet per minute per square foot at 1 inch w.g. for 48 inch Å~ 48 inch closed damper.
Pressure Drop: Maximum 0.13 inch w.g. at 1,000 feet per minute across both damper/airflow monitor and air straightener.
18. Controls
a. The AFMS shall come complete with its own controls and, where indicated, a 24V actuator. A 0-10 V DC signal shall be provided by the AFMS to the building EMCS to monitor airflow. The AFMS shall be able to receive a 0-10 V DC signal from the EMCS to act as a setpoint adjustment when an actuator is provided.

2.11 THERMOSTATS

A. Available Manufacturers:
1. Erie Controls.
2. Danfoss Inc.; Air-Conditioning and Refrigeration Div.
3. Heat-Timer Corporation.
4. Sauter Controls Corporation.
5. tekmar Control Systems, Inc.
6. Theben AG - Lumilite Control Technology, Inc.
B. Combination Thermostat and Fan Switches: Line-voltage thermostat with push-button or leveroperated fan switch.
1. Label switches "FAN ON-OFF," "FAN HIGH-LOW-OFF" or "FAN HIGH-MED-LOW-OFF," as indicated.
2. Mount on single electric switch box.
C. Electric, solid-state, microcomputer-based room thermostat with remote sensor.
1. Automatic switching from heating to cooling.

2. Preferential rate control to minimize overshoot and deviation from set point.
3. Set up for four separate temperatures per day.
4. Instant override of set point for continuous or timed period from 1 hour to 31 days.
5. Short-cycle protection.
6. Programming based on weekday, Saturday, and Sunday.
7. Selection features include degree F or degree C display, 12- or 24-hour clock, keyboard disable, remote sensor, and fan on-auto.
8. Battery replacement without program loss.
9. Thermostat display features include the following:

a. Time of day.
b. Actual room temperature.
c. Programmed temperature.
d. Programmed time.
e. Duration of timed override.
f. Day of week.
g. System mode indications include "heating," "off," "fan auto," and "fan on."
D. Low-Voltage, On-Off Thermostats: NEMA DC 3, 24-V, bimetal-operated, mercury-switch type, with adjustable or fixed anticipation heater, concealed set-point adjustment, 55 to 85 deg F (13 to 30 deg C) set-point range, and 2 deg F (1 deg C) maximum differential.
E. Line-Voltage, On-Off Thermostats: Bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch or equivalent solid-state type, with heat anticipator; listed for electrical rating; with concealed set-point adjustment, 55 to 85 deg F (13 to 30 deg C) set-point range, and 2 deg F (1 deg C) maximum differential.
1. Electric Heating Thermostats: Equip with off position on dial wired to break ungrounded conductors.
2. Selector Switch: Integral, manual on-off-auto.
F. Electric, Low-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, automatic-reset switch that trips if temperature sensed across any 12 inches (300 mm) of bulb length is equal to or below set point.
1. Bulb Length: Minimum 20 feet (6 m).
2. Quantity: One thermostat for every 20 sq. ft. (2 sq. m) of coil surface.
G. Electric, High-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, automatic-reset switch that trips if temperature sensed across any 12 inches (300 mm) of bulb length is equal to or above set point.
1. Bulb Length: Minimum 20 feet (6 m).
2. Quantity: One thermostat for every 20 sq. ft. (2 sq. m) of coil surface.

2.12 HUMIDISTATS

A. Available Manufacturers:
1. MAMAC Systems, Inc.
2. ROTRONIC Instrument Corp.
B. Duct-Mounting Humidistats: Electric insertion, 2-position type with adjustable, 2 percent throttling range, 20 to 80 percent operating range, and single- or double-pole contacts.

2.13 ACTUATORS

A. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.
1. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
2. Nonspring-Return Motors for Valves Larger Than NPS 2-1/2 (DN 65): Size for running

torque of 150 in. x lbf (16.9 N x m) and breakaway torque of 300 in. x lbf (33.9 N x m).
3. Spring-Return Motors for Dampers Larger Than 25 Sq. Ft. (2.3 sq. m): Size for running and breakaway torque of 150 in. x lbf (16.9 N x m).
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B. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.
1. Manufacturers:
a. Belimo Aircontrols (USA), Inc.
2. Valves: Size for torque required for valve close off at maximum pump differential pressure.
3. Dampers: Size for running torque calculated as follows:
a. Parallel-Blade Damper with Edge Seals: 7 inch-lb/sq. ft. (86.8 kg-cm/sq. m) of damper.
b. Opposed-Blade Damper with Edge Seals: 5 inch-lb/sq. ft. (62 kg-cm/sq. m) of damper.
c. Parallel-Blade Damper without Edge Seals: 4 inch-lb/sq. ft (49.6 kg-cm/sq. m) of damper.
d. Opposed-Blade Damper without Edge Seals: 3 inch-lb/sq. ft. (37.2 kg-cm/sq. m) of damper.
e. Dampers with 2- to 3-Inch wg (500 to 750 Pa) of Pressure Drop or Face Velocities of 1000 to 2500 fpm (5 to 13 m/s): Increase running torque by 1.5.
f. Dampers with 3- to 4-Inch wg (750 to 1000 Pa) of Pressure Drop or Face Velocities of 2500 to 3000 fpm (13 to 15 m/s): Increase running torque by 2.0.
4. Coupling: V-bolt and V-shaped, toothed cradle.
5. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
6. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on nonspring-return actuators.
7. Power Requirements (Two-Position Spring Return): 24-V ac.
8. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.
9. Proportional Signal: 2- to 10-V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
10. Temperature Rating: Minus 22 to plus 122 deg F (Minus 30 to plus 50 deg C).
11. Temperature Rating (Smoke Dampers): Minus 22 to plus 250 deg F (Minus 30 to plus 121 deg C).
12. Run Time: 12 seconds open, 5 seconds closed.

2.14 CONTROL VALVES

A. Manufacturers:
1. Belimo
2. Parker Hannifin Corporation; Skinner Valve Division.
B. Control Valves: Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.
C. Hydronic system globe valves shall have the following characteristics:
1. NPS 2 (DN 50) and Smaller: Class 125 bronze body, bronze trim, rising stem, renewable composition disc, and screwed ends with backseating capacity repackable under pressure.
2. NPS 2-1/2 (DN 65) and Larger: Class 125 iron body, bronze trim, rising stem, plug-type disc, flanged ends, and renewable seat and disc.
3. Internal Construction: Replaceable plugs and stainless-steel or brass seats.
a. Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom.
b. Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom.
4. Sizing: 5-psig (35-kPa) maximum pressure drop at design flow rate or the following:
a. Two Position: Line size

Webb County Main Fire Station and Administration Building

FOR

WEBB COUNTY

HICKEY | PEÑA ARCHITECTS

REGISTERED ARCHITECT
MARIO A. PEÑA
20580
STATE OF TEXAS

Digitally Signed on 09/28/15

Architect's Project #: 1312

Date Issued: September 28th 2015

VOLUME 2 OF 2

SPECIFICATIONS

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APPENDIX 2 MEP SPECIFICATIONS

GEOTECHNICAL ENGINEERING STUDY

WEBB COUNTY MAIN FIRE STATION

CONDUCTED FOR:

HICKEY | PEÑA
ARCHITECTS

Laredo, Webb County, Texas 78043

2015

PREPARED BY:

CASTLE
ENGINEERING & TESTING, LLC

1216 SANTA MARIA AVENUE

LAREDO, TEXAS 78040

TBPE REGISTRATION No. F-10341

September 28, 2015

Mr. Mario A. Peña, A.I.A.
Principal/Owner
Hickey-Peña Architects, LLC
919 Victoria Street
Laredo, Texas 78040

CASTLE
ENGINEERING & TESTING, LLC

Re: Geotechnical Engineering Study
Webb County Main Fire Station
7210 E. Saunders Street
Laredo, Webb County, Texas
CET Project No.: 15G047

Dear Mr. Peña:

Castle Engineering & Testing, LLC (CET) has completed a geotechnical engineering exploration report for the proposed **Webb County New Main Fire Station** to be located at 7210 East Saunders Street in Laredo, Webb County, Texas.

We appreciate the opportunity to assist in this phase of the project, and we look forward for the opportunity to provide additional geotechnical and construction material testing services as the project progresses.

Please feel free to call us if you have any questions regarding this report or if we may be of further service.

Respectfully,

Castle Engineering & Testing, LLC

STATE OF TEXAS
JESSE P. RODRIGUEZ
57352
LICENSED
PROFESSIONAL ENGINEER
28. Sept. 15.

Jesse P. Rodriguez, P.E
President

JPR/OM-15G047

Copies Submitted: (3) Hickey-Peña Architects, LLC; Mr. Mario A. Peña, A.I.A.

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APPENDIX

1. INTRODUCTION

1.1 Authorization and Scope

Mr. Mario A. Peña, A.I.A., Principal/Owner of Hickey-Peña Architects, LLC, authorized this geotechnical engineering study. The purposes of this study were to determine and evaluate the stratification and engineering properties of the site subsurface soils and to develop geotechnical engineering recommendations and guidelines to be used in the design of foundations, new pavement parking areas, preparation of the pavement subgrade, and other related ancillary items to be included in the construction documents for this project.

CET Scope of Services for this project consists of the following:

1. Drilling test borings at selected and accessible locations within the project site limits to determine and evaluate the stratification and engineering properties of the site subsurface soils and to determine groundwater conditions.

2. Perform the proper geotechnical laboratory tests on selected recovered samples to evaluate the physical engineering properties of the strata encountered.

3. Engineering analysis to develop geotechnical engineering design recommendations with respect to:

    - Foundation Design,
    - Pavement Design recommendations,
    - Construction Guidelines, and
    - Site, Subgrade, and Fill Preparation.

1.2 Project Description

Based on the information provided to us by Hickey-Peña Architects, LLC, we understand that plans are underway to develop the Webb County Main Fire Station and Administration Building construction design documents. The proposed Improvements consist of:

- New Fire Station and Administration Building;
- New Parking Areas; and
- Site improvements in grading, drainage and utilities.

The structures may consist of pre-engineered metal frames with in-laid CMU wall sections and various exterior finishes, all supported by shallow or deep foundation systems. The roof system will be metal decking supported by steel roof joists, which will be supported on either interior concrete or steel pipe columns. Flexible and rigid materials will be considered for the final design pavement sections.

1.3 Climate

Laredo is located in a climatic zone described as hot during summer when temperatures tend to be in the 90's and cool during winter when temperatures tend to be below the 50's. The

climatological data presented below was obtained from Weather Underground; average monthly temperatures for Laredo in degrees Fahrenheit and total monthly precipitation amounts in inches for the periods of 2012, 2013 and part of 2014 are shown below:

Table No. 1- Average Monthly Temperatures and Precipitation for 2013

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temp. (º F)	60	66	71	76	81	88	88	90	83	78	64	56
Actual Precip. (in.)	0.44	0.31	0.00	1.74	2.41	2.01	2.44	0.23	3.35	3.81	0.15	1.24
Average Precip. (in.)	0.02	0.01	0.00	0.07	0.09	0.07	2.44	0.23	3.35	0.15	0.01	0.05

Table No. 2- Average Monthly Temperatures and Precipitation for 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temp. (º F)	55	61	66	78	81	90	90	91	83	79	62	60
Actual Precip. (in.)	0.01	0.08	0.96	0.03	3.71	0.14	1.13	0.18	5.51	0.48	1.81	0.94
Average Precip. (in.)	0.00	0.00	0.04	0.00	0.15	0.01	0.04	0.01	0.19	0.02	0.08	0.04

Table No. 3- Average Monthly Temperatures and Precipitation for 2015

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temp. (º F)	53	58	64	75	77	85	89	90	86*	---	---	---
Actual Precip. (in.)	0.59	0.29	2.58	4.48	0.04	1.13	0.06	0.03	1.19*	---	---	---
Average Precip. (in.)	0.02	0.01	0.09	0.20	0.01	0.05	0.00	0.00	0.05*	---	---	---

* The data for the month of September is only available until the date when the report is signed.

1.4 Geology

The Laredo Sheet (1976) of the Geologic Atlas of Texas published by the Bureau of Economic Geology of the University of Texas at Austin has mapped the Laredo Formation within the Eocene Period of Tertiary Geologic Age at the project location. The Laredo Formation generally consists of sandstone and clay; thick sandstone members in upper and lower part, very fine to fine grained, in part glauconitic, micaceous, ferruginous, cross bedded, dominantly red and brown; clay in middle, weathers orange-yellow; dark-gray limestone concretions common, some fossiliferous; marine mega fossils abundant. The thickness of this formation is about 620 feet.

2. FIELD AND LABORATORY TESTING

2.1 Field Testing

The project site was explored by drilling a total of four (4) soil test borings to depths varying from five (5) to fifteen (15) feet in depth and within the proposed areas to receive the improvements. The field investigation included a reconnaissance of the project site, drilling of borings, performing standard penetration tests (SPT) and obtaining disturbed split-barrel samples, and auger samples. Soil samples were obtained at selected intervals in the soil test borings. A split-spoon sampler is a 2-inch O.D. tube that is driven into the soil to be sampled that can be split open lengthwise for easy removal and visual inspection of the soil obtained. Disturbed soil samples were obtained in general accordance with ASTM D-1586 (Penetration Test and Split-Barrel Sampling of Soils).

The results of the standard penetration test indicate the relative density and comparative consistency of the soils, and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components.

2.2 Laboratory Testing

Laboratory tests were carried out in a number of selected soil samples in order to acquire necessary soil engineering preparation with regards to the physical and mechanical properties of the soil layers and further on to evaluate and determine the parameters required for the engineering recommendations. Atterberg limits, moisture content and percent fines tests were performed to assist in classifying the soils and to provide indicators of soil strength and behavior. All phases of the laboratory-testing program were performed in general accordance with the applicable ASTM Specifications.

A summary of the laboratory test results is presented in the Appendix. The samples collected will be stored for 30 days from the date of issue of this report, and then disposed of unless otherwise instructed in writing by the client.

3. SITE AND SUBSURFACE CONDITIONS

3.1 Site Conditions

The project site is within the existing Webb County Road and Bridge property limits, located at 7210 E. Saunders Street and currently in use year round. During our field exploration operations, CET personnel observed and noted the following general site conditions:

- The proposed location for the Main Fire House and Administration Building is currently next to the Road and Bridge Department as field operations office, parking, and repair shop;
- The current locations has a variation of elevations, and varies from three (3) to five (5) feet, sloping toward the west; and
- The existing landscaping consists of trees and natural grass.

3.2 Subsurface Conditions

The subsurface conditions encountered are shown in the boring logs found in the Appendix. The subsurface soil mixtures encountered, consists of clayey sand (SC), sandy lean clay

(CL), fat sandy clay (CH), the soil mixtures encountered are competent soils for support of the proposed improvements. At various bore hole locations, hard cemented layers of the soil mixture were encountered, some as shallow as five (5) to six and a half (6.5) feet below the surface and others at the lower depths drilled. The soils are underlain by any of the following: sandstone, siltstone, and various cemented sedimentary rock in most borings drilled. The results of our field exploration and laboratory testing indicate that the soil mixtures vary from non-expansive to low/moderate expansive potential.

Table No. 4 - Major Strata

Stratum	Location	Depth, feet*	Description and Classification
I	B1 - B3	Various Depths	CLAYEY SAND (SC); pale brown, yellowish brown, Inorganic clayey sand of low to moderate plasticity, firm to stiff to hard. Cemented after 5 feet in B2.
II	B2	13.5 – 15	FAT CLAY (CH); very pale brown.
III	B1 – B4	Various Depths	SANDY CLAY (CL); yellowish brown.

* The depths and thicknesses of the strata presented are based on information at the borehole locations and variations outside of the ranges of depth and thickness could occur between borehole locations.

The site soil has been evaluated by performing field and laboratory tests on the subsurface samples recovered during the drilling operations. The types of tests conducted on the subsurface samples are listed in the Appendix. The results of the tests are tabulated on the Logs of Borings, which are also provided in the Appendix. Field tests and the laboratory testing program were directed towards evaluating the shear strength, moisture content, volume change characteristics, and plasticity of the subsurface strata for this project. The Symbol Key and Unified Soil Classification System and Terms Sheets, which define the terms and descriptive symbols used on each boring log, are also presented in the Appendix.

3.3 Groundwater

Groundwater was not encountered during the drilling operations. It is noted that groundwater levels will fluctuate with seasonal climatic variations; however, groundwater should not be a factor affecting design or construction at this site. Groundwater levels could be significantly higher after a major rainfall or in rainy season. *As such, the water table must be checked immediately prior to construction to assess its effect on dewatering and other construction activities.*

4. EVALUATION

4.1 General

All recommendations are based on knowledge of the area; however, the project design team should specify actual construction requirements. The final selection of foundation types and depths should be based on considerations of several factors, such as: 1) function of the structure, 2) soil strength properties, expansive properties, and settlement characteristics of subsurface materials; 3) the magnitude of applied structural loads; and 4) foundation construction costs.

4.2 Potential Vertical Rise (PVR)

Potential vertical soil movements have been estimated using the Texas Department of Transportation method TEX-124-E, Potential Vertical Rise (PVR). This method utilizes the soils in-situ moisture conditions and plasticity characteristics within the active zone. It is estimated that depth of the active zone at this site is approximately 15 feet. *Based on the borings drilled at the site, our laboratory analyses indicate that the PVR at this site is* ***less than one and one-third (1-1/3) inch*** *in its present condition.* A sustained surcharge load of one (1) pound per square inch is assumed to be supplied by the floor and sustained live load in the PVR calculations. It is noted that the PVR estimates are provided as an indicator of the severity of potential soil movements at this site and are not intended as a prediction of actual soil foundation movements.

5. RECOMMENDATIONS

5.1 Site Preparation

The final grade elevation proposed for the proposed improvements was not provided to us; however, all final site grades must provide effective drainage that remains in conformance with existing drainage patterns during and after construction.
Site preparation should consist of the following:

1. Strip vegetation and loose topsoil, if any, containing significant organic material from the proposed construction area prior to build any foundation or installation of base material.
2. The exposed subgrade surfaces should then be proof rolled with a loaded heavy earthwork piece of machinery such as a motorized articulated scraper or dump truck to detect soft or loose zones, followed by proper soil replacement, as necessary to achieve the desired final grade elevations.
3. The subgrade should then be scarified to at least eight (8) inches; moisture conditioned between minus two (-2) to plus three (+3) percentage points of the optimum moisture and compacted to a minimum of 95 percent of the maximum dry density determined in accordance with ASTM D-698 (Standard Proctor).
4. Structural fill may consist of inorganic silty clays or sandy clays with a Liquid Limit (LL) of less than 35 and a Plasticity Index (PI) between seven (7) and fifteen (15). The fill should be placed in compacted lifts not to exceed six (6) inches in thickness, moisture conditioned between minus two (-2) to plus three (+3) percentage points of the optimum moisture and compacted to a minimum of 95 percent of the maximum dry density determined in accordance with ASTM D-698 (Standard Proctor).

Particular attention should be given to maintaining the proper moisture content during compaction and to prevent the fill from drying before subsequent lifts are placed.

5.2 IBC Considerations

Chapter 18 of the International Building Code (IBC) provides additional requirements that impact the design of foundations. Section 1802 addresses foundations and soils investigations, sub-section 1802.3 addresses soil classification and specifically expansive soils (1802.3 & 1805.8). Highly expansive clay was not encountered; however the IBC should be consulted for the final foundation design.

5.3 Design Parameters

Foundation Design Criteria

Principal column and wall loads for the Webb County Main Fire Station and Administration Building structures may be supported on individual or continuous spread footings in combination with a structural fill slab-on-grade and be founded within the low plasticity clays at a minimum depth of at least thirty-six (36) inches below the existing ground surface, found at time of our drilling operations. The spread footings and slab beams may be designed with an end bearing pressure in combination with the associated skin friction values as depicted in the following paragraph. This bearing pressure is based on a factor of safety against bearing capacity failure of approximately three (3).

The proposed building foundation improvements may be founded on natural soils at the three to five (3 - 5) foot depths and be designed for a bearing pressure based on total loads per Table 5.

Table No. 5 – Continuous Spread Footings

Spread or Continuous Footing	3' Depth	4' Depth	5' Depth
1' Width	2800 psf/lft	4200 psf/lft	4600 psf/lft

Slab-on-fill supported foundation systems may be utilized provided the building pad select fill and supporting subgrade is properly prepared and moisture conditioned. The stiffened beams should be founded a minimum of ***36 inches below*** finish floor grade and the foundation system be on a **supporting subgrade of 24 inches** of properly prepared, compacted, and moisture conditioned structural fill. The fill supported foundation may be designed for a bearing capacity of **3.0 kips per square foot (ksf)** based on total loads, , or a dead load plus long term live load net bearing pressure of **2,000 psf**, whichever results in a larger bearing surface.

When establishing final grade around the structures, we recommend the following:

1. Elevation of ground surface adjacent to the foundation should be a minimum of at least six (6) inches below finished floor.
2. The slope of the ground surface away from the structure should be a minimum of five (5) percent for a distance of at least ten (10) feet.
3. A two (2) feet wide mow band or a six (6) inches thick clay soil mat barrier around the foundation perimeter can also be installed to mitigate moisture changes affecting the foundation performance.

These recommendations are for proper development of bearing capacity for the continuous beam sections of the foundation system and to reduce the potential for water to migrate beneath the slab foundation. These recommendations are not based on structural considerations. Grade beam depths for both the exterior and interior grade beams may need to be greater than recommended herein for structural considerations and should be properly evaluated and designed by the structural engineer. The grade beams or slab portions may be thickened and widened to serve as spread footings at concentrated load areas.

CET has no detailed design information regarding the structured materials proposed; therefore, we still recommend that some interior beams be installed that meet the minimum requirements per an acceptable method for calculating structural loads, deflections and design stresses. Final foundation design considerations must be based on final structural considerations per the project structural engineer.

The footings can provide some uplift resistance for those structures subjected to wind or other induced structural loading. The uplift resistance of a spread footing may be computed using the effective weight of the soil above the spread footing along with the weight of the spread footing and structure. A soil unit weight of 100 pcf may be assumed for the select fill placed above the footing, provided that the select fill is properly compacted as recommended in this report. If the footing foundations are over excavated and formed, the backfill around the foundation sides should be achieved with compacted select fill, lean concrete, compacted cement stabilized sand (two sacks cement to one cubic yard of sand) or flowable fill. The fill should be placed in compacted lifts not to exceed six (6) inches in thickness, moisture conditioned between minus two (-2) to plus three (+3) percentage points of the optimum moisture and compacted to a minimum of 95 percent of the maximum dry density determined in accordance with ASTM D-698 (Standard Proctor). Reinforcing steel should be placed and the foundation poured the same day of excavation.

For foundations designed and constructed in accordance with the recommendations in this report and under static loading conditions, total post-construction foundation settlement is expected to be less than about one (1) inch. Post-construction differential settlement is expected to be about half of the total settlement. Settlement of the footings can be reduced to the smallest amount compatible with the general method of construction. In general, the foundation will be considered satisfactory if it does not transmit pressures to the subsoil that exceed the safe load or that will cause excessive settlement.

5.4 Lateral Analysis

Presented in the Table below are the recommended soil parameters, which may be used for the lateral load analysis.

Table No. 6 – Lateral Load Soil Parameters

Depth*, (ft)	Friction Angle** (deg)	Rankine Active Earth Pressure, K (a)	Rankine Passive Earth Pressure, K (p)
0 – 10	28	0.36	2.77

* Based on existing surface at time of drilling operations
**Estimated value

Passive Earth Pressure, K(p)	Depth	Equivalent Fluid Pressure
2 k/f	10 feet with respect to existing natural ground	40 psf

5.5 Vapor Retarder Membrane/Vapor Barrier

Subsurface moisture and moisture vapor naturally migrate upward through the soil and, where the soil is covered by a building, this subsurface moisture will collect. To reduce the impact of this subsurface moisture and the potential impact of introduced moisture (such as landscape irrigation or plumbing leaks) the current industry standard is to place a vapor retarder membrane on the compacted granular layer. This membrane typically consists of polyvinyl plastic sheeting at least 10 mills in thickness. It should be noted that although capillary break and vapor barrier systems are currently the industry standard, this system may not be completely effective in preventing floor slab moisture problems. These systems will not "moisture proof" the mat/slab nor will it assure mat/slab moisture transmission rates will meet floor-covering manufacturer standards. The design and construction of such systems are dependent on the proposed use and design of the proposed building and all elements of building design and function should be considered in the mat/slab foundation design. Building design and construction may have a greater role in perceived moisture problems or inadequate ventilation may result in excessive moisture in a building and affect indoor air quality.

The structural engineer is often faced with the decision to use a vapor barrier or a vapor retarder. ACI 302.1 has recently provided a flowchart to assist the designer in making this controversial decision. The structural designer must decide if the mat/slab will have a vapor sensitive floor treatment above or simple concrete finish to determine if the vapor barrier goes below the slab, the slab dry granular base, or perhaps no vapor barrier is required at all.

5.6 Flatwork

For any flatwork outside of the building areas which will be sensitive to movement, subgrade preparation as discussed above should be strongly considered to reduce differential movements between the flatwork and the adjacent structure. If subgrade preparation as given above for structures is not implemented in the exterior flatwork areas, those areas may be susceptible to post construction movements. If these areas do heave, it could result in reversed grading with surface runoff and drainage flowing towards the structure.

5.7 Selection and Placement of Fill

Select fill soils may be required to achieve the proposed site grades. All imported or on-site non expansive select fill soils should be nearly-free of organic or other deleterious debris, essentially non-plastic, and less than two and one-half (2.5) inches in maximum dimension. Coarse-grained soils are preferred for fill; however, most fine-grained soils can be used advantageously if attention is given to drainage, compaction requirements, moisture and density control.

Well-graded mixtures of crushed stone, clayey gravel; caliche and small quantities of cobbles, rock fragments, and/or clayey soils are generally acceptable for use as select fill. The clayey gravel should meet the gradation criteria for Item 247, Type “B”, Grade 3 as specified in the 2014 TxDOT Standard Specifications manual. The crushed stone should meet the gradation criteria for Item 247, Type “A”, Grades 1-2 as specified in the 2014 TxDOT Standard Specifications manual. The fill material should meet the PI requirements presented in this section. *On-site soils should be clean of all debris and meet the requirements of select fill material presented in this report.*

The fill should be placed in compacted lifts not to exceed six (6) inches in thickness, moisture conditioned between minus two (-2) to plus three (+3) percentage points of the optimum moisture and compacted to a minimum of 95 percent of the maximum dry density determined in accordance with ASTM D-698 (Standard Proctor).

5.8 Utility Trench Excavation and Backfill

It appears that excavation for utility trenches can be readily made with a conventional excavator in either native soil or compacted imported fill. If trenches are extended deeper than five (5) feet or are allowed to dry out, the excavations may become unstable and should be evaluated to verify their stability prior to occupation by construction personnel. Shoring or sloping of any deep trench walls may be necessary to protect personnel and provide temporary stability. All excavations should comply with current OSHA safety requirements for soils (Federal Register 29 CFR, Part 1926).

During wet weather, runoff water should be prevented from entering excavations. Water should be collected and disposed of outside the construction and the construction limits. Heavy construction equipment, excavated soil, and vehicular traffic should not be allowed within a distance of at least one-third (⅓) the slope height from the top of any excavation.

We recommend all backfill be placed in compacted lifts not to exceed six (6) inches in thickness, moisture conditioned between minus two (-2) to plus three (+3) percentage points of the optimum moisture and compacted to a minimum of 95 percent of the maximum dry density determined in accordance with ASTM D-698 (Standard Proctor).Jetting and flooding should not be permitted. Poor compaction in utility trench backfill may cause excessive settlements resulting in damage to the pavement structural section or other overlying improvements. Compaction of trench backfill outside of improvement areas should be a minimum of 90 percent relative compaction.

Another fast and economical backfill alternative is the use of flowable Controlled Low Strength Material (CLSM) mixtures due to the saving of labor and time over placing and compacting soil or granular materials. If it is anticipated or specified that the flowable lean-mix backfill may be excavated at some point in the future the strength must be much lower than the 1,200 psi which the American Concrete Institute (ACI) uses as the upper limit for CLSM. The late-age strength of removable CLSM materials should be in the range of 30 to 150 psi as measured by compressive strength in cylinders. Controlled Low Strength Material (CLSM) is defined in ACI 229R and TxDOT Item 401.

6. PAVEMENT DESIGN CRITERIA

6.1 Pavement Structural Design

The proposed pavement sections are based on a CBR of 3.4; the final pavement design section should be reviewed by the project design team in consultation with the owner during development of the final plans. The pavement thickness designs are shown in the Appendix and are summarized below.

Table No. 7 – Flexible Pavement Design

Component	Thickness, in.
HMAC, Type “C” or “D”	2.5
Flexible Base	12.0
Modified Subgrade or Geogrid	---
Moisture Conditioned Subgrade	8.0

Table No. 8 - Rigid Pavement Design Alternatives

Component	Thickness, in.
Reinforced Concrete	7.0
Modified Subgrade	---
Moisture Conditioned Subgrade	8.0

6.2 Selection and Placement of Pavement Materials

Presented below are selection and preparation guidelines for various materials that may be used to construct the pavement sections.

6.2.1 Hot Mix Asphaltic Concrete (HMAC)

We recommend that the asphaltic concrete surface course should meet 2014 TxDOT Standard Specifications Item 341 and Item SS3224 (2011), Type “C” or “D” and its specific criteria for the Job Mix Formula (JMF). The Super Pave Gyratory, design number of revolutions (N_{des}) for the asphaltic mix should be in accordance with TEX-241-F. The Performance Graded (PG) binders should be at least PG 64-22 for the light traffic, or should be at least PG 70-22 for the truck areas and high traffic volume. These binders provide 98 percent reliability against rutting and 98 percent reliability against low temperature thermal cracking to accommodate slow moving, to prevent rutting because of the turning movements and stop and go traffic.

The mix should be compacted to between 91 and 95 percent of the maximum theoretical density as measured by TEX-207-F and TEX-227-F. The asphalt cement content by percent of total mixture weight should fall within a tolerance of ± 0.3 percent asphalt cement from the specific mix. Aggregates known for stripping should not be used unless measures are taken to address this concern. Typically, this includes the use of an anti-strip agent. The mix should have at least 70 percent strength retention when tested in accordance with TEX 531-C.

6.2.2 Asphalt Stabilized Base (HMAC) Type "A" or "B"

The Asphalt Stabilized Base (HMAC) Type "A" or "B" materials should meet the specification requirements of 2014 TxDOT Standard Specifications manual, Item 341 Type "A" Coarse Base or Type "B" Fine Base. Every two (2) inches of flexible base/caliche material may be replaced with one (1) inch of HMAC Type "A" or "B".

6.2.3 Reinforced Concrete

Reinforced concrete should have a minimum 28-day design compressive strength of 4,000 psi. The concrete should be properly cured in accordance with American Concrete Institute (ACI) recommended procedures and vehicular traffic should not be allowed for at least three (3) days (light traffic) or seven (7) days (heavy traffic).

6.2.4 Flexible Base

Base material may be composed of crushed stone base meeting all of the requirements of 2014 TxDOT Standard Specifications manual Item 247, Type "A", Grades 1-2. As an alternate to the Type "A" base material, caliche (treated with lime or cement) should meet the requirements for Item 247, Type "B", Grades 1 through 3 as specified in the 2014 TxDOT Standard Specifications manual. *In addition the percent passing No. 200 sieve should not exceed 20 percent.*

The base should be compacted to at least 95 percent of the maximum dry density as determined by the modified moisture-density relationship (ASTM D-1557) at moisture contents ranging between minus two (-2) and plus three (+3) percentage points of the optimum moisture content

6.2.5 Moisture Conditioned Subgrade

The subgrade should be scarified to a depth of at least eight (8) inches and moisture conditioned at moisture contents ranging between minus two (-2) to plus three (+3) percentage points of the optimum moisture content. The subgrade should then be compacted to at least 95 percent of the maximum dry density determined in accordance with ASTM D-698. *The subgrade should be moisture conditioned just prior to fill placement in order that the subgrade maintains its compaction moisture levels and does not dry out.*

Pavement areas should be stripped of vegetation, debris and loose topsoil, and the exposed subgrade should be proof rolled with appropriate construction equipment weighing at least 15 tons. The purpose of this recommendation is to check the subgrade for weak or soft areas prior to fill placement and compaction. This operation should be observed and evaluated by qualified geotechnical personnel experienced in earthwork operations.

If weak or soft areas are evidenced during proof rolling operations, the soil in the subject area should be removed to expose competent subgrade soils in both horizontal and vertical limits. The excavated soils, provided they are not contaminated with deleterious materials, or clean imported fill soils can be used to restore grade at these isolated areas; any imported fill should meet the requirements for select fill. Placement and compaction of the soils should be as discussed below.

7. GENERAL REMARKS

7.1 Construction Services

We recommend that **Castle Engineering & Testing, LLC** be retained to provide construction materials testing services during grading and foundation construction activities. This is to observe compliance with the plans, specifications, and geotechnical recommendations and to allow design changes if the subsurface conditions differ from those anticipated before construction.

7.2 Limitations

The evaluation and recommendations submitted in this report are based, in part, upon the information obtained from the soil borings drilled. The nature and extent of variations in the soil conditions between or beyond the borings and excavations may not become evident until actual construction.

The transition lines shown on the boring logs are approximate and the actual transitions may be gradual. If changes in nature or design of the project are planned, the conclusions and recommendations in this report should be reviewed by the soils engineer and if necessary, modified. Soil samples not altered by laboratory testing will be retained for a period of 30 days and then, unless we are directed otherwise, will be discarded.

This report has been prepared for the exclusive use of **Hickey-Peña Architects, LLC** and their design team for specific application to the proposed **Webb County Main Fire Station and Administration Building** in Laredo, Webb County, Texas, according to accepted foundation-engineering practices. No other warranty, expressed or implied, is made.

APPENDIX

Vicinity Map

Boring Location Plan

Boring Logs

The Symbol Key Sheet

Unified Soil Classification System and Terms Sheet

Field and Laboratory Testing Procedures

Pavement Design (AASTHO 1993 Method)

Flexible Pavement Nomograph

CASTLE
ENGINEERING & TESTING, LLC
1818 SANTA MARIA - LAREDO, TEXAS 78040
PHONE 956/727/8880 - FAX 956/727/8884
TBPE F-4041

PROJECT

WEBB COUNTY MAIN FIRE STATION

LAREDO, TEXAS

SHEET TITLE

VICINITY MAP

Date
09/24/2015
Prepared for:
Hickey-Peña Architects
Project No.
14G047
Designed By:
Jesse P. Rodriguez, P.E.

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TBPE F-4044

PROJECT

WEBB COUNTY MAIN FIRE STATION

LAREDO, TEXAS

SHEET TITLE

BORE LOCATIONS

Date
09/24/2015
Prepared for:
Hickey-Peña Architects
Project No.
14G047
Designed By:
Jesse P. Rodriguez, P.E.

LOG OF BORING B-1

PROJECT: Webb County Main Fire Station
LOCATION: 7210 E. Saunders Street
CLIENT: Hickey-Peña Architects, LLC

PROJECT NUMBER: 15G047
DATE(S) DRILLED: 9/23/15
SURFACE ELEVATION: N/A

DRILLING METHOD(S):
Straight Flight

GROUNDWATER INFORMATION:
Subsurface water was not encountered during or after completion of drilling operations.

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT R: RQD %	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (LL)	ATTERBERG LIMITS: PLASTIC LIMIT (PL)	ATTERBERG LIMITS: PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
			N = 7	10	37	18	19					38	-CLAYEY SAND WITH GRAVEL (SC); Ligth Yellowish Brown
			N = 21	9	43	23	20					48	-CLAYEY SAND WITH GRAVEL (SC); Ligth Yellowish Brown
	5		N = 44	11	45	23	22					56	-SANDY LEAN CLAY WITH GRAVEL (CL); Ligth Yellowish Brown
			N = 57	21									
			N = 45	21	48	24	24					87	-SANDY LEAN CLAY WITH GRAVEL (CL); Ligth Yellowish Brown
	10												
			N = 38	23									
	15												Boring Terminated at 15 Feet

REMARKS:
The borehole was backfilled with cuttings upon completion of the drilling operations.

CASTLE
ENGINEERING & TESTING, LLC

LOG OF BORING B-2

PROJECT: Webb County Main Fire Station
LOCATION: 7210 E. Saunders Street
CLIENT: Hickey-Peña Architects, LLC

PROJECT NUMBER: 15G047
DATE(S) DRILLED: 9/23/15
SURFACE ELEVATION: N/A

DRILLING METHOD(S):
Straight Flight

GROUNDWATER INFORMATION:
Subsurface water was not encountered during or after completion of drilling operations.

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT R: RQD %	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (LL)	ATTERBERG LIMITS: PLASTIC LIMIT (PL)	ATTERBERG LIMITS: PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
			N = 77	5	42	20	22					39	-CLAYEY SAND WITH GRAVEL (SC); Pale Brown
			N = 50/4"	8	43	20	23					62	-SANDY LEAN CLAY WITH GRAVEL (CL); Light Yellowish Brown
	5		N = ref/3"	7									
			N = ref/3"	7	37	20	17					70	-SANDY LEAN CLAY WITH GRAVEL (CL); Light Yellowish Brown
			N = 50/2"	20									
	10												
			N = 50/2"	23	54	30	24					86	-SANDY FAT CLAY (CH); Very Pale Brown
	15												Boring Terminated at 15 Feet

REMARKS:
The borehole was backfilled with cuttings upon completion of the drilling operations.

CASTLE
ENGINEERING & TESTING, LLC

LOG OF BORING - CASTLE.GDT - 9/25/15 13:10 - N:\GEOTECHNICAL\GINT FILE\GINT\PROJECTS\15G047.GPJ

LOG OF BORING B-3

PROJECT: Webb County Main Fire Station
LOCATION: 7210 E. Saunders Street
CLIENT: Hickey-Peña Architects, LLC

PROJECT NUMBER: 15G047
DATE(S) DRILLED: 9/23/15
SURFACE ELEVATION: N/A

DRILLING METHOD(S):
Straight Flight

GROUNDWATER INFORMATION:
Subsurface water was not encountered during or after completion of drilling operations.

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT R: RQD %	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (LL)	ATTERBERG LIMITS: PLASTIC LIMIT (PL)	ATTERBERG LIMITS: PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
			N = 54	6	36	19	17					44	-CLAYEY SAND WITH GRAVEL (SC); Light Yellowish Brown
			N = 41	7	37	18	19					61	-SANDY LEAN CLAY (CL); Light Yellowish Brown
	5												Boring Terminated at 5 Feet

REMARKS:
The borehole was backfilled with cuttings upon completion of the drilling operations.

CASTLE
ENGINEERING & TESTING, LLC

LOG OF BORING B-4

PROJECT: Webb County Main Fire Station
LOCATION: 7210 E. Saunders Street
CLIENT: Hickey-Peña Architects, LLC

PROJECT NUMBER: 15G047
DATE(S) DRILLED: 9/23/15
SURFACE ELEVATION: N/A

DRILLING METHOD(S):
Straight Flight

GROUNDWATER INFORMATION:
Subsurface water was not encountered during or after completion of drilling operations.

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT R: RQD %	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (LL)	ATTERBERG LIMITS: PLASTIC LIMIT (PL)	ATTERBERG LIMITS: PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
			N = 54	7	37	19	18					51	-SANDY LEAN CLAY (CL); Light Yellowish Brown
			N = 41	8									
	5												Boring Terminated at 5 Feet

REMARKS:
The borehole was backfilled with cuttings upon completion of the drilling operations.

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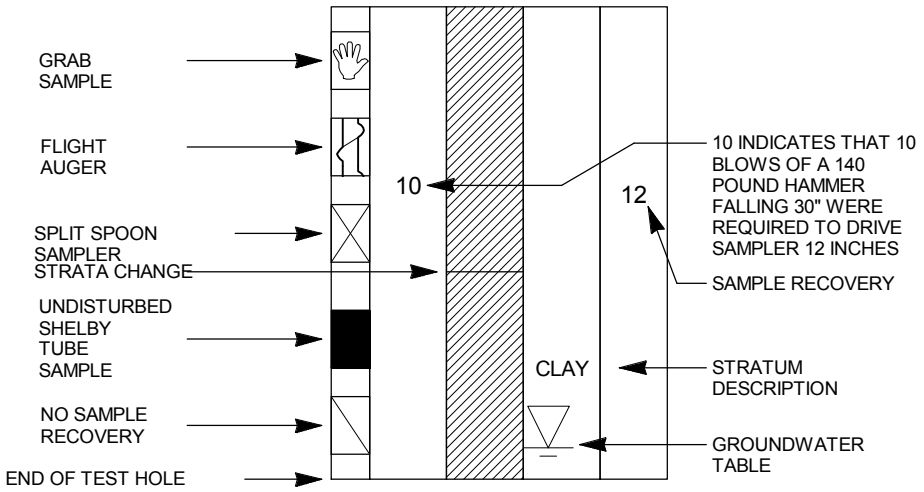
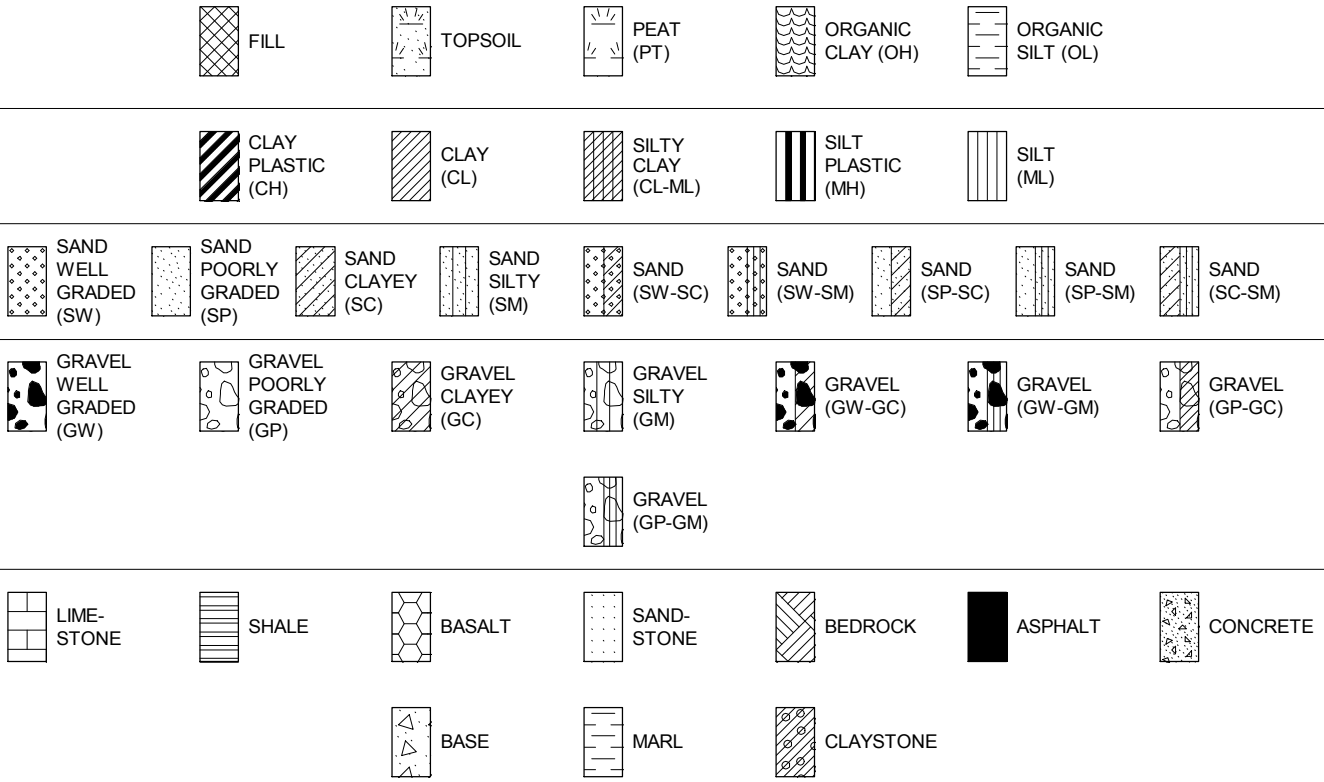
ENGINEERING & TESTING, LLC

SYMBOL KEY SHEET



MATERIAL SYMBOLS



STANDARD PENETRATION TEST (ASTM D 1586) DRIVING RECORD

Note: Driving is limited to 50 blows per interval, or 25 blows for 0.25 inch advancement, whichever controls. This is done to avoid damaging sampling tools

Blows Per Foot	Description
25	Sampler was seated 6 inches, then 25 blows were required to advance the sampler 12 inches.
50/4"	Sampler was seated 6 inches, then 50 blows were required to advance the sampler 4 inches.
ref/2"	Sampler could only be driven 2 inches of the 6 inch seating penetration before the 50 blow limit was reached.

SAMPLER SYMBOLS

Project Name: Webb County Main Fire Station
Project Number: 15G047

Figure No. 1

SYMBOL KEY SHEET - CASTLE.GDT - 9/29/15 07:51 - N:\GEOTECHNICAL\GINT FILE\GINT\PROJECTS\15G047.GPJ

UNIFIED SOIL CLASSIFICATION SYSTEM AND TERMS

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE-GRAINED SOILS (major portions retained on No. 200 sieve): includes (1) clean gravel and sands and (2) silty or clayey gravels and sands. Condition is rated according to relative density as determined by laboratory tests or standard penetration resistance tests.

Descriptive Terms	Relative Density	SPT Blow Count
Very loose	0 to 15 %	< 4
Loose	15 to 35 %	4 to 10
Medium dense	35 to 65 %	10 to 30
Dense	65 to 85 %	30 to 50
Very dense	85 to 100 %	> 50

FINE-GRAINED SOILS (major portions passing on No. 200 sieve): includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings, SPT blow count, or unconfined compression tests.

Descriptive Terms	Unconfined Compressive Strength kPa	SPT Blow Count
Very soft	< 25	< 2
Soft	25 to 50	2 to 4
Medium stiff	50 to 100	4 to 8
Stiff	100 to 200	8 to 15
Very stiff	200 to 400	15 to 30
Hard	> 400	> 30

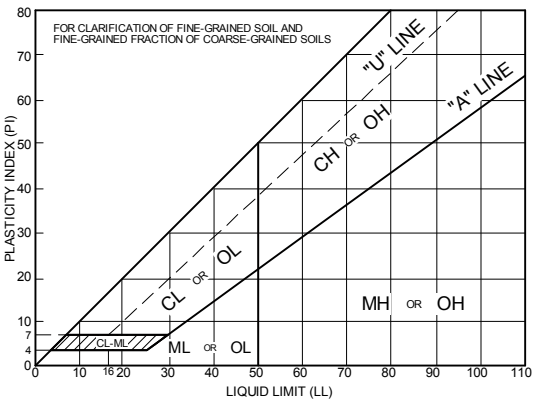
GENERAL NOTES

1. Classifications are based on the United Soil Classification System and include consistency, moisture, and color. Field descriptions have been modified to reflect results of laboratory tests where deemed appropriate.

2. Surface elevations are based on topographic maps and estimated locations.

3. Descriptions on these boring logs apply only at the specific boring locations and at the time the borings were made. They are not guaranteed to be representative of subsurface conditions at other locations or times.

Major Divisions			Group Symbols	Typical Names	Laboratory Classification Criteria	
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravel (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows: Less than 5 percent..... GW, GP, SW, SP; More than 12 percent..... GM, GC, SM, SC; 6 to 12 percent..... Borderline case4s requiring dual symbols**	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW
		Gravel with fines (Appreciable amount of fines)	GM* d u	Silty gravels, gravel-sand-silt mixtures		Atterberg limits below "A" line or P.I. less than 4 — Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-silt mixtures		Atterberg limits above "A" line or P.I. greater than 7
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines		$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP	Poorly-graded sands, gravelly sands, little or no fines		Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM* d u	Silty sands, sand-silt mixtures		Atterberg limits below "A" line or P.I. less than 4 — Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			SC	Clayey sands, sand-clay mixtures		Atterberg limits above "A" line or P.I. greater than 7
Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)	Silts and Clays (Liquid limit less than 60)		ML	Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey silts with slight plasticity		
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
			OL	Organic silts and organic silty clays of low plasticity		
	Silts and Clays (Liquid limit greater than 60)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, organic silts		
			CH	Inorganic clays of high plasticity, fat clays		
			OH	Organic clays of medium to high plasticity, organic silts		
	Highly Organic Soils		Pt	Peat and other highly organic soils		



Plasticity Chart

Material	Sieve sizes	mm	Sieve
Silt or clay	< #200	< 0.074	
Sand: Fine	#200 to #40	0.074 to 0.42	
Sand: Medium	#40 to #10	0.42 to 2.00	
Sand: Coarse	#10 to #4	2.00 to 4.76	
Gravel: Fine		4.76 to 19.1	#4 to 3/4 in.
Gravel: Coarse		19.1 to 76.2	3/4 in. to 3 in.
Cobble		76.2 to 304.8	3 in. to 12 in.
Boulders		304.8 to 914.4	12 in. to 36 in.

* Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg Limits: suffix d used when L.L. is 23 or less and the P.I. is 6 or less; the suffix is used when L.L. is greater than 26.

** Borderline classifications used for soils possessing characteristics of two groups are designated by combinations of groups symbols. For example; GW-GC, well-graded gravel-sand mixture with clay binder.

Project Name: Webb County Main Fire Station
Project Number: 15G047

FIELD AND LABORATORY TESTING PROCEDURES

FIELD TESTING

A. Boring Procedure Between Samples

The borehole is extended downward, between samples by continuous flight, hollow or stem augers or by rotary drilling techniques using bentonite drilling fluid or water.

B. Penetration Test and Split-Barrel Sampling of Soils (ASTM D-1586)

This sampling method consists of driving a 2-inch outside diameter split barrel sampler using a 140 pound hammer freely falling through a distance of 30 inches. The sampler is first seated 6 inches into the material to be sampled and then driven an additional 12 inches. The number of blows required to drive the sampler the final 12 inches is known as the Standard Penetration Resistance. Recovered samples are first classified as to color and texture by the field logger. Later, in the laboratory, the field logger's classification is reviewed by the soils engineer who examines each sample.

C. Thin-Walled Tube Geotechnical Sampling of Soils (ASTM D-1587)

This method consists of pushing thin walled steel tubes, usually 3 inches in diameter, into the soils to be sampled using hydraulic or other means. Cohesive soils are usually to be sampled in this manner and relatively undisturbed samples are recovered.

D. Soil Investigation and Sampling by Auger Borings (ASTM D-1452)

This method consists of augering a hole and removing representative soil samples from the auger flight or bit at 5 foot intervals or with each change in the substrata. Disturbed samples are obtained and this method is, therefore, limited to situations where it is satisfactory to determine the approximate subsurface profile.

E. Diamond Core Drilling for Site Investigation (ASTM D-2113)

This method consists of advancing a hole into hard strata by rotating a single or double tube core barrel equipped with a cutting bit. Diamond, tungsten carbide, or other cutting agents may be used for the bit. Wash water is used to remove the cuttings and to cool the bit. Normally, a 2 inch outside diameter by 1⅝ inch inside diameter (NX) coring bit is used unless otherwise noted. The rock or hard material recovered within the core barrel is examined in the field and in the laboratory and the cores are stored in partitioned boxes. The core recovery is the length of the material recovered and is expressed as a percentage of the total distance penetrated.

F. Visual – Manual Soil Classification Procedure (ASTM D-2488)

This procedure is a visual – manual soil classification methodology for the description of soil for engineering purposes when precise soil classification is not required.

LABORATORY TESTING

A. Atterberg Limits: Liquid Limit (LL), Plastic Limit (PL) and Plasticity Index (PI) of Soils (ASTM D-4318 or TEX 104-E, 105-E and 106-E)

Atterberg Limits determine the soil's plasticity characteristics. The soil's Plasticity Index (PI) is representative of this characteristic and is the difference between the Liquid Limit (LL) and the Plastic Limit (PL). The LL is the moisture content at which the soil will flow as a heavy viscous fluid. The PL is the moisture content at which the soil begins to lose its plasticity. The test results are presented on the boring logs adjacent to the appropriate sampling information.

B. Particle Size Analysis of Soils (ASTM D-422 or TEX 110-E)

Grain size analysis tests are performed to determine the particle size and distribution of the samples tested. The grain size distribution of the soils coarser than the Standard No. 200 sieve was determined by passing the sample through a standard set of nested sieves.

C. Laboratory Determination of Water (Moisture) Content of Soil and Rock (ASTM D-2216 or TEX 103-E)

The moisture content of soil is defined as the ratio, expressed as a percentage, of the weight of water in a given soil mass to the weight of solid particles. It is determined by measuring the wet and oven dry weights of a soil sample. The test results are presented on the boring logs.

D. Unconfined Compressive Strength of Cohesive Soil (ASTM D-2166)

The unconfined compressive strength of soil is determined by placing a section of an undisturbed sample into a loading frame and applying an axial load until the sample fails in shear. The test results are presented on the boring logs adjacent to the appropriate sampling information.

E. California Bearing Ratio (CBR) of Lab Compacted Soils (ASTM D-1883)

The CBR test is performed by compacting soil in a six inch diameter mold at the desired density, soaking the sample for four days under a surcharge load approximating the pavement weight and then testing the soils in punching shear. A two inch diameter piston is forced into the soil to determine the resistance to penetration. The CBR is the ratio if the actual load required to produce 0.1 inches of penetration to that producing the same penetration in a standard crushed stone.

F. Swell Test (ASTM D-4546)

The swell test is performed by confining a one inch thick specimen in a 2½ diameter stainless steel ring and loading the specimen to the approximate overburden pressure. The test specimen is then inundated with distilled water and allowed to swell for 48 hours. The volumetric swell is measured as a percentage of the total volume and is converted mathematically to linear swell.

G. Compaction Tests (ASTM D-698, D-1557, TEX 113-E and TEX 114-E)

The compaction test is performed by compacting soil in a steel mold at varying moisture contents. Layers are compacted using a hammer weight and number of blows per layer which vary with the different test procedures, ASTM D-698, D-1557, TEX 113-E and TEX 114-E. The data is plotted and the maximum unit weight and moisture content determined. The test results are given in the appendix with a notation of the test method used.

H. Classification of Soils for Engineering Purposes (Unified Soil Classification System, ASTM D-2487)

This standard describes a system for classifying mineral and organic-mineral soils for engineering purposes based on laboratory determination of particle size characteristics, liquid limit, and plasticity index shall be used when precise classification is required.

I. Amount of Material in Soils Finer Than the No. 200 (75µm) Sieve (ASTM D-1140)

There are two tests methods to cover determination of the amount of material finer than the No. 200 (75 µm) sieve by washing. Method A – Test specimen is not dispersed prior to wash sieving. Method B – Test specimen is dispersed by soaking in water containing a deflocculating agent prior to wash sieving.

Pavement Design
(AASHTO 1993 Method)

CASTLE Engineering and Testing, LLC.
1216 Santa Maria Ave.
Laredo, Texas 78040
Phone 956.727.3530
Fax 956.727.3384
TBPE Firm No. F-10341

Design Parameters

City of Laredo Pavement Standards

Street Classification	18-Kip ESAL	Reliability Level	Minimum Pavement SN	Maximum Pavement SN	Initial Serviceability Index (p0)	Terminal Serviceability Index (p0)	Standard Deviation (S0)
Local Street	100,000	R-70	1.98	3.18	4.2	2.0	0.45

Design Inputs

		Asphalt		Concrete	
Subgrade Support	CBR=	3.4			
	Mr=	5100	psi	120	pci
Reliability		70	%	70	%
Standard Deviation	So=	0.45		0.35	
Initial Serviceability	Po=	4.2		4.5	
Terminal Serviceability	Pt=	2.0		2.0	
Design Serviceability Loss	ΔPSI=	2.0		2.0	

Design Structural Number (Based on Empirical Equation for Flexible Pavements and Nomograph)= **2.37**

Calculated Asphalt Pavement Section

Calculated SN, based on Layer Thickness

	Layer Coefficient	Drainage Factor	Layer Thickness (in)	Individual SN
AC Surface and Binder (a1*D1)=	0.44	0.0	**2.5**	1.1
HMAC Black Base (a2*D2*M2)=	0.30	1.0	**0.0**	0.00
Aggregate Base (a3*D3*M3)=	0.12	1.2	**12.0**	1.73
Subgrade (a4*D4*M4)=	0.10	1.0	**0.0**	0.00
			Structural Number =	**2.83**

Calculated Concrete Pavement Section

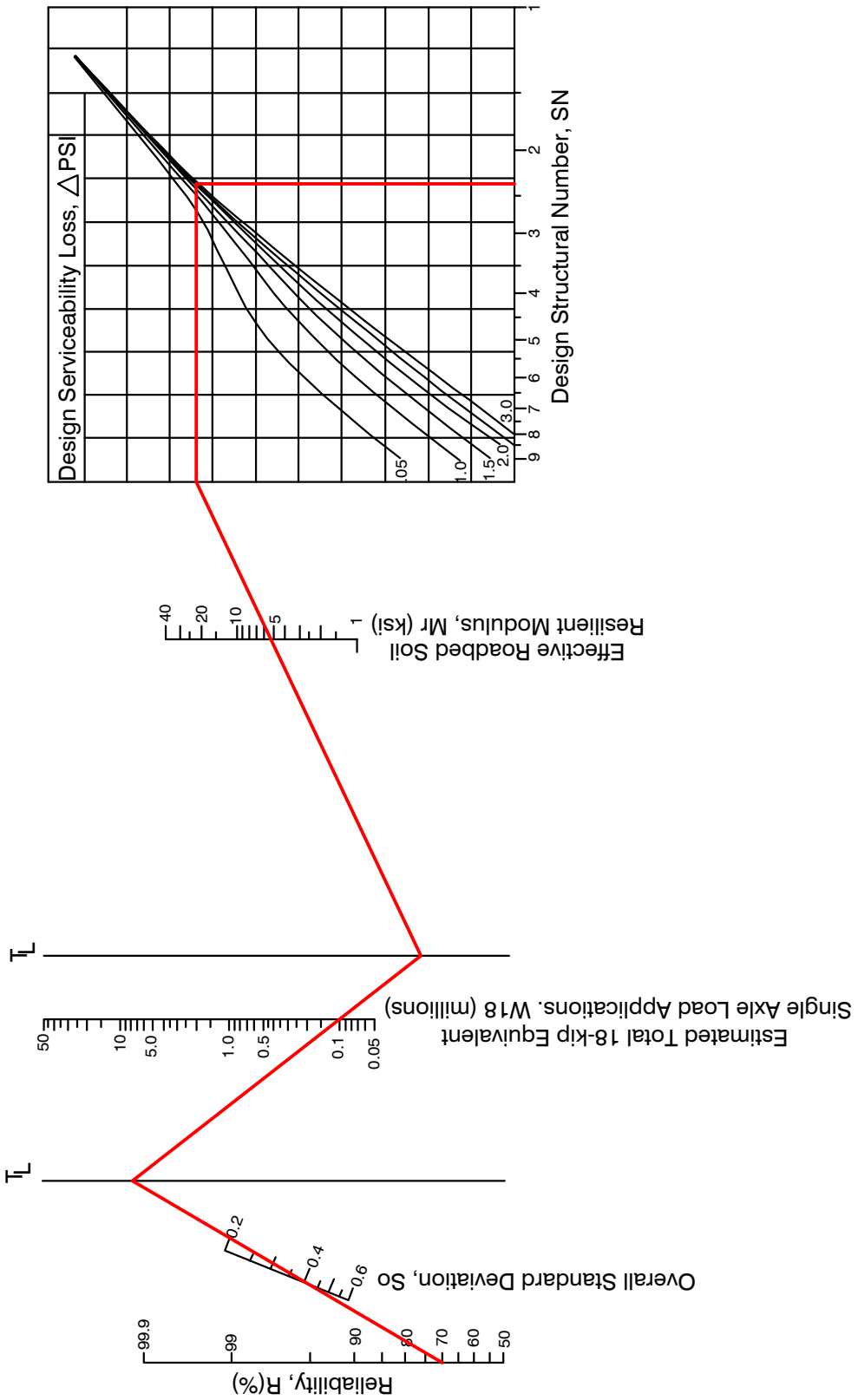
Concrete Compressive Strength=	3,500	psi
Modulus of Elasticity of Concrete=	3,370	ksi
Modulus of Rupture of Concrete=	530	
Load Transfer ("J" Factor)=	4.0	
Drainage Coefficient=	1.2	
Concrete Pavement Thickness=	**7.0**	**in.**
Moisture Conditioned Subgrade=	**8.0**	**in.**

STATE OF TEXAS
JESSE P. RODRIGUEZ
57352
LICENSED
PROFESSIONAL ENGINEER

28 SEP 15

Project:	Webb County Fire Station
Project No.:	15G047
Location:	Laredo Texas
Date:	9/28/2015

Review By:



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PHONE 956.727.8580 - FAX 956.727.8584
TBPE F-4084

PROJECT

WEBB COUNTY MAIN FIRE STATION

LAREDO, TEXAS

SHEET TITLE

NOMOGRAPH

Date
09/24/2015
Prepared for:
Hickey-Peña Architects
Project No.
14G047
Designed By:
Jesse P. Rodriguez, P.E.

SECTION 15050

BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all Work herein.

B. The Contract Drawings indicate the extent and general arrangement of the systems. If any departure from the Contract Drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore, shall be submitted to the Architect for approval as soon as practicable. No such departures shall be made without the prior written approval of the Architect.

C. Notwithstanding any reference in the Specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, such reference shall not be construed as limiting competition; and the Contractor, in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgment of the Architect, expressed in writing, is equal to that specified.

1.02 SCOPE OF WORK

A. The Work included under this Contract consists of the furnishing and installation of all equipment and material necessary and required to form the complete and functioning systems in all of its various phases, all as shown on the accompanying Drawings and/or described in these Specifications. The contractor shall review all pertinent drawings, including those of other contracts prior to commencement of Work.

B. This Division requires the furnishing and installing of all items Specified herein, indicated on the Drawings or reasonably inferred as necessary for safe and proper operation; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include, but are not limited to, materials, labor, supervision, transportation, storage, equipment, utilities, all required permits, licenses and inspections. All work performed under this Section shall be in accordance with the Project Manual, Drawings and Specifications and is subject to the terms and conditions of the Contract.

C. The approximate locations of Mechanical (HVAC) and Plumbing items are indicated on the Drawings. These Drawings are not intended to give complete and accurate details in regard to location of outlets, apparatus, etc. Exact locations are to be determined by actual measurements at the building, and will in all cases be subject to the Review of the Owner or Engineer, who reserves the right to make any reasonable changes in the locations indicated without additional cost to the Owner.

D. Items specifically mentioned in the Specifications but not shown on the Drawings and/or items shown on Drawings but not specifically mentioned in the Specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.

E. All discrepancies between the Contract Documents and actual job-site conditions shall be reported to the Owner or Engineer so that they will be resolved prior to the bidding, where this cannot be done at least 7 working days prior to bid; the greater or more costly of the

discrepancy shall be bid. All labor and materials required to perform the work described shall be included as part of this Contract.

F. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and fully operating system in cooperation with other trades.

G. It is the intent of the above "Scope" to give the Contractor a general outline of the extent of the Work involved; however, it is not intended to include each and every item required for the Work. Anything omitted from the "Scope" but shown on the Drawings, or specified later, or necessary for a complete and functioning heating, ventilating and air conditioning system shall be considered a part of the overall "Scope".

H. The Contractor shall rough-in fixtures and equipment furnished by others from rough-in and placement drawings furnished by others. The Contractor shall make final connection to fixtures and equipment furnished by others.

1.03 SCHEMATIC NATURE OF CONTRACT DOCUMENTS

A. The contract documents are schematic in nature in that they are only to establish scope and a minimum level of quality. They are not to be used as actual working construction drawings. The actual working construction drawings shall be the approved shop drawings.

B. All duct or pipe or equipment locations as indicated on the documents do not indicate every transition, offset, or exact location. All transitions, offsets clearances and exact locations shall be established by actual field measurements, coordination with the structural, architectural and reflected ceiling plans, and other trades. Submit shop drawings for approval.

C. All transitions, offsets and relocations as required by actual field conditions shall be performed by the contractor at no additional cost to the owner.

D. Additional coordination with electrical contractor may be required to allow adequate clearances of electrical equipment, fixtures and associated appurtenances. Contractor to notify Architect and Engineer of unresolved clearances, conflicts or equipment locations.

1.04 SITE VISIT AND FAMILIARIZATION

A. Before submitting a bid, it will be necessary for each Contractor whose work is involved to visit the site and ascertain for himself the conditions to be met therein in installing his work and make due provision for same in his bid. It will be assumed that this Contractor in submitting his bid has visited the premises and that his bid covers all work necessary to properly install the equipment shown. Failure on the part of the Contractor to comply with this requirement shall not be considered justification for the omission or faulty installation of any work covered by these Specifications and Drawings.

B. Understand the existing utilities from which services will be supplied; verify locations of utility services, and determine requirements for connections.

C. Determine in advance that equipment and materials proposed for installation fit into the confines indicated.

1.05 WORK SPECIFIED IN OTHER SECTIONS

A. Finish painting is specified. Prime and protective painting are included in the work of this Division.

B. Owner and General Contractor furnished equipment shall be properly connected to Mechanical (HVAC) and Plumbing systems.

C. Furnishing and installing all required Mechanical (HVAC) and Plumbing equipment control relays and electrical interlock devices, conduit, wire and J-boxes are included in the Work of this Division.

1.06 PERMITS, TESTS, INSPECTIONS

A. Arrange and pay for all permits, fees, tests, and all inspections as required by governmental authorities.

1.07 DATE OF FINAL ACCEPTANCE

A. The date of final acceptance shall be the date of owner occupancy, or the date all punch list items have been completed or final payment has been received. Refer to Division One for additional requirements.

B. The date of final acceptance shall be documented in writing and signed by the architect, owner and contractor.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

B. Deliver products to the project at such time as the project is ready to receive the equipment, pipe or duct properly protected from incidental damage and weather damage.

C. Damaged equipment, duct or pipe shall be promptly removed from the site and new, undamaged equipment, pipe and duct shall be installed in its place promptly with no additional charge to the Owner.

1.09 NOISE AND VIBRATION

A. The heating, ventilating and air conditioning systems, and the component parts there of, shall be guaranteed to operate without objectionable noise and vibration.

B. Provide foundations, supports and isolators as specified or indicated, properly adjusted to prevent transmission of vibration to the Building structure, piping and other items.

C. Carefully fabricate ductwork and fittings with smooth interior finish to prevent turbulence and generation or regeneration of noise.

D. All equipment shall be selected to operate with minimum of noise and vibration. If, in the opinion of the Architect, objectionable noise or vibration is produced or transmitted to or through the building structure by equipment, piping, ducts or other parts of the Work, the Contractor shall rectify such conditions without extra cost to the Owner.

1.10 APPLICABLE CODES

A. Obtain all required permits and inspections for all work required by the Contract Documents and pay all required fees in connection thereof.

B. Arrange with the serving utility companies for the connection of all required utilities and pay all charges, meter charges, connection fees and inspection fees, if required.

C. Comply with all applicable codes, specifications, local ordinances, industry standards, utility company regulations and the applicable requirements of the following nationally accepted codes and standards:

1. Air Moving & Conditioning Association, AMCA.
2. American Standards Association, ASA.
3. American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., ASHRAE.
4. American Society of Mechanical Engineers, ASME.
5. American Society of Plumbing Engineers, ASPE.
6. American Society of Testing Materials, ASTM.
7. American Water Works Association, AWWA.
8. National Bureau of Standards, NBS.
9. National Fire Protection Association, NFPA.
10. Sheet Metal & Air Conditioning Contractors' National Association, SMACNA.
11. Underwriters' Laboratories, Inc., UL.
12. International Energy Conservation Code, IECC.

D. Where differences existing between the Contract Documents and applicable state or city building codes, state and local ordinances, industry standards, utility company regulations and the applicable requirements of the above listed nationally accepted codes and standards, the more stringent or costly application shall govern. Promptly notify the Engineer in writing of all differences.

E. When directed in writing by the Engineer, remove all work installed that does not comply with the Contract Documents and applicable state or city building codes, state and local ordinances, industry standards, utility company regulations and the applicable requirements of the above listed nationally accepted codes and standards, correct the deficiencies, and complete the work at no additional cost to the Owner.

1.11 DEFINITIONS AND SYMBOLS

A. General Explanation: A substantial amount of construction and Specification language constitutes definitions for terms found in other Contract Documents, including Drawings which must be recognized as diagrammatic and schematic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in Contract Documents are defined generally in this article, unless defined otherwise in Division 1.

B. Definitions and explanations of this Section are not necessarily either complete or exclusive, but are general for work to the extent not stated more explicitly in another provision of the Contract Documents.

C. Indicated: The term "Indicated" is a cross-reference to details, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications and to similar means of recording requirements in Contract Documents. Where such terms as "Shown", "Noted", "Scheduled", "Specified" and "Detailed" are used in lieu of "Indicated", it is for the purpose of helping the reader locate cross-reference material, and no limitation of location is intended except as specifically shown.

D. Directed: Where not otherwise explained, terms such as "Directed", "Requested", "Accepted", and "Permitted" mean by the Architect or Engineer. However, no such implied meaning will be interpreted to extend the Architect's or Engineer's responsibility into the Contractor's area of construction supervision.

E. Reviewed: Where used in conjunction with the Engineer's response to submittals, requests for information, applications, inquiries, reports and claims by the Contractor the meaning of the term "Reviewed" will be held to limitations of Architect's and Engineer's responsibilities and duties as specified in the General and Supplemental Conditions. In no case will "Reviewed" by Engineer be interpreted as a release of the Contractor from responsibility to fulfill the terms and requirements of the Contract Documents.

F. Furnish: Except as otherwise defined in greater detail, the term "Furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

G. Install: Except as otherwise defined in greater detail, the term "Install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance.

H. Provide: Except as otherwise defined in greater detail, the term "Provide" is used to mean "Furnish and Install", complete and ready for intended use, as applicable in each instance.

I. Installer: Entity (person or firm) engaged by the Contractor or its subcontractor or Sub-contractor for performance of a particular unit of work at the project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.

J. Imperative Language: Used generally in Specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or when so noted by other identified installers or entities.

K. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended as minimum quality level or quantity of work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable tolerance limits. In complying with requirements, indicated or scheduled numeric values are either minimums or maximums as noted or as appropriate for the context of the requirements. Refer instances of uncertainty to Owner or Engineer via a request for information (RFI) for decision before proceeding.

L. Abbreviations and Symbols: The language of Specifications and other Contract Documents including Drawings is of an abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self explanatory nature have been included in text of Specifications and Drawings. Specific abbreviations and symbols have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of Specification requirements with notations on Drawings and in Schedules. These are frequently defined in Section at first instance of use or on a Legend and Symbol Drawing. Trade and industry association names and titles of generally recognized industry standards are frequently abbreviated. Singular

words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of Contract Documents so indicate. Except as otherwise indicated, graphic symbols and abbreviations used on Drawings and in Specifications are those recognized in construction industry for indicated purposes. Where not otherwise noted symbols and abbreviations are defined by 1993 ASHRAE Fundamentals Handbook, chapter 34 "Abbreviations and Symbols", ASME and ASPE published standards.

1.12 DRAWINGS AND SPECIFICATIONS

A. These Specifications are intended to supplement the Drawings and it will not be the province of the Specifications to mention any part of the work which the Drawings are competent to fully explain in every particular and such omission is not to relieve the Contractor from carrying out portions indicated on the Drawings only.

B. Should items be required by these Specifications and not indicated on the Drawings, they are to be supplied even if of such nature that they could have been indicated thereon. In case of disagreement between Drawings and Specifications, or within either Drawings or Specifications, the better quality or greater quantity of work shall be estimated and the matter referred to the Architect or Engineer for review with a request for information and clarification at least 7 working days prior to bid opening date for issuance of an addendum.

C. The listing of product manufacturers, materials and methods in the various sections of the Specifications, and indicated on the Drawings, is intended to establish a standard of quality only. It is not the intention of the Owner or Engineer to discriminate against any product, material or method that is equal to the standards as indicated and/or specified, nor is it intended to preclude open, competitive bidding. The fact that a specific manufacturer is listed as an acceptable manufacturer should not be interpreted to mean that the manufacturers' standard product will meet the requirements of the project design, Drawings, Specifications and space constraints.

D. The Architect or Engineer and Owner shall be the sole judge of quality and equivalence of equipment, materials and methods.

E. Products by other reliable manufacturers, other materials, and other methods, will be accepted as outlined, provided they have equal capacity, construction, and performance. However, under no circumstances shall any substitution by made without the written permission of the Architect or Engineer and Owner. Request for prior approval must be made in writing 10 days prior to the bid date without fail.

F. Wherever a definite product, material or method is specified and there is not a statement that another product, material or method will be acceptable, it is the intention of the Owner or Engineer that the specified product, material or method is the only one that shall be used without prior approval.

G. Wherever a definite material or manufacturer's product is specified and the Specification states that products of similar design and equal construction from the specified list of manufacturers may be substituted, it is the intention of the Owner or Engineer that products of manufacturers that are specified are the only products that will be acceptable and that products of other manufacturers will not be considered for substitution without approval.

H. Wherever a definite product, material or method is specified and there is a statement that "OR EQUAL" product, material or method will be acceptable, it is the intention of the Owner or Engineer that the specified product, material or method or an "OR EQUAL" product, material or method may be used if it complies with the specifications and is submitted for review to the Engineer as outline herein.

I. Where permission to use substituted or alternative equipment on the project is granted by the Owner or Engineer in writing, it shall be the responsibility of the Contractor or Subcontractor involved to verify that the equipment will fit in the space available which includes allowances for all required Code and maintenance clearances, and to coordinate all equipment structural support, plumbing and electrical requirements and provisions with the Mechanical (HVAC) and Plumbing Design Documents and all other trades, including Division 16.

J. Changes in architectural, structural, electrical, mechanical, and plumbing requirements for the substitution shall be the responsibility of the bidder wishing to make the substitution. This shall include the cost of redesign by the affected designer(s). Any additional cost incurred by affected subcontractors shall be the responsibility of this bidder and not the owner.

K. If any request for a substitution of product, material or method is rejected, the Contractor will automatically be required to furnish the product, material or method named in the Specifications. Repetitive requests for substitutions will not be considered.

L. The Owner or Engineer will investigate all requests for substitutions when submitted in accordance with above and if accepted, will issue a letter allowing the substitutions.

M. Where equipment other than that used in the design as specified or shown on the Drawings is substituted (either from an approved manufacturers list or by submittal review), it shall be the responsibility of the substituting Contractor to coordinate space requirements, building provisions and connection requirements with his trades and all other trades and pay all additional costs to other trades, the Owner, the Architect or Engineer, if any, due to the substitutions.

N. The electrical design and electrical drawings are based on the equipment and/or electric motors of the type, size and electrical characteristics shown and specified on the mechanical drawings. Any change in equipment and/or motor size or type brought on directly or indirectly by a substitution or mechanical equipment having characteristics requiring a change, shall be the responsibility of the Mechanical Contractor and the entire cost of such change, including conduit, wiring, motor starting equipment, etc., shall be paid for by the Mechanical Contractor at no additional charge, unless the substitution was initiated by the Owner. Submittals must clearly show and deviations. Mechanical Contractor is responsible for coordinating any required changes with the Electrical Contractor, prior to Electrical Contractors ordering of panels and associated equipment.

1.13 SUBMITTALS

A. Coordinate with Division 1 for submittal timetable requirements, unless noted otherwise within thirty (30) days after the Contract is awarded the Contractor shall submit a minimum of eight (8) complete bound sets of shop drawings and complete data covering each item of equipment or material. The first submittal of each item requiring a submittal must be received by the Architect or Engineer within the above thirty day period. The Architect or Engineer shall not be responsible for any delays or costs incurred due to excessive shop drawing review time for submittals received after the thirty (30) day time limit. The Architect and Engineer will retain one (1) copy each of all shop drawings for their files. Where full size drawings are involved, submit one (1) print and one (1) reproducible sepia or mylar in lieu of eight (8) sets. All literature pertaining to an item subject to Shop Drawing submittal shall be submitted at one time. A submittal shall not contain information from more than one Specification section, but may have a section subdivided into items or equipment as listed in each section. The Contractor may elect to submit each item or type of equipment separately. Each submittal shall include the following items enclosed in a suitable binder:

1. A cover sheet with the names and addresses of the Project, Architect, MEP Engineer, General Contractor and the Subcontractor making the submittal. The cover sheet shall also contain the section number covering the item or items submitted and the item nomenclature or description.
2. An index page with a listing of all data included in the Submittal.
3. A list of variations page with a listing all variations, including unfurnished or additional required accessories, items or other features, between the submitted equipment and the specified equipment. If there are no variations, then this page shall state "NO VARIATIONS". Where variations affect the work of other Contractors, then the Contractor shall certify on this page that these variations have been fully coordinated with the affected Contractors and that all expenses associated with the variations will be paid by the submitting Contractor. This page will be signed by the submitting Contractor.
4. Equipment information including manufacturer's name and designation, size, performance and capacity data as applicable. All applicable Listings, Labels, Approvals and Standards shall be clearly indicated.
5. Dimensional data and scaled drawings as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances clearly indicated and labeled at a minimum scale of 1/4" = 1'-0", as required to demonstrate that the alternate or substituted product will fit in the space available.
6. Identification of each item of material or equipment matching that indicated on the Drawings.
7. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements or accessories shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method.
8. Additional information as required in other Sections of this Division.
9. Certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Drawings and Specifications, signed and dated in long hand. Submittals that do not comply with the above requirements shall be returned to the Contractor and shall be marked "REVISE AND RESUBMIT".

B. Refer to Division 1 for additional information on shop drawings and submittals.

C. Equipment and materials submittals and shop drawings will be reviewed for compliance with design concept only. It will be assumed that the submitting Contractor has verified that all items submitted can be installed in the space allotted. Review of shop drawings and submittals shall not be considered as a verification or guarantee of measurements or building conditions.

D. Where shop drawings and submittals are marked "REVIEWED", the review of the submittal does not indicate that submittals have been checked in detail nor does it in any way relieve the Contractor from his responsibility to furnish material and perform work as required by the Contract Documents.

E. Shop drawings shall be reviewed and returned to the Contractor with one of the following categories indicated:

1. REVIEWED: Contractor need take no further submittal action, shall include this submittal in the O&M manual and may order the equipment submitted on.
2. REVIEWED AS NOTED: Contractor shall submit a letter verifying that required exceptions to the submittal have been received and complied with including additional accessories or coordination action as noted, and shall include this submittal and compliance letter in the O&M manual. The contractor may order the

equipment submitted on at the time of the returned submittal providing the Contractor complies with the exceptions noted.

3. NOT APPROVED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is not approved, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or drawings. Contractor shall not order equipment that is not approved. Repetitive requests for substitutions will not be considered.
4. REVISE AND RESUBMIT: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked revise and resubmit, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or provide as noted on previous shop drawings. Contractor shall not order equipment marked revise and resubmit. Repetitive requests for substitutions will not be considered.
5. CONTRACTOR'S CERTIFICATION REQUIRED: Contractor shall resubmit submittal on material, equipment or method of installation. The Contractor's stamp is required stating the submittal meets all conditions of the contract documents. The stamp shall be signed by the General Contractor. The submittal will not be reviewed if the stamp is not placed and signed on all shop drawings.
6. MANUFACTURER NOT AS SPECIFIED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked manufacturer not as specified, the Contractor will automatically be required to furnish the product, material or method named in the specifications. Contractor shall not order equipment where submittal is marked manufacturer not as specified. Repetitive requests for substitutions will not be considered.

F. Materials and equipment which are purchased or installed without shop drawing review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged unsatisfactory by the Owner or Engineer for any reason shall be at the expense of the Contractor. The responsible Contractor shall remove the material and equipment noted above and replace with specified equipment or material at his own expense when directed in writing by the Architect or Engineer.

G. Shop Drawing Submittals shall be complete and checked prior to submission to the Engineer for review.

H. Submittals are required for, but not limited to, the following items:

1. Pipe Material and Specialties.
2. Pipe Fabrication Drawings.
3. Basic Materials.
4. Variable Air Volume Boxes.
5. Air Handling Units.
6. Cooling Towers.
7. Chillers.
8. Air Cooled Condensing Units.
9. Water Treatment.
10. Expansion Compensation.
11. Variable Frequency Drives.
12. Noise and Vibration Controls.
13. Plumbing Fixtures and Specialties.
14. Plumbing Equipment.
15. Sanitary DWV Fittings, Pipe and Accessories.
16. Domestic Hot and Cold Water Pipe, Fittings and Accessories.
17. HVAC Pipe and Duct Insulation.
18. Hydronic and Plumbing Valves.
19. Hydronic Piping and Accessories.

20. Hydronic Pumps.
21. Roof-Top A/C Units.
22. Heating Water Boiler.
23. Portable Pipe Hanger and Equipment Supports.
24. Duct Specialties.
25. Duct Fabrication Drawings.
26. Air Distribution Devices.
27. Fan Coil Units.
28. Filters.
29. Fans.
30. Fire Dampers and Fire Smoke Dampers.
31. Temperature Controls and Control Sequences.
32. Test, Adjust and Balance Reports.
33. Testing, Adjusting and Balancing Contractor Qualifications.
34. Coordination Drawings.

I. Refer to other Division 15 sections for additional shop drawing requirements. Provide samples of actual materials and/or equipment to be used on the Project upon request of the Owner or Engineer.

J. Contractor to submit Mechanical/Electrical equipment coordination sheet with equipment submittal for all AHU's, ACCU's, and Fans. Reference chart at end of section. Provide copy to electrical subcontractor.

1.14 COORDINATION DRAWINGS

A. Prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. Indicate the proposed locations of pipe, duct, equipment, and other materials. Include the following:
   a. Wall and type locations.
   b. Clearances for installing and maintaining insulation.
   c. Locations of light fixtures and sprinkler heads.
   d. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
   e. Equipment connections and support details.
   f. Exterior wall and foundation penetrations.
   g. Routing of storm and sanitary sewer piping.
   h. Fire-rated wall and floor penetrations.
   i. Sizes and location of required concrete pads and bases.
   j. Valve stem movement.
   k. Structural floor, wall and roof opening sizes and details.
2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
4. Prepare reflected ceiling plans to coordinate and integrate installations, air distribution devices, light fixtures, communication systems components, and other ceiling-mounted items.

B. This Contractor shall be responsible for coordination of all items that will affect the installation of the work of this Division. This coordination shall include, but not be limited to: voltage, ampacity, capacity, electrical and piping connections, space requirements, sequence of construction, building requirements and special conditions.

C. By submitting shop drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

1.15 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Special Project Requirements, in addition to the requirements specified in Division 15, indicate the following installed conditions:

1. Duct mains and branches, size and location, for both exterior and interior; locations of dampers, fire dampers, duct access panels, and other control devices; filters, fuel fired heaters, fan coils, condensing units, and roof-top A/C units requiring periodic maintenance or repair.
2. 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, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart. Indicate actual inverts and horizontal locations of underground piping.
3. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
4. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
5. Contract Modifications, actual equipment and materials installed.

B. Engage the services of a Land Surveyor or Professional Engineer registered in the state in which the project is located as specified herein to record the locations and invert elevations of underground installations.

C. The Contractor shall maintain a set of clearly marked black line record "AS-BUILT" prints on the job site on which he shall mark all work details, alterations to meet site conditions and changes made by "Change Order" notices. These shall be kept available for inspection by the Owner, Architect or Engineer at all times.

D. Refer to Division 1 for additional requirements concerning record drawings. If the Contractor does not keep an accurate set of as-built drawings, the pay request may be altered or delayed at the request of the Architect. Mark the drawings with a colored pencil. Delivery of as-built prints and reproducibles is a condition of final acceptance.

E. The record prints shall be updated on a daily basis and shall indicate accurate dimensions for all buried or concealed work, precise locations of all concealed pipe or duct, locations of all concealed valves, controls and devices and any deviations from the work shown on the Construction Documents which are required for coordination. All dimensions shall include at least two dimensions to permanent structure points.

F. Submit three prints of the tracings for approval. Make corrections to tracings as directed and delivered "Auto Positive Tracings" to the architect. "As-Built" drawings shall be furnished in addition to shop drawings.

G. When the option described in paragraph F., above is not exercised then upon completion of the work, the Contractor shall transfer all marks from the submit a set of clear concise set of reproducible record "AS-BUILT" drawings and shall submit the reproducible drawings with corrections made by a competent draftsman and three (3) sets of black line prints to the Architect or Engineer for review prior to scheduling the final inspection at the completion of the work. The reproducible record "AS-BUILT" drawings shall have the Engineers Name and Seal removed or blanked out and shall be clearly marked and signed on each sheet as follows:

CERTIFIED RECORD DRAWINGS

DATE:

(NAME OF GENERAL CONTRACTOR)

BY:_____
(SIGNATURE)

(NAME OF SUBCONTRACTOR)

BY:_____
(SIGNATURE)

1.16 OPERATING MANUALS

A. Prepare maintenance manuals in accordance with Division 1 and in addition to the requirements specified in Division 1, include the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

1.17 CERTIFICATIONS AND TEST REPORTS

A. Submit a detailed schedule for completion and testing of each system indicating scheduled dates for completion of system installation and outlining tests to be performed and schedule date for each test. This detailed completion and test schedule shall be submittal at least 90 days before the projected Project completion date.

B. Test result reporting forms shall be submitted for review no later than the date of the detailed schedule submitted.

C. Submit 4 copies of all certifications and test reports to the Architect or Engineer for review adequately in advance of completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.

D. Certifications and test reports to be submitted shall include, but not be limited to those items outlined in Section of Division 15.

1.18 MAINTENANCE MANUALS

A. Coordinate with Division 1 for maintenance manual requirements, unless noted otherwise bind together in “D ring type” binders by National model no. 79-883 or equal, binders shall be large enough to allow ¼” of spare capacity. Three (3) sets of all approved shop drawing submittals, fabrication drawings, bulletins, maintenance instructions, operating instructions and parts exploded views and lists for each and every piece of equipment furnished under this Specification. All sections shall be typed and indexed into sections and labeled for easy reference and shall utilize the individual specification section numbers shown in the Mechanical Specifications as an organization guideline. Bulletins containing information about equipment that is not installed on the project shall be properly marked up or stripped and reassembled. All pertinent information required by the Owner for proper operation and maintenance of equipment supplied by Division 15 shall be clearly and legibly set forth in memoranda that shall, likewise, be bound with bulletins.

B. Prepare maintenance manuals in accordance with Special Project Conditions, in addition to the requirements specified in Division 15, include the following information for equipment items:

1. Identifying names, name tags designations and locations for all equipment.
2. Valve tag lists with valve number, type, color coding, location and function.
3. Reviewed shop drawing submittals with exceptions noted compliance letter.
4. Fabrication drawings.
5. Equipment and device bulletins and data sheets clearly highlighted to show equipment installed on the project and including performance curves and data as applicable, i.e., description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and model numbers of replacement parts.
6. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
7. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions, servicing instructions and lubrication charts and schedules.
8. Equipment and motor name plate data.
9. Wiring diagrams.
10. Exploded parts views and parts lists for all equipment and devices.
11. Color coding charts for all painted equipment and conduit.
12. Location and listing of all spare parts and special keys and tools furnished to the Owner.
13. Furnish recommended lubrication schedule for all required lubrication points with listing of type and approximate amount of lubricant required.

C. Refer to Division 1 for additional information on Operating and Maintenance Manuals.

D. Operating and Maintenance Manuals shall be turned over to the Owner or Engineer a minimum of 14 working days prior to the beginning of the operator training period.

1.19 OPERATOR TRAINING

A. The Contractor shall furnish the services of factory trained specialists to instruct the Owner's operating personnel. The Owner's operator training shall include 12 hours of on site training in three 4 hour shifts.

B. Before proceeding with the instruction of Owner Personnel, prepare a typed outline in triplicate, listing the subjects that will be covered in this instruction, and submit the outline for

review by the Owner. At the conclusion of the instruction period obtain the signature of each person being instructed on each copy of the reviewed outline to signify that he has a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.

C. Refer to other Division 15 Sections for additional Operator Training requirements.

1.20 FINAL COMPLETION

A. At the completion of the work, all equipment and systems shall be tested and faulty equipment and material shall be repaired or replaced. Refer to Sections of Division 15 for additional requirements.

B. Clean and adjust all air distribution devices and replace all air filters immediately prior to final acceptance.

C. Touch up and/or refinish all scratched equipment and devices immediately prior to final acceptance.

1.21 CONTRACTOR'S GUARANTEE

A. Use of the HVAC and Plumbing systems to provide temporary service during construction period will not be allowed without permission from the Owner in writing and if granted shall not be cause warranty period to start, except as defined below.

B. Contractor shall guarantee to keep the entire installation in repair and perfect working order for a period of one year after its completion and final acceptance, and shall furnish free of additional cost to the Owner all materials and labor necessary to comply with the above guarantee throughout the year beginning from the date of issue of Substantial Completion, Beneficial Occupancy by the Owner or the Certificate of Final Payment as agreed upon by all parties.

C. This guarantee shall not include cleaning or changing filters except as required by testing, adjusting and balancing.

D. All air conditioning compressors shall have parts and labor guarantees for a period of not less than 5 years beyond the date of final acceptance.

E. Refer to Sections in Division 15 for additional guarantee or warranty requirements.

1.22 TRANSFER OF ELECTRONIC FILES

A. Project documents are not intended or represented to be suitable for reuse by Architect/Owner or others on extensions of this project or on any other project. Any such reuse or modification without written verification or adaptation by Engineer, as appropriate for the specific purpose intended, will be at Architect/Owner’s risk and without liability or legal exposure to Engineer or its consultants from all claims, damages, losses and expense, including attorney’s fees arising out of or resulting thereof.

B. Because data stored in electric media format can deteriorate or be modified inadvertently, or otherwise without authorization of the data’s creator, the party receiving the electronic files agrees that it will perform acceptance tests or procedures within sixty (60) days of receipt, after which time the receiving party shall be deemed to have accepted the data thus transferred to be acceptable. Any errors detected within the sixty (60) day acceptance period will be corrected by the party delivering the electronic files. Engineer is not responsible for

maintaining documents stored in electronic media format after acceptance by the Architect/Owner.

C. When transferring documents in electronic media format, Engineer makes no representations as to the long term compatibility, usability or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by Engineer at the beginning of the Project.

D. Any reuse or modifications will be Contractor's sole risk and without liability or legal exposure to Architect, Engineer or any consultant.

E. The Texas Board of Architectural Examiners (TBAE) has stated that it is in violation of Texas law for persons other than the Architect of record to revise the Architectural drawings without the Architect's written consent.

It is agreed that "MEP" hard copy or computer-generated documents will not be issued to any other party except directly to the Architect/Owner. The contract documents are contractually copyrighted and cannot be used for any other project or purpose except as specifically indicated in AIA B-141 Standard Form of Agreement between Architect and Owner.

If the client, Architect/Owner, or developer of the project requires electronic media for "record purposes", then an AutoCAD based compact disc ("CD") will be prepared. The "CD" will be submitted with all title block references intact and will be formatted in a "plot" format to permit the end user to only view and plot the drawings. Revisions will not be permitted in this configuration.

F. At the Architect/Owner's request, Engineer will prepare one "CD" of electronic media to assist the contractor in the preparation of submittals. The Engineer will prepare and submit the "CD" to the Architect/Owner for distribution to the contractor. All copies of the "CD" will be reproduced for a cost of reproduction fee of Five Hundred Dollars ($500.00) per "CD".

The "CD" will be prepared and all title blocks, names and dates will be removed. The "CD" will be prepared in a ".dwg" format to permit the end user to revise the drawings.

G. This Five Hundred Dollars ($500.00) per "CD" cost of reproduction will be paid directly from the Contractor to the Engineer. The "CD" will be prepared only after receipt of the Five Hundred Dollars ($500.00). The Five Hundred Dollars ($500.00) per "CD" cost of reproduction is to only recover the cost of the manhours necessary to reproduce the documents. It is not a contractual agreement between the Contractor and Engineer to provide any engineering services, nor any other service.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide materials and equipment manufactured by a domestic United States manufacturer.

B. Access Doors: Provide access doors as required for access to equipment, valves, controls, cleanouts and other apparatus where concealed. Access doors shall have concealed hinges and screw driver cam locks.

C. All access panels located in wet areas such as restrooms, locker rooms, shower rooms, kitchen and any other wet areas shall be constructed of stainless steel.

D. Access Doors: shall be as follows:

1. Plastic Surfaces: Milcor Style K.
2. Ceramic Tile Surface: Milcor Style M.
3. Drywall Surfaces: Milcor Style DW.
4. Install panels only in locations approved by the Architect.

PART 3 - EXECUTION

3.01 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected via reviewed submittals.

B. Refer to equipment specifications in Divisions 2 through 16 for additional rough-in requirements.

3.02 MECHANICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:

1. Coordinate mechanical systems, equipment, and materials installation with other building components.
2. Verify all dimensions by field measurements.
3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
7. Coordinate connection 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.
8. Install systems, materials, and equipment to conform with architectural action markings on submittal, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, resolve conflicts and route proposed solution to the Architect for review.
9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
10. Install mechanical equipment to facilitate servicing, 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. Extend grease fittings to an accessible location and label.
11. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified.
12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

13. Provide roof curbs for all roof mounted equipment. Coordinate with roof construction for pitched roof. Provide roof curb to match roof slope. Refer to architectural drawings and details.
14. The equipment to be furnished under this Specification shall be essentially the standard product of the manufacturer. Where two or more units of the same class of equipment are required, these units shall be products of a single manufacturer; however, the component parts of the system need not be the product of the same manufacturer.
15. The architectural and structural features of the building and the space limitations shall be considered in selection of all equipment. No equipment shall be furnished which will not suit the arrangement and space limitations indicated.
16. Lubrication: Prior to start-up, check and properly lubricate all bearings as recommended by the manufacturer.
17. Where the word "Concealed" is used in these Specifications in connection with insulating, painting, piping, ducts, etc., it shall be understood to mean hidden from sight as in chases, furred spaces or suspended ceilings. "Exposed" shall be understood to mean the opposite of concealed.
18. Identification of Mechanical Equipment:
    a. Mechanical equipment shall be identified by means of nameplates permanently attached to the equipment. Nameplates shall be engraved laminated plastic or etched metal. Shop drawings shall include dimensions and lettering format for approval. Attachments shall be with escutcheon pins, self-tapping screws, or machine screws.
    b. Tags shall be attached to all valves, including control valves, with nonferrous chain. Tags shall be brass and at least 1-1/2 inches in diameter. Nameplate and tag symbols shall correspond to the identification symbols on the temperature control submittal and the "as-built" drawings.

3.03 CUTTING AND PATCHING

A. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

B. 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. Remove samples of installed Work as specified for testing.
5. Install equipment and materials in existing structures.
6. Upon written instructions from the Engineer, uncover and restore Work to provide for Engineer/Owner's observation of concealed Work, without additional cost to the Owner.
7. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers; refer to the materials and methods required for the surface and building components being patched; Refer to Section "DEFINITIONS" for definition of "Installer."

C. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to removal of mechanical piping, mechanical ducts and HVAC units, plumbing fixtures and trim, and other mechanical items made obsolete by the new Work.

D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

3.04 WORK SEQUENCE, TIMING, COORDINATION WITH OWNER

A. The Owner will cooperate with the Contractor, however, the following provisions must be observed:

1. A meeting will be held at the project site, prior to any construction, between the Owner's Representative, the General Contractor, the Sub-Contractors and the Engineer to discuss Contractor's employee parking space, access, storage of equipment or materials, and use of the Owner's facilities or utilities. The Owner's decisions regarding such matters shall be final.
2. During the construction of this project, normal facility activities will continue in existing buildings until renovated areas are completed. Plumbing, fire protection, lighting, electrical, communications, heating, air conditioning, and ventilation systems will have to be maintained in service within the occupied spaces of the existing building.

3.05 DEMOLITION AND WORK WITHIN EXISTING BUILDINGS

A. In the preparation of these documents every effort has been made to show the approximate locations of, and connections to the existing piping, duct, equipment and other apparatus related to this phase of the work. However, this Contractor shall be responsible for verifying all of the above information. This Contractor shall visit the existing site to inspect the facilities and related areas. This Contractor shall inspect and verify all details and requirements of all the Contract Documents, prior to the submission of a proposal. All discrepancies between the Contract Documents and actual job-site conditions shall be resolved by his contractor, who shall produce drawings that shall be submitted to the Architect/Engineer for review. All labor and materials required to perform the work described shall be apart of this Contract.

B. All equipment and/or systems noted on the Drawings "To Remain" shall be inspected and tested on site to certify its working condition. A written report on the condition of all equipment to remain, including a copy of the test results and recommended remedial actions and costs shall be made by this Contractor to the Architect/Engineer for review.

C. All equipment and/or systems noted on the Drawings "To Be Removed" shall be removed including, associated pipe and duct pipe and duct hangers and/or line supports. Where duct or pipe is to be capped for future or end of line use, it shall be properly tagged with its function or service appropriately identified. Where existing equipment is to be removed or relocated and has an electric motor or connection, the Electrical Contractor shall disconnect motor or connection, remove wiring to a safe point and this Contractor shall remove or relocate motor or connection along with the equipment.

D. During the construction and remodeling, portions of the Project shall remain in service. Construction equipment, material tools, extension cords, etc., shall be arranged so as to present minimum hazard or interruption to the occupants of the building. None of the construction work shall interfere with the proper operation of the existing facility or be so conducted as to cause harm or danger to persons on the premises. All fire exits, stairs or corridors required for proper access, circulation or exit shall remain clear of equipment, materials or debris. The General Contractor shall maintain barricades, other separations in corridors and other spaces where work is conducted.

E. Certain work during the demolition phase of construction may require overtime or night time shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time at least seventy-two (72) hours in advance in writing.

F. Any salvageable equipment as determined by the Owner, shall be delivered to the Owner, and placed in storage at the location of his choice. All other debris shall be removed from the site immediately.

G. Equipment, piping or other potential hazards to the working occupants of the building shall not be left overnight outside of the designated working or construction area.

H. Make every effort to minimize damage to the existing building and the owner's property. Repair, patch or replace as required any damage that might occur as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction and to keep construction disrupted areas to a minimum. Corporate with the Owner and other trades in scheduling and performance of the work.

I. Include in the contract price all rerouting of existing pipe, duct, etc., and the reconnecting of the existing equipment and plumbing fixtures as necessitated by field conditions to allow the installation of the new systems regardless of whether or not such rerouting, reconnecting or relocating is shown on the drawings. Furnish all temporary pipe, duct, controls, etc., as required to maintain heating, cooling, ventilation and plumbing services for the existing areas with a minimum of interruption.

J. All existing plumbing fixtures, pipe, duct, materials, equipment, controls and appurtenances not included in the remodel or alteration areas are to remain in place.

K. Pipe, duct, equipment and controls serving mechanical, plumbing and owner's equipment, etc., which is to remain but which is served by pipe, duct, equipment and controls that are disturbed by the remodeling work, shall be reconnected in such a manner as to leave this equipment in proper operating condition.

L. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and operating system in cooperation with other trades with a minimum of disruption or downtime.

M. Refer to Architectural "Demolition and/or Alteration" plans for actual location of walls, ceiling, etc., being removed and/or remodeled.

END OF SECTION

Mech/Elec. Equipment Coordination Sheet					
Mark #	**Unit Type**	**Manufacturer's Recomm. Fuse Size (MOCP)**	**Mark #**	**Unit Type**	**Manufacturer's Recomm. Fuse Size (MOCP)**

SECTION 15051

STARTING OF SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Starting systems.

B. Demonstration and instructions.

C. Testing, adjusting, and balancing.

1.02 RELATED SECTIONS

A. Section 01400 - Quality Control: Manufacturers field reports.

B. Section 01700 - Contract Closeout: System operation and maintenance data and extra materials.

C. Section 15950 – Automatic Temperature Controls.

D. Section 15990 - Testing, Adjusting and Balancing.

1.03 STARTING SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect, Engineer and Owner seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions that may cause damage.

D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Adjust electrical amp draw on motors to within 80% of rated amp draw.

F. Verify wiring and support components for equipment are complete and tested.

G. Execute start-up under supervision of applicable manufacturer's representative in accordance with manufacturers' instructions.

H. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

I. Adjust return air to 500 fpm at each air unit inlet. Replace drive packages as necessary to achieve design airflows.

J. Submit a written report in accordance with Section 01400 that equipment or system has been properly installed and is functioning correctly.

1.04 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of final inspection.

B. Demonstrate Project equipment and provide instruction by a qualified manufacturers' representative who is knowledgeable about the Project.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.

E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

1.05 TESTING, ADJUSTING, AND BALANCING

A. Mechanical Division will secure the services of an independent firm to perform testing, adjusting, and balancing.

B. The independent firm will perform services specified in Section 15990.

C. Reports will be submitted by the independent firm to the Architect/Engineer indicating observations and results of tests and indicating compliance or non-compliance with the requirements of the Contract Documents.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 15070
INSIDE UTILITY TRENCH EXCAVATION, BACKFILL, AND COMPACTION

PART 1 – GENERAL

1.01 DESCRIPTION

A. This section describes general requirements, products, and methods of execution relating to excavation, backfill and compaction of inside trenches for mechanical work. Inside trenches are those which occur within an arbitrary, imaginary boundary five feet beyond the outside perimeter of the structure.SG

B. Scope: Provide all trench work for mechanical work of every description and of whatever substance encountered to the depth indicated, or to provide pipe slopes and elevations shown on the drawing. Excavate and backfill utility trenches. Place and compact bedding material. Compact backfill material.

C. SPECIAL NOTE: All provisions and divisions of these specifications are a part of this section of these specifications. The Contractor shall consult these divisions and provisions in detail for instructions and include all items pertaining to this work. The Contractor shall consult all other divisions of these specifications, determine the extent of impact on the work required to complete the work required by this section of the specifications or portion thereof and related work shown on the drawings.

1.02 APPLICABE CODES

A. Local Codes and Ordinances

B. Texas Safety Standards

C. OSHA – Section 1926.650

1.03 SAFETY PRECAUTIONS AND PROGRAMS

A. It shall be the duty and responsibility of the Contractor and all of its subcontractors to be familiar and comply with all requirements of Public Law 91-696, 29 U.S.C. Secs. 651 et. seq., the Occupational Safety and Health Act of 1970, (OSHA) and all amendments thereto, and to enforce and comply with all of these provisions of this Act. IN ADDITION, ON PROJECTS IN WHICH TRENCH EXCAVATION WILL EXCEED A DEPTH OF FIVE FEET, THE CONTRACTOR AND ALL OF ITS SUBCONTRACTORS SHALL COMPLY WITH ALL REQUIREMENTS OF 29 C.F.R. SECS. 1926.652 AND 1926.653, OSHA SAFETY AND HEALTH STANDARDS.

PART 2 – BEDDING MATERIAL

2.01 BEDDING MATERIAL

A. Select bedding material from trench excavation using care to separate it from unsuitable material. If suitable bedding material is not available from trench excavation, import it from sources approved by the Architect.

B. Use clean sand. Maintain moisture content within a range that will allow specified compaction.

2.02 TRENCH BACKFILL

A. Obtain trench backfill material from trench excavation. If sufficient suitable trench backfill material compatible with structural backfill is not available from trench excavation, import it from sources approved by Architect.

B. Use granular material, free from large stones, boulders and debris. Maintain moisture content within a range that will allow specified compaction. Maximum aggregate size four inches (4”).

PART 3 – EXECUTION

3.01 EXCAVATION

A. Place all excavated material suitable for backfill in an orderly manner, and in conformance with safety codes.

B. Dispose of all material not suitable for backfilling.

C. Form bell holes so pipelines rest on continuous undisturbed soil. If larger rocks or boulders are encountered, remove them. If trenches are below specified grade, backfill to required depth with select granular materials free from debris and rock, and compact to proper grade before installing piping.

3.02 LOCATION

A. Locate trenches to accommodate utilities shown on drawings

B. Construct trench with adequate width to allow compaction equipment to be used at the sides of pipes.

C. Make trench side slopes conform to prevailing safety code requirements.

3.03 DEWATERING

A. Perform whatever work is necessary to prevent the flow and accumulation of surface or ground water in the excavation.

3.04 TIMING

A. Do not backfill until underground mechanical system has been properly tested, inspected and approved.

B. Coordinate with the work of others, and complete all trench work in a timely manner.

3.05 BEDDING

A. Place bedding material under, around, and over the pipe in lifts not exceeding 8” in depth,

B. Work material around pipe by hand methods, taking care to keep any oversize or sharp stones out of contact with the pipe, and to provide uniform support for the pipe.

B. Cover pipe with bedding material to building subgrade or to a minimum 12” depth before adding other backfill.

3.06 BACKFILLING

A. Continue placing backfill material until trench is completely filled to building subgrade, or as shown on drawings.

B. Place backfill material in lifts not to exceed 12” in depth.

3.07 COMPACTION

A. Compact all bedding material to at least 95% of maximum density, taking care not to damage the pipe.

B. Compact all backfill under footings, slabs, and other structures to 95% of maximum density or more, if required by the Architect.

C. Compact other areas to preclude future settlements, or at least 85% of maximum density.

3.08 FINISHING

A. After completion of backfilling, dispose of excess material and smooth the surface of grade.

B. Do not allow heavy equipment to be used over backfilled work that does not have sufficient cover to prevent pipe damage.

3.09 SPECIAL PRECAUTIONS

A. Avoid unauthorized and unnecessary excavations.

B. Minimize number and size of excavations under footings or bearing walls.

C. Support footings, foundations, and walls with timbers and jacks if there appears to be any possible chance of damage, and keep such precautions in place to eliminate possible damage.

D. Backfill under footings and bearing walls, using maximum compaction or concrete or proportions as specified for footings.

E. Avoid damage to all existing underground services, foundations, cables, conduit lines or foundations. Repair any existing underground work accidentally damaged at no additional cost to the Owner.

3.10 UNDER EXISTING SLAB INSTALLATION

A. When breaking out an existing floor slab, make a saw cut and remove concrete. When repouring concrete, compact the fill to the same specifications as the building fill. Re: Architectural/Structural. Make necessary saw cuts and patching as required.

END OF SECTION

SECTION 15080
OUTSIDE UTILITY TRENCH EXCAVATION, BACKFILL, AND COMPACTION

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

A. Related Work Specified Elsewhere:

1. Section 15010 – General Provisions

2. Section 15050 – Basic Materials and Methods

3. Division 2 – Site Work

B. Description: This section described general requirements, products, and methods of execution relating excavation, backfill, and compaction of utility trenches outside of buildings. The arbitrary line of demarcation between inside and outside of buildings occurs 5' outside the building perimeters.

C. It shall be the duty and responsibility of the Contractor and all of its subcontractors to be familiar and comply with all requirements of Public Law 91-696, 29 U.S.C. Secs. 651 et. seq., the Occupational Safety and Health Act of 1970, (OSHA) and all amendments thereto, and to WHICH TRENCH EXCAVATION WILL EXCEED A DEPTH OF FIVE FEET, THE CONTRACTOR AND ALL OF ITS SUBCONTRACTORS SHALL COMPLY WITH ALL REQUIREMENTS OF 29 C.F.R. SECS. 1926.652 AND 1926.653, OSHA SAFETY AND HEALTH STANDARDS.

D. SPECIAL NOTE: All provisions and divisions of these specifications are a part of this section of these specifications. The Contractor shall consult these divisions and provisions in detail for instructions and include all items pertaining to this work. The Contractor shall consult all other divisions of these specifications, determine the extent of impact on the work required to complete the work required by this section of the specifications or portion thereof and related work shown on the drawings.

PART 2 – PRODUCTS

2.01 BEDDING MATERIAL

A. Select bedding material from trench excavation using care to separate it from unsuitable material. If suitable bedding material is not available from trench excavation, import it from sources approved by the Architect.

B. Use granular material, free from large stones, boulders and debris. Maximum aggregate size passing a 2" sieve opening. Maintain moisture content within a range that will allow specified compaction.

2.02 TRENCH BACKFILL

A. Obtain trench backfill material from trench excavation. If sufficient suitable trench backfill material is not available from trench excavation, import it from sources approved by the Architect.

B. Use granular material, free from large stones, boulders, and debris. Maintain moisture content within range that will allow specified compaction. Maximum aggregate size 4 inches.

PART 3 – EXECUTION

3.01 EXCAVATION

A. Excavate trenches to depth and grades as shown on drawings.

B. Place all excavated material suitable for backfill in an orderly manner and in conformance with safety codes.

C. Dispose of all material not suitable for backfill.

D. Form bell holes so pipelines rest on continuous undisturbed soil. If larger rocks or boulders are encountered, remove them. If ground surface is below specified pipe grade, fill to required depth with granular materials free from debris and rock, and compact to proper grade before installing piping.

3.02 LOCATION

A. Locate trenches to accommodate utilities shown on the drawings.

B. Construct trench with adequate width to allow compaction equipment to be used at the side of pipes.

B. Make trench side slopes conform to prevailing safety code requirements.

3.03 DE-WATERING

A. Perform whatever work is necessary to prevent flow and accumulation of surface or ground water in the excavation.

3.04 TIMING

A. Do not complete backfill until utility system has been properly tested, inspected, and approved.

B. Coordinate with the work of others and complete all trench work in a timely manner.

3.05 BEDDING

A. Place bedding material under, around, and over pipe in lifts not exceeding 8” in depth.

B. Work material around pipe by hand methods, taking care to keep any oversize or sharp stones out of contact with the pipe, and provide uniform support for the pipe.

C. Cover pipe with bedding material to a minimum 6” depth before adding other backfill.

D. Cover water line with 18” bedding material before backfilling.

3.06 BACKFILLING

A. Continue placing backfill material until trench is completely filled to finished grade, or as shown on the drawing.

B. Place backfill material in lifts not to exceed 12” in depth.

3.07 COMPACTION

A. Compact all bedding material to al least 95% of maximum density, taking care not to damage the pipe.

B. Compact backfill material to preclude future settlement or at least to 90% of maximum density.

3.08 FINISHING

A. After completion of backfilling, dispose of excess material and smooth the surface to grade.

B. Restore all surface areas to original conditions, or improve as shown on the drawings. Replace all paving, base course, gravel surfacing, sub-base, topsoil or other existing finished surface as shown on drawings.

C. Clean up and finish all construction areas to original condition or better.

END OF SECTION

SECTION 15140

SUPPORTS AND ANCHORS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Pipe, and equipment hangers, supports, and associated anchors.

B. Sleeves and seals.

C. Flashing and sealing equipment and pipe stacks.

1.02 RELATED WORK

A. Section 15240 - Vibration Isolation.

B. Section 15260 - Piping Insulation.

C. Section 15280 - Equipment Insulation.

D. Section 15310 - Fire Protection System.

E. Section 15410 - Plumbing System.

F. Section 15510 - Hydronic Piping.

G. Section 15530 – Refrigerant Piping

1.03 REFERENCES

A. ANSI/ASME B31.1 - Power Piping.

B. NFPA 13 - Standard for the Installation of Sprinkler Systems.

C. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems.

1.04 QUALITY ASSURANCE

A. Supports for Sprinkler Piping: In conformance with NFPA 13.

B. Supports for Standpipes: In conformance with NFPA 14.

1.05 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division One.

B. Indicate hanger and support framing and attachment methods.

PART 2 - PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

A. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch Malleable iron, adjustable swivel, split ring.

B. Hangers for Pipe Sizes 2 to 4 Inches Carbon steel, adjustable, clevis.

C. Hangers for Pipe Sizes 6 Inches and over: Adjustable steel yoke, cast iron roll, double hanger.

D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods; cast iron roll and stand for pipe sizes 6 inches and over.

E. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

F. Wall Support for Pipe Sizes 4 Inches and over: adjustable steel yoke and cast iron roll.

G. Vertical Support: Steel riser clamp.

H. Floor Support for Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.

I. Floor Support for Pipe Sizes 6 Inches and over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.

J. Roof Pipe Supports and Hangers: Galvanized Steel Channel System as manufactured by Portable Pipe Hangers, Inc. or approved equal.

For pipes 2-1/2" and smaller – Type PP10 with roller
For pipes 3" through 8" – Type PS
For multiple pipes – Type PSE - Custom

K. Copper Pipe Support and Hangers: Electro-galvanized with thermoplastic elastomer cushions; Unistrut "Cush-A-Clamp" or equal. Hangers: Plastic coated; Unistrut or equal.

L. For installation of protective shields refer to specification section 15140-3.03.

M. Shields for Vertical Copper Pipe Risers: Sheet lead.

N. Pipe Rough-In Supports in Walls/Chases: Provide preformed plastic pipe supports, Sioux Chief "Pipe Titan" or equal.

2.02 HANGER RODS

A. Galvanized Hanger Rods: Threaded both ends, threaded one end, or continuous threaded.

2.03 INSERTS

A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.04 FLASHING

A. Metal Flashing: 20 gage galvanized steel.

B. Lead Flashing: 4 lb./sq. ft. sheet lead for waterproofing; 1 lb./sq. ft. sheet lead for soundproofing.

C. Caps: Steel, 20 gage minimum; 16 gage at fire resistant elements.

D. Coordinate with roofing contractor/architect for type of flashing on metal roofs.

2.05 EQUIPMENT CURBS

A. Fabricate curbs of hot dipped galvanized steel.

2.06 SLEEVES

A. Sleeves for Pipes Through Non-fire Rated Floors: Form with 18 gage galvanized steel, tack welded to form a uniform sleeve.

B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Form with steel pipe, schedule 40.

C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Prefabricated fire rated steel sleeves including seals, UL listed.

D. Sleeves for Round Ductwork: Form with galvanized steel.

E. Sleeves for Rectangular Ductwork: Form with galvanized steel.

F. Fire Stopping Insulation: Glass fiber type, non-combustible, U.L. listed.

G. Caulk: Paintable 25-year acrylic sealant.

H. Pipe Alignment Guides: Factory fabricated, of cast semi-steel or heavy fabricated steel, consisting of bolted, two-section outer cylinder and base with two-section guiding spider that bolts tightly to pipe. Length of guides shall be as recommended by manufacturer to allow indicated travel.

2.07 FABRICATION

A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

B. Design hangers without disengagement of supported pipe.

C. Design roof supports without roof penetrations, flashing or damage to the roofing material.

2.08 FINISH

A. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

PART 3 - EXECUTION

3.01 INSERTS

A. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams. Coordinate with structural engineer for placement of inserts.

B. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.

C. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.

D. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab. Verify with structural engineer prior to start of work.

3.02 PIPE HANGERS AND SUPPORTS

A. Support horizontal piping as follows:

PIPE SIZE	MAX. HANGER SPACING	HANGER DIAMETER
(Steel Pipe)		
1/2 to 1-1/4 inch	7'-0"	3/8"
1-1/2 to 3 inch	10'-0"	3/8"
4 to 6 inch	10'-0"	1/2"
8 to 10 inch	10'-0"	5/8"
12 to 14 inch	10'-0"	3/4"
15 inch and over	10'-0"	7/8"
(Copper Pipe)		
1/2 to 1-1/4 inch	5'-0"	3/8"
1-1/2 to 2-1/2 inch	8'-0"	3/8"
3 to 4 inch	10'-0"	3/8"
6 to 8 inch	10'-0"	1/2"
(Cast Iron)		
2 to 3 inch	5'-0"	3/8"
4 to 6 inch	10'-0"	1/2"
8 to 10 inch	10'-0"	5/8"
12 to 14 inch	10'-0"	3/4"
15 inch and over	10'-0"	7/8"
(PVC Pipe)		
1-1/2 to 4 inch	4'-0"	3/8"
6 to 8 inch	4'-0"	1/2"
10 and over	4'-0"	5/8"

B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

C. Place a hanger within 12 inches of each horizontal elbow and at the vertical horizontal transition.

D. Use hangers with 1-1/2 inch minimum vertical adjustment.

E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.

F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.

G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

H. Support riser piping independently of connected horizontal piping.

I. Install hangers with nut at base and above hanger; tighten upper nut to hanger after final installation adjustments.

J. Portable pipe hanger systems shall be installed per manufactures instructions.

3.03 Insulated Piping: Comply with the following installation requirements.

A. Clamps: Attach galvanized clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.

B. Saddles: Install galvanized protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation.

C. Shields: Install protective shields MSS Type 40 on cold and chilled water piping that has vapor barrier. Shields shall span an arc of 180 degrees and shall have dimensions in inches not less than the following:

NPS	LENGTH	THICKNESS
1/4 THROUGH 3-1/2	12	0.048
4	12	0.060
5 & 6	18	0.060
8 THROUGH 14	24	0.075
16 THROUGH 24	24	0.105

D. Piping 2” and larger provide galvanized sheet metal shields with calcium silicate at hangers/supports.

E. Insert material shall be at least as long as the protective shield.

F. Thermal Hanger Shields: Install where indicated, with insulation of same thickness as piping.

3.04 EQUIPMENT BASES AND SUPPORTS

A. Provide equipment bases of concrete.

B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct support of steel members. Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.05 FLASHING

A. Provide flexible flashing and metal counter flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Flash vent and soil pipes projecting 8 inches minimum above finished roof surface with lead worked one inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counter flash and seal.

C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device.

D. Seal floor shower mop sink and all other drains watertight to adjacent materials.

E. Provide curbs for mechanical roof installations 8 inches minimum high above roofing surface. Contact architect for all flashing details and roof construction. Seal penetrations watertight.

3.06 SLEEVES

A. Set sleeves in position in formwork. Provide reinforcing around sleeves.

B. Extend sleeves through floors minimum one inch above finished floor level. Caulk sleeves full depth with fire rated thermfiber and 3M caulking and provide floor plate.

C. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with U.L. listed fire stopping insulation and caulk seal air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

D. Fire protection sleeves may be flush with floor of stairways.

END OF SECTION

SECTION 15170

MOTORS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 15050, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

B. WORK SPECIFIED ELSEWHERE:

1. Painting
2. Automatic temperature controls.
3. Power control wiring to motors and equipment.

1.03 WARRANTY

Warrant the Work specified herein for one year and motors for five years beginning on data of substantial completion against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

1.04 SUBMITTALS

A. SHOP DRAWINGS: Indicate size material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures variations, and accessories.

C. MOTOR NAMEPLATE INFORMATION: Manufacturer's name, address, utility and operating data.

D. Refer to Division One for additional information.

1.05 DELIVERY AND STORAGE

A. DELIVERY: Deliver clearly labeled, undamaged materials in the manufacturers' unopened containers.

B. TIME AND COORDINATION: Deliver materials to allow for minimum storage time at the project site. Coordinate delivery with the scheduled time of installation.

C. STORAGE: Store materials in a clean, dry location, protected from weather and abuse.

PART 2 - PRODUCTS

2.01 ELECTRIC MOTORS

A. APPROVED MANUFACTURERS: Provide motors by a single manufacturer as much as possible.

1. Baldur
2. Marathon
3. Siemens-Allis
4. General Electric
5. U.S. Motor

B. TEMPERATURE RATING: Provide insulation as follows:

1. CLASS B: 40 degrees C maximum.
2. CLASS F:
   a. Between 40 degrees C and 65 degrees C maximum.
   b. Totally enclosed motors.

C. STARTING CAPABILITY: As required for service indicated five starts minimum per hour.

D. PHASES AND CURRENT: Verify electrical service compatibility with motors to be used.

1. UP TO 1/2 HP: Provide permanent split, capacitor-start single phase with inherent overload protection.
2. 3/4 HP AND LARGER: Provide squirrel-cage induction polyphone.
3. Provide two separate windings on 2-speed polyphone motors.
4. Name plate voltage shall be the same as the circuit's normal voltage, serving the motor.

E. SERVICE FACTOR: 1.15 for poly-phase; 1.35 for single phase.

F. FRAMES: U-frames 1.5 Hp. and larger.

G. BEARINGS: Provide sealed re-graspable ball bearings; with top mounted ale mite lubrication fittings and bottom side drains minimum average life 100,000 hours typically, and others as follows:

1. Design for thrust where applicable.
2. PERMANENTLY SEALED: Where not accessible for greasing.
3. SLEEVE-TYPE WITH OIL CUPS: Light duty fractional hp. motors or polyphone requiring minimum noise level.

H. ENCLOSURE TYPE: Provide enclosures as follows:

1. CONCEALED INDOOR: Open drip proof.
2. EXPOSED INDOOR: Guarded.
3. OUTDOOR TYPICAL: Type II. TEC.
4. OUTDOOR WEATHER PROTECTED: Type I. TEA.

I. OVERLOAD PROTECTION: Built-in sensing device for stopping motor in all phase legs and signaling where indicated for fractional horse power motors.

J. NOISE RATING: "Quiet" except where otherwise indicated.

K. EFFICIENCY: Minimum full load efficiency listed in the following table, when tested in accordance with IEEE Test Procedure 112A, Method B, including stray load loss measure.

NEMA Efficiency

Motor Horsepower	INDEX Letter	Minimum Efficiency %
	1800 RPM Synchronous Speed	
7.5-10	F	89.5
15-20	E	91.0
25-30	E	92.4
40	D	93.0
50	C	93.0
60	C	93.6
75	C	94.1
100-125	B	94.5
150-200	B	95.0
	1200 RPM Synchronous Speed	
3-5	G	87.5
7.5	G	89.5
10	F	89.5
15	F	90.2
20	E	90.2
25-30	E	91.7
40-50	D	93.0
60	D	93.6
75	C	93.6
100-125	C	94.1
150-200	B	95.0

PART 3 - EXECUTION

3.01 All equipment shall be installed in accordance with the manufacturers' recommendations and printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Contractors' price shall include all items required as per manufacturers' requirements.

3.03 INSTALLATION

A. GENERAL: Install in a professional manner. Any part or parts not meeting this requirement shall be replaced or rebuilt without extra expense to Owner.

B. Install rotating equipment in static and dynamic balance.

C. Provide foundations, supports, and isolators properly adjusted to allow minimum vibration transmission within the building.

D. Correct objectionable noise or vibration transmission in order to operate equipment satisfactorily as determined by the Engineer.

END OF SECTION

SECTION 15171

COMBINATION AND NON-COMBINATION MOTOR STARTERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Motor Controllers – Combination and Non-combination Motor Starters

B. Furnish and install a complete motor controller for the following item(s):

1. Constant volume air handling units
2. Constant volume pumps
3. Constant volume supply and exhaust fans.

1.02 RELATED SECTIONS

A. Section 15050 – Basic Materials and Methods

B. Section 15170 – Motors

C. Section 15240 – Sound and Vibration Control

D. Section 15855 – Air Handling Unit

E. Section 15950 – Controls

F. Section 15990 – Testing, Adjusting and Balancing

G. Section 16075 – Electrical Identification

1.03 SUBMITTALS

A. Manufacturer shall provide copies of the following documents:

1. Product data sheets on specified products.
2. Shop drawings for specified product.
3. Wiring Schematics for specified products.
4. Installation instructions.

1.04 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed controllers to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01782 "Operation and Maintenance Data," include the following:

1. Routine maintenance requirements for enclosed controllers and installed components.
2. Provide manufacture’s written instructions for testing and adjusting circuit breaker and Motor Circuit Protection trip settings of combination controllers.
3. Provide manufacturer's written instructions for setting field-adjustable overload relays.
4. Provide manufacture’s written instructions for testing, adjusting, and reprogramming reduced-voltage solid-state controllers.

1.05 MATERIALS MAINTENANCE SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
2. Control Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.
3. Indicating Lights: Two of each type and color installed.
4. Auxiliary Contacts: Furnish one spare(s) for each size and type of magnetic controller installed.
5. Power Contacts: Furnish three spares for each size and type of magnetic contactor installed.

1.06 QUALIFICATIONS

A. Manufacturer must have minimum of 20 years of documented experience, specializing in combination and non-combination starters.

B. The starter assembly shall be UL listed under UL 508A

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept starters on site in original packing. Inspect for damage.

B. Store in a clean, dry space. Maintain factory wrapping, or provide additional heavy canvas, or heavy plastic cover, to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully, in accordance of manufacturer’s written instruction, to avoid damage to components, enclosure, and finish.

1.08 WARRANTY

A. Manufacturer shall provide a five year warranty on the complete starter assembly.

PART 2 - PRODUCTS

2.01 SECTION INCLUDES:

A. Enclosed FVNR combination single phase motor starter with electronic overload relay

B. Enclosed FVNR non-combination motor starters with electronic overload relay

C. Enclosed FVNR combination motor starters with electronic overload relay

D. Enclosed FVNR Two-Speed motor starters with electronic overload relay

2.02 REFERENCES

A. The starters referenced in this section are designed and manufactured to the following standards unless otherwise noted:

1. ANSI/NFPA -70, National Electric Code
2. UL 508, and UL508A Industrial Control Equipment
3. NEMA ICS-2, 2000
4. IEC 60947-5, 60947-4, 60947-3

2.03 APPROVED MANUFACTURERS: Provide one of the following manufacturer's.

1. Cerus Industiral.
2. Square D.
3. Cutler Hammer.
4. ABB

2.04 SYSTEM DESCRIPTION

A. Single Phase Starter: Starters for 115VAC single phase motors less than 1 HP shall be capable of both manual and automatic operation. Refer to Section 2.03.1 for single phase starter requirements.

B. Magnetic Starters: Starters for 3-phase motors shall be magnetic starters. Refer to Section 2.03.2 for magnetic starter requirements.

C. Combination Starters: Provide combination magnetic starters for all motors requiring branch circuit protection or a line-of-sight disconnect. Refer to Section 2.03.3 for combination magnetic starter requirements.

2.04.1 ENCLOSED FULL VOLTAGE NON-REVERSING (FVNR) SINGLE PHASE STARTER

A. Single Phase Motor Starter Control: The single phase motor starter shall consist of a manually operated quick-make toggle mechanism lockable in the “Off” position which shall also function as the motor disconnect. Additionally, the starter shall provide thermal overload protection, run status pilot light and fault pilot light. The starter must include the capability to operate in both manual and automatic control modes. In automatic mode, the starter shall have the capability to integrate with a building automation system by providing terminals for run input, run status output and fault output. All control terminals shall be integrated in the starter. At a minimum, each single phase starter shall include an interposing run relay and current sensing status output relay. Single phase motor starter shall be in a surface mount enclosure.

B. Approved manufacturer: Cerus Industrial, model BAS-1P or approved equal.

2.04.2 ENCLOSED FULL VOLTAGE NON-REVERSING (FVNR) NON-COMBINATION STARTER

A. Magnetic Motor Starters shall be enclosed in a general purpose electrical enclosure with the appropriate environmental rating.

B. Starters shall consist of a horsepower rated magnetic contactor with a minimum of 1NO and 1NC auxiliary contacts and solid state electronic overload relay. Overload relay shall protect all three phases with a wide range current setting and trip class to allow field adjustment for specific motor FLA. Interchangeable heater elements are not acceptable. Overload relay shall provide phase failure, phase loss, locked rotor and stall protection.

C. Provide a manual reset pushbutton on the starter cover to restore normal operation after a trip or fault condition.

D. Each starter shall include an installed 50VA control power transformer (CPT) with protected secondary. The CPT must accept the available line voltage and the control voltage shall not exceed 120V.

E. Installed accessories shall include Hand-Off-Auto operation switch with 22mm style operator interfaces. Include LED pilot light indicators for Hand, Off, Auto, Run and Overload conditions. All pilot devices shall be water tight and dust tight.

F. When remotely controlled by an automation system, the starter shall include remote run terminals which accept both a voltage input signal and a contact closure. The voltage run input shall accept both AC and DC signals including 24VAC, 120VAC, 24VDC and 48VDC to allow direct connection of the transistorized automation signal to the starter.

G. In applications where the motor is interlocked with a damper or valve, the actuator control must reside within the starter enclosure. The starter must provide a voltage output to operate the actuator to open the damper or valve without closing the motor circuit. The starter will only

close the motor circuit and start the motor after it has received a contact closure from a limit or end switch confirming the damper or valve position.

H. The starter shall provide a provision for Fireman's Override operation. When activated, the starter run the motor in any mode (Hand, Off or Auto) regardless of other inputs or lack of inputs either manual or auto. The purpose of the Fireman's Override input is to act as a smoke purge function. Fireman's Override has priority over the Emergency Shutdown input.

I. If the starter is controlled by a fire alarm or life safety system, the starter shall include an Emergency Shutdown input which will disable the starter from operating in either Hand or Auto mode regardless of other inputs either manual or auto.

J. Manufacturer shall provide and install tags with engraved white lettering to designate equipment served

2.04.3 ENCLOSED FULL VOLTAGE NON-REVERSING (FVNR) COMBINATION STARTER

A. Enclosed combination starters shall include all of the magnetic starter requirements in addition to a disconnecting method. Acceptable disconnects include: motor circuit protectors, UL 489 circuit breakers, or a fused disconnects. All disconnects shall include a lock-out mechanism when in the off position.

B. The Motor Circuit protector shall be a UL listed 508 current limiting manual motor starter with magnetic trip elements only. The breaker shall carry a UL 508F rating (up to 100A frame size) which provides for coordinated short circuit rating for use with the motor contactor and provides a minimum interrupting rating of 30,000 AIC for the combination starter.

C. Fused disconnect shall be UL 98 suitable for service entrance protection. It shall accommodate time delay J-style fuses.

D. UL 489 breaker shall include thermal and magnetic trip mechanisms.

PART 3 - EXECUTION

3.01 All equipment shall be installed in accordance with the manufacturers' recommendations and printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Contractors' price shall include all items required as per manufacturers' requirements.

3.03 EXAMINATION

A. Examine areas and surfaces to receive enclosed controllers, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine enclosed controllers before installation. Reject enclosed controllers that are wet or moisture damaged.

3.04 INSTALLATION

A. Install wall mounted enclosed controllers on walls with tops at uniform height unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural steel channels bolted to the wall. For controllers not at walls, provide freestanding racks of lightweight structural steel channels bolted to the floor.

B. Install fuses in each fusible-switch enclosed controller.

C. Install fuses in control circuits if not factory installed.

D. Install heater in thermal overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.

E. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.

F. Comply with NECA 1.

G. Install in a professional manner. Any part or parts not meeting this requirement shall be replaced or rebuilt without extra expense to Owner.

H. Install rotating equipment in static and dynamic balance.

I. Provide foundations, supports, and isolators properly adjusted to allow minimum vibration transmission within the building.

J. Correct objectionable noise or vibration transmission in order to operate equipment satisfactorily as determined by the Engineer.

3.05 IDENTIFICATION

A. Identify enclosed controllers, components, and control wiring. Comply with requirements for identification specified in Section 16075 “Electrical Identification”.

1. Label each enclosure with an engraved nameplate.

3.06 CONTROL WIRING INSTALLATION

A. Install wiring between enclosed controllers and remote devices and facility's central control system. Comply with requirements in Section 16123 "Wire and Cables".

B. All controls wiring shall be installed in conduit in compliance with Section 16136 “Raceways”.

C. Bundle, train, and support wiring in enclosures.

D. Connect selector switches and other automatic-control selection devices where applicable.

1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switch is in manual-control position.
2. Connect selector switches with enclosed-controller circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.07 ADJUSTING

A. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.

B. Adjust overload-relay heaters or settings if power factor correction capacitors are connected to the load side of the overload relays.

C. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable instantaneous trip elements. Initially adjust to six times the motor nameplate full-load ampere ratings and attempt to start motors several times, allowing for motor cool down between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA

Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Architect/Engineer before increasing settings.

D. Set the taps on reduced-voltage autotransformer controllers at 65 percent.

E. Set field-adjustable switches and program microprocessors for required start and stop sequences in reduced-voltage solid-state controllers.

F. Set field-adjustable circuit-breaker trip ranges.

End of Section

SECTION 15190

SYSTEM IDENTIFICATION AND PIPE MARKING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 15050, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

1.03 Refer to Architectural Sections for additional requirements.

PART 2 - PRODUCTS

2.01 VALVE AND PIPE IDENTIFICATION

A. Valves:

1. All valves shall be identified with a 1-1/2" diameter brass disc wired onto the handle. The disc shall be stamped with 1/2" high depressed black filled identifying numbers. These numbers shall be numerically sequenced for all valves on the job.

2. The number and description indicating make, size, model number and service of each valve shall be listed in proper operational sequence, properly typewritten. Three copies to be turned over to Owner at completion.

3. Tags shall be fastened with approved meter seal and 4 ply 0.018 smooth copper wire. Tags and fastenings shall be manufactured by the Seton Name Plate Company or approved equal.

4. All valves shall be numbered serially with all valves of any one system and/or trade grouped together.

B. Pipe Marking:

1. All interior visible piping located in accessible spaces such as above accessible ceilings, equipment rooms, attic space, under floor spaces, etc., shall be identified with all temperature pipe markers as manufactured by W.H. Brady Company, 431 West Rock Ave., New Haven, Connecticut, or approved equal.

2. All exterior visible piping shall be identified with UV and acid resistant outdoor grade acrylic plastic markers as manufactured by Set Mark distributed by Seton Nameplate Company. Factory location 20 Thompson Road, Branford, Connecticut, or approved equal.

3. Generally, markers shall be located on each side of each partition, on each side

of each tee, on each side of each valve and/or valve group, on each side of each piece of equipment, and, for straight runs, at equally spaced intervals not to exceed 75 feet. In congested area, marks shall be placed on each pipe at the points where it enters and leaves the area and at the point of connection of each piece of equipment and automatic control valve. All markers shall have directional arrows.

4. Markers shall be installed after final painting of all piping and equipment and in such a manner that they are visible from the normal maintenance position. Manufacturer's installation instructions shall be closely followed.

5. Markers shall be colored as indicated below per ANSI/OSHA Standards:

SYSTEM	COLOR	LEGEND
Sanitary Sewer	Green	Vent Sanitary Sewer
Storm Drain	Green	Storm Drain
Domestic Water	Green	Domestic Water
Domestic Hot Water Supply	Yellow	Domestic Hot Water Supply
Domestic Hot Water Re-circulating	Yellow	Domestic Hot Water Return
Fire Protection	Red	Fire Protection
Automatic Sprinkler	Red	Fire Sprinkler
Gas	Yellow	Natural Gas
Compressed Air	Blue	Compressed Air

C. CEILING TACKS:

Manufacturers:
1. Brady.
2. Other acceptable manufacturers offering equivalent products.
   a) LEM.
   b) Seton.

Description: Steel with 3/4 inch (20 mm) diameter color coded head.

Color code as follows:
1. Yellow - HVAC equipment
2. Red - Fire dampers/smoke dampers
3. Green - Plumbing valves
4. Blue - Heating/cooling valves

PART 3 - EXECUTION

3.01 All labeling equipment shall be installed as per manufacturers printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans

or in the specifications. Contractor's price shall include all items required as per manufacturers' requirements.

3.03 All piping shall be cleaned of rust, dirt, oil and all other contaminants prior to painting. Install primer and a quality latex paint over all surfaces of pipe.

3.04 Provide ceiling tacks to locate valves or dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 15240

SOUND AND VIBRATION CONTROL

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Vibration and sound control products.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division One specification sections, apply to work of this section

B. This section is Division-15 Basic Materials and Methods section, and is part of each Division-15 section making reference to vibration control products specified herein.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of vibration control products, of type, size, and capacity required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Vibration and sound control products shall conform to ASHRAE criteria for average noise criteria curves for all equipment at full load conditions.

C. Except as otherwise indicated, sound and vibration control products shall be provided by a single manufacturer.

1.04 SUBMITTALS

A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Amber/Booth Company, Inc.

B. Mason Industries, Inc.

C. Noise Control, Inc.

2.02 GENERAL

A. Provide vibration isolation supports for equipment, piping and ductwork, to prevent transmission of vibration and noise to the building structures that may cause discomfort to the occupants.

B. Model numbers of Amber/Booth products are included for identification. Products of the additional manufacturers will be acceptable provided they comply with all of the requirements of this specification.

2.03 FLOOR MOUNTED AIR HANDLING UNITS

A. Provide Amber/Booth XLW-2, style C aluminum housed isolators sized for 2" static deflection. Cast iron or steel housings may be used provided they are hot-dip galvanized after fabrication

B. If floor mounted air handling units are furnished with internal vibration isolation option, provide 2" thick Amber/Booth type NRC ribbed neoprene pads to address high frequency breakout and afford additional unit elevation for condensate drains. Ribbed neoprene pads shall be located in accordance with the air handling unit manufacturer's recommendations.

2.04 SUSPENDED AIR HANDLING UNITS

A. Provide Amber/Booth type BSWR-2 combination spring and rubber-in-shear isolation hanger sized for 2'' static deflection.

B. If suspended air handling units are furnished with internal vibration isolation option, furnish Amber/Booth type BRD rubber-in-shear or NR AMPAD 3/8'' thick neoprene pad isolation hangers sized for approximately ½'' deflection to address high frequency break-out.

2.05 SUSPENDED FANS AND FAN COIL UNITS

A. Provide Amber/Booth type BSS spring hangers sized for 1'' static deflection.

2.06 PIPING

A. Provide spring and rubber-in-shear hangers, Amber/Booth type BSR in mechanical equipment rooms, for a minimum distance of 50 feet from isolated equipment for all chilled water and hot water piping 1-1/2'' diameter and larger. Springs shall be sized for 1'' deflection.

B. Floor supported piping is required to be isolated with Amber/Booth type SW-1 open springs sized for 1'' deflection.

C. Furnish line size flexible connectors at supply and return of pumps.

2.07 CORROSION PROTECTION

A. All vibration isolators shall be designed and treated for resistance to corrosion.

B. Steel components: PVC coated or phosphated and painted with industrial grade enamel. Nuts, bolts, and washers: zinc-electroplated.

PART 3 - EXECUTION

3.01 All equipment shall be installed in accordance with the manufacturer's recommendations and printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturers requirements.

3.03 If internal isolation option is used on air handling units, the mechanical contractor shall verify proper adjustment and operation of isolators prior to start-up. All shipping brackets and temporary restraint devices shall be removed.

3.04 The vibration isolation supplier shall certify in writing that he has inspected the installation and that all external isolation materials and devices are installed correctly and functioning properly.

END OF SECTION

SECTION 15260

PIPING INSULATION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 15050, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

B. Work specified elsewhere.

1. Painting.
2. Pipe hangers and supports.

C. All pipes subject to freezing conditions shall be insulated.

1.03 WARRANTY

A. Warrant the Work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials or workmanship.

B. Defects shall include, but not be limited to, the following:

1. Mildewing.
2. Peeling, cracking, and blistering.
3. Condensation on exterior surfaces.

1.04 SUBMITTALS

A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, project variations, and accessories.

1.05 DELIVERY AND STORAGE

A. DELIVERY: Deliver undamaged materials in the manufacturer's unopened containers. Containers shall be clearly labeled with the insulation's flame and smoke ratings.

PART 2 - PRODUCTS

2.01 It is the intent of these specifications to secure superior quality workmanship resulting in an absolutely satisfactory installation of insulation from the standpoint of both function and appearance. Particular attention shall be given to valves, fittings, pumps, etc., requiring low

temperature insulation to insure full thickness of insulation and proper application of the vapor seal. All flaps of vapor barrier jackets and/or canvas covering must be neatly and securely smoothed and sealed down.

2.02 The type of insulation and its installation shall be in strict accordance with these specifications for each service, and the application technique shall be as recommended by the manufacturer. All insulation types, together with adhesives and finishes shall be submitted and approved prior to installation.

2.03 A sample quantity of each type of insulation and each type application shall be installed and approval secured prior to proceeding with the main body of the work. Condensation caused by improper installation of insulation shall be corrected by Installing Contractor. Any damage caused by condensation shall be made good at no cost to the Owner or Architect/Engineer.

2.04 All insulation shall have composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to insulation) fire and smoke hazard as tested by Procedure ASTM E084, NFPA 255 and UL 723 not exceeding:

Flame Spread 25
Smoke Developed 50

2.05 Accessories, such as adhesives, mastics and cements shall have the same component ratings as listed above.

2.06 All products or their shipping cartons shall have a label affixed, indicating flame and smoke ratings do not exceed the above requirements.

2.07 APPROVED MANUFACTURERS

A. Calcium silicate materials shall be as manufactured by Johns Manville.

B. Glass fiber materials shall be as manufactured by Johns Manville or Owens-Corning and shall have the same thermal properties, density, fire rating, vapor barrier, etc., as the types specified herein, subject to review by the Engineer.

C. Adhesives shall be as manufactured by Childers, Foster, HB Fuller or Armstrong, and shall have the same adhesive properties, fire rating, vapor seal, etc., as the types specified herein, subject to review by the Engineer.

D. Armaflex elastomeric cellular thermal insulation by Armstrong.

E. Phenolic foam insulation shall be as manufactured by Insul-Phen Insulation (Insul-Phen).

F. Polyisocyanurate insulation shall be as manufactured by Dow “Trymer 2000 XP”.

G. Metal jacketing and fitting covers shall be as manufactured by Childers or RPR Products.

2.08 MATERIALS

A. For insulation purpose piping is defined as the complete piping system including supplies and returns, pipes, valves, automatic control valve bodies, fittings, flanges, strainers, thermometer well, unions, reducing stations, and orifice assemblies.

B. INTERIOR DOMESTIC WATER PIPE: provide fiberglass pipe insulation with all service jackets with self sealing lap joint.

C. EXTERIOR DOMESTIC WATER PIPE: Provide elastomeric cellular thermal, or preformed phenolic foam pipe insulation with secured metal jacketing.

D. DRAIN BODIES AND DOWN SPOUTS: Insulate horizontal roof drain down spouts, underside of roof drain bodies, chilled water waste lines from drinking fountain to junction with main waste stacks, and branch lines including traps and exposed underside of floor drains receiving cooling coil condensate, same as water piping where exposed to building occupant view. When concealed, insulation may be same as specified for external duct wrap.

E. CONDENSATE DRAINAGE PIPING: Fire resistant fiberglass insulation; insulation not required when piping is exposed on roof.

F. REFRIGERANT PIPING: Refrigerant pipe insulation shall be model "AP-2000", fire rated for use in environmental air plenums. Apply manufacturers recommended finish and sealant for exterior applications.

G. METAL JACKETING: Utilize Childers “Strap-On” jacketing. Provide preformed fitting covers for all elbows and tees.

PART 3 - EXECUTION

3.01 All insulation shall be installed in accordance with the manufacturers’ recommendations and printed installation instructions, including high density inserts at all hangers and pipe supports to prevent compression of insulation.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturers requirements.

3.03 Pipes located outdoors or in tunnels shall be insulated same as concealed piping; and in addition shall have a jacket of 0.016 inch thick, smooth aluminum with longitudinal modified Pittsburg Z-Lock seam and 2 inch overlap. Jacketing shall be easily removed and replaced without damage. All butt joints shall be sealed with gray silicone. Galvanized banding is not acceptable.

3.04 All insulated piping located over driveways shall have an aluminum shield permanently banded over insulation to protect it from damage from car antennas.

3.05 WATER PIPE INSULATION INSTALLATION

A. The insulation shall be applied to clean, dry pipes with all joints firmly butted together. Where piping is interrupted by fittings, flanges, valves or hangers and at intervals not to exceed 25 feet on straight runs, an isolating seal shall be formed between the vapor barrier jacket and the bare pipe. The seal shall be by the applications of adhesive to the exposed insulation joint faces, carried continuously down to and along 4 inches of pipe and up to and along 2 inches of jacket.

B. Pipe fittings and valves shall be insulated with pre-molded or shop fabricated glass fiber covers finished with two brush coats of vapor barrier mastic reinforced with glass fabric.

C. All under lap surfaces shall be clean and free of dust, etc. before the SSL is sealed. These laps shall be firmly rubbed to insure a positive seal. A brush coat of vapor retarder shall be applied to all edges of the vapor barrier jacket.

3.06 FIRE RATED INSULATION

A. All pipe penetrations through walls and concrete floors shall be fire rated by applying USG Thermafiber in the space between the concrete and the pipe.

B. The fire rating shall be additionally sealed by using 3M brand model CP 25 or 303 fire barrier caulk and putty.

C. All fire rating material shall be insulated in accordance with manufacturer's printed instructions.

PART 4 - SCHEDULES

4.01 LOW TEMPERATURE SURFACES	MINIMUM INSULATION THICKNESS BASED ON FIBERGLASS
A. Exposed exterior domestic water pipe:	1½ inch
B. Interior domestic cold water pipe exposed to freezing temperatures (apparatus bay):	1 inch
C. Condensate drain lines:	¾ inch
D. Drains receiving condensate:	1 inch
E. Concealed horizontal leader from roof drain:	1½ inch blanket wrap
Exposed horizontal leader from roof drain:	1 inch thick rigid with all service jackets
F. Refrigerant Piping	
(1) 1“ and smaller	1 inch
(2) Larger than 1½ inch	1½ inch

4.02 HIGH TEMPERATURE SURFACES	MINIMUM INSULATION THICKNESS
A. Domestic Hot Water and Hot Water Circulating Piping	1 inch

END OF SECTION

SECTION 15290

DUCT INSULATION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Ductwork system insulation.

1.02 RELATED SECTIONS

A. Section 15050 - Basic Materials and Methods

B. Section 15170 - Motors and Motor Controllers

C. Section 15190 - System Identification and Pipe Marking

1.03 QUALITY ASSURANCE

A. Installer's Qualifications: Firm with at least 5 years successful installation experience on projects with mechanical insulations similar to that required for this project.

B. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.

1. Exception: Outdoor mechanical insulation may have flame spread index of 75 and smoke developed index of 150.

C. Duct and plenum insulation shall comply with minimum R-value requirements of 2012 International Energy Conservation Code.

D. Adhesive and other material shall comply with NFPA and NBFU Standards No. 90A and 90B.

1.04 SUBMITTALS

A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories. Provide 8x11 sample of product along with submittal.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver insulation, coverings, cements, adhesives, and coatings to site in unopened containers with manufacturer's stamp, clearly labeled with flame and smoke rating, affixed showing fire hazard indexes of products.

B. Protect insulation against dirt, water and chemical and mechanical damage. Do not install damaged or wet insulation; remove from project site.

PART 2 - PRODUCTS

2.01 GENERAL DESCRIPTION

A. The type of insulation and its installation shall be in strict accordance with these specifications for each service, and the application technique shall be as recommended by the manufacturer. All insulation types, together with adhesives and finishes shall be submitted and approved before any insulation is installed.

B. A sample quantity of each type of insulation and each type of application shall be installed and approval secured prior to proceeding with the main body of the work.

2.02 ACCEPTABLE MANUFACTURERS

A. Glass fiber materials shall be as manufactured by Knauf, Certain-Teed, Johns-Manville or Owens-Corning and shall have the same thermal properties, density, fire rating, vapor barrier, etc., as the types specified herein, subject to review by the Engineer.

B. Adhesives shall be as manufactured by Minnesota Mining, Arabol, Benjamin-Foster, Armstrong or Insulmastic, Inc., and shall have the same adhesive properties, fire rating, vapor seal, etc., as the types specified herein, subject to review by the Engineer.

C. Ceramic fiber materials shall be as manufactured by Primer Refractories, A.P. Green Refractories or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

A. All insulation shall be installed in accordance with the manufacturer's recommendations and printed installation instructions.

B. All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer's requirements.

3.02 EXTERNAL DUCT INSULATION

A. Fasten all longitudinal and circumferential laps with outward clinching staples 3" on center. On rectangular ducts over 24" wide apply as above and hold insulation in place on bottom side with mechanical pins and clips on 12" centers.

B. Seal all joints, fastener penetrations and other breaks in vapor barrier with 3 inch wide strips of white glass fabric embedded between two coats of vapor barrier mastic, Childers CP-30 or approved equal. Contractor may choose to seal all joints, fastener penetrations and other breaks in vapor barrier with 3 inch wide strips of aluminum foil tape. Duct tape shall be UL listed 181 A-P/B-FX and UL 723. Shurtape No. AF-982 or approved equivalent.

C. All external duct insulation shall be Johns Manville Type 75 fiberglass duct wrap insulation with reinforced aluminum facing or approved equal.

D. External duct wrap is required on all outside air ducts, return ducts, and supply air ducts that are not internally insulated. Duct wrap shall be provided as follows:

1. A minimum installed R-value of 6 when ducts are located in unconditioned spaces, such as ceiling plenum space.
2. A minimum installed R-value of 8 when ducts are located outside of the building.

3.03 DUCT LINER

A. Duct liner shall be kept clean and dry during transportation, storage and installation. Care should be taken to protect the liner from exposure to the elements or damage from mechanical abuse.

B. All portions of duct designed to receive duct liner shall be completely covered with liner as specified. The smooth, black, acrylic-coated surfaces with flexible glass cloth reinforcement shall face the airstream. All duct liner shall be cut to assure tight, overlapped corner joints. The top pieces shall be supported by the sidepieces. Duct liner shall be installed following the guidelines in the NAIMA "Duct Liner Installation Standard".

C. The duct liner shall be tested according to erosion test method in UL 181 and shall be guaranteed to withstand velocities in the duct system up to 5000 fpm without surface erosion.

D. Duct liner shall be adhered to the sheet metal with full coverage of an approved adhesive that conforms to ASTM C 916, and all exposed leading edges and transverse joints shall be coated with Permacote factory-applied or field-applied edge coating and shall be neatly butted without gaps. Shop or field cuts shall be liberally coated with Johns Manville SuperSeal® duct butter and Edge Treatment or approved adhesive.

E. Metal nosings shall be securely installed over transversely oriented liner edges facing the airstream at forward discharge and at any point where lined duct is preceded by unlined duct.

F. When velocity exceeds 4000 fpm (20.3 m/sec), use metal nosing on every leading edge. Nosing may be formed on duct or be channel or zee attached by screws, rivets or welds.

G. The liner shall further be secured with Graham welding pins and washers on not more than 18 inch centers both vertical and horizontal surfaces, and the pins and washers shall be pointed up with adhesive.

H. Duct liner shall be Johns Manville Linacoustic RC fiberglass duct liner with factory-applied edge coating or approved equal. The liner shall meet the Life Safety Standards as established by NFPA 90A and 90B, FHC 25/50 and Limited Combustibility and the air stream surface coating should contain an immobilized, EPA-registered, anti microbial agent so it will not support microbial growth as tested in accordance with ASTM G21 and G22. The duct liner shall conform to the requirements of ASTM C 1071, with an NRC not less than .70 as tested per ASTM C 423 using a Type "A" mounting, and a thermal conductivity no higher than .25 BTU•in/(hr•ft^2•°F) at 75°F mean temperature.

I. Duct liner is required on all return air ductwork, return air boots and supply air ductwork within 15 feet of the air handling units. Provide sheet metal liner cap over all leading edges of internal insulation exposed to air stream. Duct liner shall be provided as follows:

1. A minimum installed R-value of 6 when ducts are located in unconditioned spaces, such as ceiling plenum space.
2. A minimum installed R-value of 8 when ducts are located outside of the building.

3.04 EXPOSED DUCTWORK LOCATED INDOORS

A. Round duct routed exposed shall be double wall with solid inner liner and 1-1/2'' thick layer of fiberglass insulation as manufactured by United McGill Company model no. Acousti-27 or approved equal.

3.05 EXPOSED DUCT LOCATED OUTDOORS

A. All duct located outdoors shall be internally lined as specified and also shall have a 2" thick, 6 lb. density rigid board external duct insulation, finished with a white weatherproofed canvas material.

3.06 AIR DEVICE AND MISCELLANEOUS DUCT INSULATION

A. The backside of all supply air devices shall be insulated with taped and sealed with external duct wrap equivalent to the insulation specified.

B. The contractor shall install an additional layer of 1½ inch thick external fiberglass duct wrap on any portion of the supply air, return air, outside air, or exhaust air system that has condensation forming during any period of operation. The insulation shall be taped and sealed and located until all evidence of the condensation had been eliminated at no additional cost to the owner.

END OF SECTION

SECTION 15330

WET PIPE FIRE PROTECTION SPRINKLER SYSTEM

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 15050, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

A. Scope of the work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

1.03 REGULATORY CODES

A. Work in accordance with:

1. NFPA.
2. Local municipal codes that have jurisdiction.

B. Products in accordance with:

1. United Laboratories (UL) listed.
2. Factory Mutual (FM) approved.

1.04 CERTIFICATE OF TESTING

A. Furnish Owner with test certificate certifying the system approved by:

1. City Fire Marshall.

PART 2 - PRODUCTS

2.01 FIRE SPRINKLER SYSTEM

A. GENERAL:

1. Work Included:
   a. Design, coordination and installation of inside and outside piping, including sprinkler heads, valves, hangers and supports sleeves.
   b. The sprinkler system is a wet type and is designed to provide coverage for entire building. The Contract Drawings indicate the extent and general arrangement, and the various occupancy classifications.
   c. Sprinkler heads are not shown.
   d. The plans provide a preliminary layout with riser assembly location, flow switch locations, valve locations, and fire department Siamese connections. These are a guide for subsequent preparation of the Contractor's detailed working drawings.
   e. Interface system with building fire and smoke alarm system.
2. Quality Assurance: Equipment and installation to meet requirements of NFPA

Number 13, latest edition and local authority having jurisdiction. All components of the completed system shall be UL listed for the intended service.

2.02 SUBMITTALS:

A. Submit shop drawings in accordance with Section 15050.

B. Submit preliminary layout showing only head locations for review by Architect/Engineer. Furnish additional heads which may be required for coordinated ceiling pattern without added cost, even though number of heads may exceed minimum code requirements.

C. Submit shop drawings of entire sprinkler system including hydraulic calculations to Architect/Engineer.

D. Provide Architect with six complete sets of final approved shop drawings before starting the installation. Include details of the sprinkler system showing sections, light fixtures, air conditioning, ducts, and a plan giving fire department connections, location of all exposed structures within twenty feet of this structure, and other equipment to be used. Drawings shall bear the stamp of review of the local fire insurance rating organization having jurisdiction.

E. Service Utility Diagram: Furnish Architect with an accurately marked print showing location of underground pipes and valves as installed upon completion of underground Work.

F. Provide a printed sheet giving brief instructions relative to all necessary aspects of sprinkler controls and emergency procedures next to sprinkler riser mains. Instruction sheet to be protected by glass or a transparent plastic cover.

G. Materials:

1. Piping:
   a. All piping above grade shall be:
      - schedule 10 black steel pipe with a rolled groove ends, joined with mechanical coupling and cut groove cast iron fittings for pipe 2-1/2" and greater.
      - schedule 40 black steel threaded pipe and fittings for pipe 2" and smaller.
   b. Acceptable manufacturer:
      - American Tube
      - Wheatland Tube
      - Gem Sprinkler
      - All piping shall be by a domestic manufacturer.
   c. Acceptable mechanical coupling manufacturer:
      - Victaulic
      - Grinnell
2. Sprinkler Heads:
   a. Suspended Ceiling Type: Concealed pendant type with brass finish and white cover plate.
   b. Exposed Area Type: Standard upright type with brass finish.
   c. Sidewall Type: White finish with matching escutcheon.
   d. Temperature rating on fusible links to suit specific hazard area with minimum margin or safety 50 degrees F. See Table 1 for more information.
   e. Sprinkler heads of the "O"-ring seal type are not acceptable.
   f. Acceptable manufacturer:

- Tyco
- Grinnell
- Viking

3. Sprinkler Alarm Valve:
   a. Provide approved automatic sprinkler valve with one or two pole (as required) flow detectors, pressure switch, outside electric gongs, and inside electric gong and circuit breaker.
   b. Acceptable manufacturer:
      - Tyco
      - Grinnell
      - Viking
4. Valves:
   a. 2” and smaller: bronze, rising stem, inside screw, solid wedge, U.L. listed valve.
   b. 2-1/2” and larger: iron body, bronze trim, rising stem, OS&Y, solid wedge, U.L. listed valve.
   c. Check valve: cast iron flanged body, bronze fitted, non-slam type.
   d. Install valves with stems upright or horizontal, not inverted.
   e. Acceptable manufacturer:
      - Nibco
      - Grinnell
      - Stockham
      - Victaulic
5. Fire Department Connection:
   a. Standard wall type or free standing post type, brass finish, thread size to suit fire department hardware; two way threaded dust cap and chain of same material and finish, and 3/4 inch automatic drip and signage marked “Sprinkler – Fire Department Connection”.
   b. Acceptable manufacturer:
      - Potter – Roemer
      - Elkhart Brass
      - Reliable
6. Insulation:
   a. All piping and valves exposed to the weather or within building and exposed to the weather shall be insulated with Phenolic foam with ASJ and all joints sealed. Insulation density shall not be less than 1.5 pounds per cubic foot, and conductivity (K) not higher than 0.25 and 75°F mean temperature difference, with factory applied all weather vapor barrier jacket.
   b. All insulated pipe and valves subject to damage shall be protected with an aluminum jacket with sealed joints.
   c. Refer to section 15260 for detailed specification.

PART 3 - EXECUTION

3.01 All equipment shall be installed in accordance with the manufacturer’s recommendations and printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items as required by NFPA and installed as per manufacturer’s recommendations.

3.03 DESIGN

A. Design spacing of sprinkler heads and selection sizes shall conform to the requirement of

NFPA 13 for the indicated occupancy.

B. Uniform discharge density design shall be based on hydraulic calculations utilizing the method outlined in NFPA 13. Density of discharge from sprinkler heads shall conform with NFPA 13.

C. Friction losses in pipe will be based on a value of "C" =120 in the Hazen - Williams formula.

D. Design and install the system so that no part will interfere with doors, windows, heating, plumbing, or electrical equipment. Do not locate sprinkler heads within 6 inches of lighting fixtures, HVAC diffusers and other obstructions. Sprinkler piping cannot penetrate ductwork or lighting fixtures.

E. The Contractor shall conform to the National Fire Protection Association's Fire Code No. 13, latest edition. Special attention shall be given to Article 1-9, working plans. It shall be the Contractor's responsibility to determine if any deficiency or deviations, such as an inadequate water supply, or any other item which would materially affect the acceptability of the system.

3.04 INSTALLATION

A. Install all items in accordance with applicable codes.

B. Install piping so that mains and branches are not located directly underneath HVAC equipment or other items needing access.

C. All sprinkler heads shall be located as near the center of ceiling tiles as is practical (±1/2”). Location shall present a uniform pattern with all heads aligned when completely installed.

D. Run piping concealed above furred ceilings and in joists to minimize obstructions. Expose only heads. Exact routing of piping shall be approved by Architect or relocated as required at no additional cost to Owner.

E. Protect sprinkler heads against mechanical injury with standard guards.

F. Locate outside alarms on wall of building adjacent to siamese fire department connection.

G. Provide on wall near sprinkler valve, cabinet containing four extra sprinkler heads of each type and wrench suitable for each head type.

H. Provide 1 inch diameter nipple and 1 inch x 1/2 inch reducing fitting for each upright head.

I. Painting shall be as follows:

1. Exposed sprinkler riser, alarm valve and all related piping shall be painted red.
2. Exposed sprinkler piping in finished areas shall be painted as directed by Architect.

3.05 REPLACEMENT

Upon receipt of written notice of failure of any part of the guaranteed equipment during the guaranteed period, the Contractor will replace the affected part or parts promptly at no additional cost.

3.06 TESTING

A. Prior to testing, the entire sprinkler system shall be thoroughly flushed clean.

B. Upon completion of the installation and flushing, test the system and obtain approval of the local fire insurance rating organization having jurisdiction. Particular attention is called to the requirements of NFPA 13 pamphlet.

3.07 TRAINING

A. Owner's people shall be fully briefed in the normal start-up of the system, operation, normal and emergency shutdown, and maintenance of the system.

B. Routine maintenance, yearly maintenance, winterization, and spring start-up shall be fully discussed and documented.

C. Names of those instructed and dates, as well as a list of information handed over to the owner, shall be included in the final report.

END OF SECTION

Table 1 Initial sprinkler head schedule

ID	Type	K-factor	Sprinkler Temperature Rating (°F)	Orifice (in)	Areas of Use
A	Concealed (QR)	5.6	135-170	1/2	High-finish areas
B	Recessed pendent (QR)	5.6	135-170	1/2	Common areas
C	Upright/Pendent (QR)	5.6	135-170	1/2	Open ceiling areas
D	Extended coverage (ECQR)	5.6	135-170	1/2	Large, open work areas
E	Upright/Pendent (QR)	5.6	175-225	1/2	Mech/elec/LAN rooms
F	Dry pendent (QR)	5.6	135-170	1/2	Server rooms
G	Storage or possibly ESFR	11.2 or 14	135-170	3/4	Warehouse
H	Dry sidewall (QR)	5.6	135-170	1/2	Loading dock

SECTION 15410

PLUMBING PIPING AND VALVES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pipe and pipe fittings.

B. Valves.

C. Sanitary sewer piping system.

D. Storm water piping system.

E. Domestic water piping system.

F. Compressed air piping system.

1.02 RELATED SECTIONS

A. Section 02222 - Excavating.

B. Section 02223 - Backfilling.

C. Section 02225 - Trenching.

D. Section 15140 - Supports and Anchors.

E. Section 15190 - Mechanical Identification.

F. Section 15242 - Vibration Isolation.

G. Section 15260 - Piping Insulation.

H. Section 15430 - Plumbing Specialties.

I. Section 15440 - Plumbing Fixtures.

J. Section 15450 - Plumbing Equipment.

1.03 REFERENCES

A. ANSI B31.1 - Power Piping.

B. ANSI B31.9 - Building Service Piping.

C. ASME - Boiler and Pressure Vessel Code.

D. ASME Sec. 9 - Welding and Brazing Qualifications.

E. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250 and 800.

F. ASME B16.3 - Malleable Iron Threaded Fittings.

G. ASME B16.4 - Cast Iron Threaded Fittings Class 125 and 250.

H. ASME B16.22 - Wrought Copper and Bronze Solder-Joint Pressure Fittings

I. ASTM A47 - Ferritic Malleable Iron Castings.

J. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.

K. ASTM A74 - Cast Iron Soil Pipe and Fittings.

L. ASTM B32 - Solder Metal.

M. ASTM B42 - Seamless Copper Pipe.

N. ASTM B306 - Copper Drainage Tube (DWV).

O. ASTM D1785 - Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedule 40, 80, and 120.

P. ASTM D2241 - Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR).

Q. ASTM D2466 - Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

R. ASTM D2564 - Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.

S. ASTM D2729 - Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

T. ASTM D2846 - Chlorinated Polyvinyl Chloride (CPVC) Pipe, Fittings, Solvent Cements and Adhesives for Potable Hot Water Systems.

U. ASTM F493 - Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.

V. AWWA C111- Rubber-Gasket Joints for Ductile Iron and Gray-Iron Pressure Pipe and Fittings.

W. AWWA C651 - Disinfecting Water Mains.

X. CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.

Y. CISPI 310 - Joints for Hubless Cast Iron Sanitary Systems.

1.04 SUBMITTALS

A. Submit under provisions of Division One.

B. Product Data: Provide data on pipe materials, Pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

1.05 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division One.

B. Record actual locations of valves.

1.06 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division One.

B. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.07 QUALITY ASSURANCE

A. Valves: Manufacturer's name and pressure rating cast or marked on valve body.

B. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulations.

C. Welders Certification: In accordance with ASME Sec 9.

D. Foreign pipe, fittings or valves are unacceptable.

E. Piping shall be labeled along entire length indicating size, class, material specification, manufacturers name and country of origin.

1.08 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum 5 years documented experience and must be a domestic manufacturer.

B. Installer: Company specializing in performing the work of this section with minimum 5 years documented experience.

1.09 REGULATORY REQUIREMENTS

A. Perform Work in accordance with plumbing and building codes having jurisdiction.

B. Conform to applicable codes for the provision and installation of all required backflow prevention devices.

C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

D. No PVC pipe or fittings will be allowed for any areas where pipe is to penetrate a fire rated assembly or to be installed in a return air plenum unless the entire length of all such piping is encased within a minimum 2 hour fire rated enclosure.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Division One.

B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

C. Provide temporary protective coating on cast iron and steel valves.

D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Tape will not be allowed as an acceptable end cover.

1.11 EXTRA MATERIALS

A. Furnish under provisions of Division One.

B. Provide two repacking kits for each size valve.

PART 2 - PRODUCTS

2.01 SANITARY SOIL WASTE AND VENT PIPING, BURIED BEYOND 5 FEET OUTSIDE OF BUILDING

A. PVC Pipe: ASTM D 1785/D 2729 schedule 40; installed per ASTM D 2321.

1. Fittings: PVC, ASTM D 3311/D 2665 drainage pattern, with bell and spigot ends. Furnished by the same manufacturer as pipe or approved equal.
2. Joints: solvent weld with ASTM D 2564 solvent cement, installed per the requirements of ASTM D 2855.

OR

B. PVC pipe: ASTM D 3034, SDR 35; installed per ASTM D 2321.

1. Fittings: ASTM F 1336 PVC, drainage pattern, with bell and spigot ends. Furnished by the same manufacturer as pipe or approved equal.
2. Joints: ASTM F 477 or F 913, elastomeric gaskets or solvent weld.

2.02 SANITARY SOIL, WASTE AND VENT PIPING, BURIED WITHIN 5 FEET OF BUILDING, BELOW GRADE

A. PVC Pipe: ASTM D 1785/D 2665 schedule 40

1. Fittings: PVC, ASTM D 3311/D 2665 drainage pattern, with bell and spigot ends to be furnished by the same manufacturer as pipe or approved equal.
2. Joints: solvent weld with ASTM D 2564 solvent cement, clear, medium bodied, for sizes 3" and smaller and gray, heavy bodied, for sizes 4" and larger, mating surfaces shall be prepared with ASTM F 656 purple primer immediately prior to cement application.

2.03 SANITARY SOIL, WASTE AND VENT PIPING, WITHIN BUILDING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A 888, hubless, service weight.

1. Fittings: Cast iron, ASTM A 888 drainage pattern.
2. Joints: No hub, ASTM C 564 neoprene gaskets and standard stainless steel clamp and solid shield assemblies constructed of type 300 series stainless steel. Clamp assemblies shall conform to FM 1680 where required by the administrative authority.

B. Copper Tubing: ASTM B 306, DWV, sizes 2" and smaller.

1. Fittings: ASME B 16.23 cast bronze, or ASME B16.29, wrought copper.
2. Joints: ASTM B 32, solder, Grade 50B.

C. Brass Pipe: ASTM B 43, chrome plated.

1. Fittings: ASME B 16.23 cast bronze, chrome plated.
2. Joints: ASTM B 32, solder, Grade 50B.

D. Steel Pipe: ASTM A 53, Schedule 40, galvanized, sizes 2-1/2" and smaller, for waste and vent piping only, steel soil pipes not permitted.

1. Fittings: Malleable iron, galvanized.
2. Joints: ASME B16.3 screwed.

2.04 STORM WATER PIPING, BURIED BEYOND 5 FEET OUTSIDE OF BUILDING

A. Pipe and fittings shall be same as specified for sanitary piping system.

2.05 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING, BELOW GRADE

A. Pipe and fittings shall be same as specified for sanitary soil, waste and vent piping system.

2.06 STORM WATER PIPING, WITHIN BUILDING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A 74 service weight.

1. Fittings: Cast iron, ASTM A 74 drainage pattern.
2. Joints: Hub and spigot, ASTM C 564 neoprene, compression type gaskets.

2.07 DOMESTIC WATER PIPING, BURIED BEYOND 5 FEET OUTSIDE OF BUILDING

A. PVC Pipe: AWWA C900 CLASS 150.

1. Fittings: Ductile or gray cast iron, standard thickness.
2. Joints: ANSI/AWWA C111, rubber gasket with 3/4 inch diameter rods.

B. PVC Pipe: ASTM D 1785 schedule 80.

1. Fittings: ASTM D 2467 PVC.
2. Joints: ASTM D 2855, solvent weld with ASTM D 2564 solvent cement.

2.08 DOMESTIC WATER PIPE, BURIED WITHIN 5 FEET OF BUILDING, BELOW GRADE

A. Copper Tubing: ASTM B 88, Type K, soft annealed.

1. Fittings: ASME B 16.18, cast bronze, ASTM B 16.22 wrought copper alloy or ASTM B 16.26 cast bronze for flared fittings.
2. Joints: Sweat solder or flared. Note: No joints will be permitted in pressure water pipe below slab on grade. All such piping must be brought up above finished floor line a minimum of 12" before joining. Exception may be taken when pipe is fully enclosed in pressure rated sleeve and pre-approved by the Architect and Engineer.

2.09 DOMESTIC WATER PIPING, WITHIN BUILDING, ABOVE GRADE

A. Copper Tubing: ASTM B 88, Type L, hard drawn.

1. Fittings: ASME B 16.18, cast bronze, or ASTM B 16.22 wrought copper alloy.
2. Joints: ASTM B 32, solder.

2.10 COMPRESSED AIR PIPING SYSTEM

A. Steel Pipe: ASTM A 53, Schedule 40, galvanized.

1. Fittings: ANSI B 16.3 Malleable iron, 150 lb. galvanized.
2. Joints: Screwed for sizes less than 4", flanged or mechanical cut grooved couplings for sizes 4" and larger.

2.11 FLANGES AND UNIONS

A. Pipe size 2 inches and under:

1. Ferrous pipe: ANSI B16.39, 150 psig malleable iron threaded unions.
2. Copper tube and pipe: 150 psig bronze unions with soldered ends.
3. Ferrous pipe: ANSI B16.5, 150 psig forged steel flanges; screwed neck, 1/16" thick preformed neoprene gaskets.

B. Pipe size 2-1/2 inches and larger:

1. Ferrous pipe: 150 psig forged steel slip-on flanges; weld neck, 1/16" thick preformed neoprene gaskets.
2. Copper tube and pipe: 150 psig slip-on bronze flanges; 1/16" thick preformed neoprene gaskets.

C. Dielectric Connections:

1. Pipe size 2 inches and under: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
2. Pipe size 2-1/2 inch and larger: flange, connection as above, with water impervious isolation barrier.

2.12 GATE VALVES

A. Manufacturers:

1. Nibco No. T-111 up to 2-1/2"; F-617-O 3" and over.
2. Other acceptable manufacturers offering equivalent products.
   a. Crane No. 428 up to 2-1/2"; 465-1/2 3" and over.
   b. Stockham No. B-100 up to 2-1/2"; G-623 3" and over.
   c. Grinnell No. 3010 up to 2-1/2"; 6020A 3" and over.

B. Up to and including 2-1/2" Inches: Bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge threaded ends.

C. Over 3" Inches: Iron body, bronze trim, rising stem, handwheel, OS&Y, solid wedge, flanged ends.

D. Provide bronze tee or cast iron square nut operator for all valves installed below ground.

1. Valves 2-1/2" and smaller shall be equipped with ASTM B62 solid red bronze tee securely affixed to the valve stem.

2. Valves 3" and larger shall be equipped with a standard 2" square combination nut/socket securely affixed to the valve stem.
3. Provide owner with two extended tee handle operating wrenches for each type of valve head installed.

2.13 BALL VALVES

A. Manufacturers:

1. Nibco No. T-585-70-66
2. Other acceptable manufacturers offering equivalent products.
   a. Crane No. 9303-B
   b. Stockham Model S-216BR-1R-T
   c. Grinnell No. 3700-6

B. Up to and including 2 Inches: Bronze two 600 PSI piece body full port, stainless steel ball and stem, Teflon seats and stuffing box ring, lever handle and balancing stops, threaded ends with union.

C. Ball valves used for balancing shall have memory stops.

2.14 SWING CHECK VALVES

A. Manufacturers:

1. Nibco No. T-413-B up to 2-1/2"; F-918 3" and over.
2. Other acceptable manufacturers offering equivalent products.
   a. Crane No. 37 up to 2-1/2"; 372 3" and over.
   b. Stockham No. B-319; up to 2-1/2"; G931 3" and over.
   c. Grinnell No. 3300 up to 2-1/2"; 6300A 3" and over.

B. Up to and including 2-1/2 Inches: Bronze swing disc, screwed ends.

C. Over 2-1/2 Inches: Iron body, bronze trim, swing disc, renewable disc and seat, flanged ends. Include outside lever and adjustable weight where required for quiet operation.

2.15 SPRING LOADED (SILENT) CHECK VALVES

A. Manufacturers:

1. Nibco No. W-910
2. Other acceptable manufacturers offering equivalent products.
   a. Grinnell No. 402

B. Iron body, bronze trim, stainless steel spring, renewable composition disc, screwed, wafer, or flanged ends.

2.16 SOLDER

A. 95.5% tin, 4% copper, 0.5% silver.

B. Lead free, antimony free, zinc-free.

C. Silvabrite 100, by Engelhard Corporation or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Coordinate and verify excavations under provisions of Division Two.

B. Verify that all excavations are to the required grade, dry, and not over-excavated.

3.02 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale, oil and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Install, clean bank sand backfill in trench to a minimum of 6 inches below pipe, and to cover all piping a minimum of 12 inches above pipe.

3.03 INSTALLATION

A. Install all materials in accordance with manufacturer's published instructions.

B. All exposed sewer and water pipe in toilet rooms or other finished areas of the building shall be chromium plated.

C. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

D. Route piping in orderly manner, parallel and perpendicular to building column grid lines, unless indicated otherwise on drawings, and maintain gradients.

E. Install piping to conserve building space and not conflict with other trades or interfere with intended use of space.

F. Group piping whenever practical at common elevations.

G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

H. Provide clearance for installation of insulation and access to valves and fittings. Valves installed beyond reasonable reach shall be provided with chain operator.

I. Provide access doors where valves and operable fittings are not exposed. Access doors shall be of approved types set in locations pre-approved by submittal to the Architect.

J. Establish elevations of buried piping outside the building to ensure not less than 2 feet of cover, or maximum depth of frost penetration, which ever is the greater.

K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

L. Provide encasement for and support of utility meters in accordance with requirements of utility companies.

M. Gate valves installed below grade shall be covered with an adjustable cast iron roadway box extended to grade. Cover shall be cast iron with 'water' cast on top and set flush to finished paving or 2" above finished earthen grade. Box shall be supported from undisturbed soil or concrete base and shall not introduce any stress to piping under all traffic conditions.

N. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting.

O. Excavate in accordance with Division Two.

P. Backfill in accordance with Division Two.

Q. Install bell and spigot pipe with bell end upstream.

R. Maintain uniformity in the installation of piping materials and joining methods. Do not mix materials types.

S. Install valves with stems upright or horizontal, not inverted.

T. Solder joints shall be wiped clean at each joint, remove excess metal while molten and flux residue when cooled.

U. No PVC pipe or fittings will be allowed for any areas where pipe is installed in return air plenum unless the entire length of all such piping is encased within a minimum 2 hour fire rated enclosure.

V. Installations of thermoplastic piping systems shall be in strict conformity to the manufacturers published instructions. Under ground drainage pipe installations shall be in conformity to ASTM D 2321.

W. Installation of solvent cement joints for PVC piping shall be in strict conformity to the requirements outlined in ASTM D 2855.

X. Waste nipple from wall to tapped tee shall be schedule 40 threaded galvanized steel pipe or brass or copper with threaded adapter.

Y. Provide approved PVC slip by cast iron no hub adaptor at each transition from underground PVC piping to above ground cast iron pipe using standard or wide bodied no hub couplings for as specified elsewhere in this section. Transition shall be made as close as possible to floor for sanitary DWV piping systems and at test tee for storm drainage piping. Support vertical cast iron pipe from floor anchors with using riser clamp and galvanized all thread rod as specified in section 15140.

3.04 APPLICATION

A. Install union downstream of all valves at equipment or apparatus connections.

B. Install male adapters each side of threaded valves in copper piped system. Sweat solder adapters to tube prior to make-up of threaded connections.

C. Install gate valves for shut-off and to isolate all equipment items, distinct parts of systems, or vertical risers.

D. Each plumbing fixture shall have a shut-off valve on each hot water and cold water supply line.

E. Each plumbing water rough-in stub out shall be fitted with a shut off valve.

F. Install globe, ball or butterfly valves for throttling, bypass, or balancing (manual flow control) services.

G. Ball valves installed in insulated piping shall be fitted with extended lever operators of sufficient length to raise handle above the insulation jacket material. Where valve is used for throttling service valve handle shall be equipped with adjustable memory stop device.

H. Provide spring loaded, non-slam, check valves on discharge of water pumps.

3.05 ERECTION TOLERANCES

A. All drainage lines in the building shall have 1/4 inch to the foot fall where possible and not less than 1/8 inch to the foot fall toward the main sewer. Pipe must be so laid that the slope will be uniform and continuous. Permission shall be secured from the Architect and Engineer before proceeding with any Work where existing conditions prevent the installation at minimum grade specified.

B. Slope all water piping and arrange to drain at low points. Provide loose key operated, polished chrome, sill cock flush to wall where fixture stop will not suffice for this requirement.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, all domestic water systems shall be complete, thoroughly flushed clean and free of all foreign matter or erection residue.

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. On building side of the main shut off valve, provide a 3/4" connection through which chlorine can be introduced into the water piping

D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, in sufficient quantity to obtain 50 to 80 mg/L residual free chlorine solution throughout the entire domestic water piping systems.

E. Bleed water from outlets as required to ensure complete distribution and test for disinfectant residual at a minimum 15 percent of total outlets.

F. Maintain disinfectant in system for 24 hours.

G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

I. Take samples no sooner than 24 hours after flushing, from 5 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.07 SERVICE CONNECTIONS

A. Provide new sanitary and storm sewer services connecting to existing building services or utility lines as shown on the drawings.

B. Before commencing work, field verify invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover as required.

C. Provide new domestic water service connecting to existing building services or utility lines as shown on plans. Assure connections are in compliance with requirements of the jurisdiction having authority.

D. Extension of services to the building shall be fabricated from the same materials as the utility service lines or those materials specified herein.

E. Should points of connection vary from those indicated on the drawings contractor shall properly allow for this in the actual connections field fabricated.

3.08 RODDING SEWERS

A. All sanitary soil and waste lines, both in the building and out, shall be rodded out after completion of the installation.

B. This Work shall be done, as part of the contract, to make certain that all lines are clear, and any obstruction that may be discovered shall be removed immediately. Rodding shall be accomplished by utilizing a rotary cutter, which shall be full size of pipe being cleaned.

3.09 TESTING OF PLUMBING PIPING SYSTEMS

A. During the progress of the work and upon completion, tests shall be made as specified herein and as required by Authorities Having Jurisdiction, including Inspectors, Owner or Architect. The Architect or duly authorized Construction Inspector shall be notified in writing at least 2 working days prior to each test or other Specification requirement which requires action on the part of the Construction Inspector.

B. Tests shall be conducted as part of this work and shall include all necessary instruments, equipment, apparatus, and service as required to perform the tests with qualified personnel. Submit proposed test procedures, recording forms, and test equipment for approval prior to the execution of testing.

C. Tests shall be performed before piping of various systems have been covered or furred-in. For insulated piping systems testing shall be accomplished prior to the application of insulation.

D. All piping systems shall be tested and proved absolutely tight for a period of not less than 24 hours. Tests shall be witnessed by the Architect or an authorized representative and pronounced satisfactory before pressure is removed or any water drawn off.

E. Leaks, damage or defects discovered or resulting from test shall be repaired or replaced to a like new condition. Leaking pipe joints, or defective pipe, shall be removed and replaced with acceptable materials. Test shall be repeated after repairs are completed and shall continue until such time as the entire test period expires without the discovery of any leaks.

F. Wherever conditions permit, each piping system shall thereafter be subjected to its normal operating pressure and temperature for a period of no less than five 5 days. During that period, it shall be kept under the most careful observation. The piping systems must

demonstrate the propriety of their installation by remaining absolutely tight during this period.

G. Domestic Water:

1. Pressure test at one and one half times the normal working pressure or 125 psig, which ever is the greater, for 24 hours.

H. Sanitary Soil, Waste and Vents and Storm Sewer:

1. After the rough-in soil, waste and vent and other parts of the sanitary sewer including branch laterals have been set from the lowest level, at point of connection to existing utility lines, to above the floor line, all outlets shall be temporarily plugged or capped, except as are required for testing as described herein. Ground work shall not permit the backfill of trenches to cover any joints until the completion of testing. Back fill shall be limited to mid sections of full joints of piping only. For pipe in ground the piping shall be readied as described herein and filled with water to a verifiable and visible level to 10' above the lowest portions of the system being tested.
2. On multi-level buildings only one floor level shall be tested at a time. Each floor shall be tested from a level below the structure of the floor, or the outlet of the building in the case of the lowest level, to a level of 12 inches above the floor immediately above the floor being tested, or the top of the highest vent in the case of the highest building level. The pipes for the level being tested shall be filled with water to a verifiable and visible level as described above and be allowed to remain so for 24 hours. If after 24 hours the level of the water has been lowered by leakage, the leaks must be found and stopped, and the water level shall again be raised to the level described, and the test repeated until, after a 24 hour retention period, there shall be no perceptible lowering of the water level in the system being tested.
3. Should the completion of these tests leave any reasonable question or doubt of the integrity of the installation, additional tests including peppermint smoke, or other measures shall be performed to demonstrate the reliability of these systems to the complete satisfaction of the Owner's duly authorized representative. Such tests shall be conducted and completed before any joints in plumbing are concealed or made inaccessible.

3.10 COMPLETE FUNCTIONING OF WORK

A. All work fairly implied as essential to the complete functioning of the systems shown on the Drawings and Specification shall be completed as part of the work of this Division unless specifically stated otherwise. It is the intention of the Drawings and Specification to establish the type and function of systems but not to set forth each item essential to the functioning of any system. In case of doubt as to the work intended or in the event of amplification or clarification thereof, the Contractor shall call upon the Architect for Supplementary Instructions and Drawings, etc.

END OF SECTION

SECTION 15430

PLUMBING SPECIALTIES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Roof and floor drains.

B. Interceptors.

C. Cleanouts.

D. Backflow preventors.

E. Water hammer arrestors.

F. Thermostatic mixing valves.

G. Hose bibbs hydrants.

1.02 RELATED WORK

A. Division 7 Roofing: Roof drains.

B. Section 15140 - Supports and Anchors.

C. Section 15410 - Plumbing Piping.

D. Section 15440 - Plumbing Fixtures.

1.03 REFERENCES

A. ANSI/ASSE 1012 - Backflow Preventers with Immediate Atmospheric Vent.

B. ANSI/ASSE 1011 - Hose Connection Vacuum Breakers.

C. ANSI/ASSE 1013 - Backflow Preventers, Reduced Pressure Principle.

D. ANSI/ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.

E. ANSI A112.21.1 - Floor Drains.

F. ANSI A112.21.2 - Roof Drains.

G. ANSI A112.26.1 - Water Hammer Arresters.

H. PDI WH-201 Water Hammer Arresters

I. AWWA C506 - Backflow Prevention Devices - Reduced Pressure Principle and Double Check Valve Types.

1.04 QUALITY ASSURANCE

A. Manufacturer: For each product specified, provide components by same manufacturer throughout.

1.05 SUBMITTALS

A. Submit under provisions of Division One.

B. Submit product data under provisions of Division One.

C. Include component sizes, rough-in requirements, service sizes, and finishes.

D. Manufacturer's Installation Instructions: Indicate assembly and support requirements.

1.06 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division One.

B. Record actual locations of equipment, cleanouts, and backflow preventers.

1.07 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division One.

B. Operation Data: Indicate frequency of treatment required for interceptors.

C. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Division One.

B. Accept specialties on site in original factory packaging. Inspect for damage.

1.09 EXTRA MATERIALS

A. Furnish under provisions of Division One.

B. Provide two loose keys for hose bibbs and spare hose end vacuum breakers.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - ROOF DRAINS

A. Jay R. Smith

B. Watts

C. Zurn

D. Substitutions: Under provisions of Division One.

E. Roof Drains

1. Roof Drains: ANSI A112.21.2; Galvanized cast iron body with sump, removable cast aluminum dome strainer, membrane flange and membrane clamp with integral gravel stop, with adjustable underdeck clamp roof sump receiver waterproofing flange

controlled flow weir leveling frame adjustable extension sleeve (for insulation) perforated or slotted ballast guard extension for inverted roof.

2. Roof Overflow Drains (OD): Galvanized cast iron body and clamp collar and bottom clamp ring; pipe extended to 2 inches above flood elevation.

2.02 ACCEPTABLE MANUFACTURERS - CLEANOUTS

A. Zurn

B. Watts

C. Jay R. Smith

D. Substitutions: Under provisions of Division One.

E. Cleanouts
1. Exterior Surfaced Areas: Square cast nickel bronze access frame and non-skid cover;
2. Exterior Unsurfaced Areas: Line type with lacquered cast iron body and round epoxy coated gasketted cover;
3. Interior Finished Floor Areas: Galvanized cast iron, two piece body with double drainage flange, weep holes, reversible clamping collar, and adjustable nickel-bronze strainer, round with scoriated cover in service areas and round with depressed cover to accept floor finish in finished floor areas;
4. Interior Finished Wall Areas: Line type with lacquered cast iron body and round epoxy coated gasketted cover, and 6” round stainless steel access cover secured with machine screw;
5. Interior Unfinished Accessible Areas: Calked or threaded type., Provide bolted stack cleanouts on vertical rainwater leaders.

2.03 ACCEPTABLE MANUFACTURERS - HOSE BIBBS/HYDRANTS

A. Woodford

B. Zurn

C. Jay R. Smith

D. Substitutions: Under provisions of Division One.

E. HOSE BIBBS/HYDRANTS
1. Bronze or brass, replaceable hexagonal disc, hose thread spout, chrome plated where exposed to interior with lockshield and removable key, integral vacuum breaker in conformance with ANSI/ASSE 1011;
2. Wall Hydrant: ANSI/ASSE 1019; non-freeze, self-draining type with rough chrome plated lockable recessed box hose thread spout, lockshield and removable key, and vacuum breaker;

2.04 RECESSED VALVE BOX

A. Manufacturers:
1. Oatey.
2. Other acceptable manufacturers offering equivalent products.
3. Sioux Chief

4. Guy Gray.
5. Washing Machine: Plastic preformed rough-in box with brass quarter turn ball valves and water hammer arrestors on both hot and cold connections, socket for waste, slip in finishing cover;
6. Refrigerator: Plastic preformed rough-in box with quarter turn brass ball valve, slip in finishing cover;

2.05 ACCEPTABLE MANUFACTURERS - BACKFLOW PREVENTORS

A. Watts

B. Wilkins

C. Febco

D. Substitutions: Under provisions of Division One.

E. BACKFLOW PREVENTERS
1. Reduced Pressure Backflow Preventers: ANSI/ASSE 1013; 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; third check valve which opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks;
2. Double Check Valve Assemblies: ANSI/ASSE 1012; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent;

2.06 ACCEPTABLE MANUFACTURERS - WATER HAMMER ARRESTORS

A. Sioux Chief

B. Wilkins

C. Zurn

D. Substitutions: Under provisions of Division One.

E. WATER HAMMER ARRESTORS
1. ANSI A112.26.1; sized in accordance with PDI WH-201, precharged suitable for operation in temperature range -100 to 300 degrees F (-73 to 149 degrees C) and maximum 250 psig (1700 kPa) working pressure;

2.07 ACCEPTABLE MANUFACTURERS - OIL INTERCEPTORS

A. Park USA

B. Jay R. Smith

C. Mifab

D. Substitutions: Under provisions of Division One.

E. Oil Interceptors

1. Construction: Precast concrete for flush with floor (deep rough-in) installation, with anchor flange, multi-weir bucket assembly, integral deep seal trap, adjustable draw-off assembly, and galvanized H20 traffic rated lid.

2.08 ACCEPTABLE MANUFACTURERS - THERMOSTATIC MIXING VALVES

A. Powers

B. Bradley

C. Leonard

D. Substitutions: Under provisions of Division One.

E. Thermostatic Mixing Valves
1. Provide thermostatic mixing valve, with check valve, volume control shut-off valve on outlet, stem type thermometer on outlet, strainer stop check on inlet, mounted in lockable cabinet of 16 gage (1.5 mm) prime coated steel.

PART 3 - EXECUTION

3.01 PREPARATION

A. Coordinate cutting, forming of roof and/or floor construction to receive drains to required invert elevations.

3.02 INSTALLATION AND APPLICATION

A. Install specialties in accordance with manufacturer's instructions to permit intended performance.

B. 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.

C. Encase exterior cleanouts in concrete flush with grade.

D. Pipe relief from back flow preventer to nearest drain.

END OF SECTION

SECTION 15440

PLUMBING FIXTURES

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 15050, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

A. WORK INCLUDED: Include the following Work in addition to items normally part of this Section:

1. Plumbing fixtures.
2. Drains and cleanouts.

B. WORK SPECIFIED ELSEWHERE:

1. Piping systems.
2. Pipe valves, and fittings.
3. Plumbing systems testing.

1.03 WARRANTY

A. Warrant the Work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

B. Defects shall include, but not be limited to, the following:

1. Noisy operation.
2. Noticeable deterioration of finish.
3. Leakage of water.

1.04 SUBMITTALS

A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.

C. OPERATION AND MAINTENANCE INSTRUCTIONS: Provide pre-printed operating and maintenance instructions for each item specified. Instruct and demonstrate the proper operation and maintenance to the Owner's designated representative.

1.05 DELIVERY AND STORAGE

A. DELIVERY: Deliver clearly labeled, undamaged materials in the manufacturers' unopened containers.

B. TIMING AND COORDINATION: Deliver materials to allow for minimum storage time at the project site. Coordinate delivery with the scheduled time of installation.

C. STORAGE: Store materials in a clean, dry location, protected from weather and abuse.

1.06 FIELD MEASUREMENTS

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

B. Confirm and field coordinate that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

PART 2 - PRODUCTS

2.01 MATERIALS

A. PLUMBING FIXTURES:

1. GENERAL: Provide plumbing fixtures as specified on drawings. The approved equal products manufacturers are as follows:
   a. Water closet, urinals, lavatories, bath tubs and showers: American Standard, Kohler, Eljer.
   b. Stainless steel sinks: Elkay, Just and Moen.
   c. Mop sinks: Stern-Williams, Fiat
   d. Faucets: American Standard, Kohler, Eljer,
   e. Faucets: Chicago, T&S Brass, Zurn
   f. Faucets: Moen, Delta Commercial, Speakman
   g. Shower valves: Leonard, Powers, Symmons, Chicago
   h. Shower Systems: Bradley, Acorn, Willoughby
   i. Flush Valves: Sloan “Royal”, Zurn “AquaVantage”
   j. Drinking fountains: Halsey Taylor, Elkay, Haws, Acorn Aqua.
   k. Floor drains and roof drains: Zurn, J.R. Smith, Josam and Watts.
   l. Emergency Fixtures: Bradley, Chicago, Haws, Speakman and Encon
2. CHAIR CARRIERS: ANSI/ASME A112.6.1.; Adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers. As manufactured by Zurn, J. R. Smith, Josam or Wade.
3. DRINKING FOUNTAIN & URINAL WALL SUPPORTS: ANSI/ASME A112.6.1; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs. As manufactured by Zurn, J. R. Smith, Josam or Wade.
4. TRAPS, STOPS AND RISERS: Heavy pattern as manufactured by McGuire, Chicago or Zurn.

B. CLEANOUTS:

1. GENERAL: Provide cleanouts as shown on Drawings and as required by the city building code.

2. ACCEPTABLE MANUFACTURERS: Zurn J. R. Smith, Josam and Watts.
3. TYPES:
   a. FINISHED FLOOR CLEANOUTS: Provide cast iron, adjustable floor level assembly with round nickel bronze top and gasket cover.
   b. RESILIENT OR TILE FINISHED FLOOR CLEANOUTS: Provide cast iron, adjustable assembly with round nickel-bronze top with gasketed water tight cover and depressed top to receive flooring finish material.
   c. DRY WALL CLEANOUTS: Provide cast iron tee and counter sink bronze plug with square nickel bronze frame and stainless steel cover.
   d. Provide membrane clamp rings for slab on grade cleanouts.
   e. All cleanouts shall have tapered bronze plugs.
   f. All cleanouts outside of building on grade shall be set in a 18" x 18" x 4" thick concrete pad.

PART 3 - EXECUTION

3.01 PREPARATION

A. EXAMINATION OF CONDITIONS: Examine conditions affecting this Work. Report unsatisfactory conditions to the proper authority and do not proceed until those conditions have been corrected. Commencing Work implies acceptance of existing conditions as satisfactory to the outcome of this Work.

3.02 INSTALLATION

A. Install fixtures in locations and heights as shown on Drawings or as directed by the Architect.

B. Install materials plumb, level, securely, and in accordance with manufacturer's recommendations.

C. All rough-in pipe openings, for final connections with all supply waste soil and vent systems shall be closed with caps or plugs during early stages of construction and installation. Tape shall not be considered sufficient protection.

D. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

E. Provide gate valves in piping serving batteries of fixtures. Label stops "Hot" and "Cold." Valves to be located above accessible ceiling. If ceiling are not accessible, provide access panels of adequate size to make valves fully accessible.

F. Plumbing fixtures shall be supported by a concealed chair carrier where required to properly support the fixture specified. All carriers to be securely mounted, bolted and checked prior to concealment.

G. Caulk around fixtures with best grade white silicone caulking. Do not use grout.

H. All handles on supply and drainage fittings or other brass items shall be properly lined up and adjusted. Fittings shall not be left in any haphazard manner.

I. All fixtures shall have individual chrome plated loose key cutoff stops on supply lines. Where same are not specified as a part of the fixture trim, they shall be installed as close to fixtures as possible in the hot and cold water supply.

J. Install each fixture with trap, easily removable for servicing and cleaning.

K. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.

L. Hot and cold water riser air chambers: Provide air chambers for hot and/or cold water riser located at the rough-in tee at all fixtures.

The air chamber shall be of the same materials and the next larger diameter than the required rough-in supply pipe and a minimum of 24" tall.

The contractor may install water hammer arrestors in lieu of air chambers. Water hammer arrestors shall be PDI Certified and sized and placed as recommended by manufacture. Provide an accessible isolation valve and proper access to arrestor for replacement.

3.03 INTERFACE WITH OTHER PRODUCTS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.04 ADJUSTING

A. Adjust work under provisions of Division One.

B. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.05 CLEANING

A. Clean work under provisions of Division One.

B. At completion clean plumbing fixtures and equipment.

3.06 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Division One.

B. Do not permit use of fixtures.

3.07 ADA ACCESSIBLE FIXTURES

A. Install fixtures to heights, indicated on architectural drawings.

B. Handicapped fixtures shall be installed to required heights, shall be of types suitable for, and supplied with controls properly installed, to comply with requirements as directed by ADA Accessibility of Federal Registry, Part III, Department of Justice 28 CFR 36 and comply with all state and local ADA Code requirements.

C. Exposed accessible sink or lavatory p-trap and angle valve assemblies shall be insulated with the fully molded, Truebro, Handi Lav-guard insulation kit. Provide the proper model for fixtures specified. All kits shall be White or as selected by Architect.

D. Wall mounted drinking fountains and coolers which protrude into passages or corridor space, whether single or paired with adjacent accessible fixture, shall be supplied with skirt or apron to lower the underside clearance of non-accessible fixture equal to that required for

accessible fixture.

END OF SECTION

SECTION 15450

PLUMBING EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Water Heaters.

1.02 RELATED SECTIONS

A. Section 15140 - Supports and Anchors.

B. Section 15240 - Vibration Isolation.

C. Section 15410 - Plumbing Piping.

D. Section 15430 - Plumbing Specialties.

E. Section 16180 - Equipment Wiring Systems: Electrical characteristics and wiring connections.

1.03 REFERENCES

A. ANSI/ASHRAE 90A - Energy Conservation in New Building Design.

B. ASME Section VIIID - Pressure Vessels; Boiler and Pressure Vessel Codes.

C. ANSI/NFPA 54 - National Fuel Gas Code.

D. ANSI/NFPA 70 - National Electrical Code.

E. ANSI/UL 1453 - Electric Booster and Commercial Storage Tank Water Heaters.

1.04 SUBMITTALS

A. Submit under provisions of Division One.

B. Shop Drawings:

1. Include heat exchanger dimensions. size of tappings, and performance data.
2. Include dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.

C. Product Data:

1. Include dimension drawings of water heaters indicating components and connections to other equipment and piping.
2. Indicate pump type, capacity, power requirements, and affected adjacent construction.
3. Submit certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
4. Provide electrical characteristics and connection requirements.

D. Manufacturer's Installation Instructions.

1.05 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division One.

B. Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with authorities having jurisdiction.

B. Provide pumps with manufacturer's name, model number, and rating/capacity identified.

C. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:

1. American Gas Association (AGA).
2. National Sanitation Foundation (NSF).
3. American Society of Mechanical Engineers (ASME).
4. National Board of Boiler and Pressure Vessel Inspectors (NBBPVI).
5. National Electrical Manufacturers' Association (NEMA).
6. Underwriters Laboratories (UL).

D. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.07 REGULATORY REQUIREMENTS

A. Conform to AGA NSF ANSI/NFPA 54 ANSI/NFPA 70 ANSI/UL 1453 requirements for water heaters.

B. Conform to ASME Section VIIID for manufacture of pressure vessels for heat exchangers.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section Division One.

B. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.09 WARRANTY

A. Provide five year warranty under provisions of Division One.

B. Warranty: Include coverage of domestic water heaters, water storage tanks, and packaged water heating systems.

1.10 EXTRA MATERIALS

A. Furnish under provisions of Division One.

B. Provide two sets of electric heater elements.

PART 2 - PRODUCTS

2.01 RESIDENTIAL GAS FIRED WATER HEATER

A. Manufacturers:

1. A.O. Smith.
2. Other acceptable manufacturers offering equivalent products.
   a. Rheem.
   b. State.
   c. Lochinvar.

B. Type: Automatic, natural gas-fired, vertical storage.

C. Tank: Glass lined welded steel with single flue passage, flue baffle and draft hood; thermally insulated with glass fiber and encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.

D. Controls: Automatic water thermostat and built-in gas pressure regulator; temperature range adjustable from 120 to 170 degrees F (49 to 77 degrees C), cast iron or sheet metal burner, safety pilot and thermocouple.

E. Accessories: Brass water connections and dip tube, drain valve, high density magnesium anode, and ASME temperature and pressure relief valve.

2.02 COMMERCIAL ELECTRIC WATER HEATERS

A. Manufacturers:
1. State.
2. Other acceptable manufacturers offering equivalent products.
   a. A.O. Smith.
   b. Rheem.

B. Type: Factory-assembled and wired, electric, [vertical] [horizontal] storage.

C. Tank: Glass lined welded steel; 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish.

D. Controls: Automatic immersion water thermostat; externally adjustable temperature range from 60 to 180 degrees F (16 to 82 degrees C), flanged or screw-in nichrome elements, high temperature limit thermostat.

E. Accessories: Brass water connections and dip tube, drain valve, high-density magnesium anode, and ASME rated temperature and pressure relief valve.

PART 3 - EXECUTION

3.01 WATER HEATER INSTALLATION

A. Install water heaters in accordance with manufacturer's instructions and to AGA NSF ANSI/NFPA 54 UL requirements.

B. Coordinate with plumbing piping and related work to achieve operating system.

C. Provide secondary drain pan and route secondary drain pipe to a point indicated on the

drawings.

D. Route TPR drain line to the exterior of the building and terminate 6 inches above grade.

E. Provide 18 inch high galvanized stand manufactured for supporting water heaters.

END OF SECTION

SECTION 15481

COMPRESSED AIR SYSTEMS

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.

B. Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of compressed air systems work, is indicated on drawings and schedules, and by requirements of this section.

B. Refer to Division-16 sections for the following work; not work of this section.

1. Power supply wiring from power source to power connection on compressed air equipment. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.
2. Interlock wiring between electrically-operated compressed air equipment units; and between equipment and field-installed control devices.
   a. Interlock wiring specified as factory-installed is work of this section.

C. Provide the following electrical work as work of this section, complying with requirements of Division-16 sections:

1. Control wiring between field-installed controls, indicating devices, and unit control panels.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of compressed air systems equipment and products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer Qualifications: Firm with at least 3 years of successful installation experience on projects with compressed air systems work similar to that required for project.

C. Codes and Standards:

1. ASME Compliance: Provide compressed air pressure vessels and relief valves in accordance with ASME "Boiler and Pressure Vessel Code"; provide ASME Code Symbol Stamp.
2. ASME Compliance: Fabricate and install compressed air systems in accordance with ASME B31.9 "Building Services Piping".
3. CGA Compliance: Fabricate and install compressed air systems in accordance with CGA Standards (Compressed Gas Association).
4. UL Compliance: Provide electrical components which are UL listed and have UL label affixed.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instructions for compressed air systems materials and products.

B. Record Drawings: At project closeout, submit record drawings of installed piping, and compressed air systems products; in accordance with requirements of Division 1.

C. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to units. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

D. Maintenance Data: Submit maintenance data and parts lists for compressed air systems materials and products. Include this data, product data, shop drawings, record drawings, and wiring diagrams in maintenance manual; in accordance with requirements of Division 1.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver compressed air equipment, including compressed air dryers and receiver tanks with factory-installed skid; with accessories as scheduled on the plans.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Quincy

B. Ingersoll – Rand

C. Champion

2.02 BASIC IDENTIFICATION

A. General: Provide identification complying with Division-15 Basic Mechanical Materials and Methods section "Mechanical Identification", in accordance with the following listing:

1. Piping Above Ground: Plastic pipe markers.
2. Valves: Plastic valve tags.

2.03 BASIC PIPES AND PIPE FITTINGS

A. General: Provide pipes and pipe fittings complying with Division-15 Basic Mechanical Materials and Methods.

B. All Sizes: Copper tube, hard-temper for exposed locations, soft-temper for underground and concealed locations; Type "L"; wrought-copper, solder-joint fittings

2.04 BASIC SUPPORTS AND ANCHORS

A. General: Provide supports and anchors, complying with Division-15 Basic Mechanical Materials and Methods section "Supports and Anchors", in accordance with the following listing:

1. Extension split pipe clamp, copper plated, hinged or 2-bolt for pipe support from any substrate.

2.05 VALVES

A. Shutoff Valves: Provide compressed air shutoff valves, bronze-body, double seal, full port, union ball type, with seat seals and stem seals. Design so quarter turn of lever-type valve handle is maximum travel between open and closed positions. Design for working pressure of 300 psi minimum. Provide valves with color-coded gas identification labels.

2.06 BASIC VIBRATION CONTROL

A. General: Provide vibration control products complying with Division-15 Basic Mechanical Materials and Methods section "Vibration Control", in accordance with the following listing:

2.07 COMPRESSED AIR EQUIPMENT AND ACCESSORIES

A. General: Provide air compressor system, size as specified on drawings.

B. The air compressor system shall be of a single point connection, base mounted design consisting of two compressor, two motors, and regulator, integral pre-wired control panel and corrosion resistant air receiver. The complete package shall be pre-wired, pre-piped, and assembled on one common base with single point connection for electrical.

C. Compressor Module: The compressor shall be a continuous duty rated. The design shall be single stage, air-cooled, rated for 120 psig discharge pressure. The compressor shall be v-belt driven with totally enclosed belt guard. The drive motor shall be a NEMA rated, open drip proof, 3600 RPM, with 1.15 service factor suitable for 208 or 230/460V electrical service.

D. Isolation System: The compressor and motor shall be fully isolated from the air receiver by means of a four point spring isolation system.

E. Air Receiver: The vertical air receiver shall be corrosion resistant, ASME coded, National Board Certified, rated for a minimum 150 psig design pressure, and include a liquid level gauge glass, safety relief valve, manual drain valve, and a timed automatic solenoid drain valve.

F. Motor and housing shall be outdoor rated in a NEMA 3R enclosure.

PART 1 - EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which compressed air systems and equipment are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION OF BASIC IDENTIFICATION

A. General: Install mechanical identification in accordance with Division-15 Basic Mechanical Materials and Methods section "Mechanical Identification".

3.03 INSTALLATION OF COMPRESSED AIR PIPING

A. General: Install piping in accordance with Division- 15 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings".

3.04 INSTALLATION OF SUPPORTS AND ANCHORS

A. Install supports and anchors, in accordance with Division-15 Basic Mechanical Materials and Methods section "Supports and Anchors". Locate spacing for supports and anchors in accordance with piping manufacturer's recommendations.

B. Support Spacing: Install piping supports at the following maximum intervals:

1. 1/2" Pipe Size: 6' o.c.
2. 3/4" to 1" Pipe Size: 8' o.c.
3. 1-1/4" or Larger Pipe Size: 10' o.c.
4. Vertical Piping: Every floor level.

3.05 INSTALLATION OF VALVES

A. Shutoff Valves: Provide shutoff valves where indicated, on plans.

3.06 INSTALLATION OF EQUIPMENT AND ACCESSORIES

A. Install equipment and accessories where indicated, in accordance with equipment manufacturer's written instructions, and with recognized industry practices, to ensure that compressed air equipment and accessories comply with requirements and serve intended purposes.

B. Coordinate with other work including plumbing, as necessary to interface installation of compressed air piping and equipment with other work.

C. Support: Install equipment on 4" high reinforced concrete pads, 4" larger on each side than equipment base. Cast anchor bolt inserts into pad.

D. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.

1. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-16 sections. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.

3.07 EQUIPMENT CONNECTIONS

A. General: Connect compressed air systems to mechanical equipment as indicated, and comply with equipment manufacturer's instructions where not otherwise indicated.

3.08 FIELD QUALITY CONTROL

A. Test compressed air alarms for proper operation at high pressure, low pressure.

END OF SECTION

SECTION 15530

REFRIGERANT PIPING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 15050, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

PART 2 - PRODUCTS

2.01 GENERAL

Provide for the systems as shown. Submit shop drawings of piping systems showing all traps, pipe sizes, and accessories; drawing to be marked "Approved", and signed by a representative of the Application Engineering Department of the condensing unit manufacturer. Pipe sizes shall be as recommended by unit manufacturer. Refer to piping schematic on drawings.

2.02 MATERIAL

A. PIPE: Copper ACR tubing.

B. FITTINGS: Wrought copper streamlined sweat fitting.

C. SOLDER: Sil-Fos, except on valves use solder recommended by valve manufacturer.

2.03 ACCESSORIES

All accessories shall be UL listed and rated in accordance with ARI Standard 710.

A. On systems 7-1/2 tons and larger, each separate refrigerant circuit shall have a separate filter dryer. Each filter dryer shall have a replaceable core and a three valve bypass. The filter drier shall be full line size and installed in the refrigerant liquid line. The filter shall have a minimum 4-3/4 inches diameter shell with removable flange and gasket. Flange shall be tapped for 1/4 inch FPT access valve. Size filter-drier for maximum 2.0 psi pressure drop at evaporator operating temperature. Similar to Mueller Brass Company model Drymaster micro-guard refillable filter series SD-485 through SD19217 or Sporlan catch-all.

B. On systems less than 7-1/2 tons, the filter dryer shall be the sealed type sizes as above. One drier per refrigerant circuit.

C. Liquid-Moisture Indicator shall be installed in liquid refrigerant line full line size similar to Mueller Brass Company model "Vuemaster" with soldered ends.

D. Thermostatic expansion valve shall have adjustable super heat and be as manufactured by Sporlan.

2.04 EVACUATION

Evacuate moisture completely by applying a commercial vacuum pump for a minimum of 24 hours. Moisture indicator shall indicate a completely moisture-free condition at time of final inspection. The vacuum pump shall run until the system indicates a maximum of 35 degrees FDB. The system shall be flushed with the operating refrigerant and the vacuum pump connected and rerun to repeat the evacuation. Evaluation shall be performed under supervision of the Engineer.

2.05 FREON AND OIL

A. Contractor shall leave the refrigeration system with a full charge of freon and oil and shall be responsible for the maintenance of a full charge of freon and oil in the systems for a period of one year from date of acceptance.

B. Should any leaks in the refrigeration system occur during the guarantee period, the Contractor shall eliminate such leaks and recharge system to a full charge of freon and oil at no cost to the Owner.

PART 3 - EXECUTION

3.01 All equipment and piping shall be installed in accordance with the manufacturers recommendations and printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer's requirements.

END OF SECTION

SECTION 15671

AIR COOLED CONDENSING UNITS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 15050, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

PART 2 - PRODUCTS

2.01 AIR-COOLED CONDENSING UNITS

A. Air-cooled condensing unit shall be designed for use with split system having a remote direct-expansion (DX) cooling coil mounted in evaporator fan unit. Capacity shall be as called for on the drawings when matched to the appropriate evaporator coil.

B. Condensing unit shall consist of high-efficiency hermetic compressor, air-cooled condenser with quiet fan, factory wired controls, R-410A refrigerant and refrigeration circuit and valves.

C. Cabinet shall be heavy-gauge galvanized steel with bonding primer and baked-enamel finish coat. The entire cabinet shall be protected from rust.

D. Compressor shall be protected from excessive current and temperatures and shall be provided with a thermostatically controlled crankcase heater to operate only when needed for protection of the compressor. Compressor shall be spring-mounted on rubber isolators. Compressor shall be located in compartment isolated from condenser fan and coil. Provide a high-capacity dryer in the system to remove moisture and dirt.

E. Condenser fan shall be directly connected to a weather-protected, quiet, high-efficiency motor. Fan guard shall be provided and shall be protected from rust by PVC finish. Condenser coil shall be aluminum fin with copper tube.

F. Connections for refrigerant suction and liquid lines shall be extended outside the cabinet and provided with service valves with gauge connections.

G. Power connections shall be made to the connectors located inside the electrical connection box.

H. Standard operating and safety controls shall include high-pressure switch, low pressure switch, compressor overload service, and solid-state timed-off control.

I. All components (parts and labor) of the sealed refrigeration circuit shall be warranted by the manufacturer for five years.

2.02 AUXILIARY EQUIPMENT

A. Auxiliary equipment shall consist of refrigerant lines prepared for the unit involved. These lines shall be cleaned, dried, and pressurized at the factory.

B. Low ambient kit to allow operation at outside temperature below 35 deg. F (2 deg. C) shall be provided.

C. Expansion valve shall be provided with the evaporator coil.

D. Provide thermostat to match the requirements of the job. Thermostat shall provide subbase with Heat-Cool-Off and Fan On-Auto switch. See section on controls for other related requirements.

E. Provide polyethylene structural base designed for that service and intended to support the unit and eliminate vibration transmission.

F. Provide hard-start kit with unit.

G. Provide guards for condenser coils.

2.03 ACCEPTABLE MANUFACTURERS

A. Condensing unit shall be the make and model number shown on the drawings or acceptable equivalents by Lennox, Carrier, Daikin, or Trane.

PART 3 - EXECUTION

3.01 All HVAC equipment shall be installed as per manufacturers printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturers requirements.

3.03 INSTALLATION

A. Install the condensing unit on proper foundation as shown on the drawings, and in location that will not restrict the air entry or discharge from the unit.

B. Install refrigerant lines as recommended by the manufacturer, taking care not to lose the refrigerant charge contained in the lines, or allow air to enter the lines or equipment. Locate the lines in such a way as to not obstruct access to the condensing unit or other equipment. Lines located under ground or under concrete shall be installed in a PVC pipe conduit for protection.

C. Provide electrical connections as required by the applicable codes. Provide control wiring required. All power wiring and control wiring shall be in conduit and located so as not to obstruct access to the unit or other equipment.

3.04 TESTING

A. Operate the condensing unit and the system to assure that unit is operating properly and without excessive noise and vibration.

B. Read and record the power draw and the refrigeration suction and liquid pressures as required by Balancing and Test, Section 15990.

END OF SECTION

SECTION 15854

DX" FAN COIL UNIT

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 15050, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

PART 2 - PRODUCTS

2.01 FAN COIL UNITS

Fan coil units shall be factory built, manufactured as scheduled on drawings. Carrier, Trane or Daikin shall be considered as equal, if they comply with the specification and schedule. Special Note: Contractor shall field verify exact clearances required for air handling units. Units shall be field located as required and shop drawings shall indicate final location for approval by Architect/Engineer.

A. Furnish and install fan coil units of the type, capacities, ratings and drive motor horsepower shown on the drawings.

B. Units shall be factory fabricated, draw-thru type, and shall have fan section, cooling coil section, condensate drain pan, adjustable blower drive with motor on resilient mounted base, vee-belts with guard, filter section, and mixing box (if scheduled) assembled as integrated air handling units.

C. REQUIREMENTS:

1. Mill-galvanized steel, rigidly framed, braced, and reinforced; access panels each side of unit; minimum panel ga. - 18; minimum weight formed framing member 14 ga.
2. Fan section, cooling coil section, and outlet frame throats shall be internally insulated at the factory with 1" thick, 3/4 PCF density, Neoprene coated fiberglass cemented in place with water-proof adhesive, having fire-retardant characteristics in accordance with NFPA 90A.
3. Drain pan shall be not lighter than 14 ga.; extend completely under the coil section and be all-galvanized, foam insulated pan with drain connections.
4. When the fan coil unit is installed above an accessible ceiling, the unit shall incorporate a secondary drain pan. The secondary pan shall be fabricated from galvanized sheet metal, 16 gauge minimum with cross breaking sloped towards a drain. The sides shall be a minimum 2" tall and the corners shall be soldered watertight. The top edge shall have a 1/4" hem to provide additional rigidity and the secondary pan shall be supported at a minimum of six points. The pan shall extend on all sides a minimum of 3" beyond the sides of the unit casing. Route the secondary drain piping to a conspicuous location or install a float switch at the low point in the secondary pan. The secondary pan should be sloped a minimum

of 1/8" per foot and supported so that the unit is not in contact with the bottom of the secondary pan.

5. The fan section, including wheels, shafts, bearings, drive, etc., shall be statically and dynamically balanced as an assembly, and the shaft shall not pass through the first critical speed, while accelerating from rest to operating speed. Submittal data shall state the first critical shaft speed. Shaft bearings shall be of vacuum de-gassed steel, and shall be selected for 200,000 hours average life.
6. Coil shall be as hereinafter specified.

2.02 COILS

A. Cooling coils shall be cartridge type and, when mounted in air handling units, shall be removable from either end. Coils shall be constructed of copper tubes with aluminum fins and shall be designed for even distribution of air across the face of the coils; air shall not pass around coil frames: Coils shall have same end connection for DX or chilled water piping.

B. DX refrigerant coils shall be counter-flow refrigerant to air, shall have inlet and outlet connections permanently marked shall have thermostatic expansion valves with adjustable super heat.

C. Maximum face velocity across cooling coils shall be 500 FPM, unless noted otherwise on schedule.

PART 3 - EXECUTION

3.01 All HVAC equipment shall be installed as per manufacturers printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturers requirements.

END OF SECTION

SECTION 15860

POWER VENTILATORS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Ceiling and inline ventilators.

1.02 RELATED SECTIONS

A. Section 15050 – Basic Materials and Methods

B. Section 15170 – Motors and Motor Controllers

C. Section 15240 – Sound and Vibration Control

D. Section 15951 – Controls

E. Section 15990 – Testing, Adjusting and Balancing

1.03 QUALITY ASSURANCE

A. UL Compliance: Fans shall be designed, manufactured, and tested in accordance with UL 705 "Power Ventilators."

B. UL Compliance: Fans and components shall be UL listed and labeled.

C. Nationally Recognized Testing Laboratory Compliance (NRTL): Fans and components shall be NRTL listed and labeled. The term "NRTL" shall be as defined in OSHA Regulation 1910.7.

D. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

E. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

F. Sound Power Level Ratings: Comply with AMCA Standard 301 "Method for Calculating Fan Sound Ratings From Laboratory Test Data." Test fans in accordance with AMCA Standard 300 "Test Code for Sound Rating." Fans shall be licensed to bear the AMCA Certified Sound Ratings Seal.

G. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings in accordance with AMCA Standard 210/ASHRAE Standard 51 - Laboratory Methods of Testing Fans for Rating.

1.04 SUBMITTALS

1. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections:

2. Product data for selected models, including specialties, accessories, and the following:

a. Certified fan performance curves with system operating conditions indicated.
b. Certified fan sound power ratings.
c. Motor ratings and electrical characteristics plus motor and fan accessories.
d. Materials gages and finishes, include color charts.
e. Dampers, including housings, linkages, and operators.
f. Full color paint samples.

3. Shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, required clearances, components, and location and size of field connections.
4. Coordination drawings, in accordance with Division 15 Section "Basic Materials and Methods", for roof penetration requirements and for reflected ceiling plans drawn accurately to scale and coordinating penetrations and units mounted above ceiling. Show the following:
   a. Roof framing and support members relative to duct penetrations.
   b. Ceiling suspension members.
   c. Method of attaching hangers to building structure.
   d. Size and location of initial access modules for acoustical tile.
   e. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinkler heads, access panels, and special moldings.

6. iring diagrams that detail power, signal, and control wiring. Differentiate between manufacturer-installed wiring and field- installed wiring.
7. Product certificates, signed by manufacturer, certifying that their products comply with specified requirements.
8. Maintenance data for inclusion in Operating and Maintenance Manual specified in Division 1 and Division 15 Section "Basic Materials and Methods".

1.05 DELIVERY, STORAGE, AND HANDLING

A. Fans shall be stored and handled in accordance with the unit manufacturer’s instructions.

B. B. Lift and support units with the manufacturer's designated lifting or supporting points.

C. Disassemble and reassemble units as required for movement into the final location following manufacturer's written instructions.

D. Deliver fan units as a factory-assembled unit to the extent allowable by shipping limitations, with protective crating and covering.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. ACME, Inc.

B. Loren Cook Company

C. Greenheck Fan Corporation

D. Substitutions under provisions of Division One.

2.02 GENERAL DESCRIPTION

A. Provide fans that are factory fabricated and assembled, factory tested, and factory finished with indicated capacities and characteristics.

B. Fans and Shafts shall be statically and dynamically balanced and designed for continuous operation at the maximum rated fan speed and motor horsepower.

C. Provide factory baked-enamel finish coat after assembly. Color shall be verified during the submittal process.

2.03 CEILING AND INLINE VENTILATORS

A. Ceiling and inline ventilators shall be direct drive or belt drive as indicated, centrifugal blower type. Fan wheel shall be constructed of galvanized steel and shall be dynamically balanced. The housing shall be constructed of minimum 20 gauge corrosion resistant galvanized steel and acoustically insulated for quiet operation. Blower and motor assembly shall be easily removable from the housing without disturbing the ductwork. The motor shall be permanently lubricated with built-in thermal overload protection and shall be factory tested prior to shipment. The ceiling ventilators shall be furnished standard with a powder-painted white steel grille.

B. Ventilators shall be certified and licensed to bear the AMCA Seal for Air and Sound Performance. Ventilator performance shall be based on tests and procedures performed in accordance with AMCA publication 211 and comply with the requirements of the AMCA Certified Ratings Program. Fan sound power level ratings shall be based on tests and procedures performed in accordance with AMCA publication 311 and comply with the requirements of the AMCA Certified Ratings Program. Ventilators shall be UL listed and CSA certified.

C. Accessories: The following accessories are required.

1. Dampers:
   a. Aluminum backdraft damper.
   b. Motor-operated volume control damper.
2. Disconnect Switch: Nonfusible type with thermal overload protection.
3. Speed Controls: Fan mounted, solid state speed controller.

PART 3 – EXECUTION

3.01 Install in accordance with manufacturer's instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer's requirements.

END OF SECTION

SECTION 15881

AIR DISTRIBUTION DEVICES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Ceiling air diffusers.

B. Wall registers and grilles.

C. Louvers.

D. Other air devices indicated on drawings and schedules.

1.02 RELATED SECTIONS

A. Section 15050 – Basic Materials and Methods

B. Section 15890 – Metal Ductwork

C. Section 15910 – Ductwork Accessories

D. Section 15990 – Testing, Adjusting and Balancing

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of air distribution devices of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:

1. ARI Compliance: Test and rate air distribution devices in accordance with ARI 650 "Standard for Air Outlets and Inlets".
2. ASHRAE Compliance: Test and rate air distribution devices in accordance with ASHRAE 70 "Method of Testing for Rating the Air Flow Performance of Outlets and Inlets".
3. AMCA Compliance: Test and rate louvers in accordance with AMCA 500 "Test Method for Louvers, Dampers and Shutters".
4. AMCA Seal: Provide louvers bearing AMCA Certified Rating Seal.
5. NFPA Compliance: Install air distribution devices in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for air distribution devices including the following:

1. Schedule of air distribution devices indicating drawing designation, room location, number furnished, model number, size, and accessories furnished.
2. Data sheet for each type of air distribution devices, and accessory furnished; indicating construction, finish, and mounting details.

3. Performance data for each type of air distribution devices furnished, including aspiration ability, temperature and velocity traverses; throw and drop; and noise criteria ratings. Indicate selections on data.

B. Shop Drawings: Submit manufacturer's assembly-type shop drawing for each type of air distribution devices, indicating materials and methods of assembly of components.

C. Maintenance Data: Submit maintenance data, including cleaning instructions for finishes, and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals; in accordance with requirements of Division 1.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver air distribution devices wrapped in factory-fabricated fiber-board type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.

B. Store air distribution devices in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

1.06 WARRANTY

A. Warrant the installation of the Work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from defective or nonconforming workmanship.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Titus Company

B. Metalaire Industries, Inc.

C. Nailor Industries

D. Krueger

E. Substitutions under provisions of Division One.

2.02 GENERAL DESCRIPTION

A. Unless otherwise indicated, provide manufacturer’s standard air devices when shown of size, shape, capacity, type and accessories indicated on drawings and schedules, constructed of materials and components as indicated and as required for complete installation and proper air distribution.

B. Provide air devices that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device and listed in manufacturer’s current data.

C. Unless noted otherwise on drawings, the finish shall be #26 white. The finish shall be an anodic acrylic paint, baked at 315°F for 30 minutes. The pencil hardness must be HB to H. The paint must pass a 100 hour ASTM D117 Corrosive Environments Salt Spray Test without creepage, blistering, or deterioration of film. The paint must pass a 250 hour ASTM-870

Water Immersion Test. The paint must also pass the ASTM D-2794 Reverse Impact Cracking Test with a 50 inch pound force applied.

D. Provide air device with border styles that are compatible with adjacent ceiling or wall system, and that are specially manufactured to fit into the wall construction or ceiling module with accurate fit and adequate support. Refer to architectural construction drawings and specifications for types of wall construction and ceiling systems.

E. Provide integral volume damper with roll formed steel blades where indicated on drawings or schedules. Dampers shall be opposed blade design with a screw driver slot or a concealed lever operator for adjustment through the face of the air device.

F. Air devices designated for fire rated systems shall be pre-assembled with UL classified radiation damper and thermal blanket. Fire rated air devices shall be shipped completely assembled; one assembly per carton. Each assembly shall be enclosed in plastic shrink wrap with installation instructions.

2.03 LOUVERS

A. Except as otherwise indicated, provide manufacturer's standard louvers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

B. Provide louvers that have minimum free area, and maximum pressure drop of each type as listed in manufacturer's current data, complying with louver schedule.

C. Provide louvers with frame and sill styles that are compatible with adjacent substrate, and that are specifically manufactured to fit into construction openings with accurate fit and adequate support, for weatherproof installation. Refer to architectural construction drawings and specifications for types of substrate.

D. Louvers shall be constructed of aluminum extrusions, ASTM B 221, Alloy 6063-T5. Weld units or use stainless steel fasteners.

E. Louver Screens: On inside face of exterior louvers, provide 1/2" square mesh anodized aluminum wire bird screens mounted in removable extruded aluminum frames.

F. Acceptable Manufacturers:

1. Ruskin Manufacturing Company
2. Greenheck Company
3. Louvers and Dampers, Inc.
4. Substitutions under provisions of Division One.

PART 3 – EXECUTION

3.01 All interior surfaces of all air devices shall be painted flat black.

3.02 See floor plans for type, neck size and CFM of air for all air distribution devices.

3.03 Install all air distribution devices as detailed on plans and in accordance with manufacturer’s recommendations.

END OF SECTION

SECTION 15885

AIR FILTERS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 15050, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

PART 2 - PRODUCTS

2.01 FILTERS

A. The filters shall be FARR 30/30 2 inch thick or approved equal.

B. APPROVED MANUFACTURERS: The following manufacturers are approved subject to specification compliance.

1. American Air Filter.
2. Airguard Industries, Inc.
3. Cambridge.

2.02 LOW VELOCITY FILTER SECTION

A. Filters shall be of the throwaway cartridge type in 24 inches X 24 inches X 2 inch frames. When installing multiple filters into slide-in frames tape adjacent filters together with duct tape to prevent bypassing of air around the filter. Media shall be rated at 500 feet per minute.

B. Filtering media shall be formed of non-woven reinforced cotton fabric type filtering media bonded to 96% open area media support grid folded into a non-creased radial pleat design. The filter pack shall be bonded to the inclosing frame to prevent air bypass. Average efficiency shall be 25-30% on ASHRAE test standard 52-76. Initial resistance shall not exceed 0.20 inches water gauge at 350 FPM face velocity.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install differential pressure switch to activate "Filter Dirty" light when pressure difference across filters reaches 0.5 inch W.G. (adjustable). Locate "filter dirty" lights in mechanical rooms with identifying label

B. Install and relocate filters in the mechanical or the storage room in accordance with manufacturer's recommendations.

C. Refer to Section 15050 for additional filter information.

END OF SECTION

SECTION 15890

METAL DUCTWORK

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Low pressure ductwork.

B. Casings.

C. Duct cleaning.

1.02 RELATED SECTIONS

A. Section 09900 - Painting: Weld priming, weather resistant, paint or coating.

B. Section 15050 - Basic Material and Methods.

C. Section 15140 - Supports and Anchors.

D. Section 15290 - Duct Insulation.

E. Section 15910 - Ductwork Accessories.

F. Section 15881 - Air Distribution Devices.

G. Section 15990 - Testing, Adjusting and Balancing.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of metal ductwork products of types, materials and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firms with least 3 years of successful installation experience on projects with metal ductwork systems similar to that required for project.

C. Codes and Standards:

1. SMACNA Standards: Comply with latest SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" for fabrication and installation of metal ductwork.
2. ASHRAE Standards: Comply with ASHRAE Handbook, Equipment Volume, Chapter 1 "Duct Construction", for fabrication and installation of metal ductwork.
3. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems", NFPA 90B "Standard for the Installation of Warm Air Heating and Air Conditioning Systems", and NFPA 96 Standard.
4. IECC 2012: Comply with 2012 International Energy Conservation Code.

1.04 GENERAL DESCRIPTION

A. Extent of metal ductwork is indicated on drawings and in schedules, and by requirements of this section.

1.05 SUBMITTALS

A. Submit shop drawings, duct fabrication standards and product data under provisions of Division One.

B. Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work.

C. The contract documents are schematic in nature and are to be used only for design intent. The contractor shall prepare sheet metal shop drawings, fully detailed and drawn to scale, indicating all structural conditions, all plumbing pipe and light fixture coordination, and all offsets and transitions as required to permit the duct to fit in the space allocated and built. All duct revisions required as a result of the contractor not preparing fully detailed shop drawings will be performed at no additional cost.

1.06 DEFINITIONS

A. Duct Sizes: Inside clear dimensions. For lined ducts, maintain indicated clear size inside lining. Where offsets or transitions are required, the duct shall be the equivalent size based on constant friction rate.

B. Low Pressure: Three pressure classifications: ½ inch WG positive or negative static pressure and velocities less than 2,000 fpm; 1 inch WG positive or negative static pressure and velocities less than 2,500 fpm, and 2 inch WG positive or negative static pressure and velocities less than 2,500 fpm.

C. Medium Pressure: Three pressure classifications: 3 inch WG positive or negative static pressure and velocities less than 4,000 fpm, 4 inch WG positive static pressure and velocities greater than 2,000 fpm, and 6 inch WG positive static pressure and velocities greater than 2,000 fpm and;

D. High Pressure: 10 inch WG positive static pressure and velocities greater than 2,000 fpm.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protection: Protect shop-fabricated and factory-fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings, use sheet metal end caps on any lined duct exposed to the weather and use 3 mil vinyl wrap with duct tape on end pieces where stored inside.

B. Storage: Where possible, store ductwork inside and protect from weather. Where necessary to store outside, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS

2.01 DUCTWORK MATERIALS

A. Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, stains and discolorations, and other imperfections, including those which would impair painting.

B. Sheet Metal.: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A 527, lockforming quality, with G 90 zinc coating in accordance with ASTM A 525; and mill phosphatized for exposed locations.

C. Stainless Steel Sheet: Where indicated, provide stainless steel complying with ASTM A167; Type 316; with No. 4 finish where exposed to view in occupied spaces, No. 1 finish elsewhere. Protect finished surfaces with mill-applied adhesive protective paper, maintained through fabrication and installation.

D. Aluminum Sheet: Where indicated, provide aluminum sheet complying with ASTM B 209, Alloy 3003, Temper H14.

E. Ducts shall be constructed and sealed as per the latest SMACNA Duct Construction Standards and as follows:

1. VAV systems - Supply ducts from Air handlers to VAV Boxes constructed to 3" S.P. and Seal Class A.
2. Ducts downstream of VAV boxes constructed to 2" S.P. and Seal Class A.
3. Constant Volume – Supply ducts constructed to 2" S.P. and Seal Class A.
4. Outside/Return/Exhaust ducts constructed to 2" S.P. and Seal Class A.

2.02 MISCELLANEOUS DUCTWORK MATERIALS

A. General: Non combustible and conforming to UL 181, Class 1 air duct materials.

B. Flexible Ducts: Flexmaster U.S.A., Inc. Type 1M or approved equal, corrosive resistant galvanized steel formed and mechanically locked to inner fabric with factory wrapped insulation blanket with aluminum vapor barrier and an R-6 thermal conductance. Flexible duct shall have reinforced metalized outer jacket comply with UL 181, Class 1 air duct. Equivalent manufactures are Thermaflex.

C. Sealants: Hard-Cast "iron grip" or approved equal, non-hardening, water resistant, fire resistive and shall not be a solvent curing product. Sealants shall be compatible with mating materials, liquid used alone or with tape or heavy mastic.

D. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.

1. For exposed stainless steel ductwork, provide matching stainless steel support materials.
2. For aluminum ductwork, provide aluminum support materials.

2.03 LOW PRESSURE DUCTWORK

A. Fabricate and support in accordance with latest SMACNA Low Pressure Duct Construction Standards and ASHRAE handbooks, except as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

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 approved shop drawings. Obtain engineer's approval prior to using round duct in lieu of rectangular duct.

C. 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 airfoil-

turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.

D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.

E. Use crimp joints with bead for joining round duct sizes 6 inch smaller with crimp in direction of airflow.

F. Use double nuts and lock washers on threaded rod supports.

2.04 CASINGS

A. Fabricate casings in accordance with SMACNA Low Pressure Duct Construction Standards and SMACNA High Pressure Duct Construction Standards and construct for operating pressures indicated.

B. Mount floor mounted casings on 4 inch high concrete curbs. At floor, rivet panels on 8 inch centers to angles. Where floors are acoustically insulated, provide liner of 18 gage galvanized expanded metal mesh supported at 12 inch centers, turned up 12 inches at sides with sheet metal shields.

C. Reinforce doorframes with steel angles tied to horizontal and vertical plenum supporting angles. Install hinged access doors where indicated or required for access to equipment for cleaning and inspection. Provide clear wire glass observation ports, minimum 6 X 6 inch size.

D. Fabricate acoustic casings with reinforcing turned inward. Provide 16 gage back facing and 22 gage perforated front facing with 3/32 inch diameter holes on 5/32 inch centers. Construct panels 3 inches thick packed with 4.5 lb./cubic foot minimum glass fiber media, on inverted channels of 16 gage.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Obtain manufacturer's inspection and acceptance of fabrication and installation of ductwork at beginning of installation.

B. 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.

C. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

D. Connect terminal units to medium or high pressure ducts with four feet maximum length of flexible duct. Do not use flexible duct to change direction.

E. Connect diffusers or troffer boots to low pressure ducts with 6 feet maximum, 4 feet minimum, length of flexible duct. Hold in place with strap or clamp.

F. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

G. The interior surface of all ductwork shall be smooth. No sheet metal parts, tabs, angles, or anything else may project into the ducts for any reason, except as specified to be so. All seams and joints shall be external.

H. All ductwork located exposed on roof shall be "crowned" to prevent water from ponding. Ref: Insulation for additional requirements.

I. Where ducts pass through floors, provide structural angles for duct support. Where ducts pass through walls in exposed areas, install suitable sheet metal escutcheons as closers.

J. All angles shall be carried around all four sides of the duct or group of ducts. Angles shall overlap corners and be welded or riveted.

K. All ductwork shall be fabricated in a manner to prevent the seams or joints being cut for the installation of grilles, registers, or ceiling outlets.

3.02 INSTALLATION OF FLEXIBLE DUCTS

A. Determine the minimum length of flexible duct needed for each connection. Excess flex causing tight bends and increased pressure drops are not acceptable. Do not exceed 6'-0" extended length.

B. Install in accordance with Section III of SMACNA's, "HVAC Construction Standards, Metal and Flexible".

C. Cut outer vapor barrier and insulation. Fold back insulation and outer vapor barrier to expose inner core. Using sheet metal snips, cut the inner core.

D. Connect the inner core to the tap or collar by pulling it a minimum of 1" over the collar.

E. Where collars are less than 1" in length, i.e. diffusers, connect a separate collar to the existing collar and proceed as described in 3.02.C above.

F. Wrap the core twice with UL181 Tape over the collar. Secure the connection by placing a clamp over the tap or collar, UL listed Panduit clamps for collars with beads and Stainless Steel clamps for collars without beads are acceptable.

G. Roll the insulation and vapor barrier back over the collar or tap as described in 3.02.C above and wrap twice with UL181 Tape.

H. Secure the outer vapor barrier with a clamp as described in 3.02.F above if desired.

I. For Medium to High Pressure applications, use duct sealer for 3.02.F and 3.02.G in lieu of UL181 Tape.

J. Flexible duct shall be hung with proper support to minimize sagging and snaking between supports. Maximum of 4'-0" between supports. Hanger material will be a minimum of 1 1/2" wide.

K. Supports will be used before all vertical 90° bends to prevent sagging and ensure a 1.5 center line turn radius of flexible duct.

3.03 REQUIREMENTS FOR UNIT CASINGS

A. Set plenum doors 6 to 12 inches above floor. Arrange door swings so that fan static pressure holds door in closed position.

3.04 DUCTWORK APPLICATION SCHEDULE

AIR SYSTEM	MATERIAL
Low Pressure Supply	Galvanized Steel
Return and Relief	Galvanized Steel
General Exhaust	Galvanized Steel
Kitchen Hood Exhaust	Galvanized Steel

3.05 DUCTWORK HANGERS AND SUPPORTS

A. All ductwork shall be properly suspended or supported from the building structure. Hangers shall be galvanized steel straps or hot-dipped galvanized rod with threads pointed after installation. Strap hanger shall be attached to the bottom of the ductwork, provide a minimum of two screws one at the bottom and one in the side of each strap on metal ductwork. The spacing, size and installation of hangers shall be in accordance with the recommendations of the latest SMACNA edition.

B. All duct risers shall be supported by angles or channels secured to the sides of the ducts at each floor with sheet metal screws or rivets. The floor supports may also be secured to ducts by rods, angles or flat bar to the duct joint or reinforcing. Structural steel supports for duct risers shall be provided under this Division.

3.06 DUCT JOINTS AND SEAMS

A. Seal all non-welded duct joints and seams with duct sealant as indicated. "***All longitudinal and transverse joints, seams and connections in metallic and non-metallic ducts shall be constructed as per specified in SMACNA HVAC Duct Construction Standards-Metal and Flexible and SMACNA Fibrous Glass Duct Construction Standards or NAIMA Fibrous Glass Duct Construction Standards. All longitudinal and transverse joints, seams and connections shall be sealed in accordance with the International Energy Conservation Code."***

END OF SECTION

SECTION 15910

DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Volume control dampers.

B. Round Duct Taps.

C. Back draft dampers.

D. Air turning devices.

E. Flexible duct connections.

F. Duct access doors.

G. Duct test holes.

1.02 RELATED WORK

A. Section 15240 - Vibration Isolation.

B. Section 15890 - Ductwork.

1.03 REFERENCES

A. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

B. SMACNA - Low Pressure Duct Construction Standards.

C. UL 33 - Heat Responsive Links for Fire-Protection Service.

D. UL 555 - Fire Dampers and Ceiling Dampers.

1.04 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division One.

B. Provide shop drawings for shop fabricated assemblies indicated, including volume control dampers duct access doors duct test holes. Provide product data for hardware used.

C. Submit manufacturer's installation instructions under provisions of Section 01300, for fire dampers and combination fire and smoke dampers.

PART 2 PRODUCTS

2.01 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated.

B. Fabricate splitter dampers of material same gauge as duct to 24 inches size in either direction, and two gauges heavier for sizes over 24 inches.

C. Fabricate splitter dampers of double thickness sheet metal to streamline shape. Secure blade with continuous hinge or rod. Operate with minimum 1/2 inch diameter rod in self aligning, universal joint, action flanged bushing, with set screw.

D. Fabricate single blade dampers for duct sizes to 9-1/2 x 24 inch.

E. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12 x 72 inch.

1. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
2. On outside air, return air, and all other dampers required to be low leakage type, provide galvanized blades and frames, seven inches wide maximum, with replaceable vinyl, EPDM, silicone rubber seals on blade edges and stainless steel side seals. Provide blades in a double sheet corrugated type construction for extra strength. Provide hat channel shape frames for strength and blade linkage enclosure to keep linkage out of the air stream. Construction leakage not to exceed 1/2%, based on 2,000 fpm and 4 inch static pressure.

F. Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.

G. Provide locking, indicating quadrant regulators on single and multi-blade dampers. Where rod lengths exceed 30 inches provide regulator at both ends.

H. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

2.02 ROUND DUCT TAPS

A. Taps to trunk duct for round flexible duct shall be spin-in fitting with locking quadrant butterfly damper, model no. FLD-B03 by Flexmaster or approved equal.

2.03 ACCEPTABLE MANUFACTURERS - BACKDRAFT DAMPERS

A. Greenheck

B. American Warming and Vent.

C. Louvers and Dampers Inc.

D. Ruskin.

E. Substitutions: Under provisions of Division One.

2.08 BACKDRAFT DAMPERS.

A. Gravity back draft dampers, size 18 x 18 inches or smaller, furnished with air moving equipment, may be air moving equipment manufacturers standard construction.

B. Fabricate multi-blade, parallel action gravity balanced back draft dampers of 16 gauge galvanized steel, or extruded aluminum, with blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.04 ACCEPTABLE MANUFACTURERS - AIR TURNING DEVICES

A. Young Regulator.

B. Titus.

C. Tuttle and Bailey.

D. Substitutions: Under provisions of Division One.

2.05 AIR TURNING DEVICES

A. On duct sizes less than 12 x 12, multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

B. Multi-blade device with radius blades attached to pivoting frame and bracket, steel or aluminum construction, with worm drive mechanism with 18 inch long removable key operator.

2.06 ACCEPTABLE MANUFACTURERS - FLEXIBLE DUCT CONNECTIONS

A. Metaledge.

B. Ventglass.

C. Substitutions: Under provisions of Division One.

2.07 FLEXIBLE DUCT CONNECTIONS TO AIR MOVING EQUIPMENT

A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated.

B. UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 20 oz per sq yd, approximately 6 inches wide, crimped into metal edging strip.

2.08 ACCEPTABLE MANUFACTURERS - DUCT ACCESS DOORS

A. Greenheck

B. American Warming and Vent.

C. Ruskin.

D. Titus.

E. Substitutions: Under provisions of Division One.

2.09 DUCT ACCESS DOORS

A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards and as indicated.

B. Review locations prior to fabrication.

C. Fabricate rigid and close-fitting doors of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover. Insulation shall be replaceable without field cutting or patching.

D. Access doors smaller than 12 inches square may be secured with sash locks.

E. Provide two hinges and two sash locks for sizes up to 18 inches square, three hinges and two compression latches with outside and inside handles for sizes up to 24 x 48 inches. Provide an additional hinge for larger sizes.

F. Access doors with sheet metal screw fasteners are not acceptable.

2.10 DUCT TEST HOLES

A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

B. Permanent test holes shall be factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions.

B. Balancing Dampers

1. Provide at points on low pressure supply, return, and exhaust systems where branches are taken from larger ducts and as required for air balancing. Use splitter dampers only where indicated.
2. All regulators mounted on externally insulated ductwork shall have 16 gauge elevated platforms at least 1/8 inch higher than the thickness of the insulation. Damper shaft shall have Ventlock No. 607 bearing mounted on ductwork within elevated platform. If duct is inaccessible the operating handle shall be extended and the regulator installed on the face of the wall or ceiling. Where regulators are exposed in finished parts of the building, they shall be flush type, Ventlock No. 666. All regulators shall be manufactured by Ventlock, or approved equal.
3. All dampers in lined ductwork shall have bushing to prevent damper damage to liner.

C. Provide back draft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

D. Provide flexible duct connections immediately adjacent to equipment in ducts associated with fans and motorized equipment. Provide at least one inch slack at all flexible duct connections.

E. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated.

F. Provide duct test holes where indicated and required for testing and balancing purposes.

END OF SECTION

SECTION 15958

AUTOMATIC TEMPERATURE CONTROLS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Complete system of automatic controls.

1.02 GENERAL FUNCTIONS

A. The microprocessor based thermostat shall automatically provide occupied and unoccupied setpoints for each zone and scheduling for all connected loads and HVAC equipment.

1. Time-of-Day Scheduling
2. Occupied and Unoccupied Temperature Control Setpoints
3. Timed Override
4. Time and date
5. local Edit Terminal Capability
6. Remote Access

1.03 TYPE OF SYSTEM

A. The system shall be composed of an independent, standalone, microprocessor-based thermostat. The thermostat shall communicate with its respective unit and provide for scheduling and coordination of occupied and unoccupied setpoints.

1.04 SUBMITTALS

A. Shop Drawings: Indicate operating data, system diagrams, wiring diagrams, and description of operating sequences. Include sizing of components as requested.

B. Product Data: Provide data for each manufactured component.

C. Operating and Maintenance Instructions. Include relevant instructions.

1.05 WARRANTY

A. Provide warranty under provisions of Division One.

1.06 WIRING

A. Refer to Division 16, Electrical. Include all necessary wiring which is not specified under Electrical.

1.07 AS-INSTALLED DRAWINGS

A. At completion of job, furnish two copies of corrected wiring diagrams, one enclosed in laminated plastic and mounted on wall of Mechanical Room.

1.08 MANUFACTURER'S ADJUSTMENT

A. At completion of job, control manufacturer must submit to the Architect a letter stating that he has final calibrations and adjustments to the system, and that the Owner's operating personnel have been instructed in its use.

PART 2 – PRODUCTS

2.01 ACCEPTABLE SYSTEM MANUFACTURERS

A. Trane.

B. Honeywell.

C. Automated Logic.

D. Carrier.

2.02 BASE UNIT

A. The thermostat shall consist of a touch screen panel with an LCD display with interactive screen to support security access and simple changing of parameters. Display shall be backling and easy to read.

B. Power shall be 24V, 50/60 Hz. The control system shall contain its own on-board isolation transformer or a dedicated transformer shall be provided.

C. Operating temperature range shall be 32°F to 120°F.

D. Operating humidity range shall be 10% to 90% non-condensing.

E. Provide clear plastic covers when thermostat is located in public spaces.

2.03 AGENCY LISTINGS

A. The controls system shall be listed by Underwriters Laboratories Inc. for Enclosed Energy Management Equipment under UL #916.

B. The building control panel shall comply with Federal Communications commission (FCC) Regulation, Part 15, Subpart J, for Class A computing devices.

C. All wiring shall be in accordance with the National Electrical Code and all Local electrical codes.

2.04 SOFTWARE

A. Software Integrity – All schedules and setpoints shall be resident in EEPROM. The clock function shall be maintained for a minimum of 250 hours at up to 140°F on power loss.

B. The local display shall prompt the infrequent user for setup and/or adjustment of:

1. The system time and date
2. Heating and cooling, occupied and unoccupied setpoints
3. Monitoring temperatures, operating modes, on/off statuses and failure conditions
4. Holiday and Exception dates
5. Units of temperature
6. Daylight Savings Time
7. Filter changes

C. Time-of-Day Scheduling – Each device shall be able to have a separate schedule with two on and two off events per day. The panel shall be capable of optimally starting the HVAC units based on individual unit recovery ramps.

Time-of-Day scheduling shall be continuous, such that if power is lost, on power-up the panel will look back for each device to see whether it should be on/off or in occupied/unoccupied temperature setpoints. If necessary, the software will look back at the previous day's schedules to determine the desired state of each device/zone.

D. Holiday Schedules – Each connected binary output and each connected unit shall have nine different daily schedules: Monday through Sunday, Holiday, and Exception days. The thermostat shall provide a minimum of 24 Holidays per year.

E. Timed Override – Each scheduled device shall be able to be overridden at the system keypad to the occupied mode for up to two hours. The override shall also be cancelable from the local keypad at any time during the override.

F. Daylight Savings Time – The system panel software shall automatically update time according to daylight savings at the legislated time and date and reset time at the end of the daylight savings period. This function shall be able to be disabled.

G. Temperature Units – All temperature inputs connected directly to the system panel or communicating over the communications link shall be able to display temperature inputs in degrees Fahrenheit or in degrees Centigrade, selectable from the front keypad.

H. Multiple Languages – The main panel shall support two additional languages other than the English language.

I. Security – Upon initial start up the factory security level shall secure the building control panel from each of the following local capabilities: changing time and date, changing setpoints, changing schedules, and initiating timed override. The security password shall be provided in the installation manual.

J. Expansion – The ability to add additional HVAC units without any additional hardware at the small building control panel.

2.05 DX /SPLIT SYSTEM UNIT CONTROLS

A. The thermostat shall be capable of communicating with its respective rooftop/split system.

B. The thermostat shall be capable of monitoring and communicating the following information:

1. Analog input Points

a. Supply air temperature
b. Zone temperature
c. Active setpoint

2. Binary Input Points

a. Smoke/fire alarm status
b. Supply fan on/off status
c. Dirty filter

3. The thermostat shall provide the following control functions:

   a. Fan on or off
   b. 1st stage cooling on or off
   c. 2nd stage cooling on or off
   d. 1st stage heating on or off
   e. 2nd stage heating on or off
   f. Occupied setpoint
   g. Unoccupied setpoint

END OF SECTION

SECTION 15990
TESTING, ADJUSTING, AND BALANCING

PART1- GENERAL

1.01 GENERAL REQUIREMENTS

A. Conditions of the contract and general requirements in Division 1 apply to work specified in all section of Division 15.

B. All Division 15 specification sections, drawings, and general provisions of the contract apply to work of this section, as do other documents referred to this section.

C. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

D. Requirements for submittals, shop drawings, and substitutions, Division 1, Section 01300 and 01600, apply to work specified in all sections of Division 15.

E. The basic Materials and Methods, Section 15050, are included as a part of this Section as though written in full in this document.

1.02 REFERENCES AND STANDARDS

A. The publications listed below from a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ASSOCIATED AIR BALANCE CONCIL (AABC)

(2002) National Standards for Testing Adjusting Balancing of Environmental Systems

NATIONAL EVROMENTAL BALANCING BUREAU (NEBB)

(1998) National Standards for Testing Adjusting Balancing of Environmental Systems

(1994) Procedural Standards for the Measurement and Assessment of Sound and Vibration

B. TAB shall be preformed in accordance with the requirements of the standard under which the TAB Firm's qualifications are approved, i.e., AABC or NEBB procedural standards, unless otherwise specifies herein. All recommendations and suggested practices contained in the TAB standard shall be considered mandatory. The provisions of the TAB Standard, including checklists, report forms, etc. Shall, as nearly as practical, be used to satisfy the Contract requirements. The TAB standard shall be used for all aspects of TAB, including qualifications, for the TAB Firm and Specialist and calibration of TAB instruments. Where the instrument manufacturer calibration recommendations are more stringent than those listed in the TAB Standard, the manufacture's recommendations shall be adhered to. All quality assurance provisions of the TAB Standard such as performance guarantees shall be part of this contract. For systems or system components not covered in the TAB standard TAB procedures shall be developed by the TAB

Specialist. Where new procedures, requirements, etc. applicable to the Contact requirements have been published or adopted by the body responsible for the TAB Standard used (AABC or NEBB), the requirements and recommendations contained in these procedures and requirements shall be considered mandatory.

C. The TAB contractor shall submit all questions regarding interpretations and questions regarding these standards in writing or as required by documents to the A/E team who shall provide formal reply in ka reasonable time. Decisions of the A/E team shall be final.

1.03 DEFINITIONS AND SIMILAR TERMS

A. In some instances, terminology differs between the Contract TAB Standard primarily
because the intent of this section is to use the industry standards specified, along with the additional requirements listed herein to produce optimal results. The following table of similar terms is provided for clarification only. Contract requirements take precedent the corresponding AABC or NEBB where differences.

CONTRACT TERM	*AABC TERM*	*NEBB TERM*
TAB Standard	National Standard Testing and Balancing Heating, Ventilating, and Air Conditioning System	Procedural Standards for Testing Adjusting Environmental System
TAB Specialist	TAB Engineer	TAB Supervisor
System Readiness Check	Construction Phase Inspection	Field Readiness Check & Preliminary Field Procedures

1.04 QUALIFICATIONS

A. The TAB of the air conditioning systems will be performed by an independent, impartial technical firm whose operations are limited only to the field of professional TAB, and is not a part or subsidiary of any other project contractor or subcontractor, to include, but not limited to General Contractor, and Mechanical; Contractor. The TAB work will be done under the direct supervision of qualified Professional Engineer employed as a full time employee of TAB firm.

B. The TAB agency shall be either a member of AABC or certified by the NEBB and certified in all categories and functions where measurements or performance are specified on the plans and specifications.

C. QUALIFICATIONS OF CONTRACTOR PERSONAL: Submit evidence to show that the people who shall be in charge of correcting deficiencies for balancing the systems are qualified. The Owner and Engineer reserve the right to require that the originally approved personal be replaced with other qualified personnel if, in the Owner and Engineer's opinion, the original personnel are not qualified to properly place the system in condition for balancing.

D. QUALIFICATIONS OF TAB FIRM

The certification shall be maintained for the entire duration of specified herein. If, for any reason, the firm losses subject certification during this period, the Contractor shall immediately execute each certifying agency's applicable Performance Guaranty, then immediately notify the Contracting Officer and submit another TAB firm for approval, at no additional cost to Project Owner, Architect, Engineer, or their designated representatives. Any firm that has been the subject to disciplinary action by either the AABC or the NEBB within the five years preceding the contract award shall not be eligible to perform any duties related to the HVAC systems including TAB. All work specified in this section and in other related sections to be performed by the TAB firm shall be considered invalid if the TAB firm losses its certification prior to contract completion and must be performed by an approved successor, at no additional cost to Project Owner, Architect, Engineer, or their designated representative. The TAB firm shall have an occupied office within 100 miles of the project site.

E. QUALIFICATIONS OF TAB FIRM PERSONAL:

1. A minimum of one registered Professional Engineer, licensed in the State the work is performed, is required to be in permanent employment of the firm.

2. The TAB Specialist shall be either a member of AABC or an experienced technician of the firm certified by NEBB. The certification shall be maintained for the entire duration of duties specified herein. If, for any reason the Specialist losses subject certification during this period, the Contractor shall immediately execute each certifying agency's applicable Performance Guaranty, then immediately notify the Contracting Officer and submit another TAB Specialist for approval, at no additional cost to Project Owner, Architect, Engineer, or their designated representatives. Any individual that has been the subject of disciplinary action by either the AABC or the NEBB within the five years preceding the contract award shall not be eligible performed any duties related to the HVAC systems, including TAB. All work specified in this section and other related sections to be performed by the TAB Specialist shall be considered invalid if the TAB Specialist losses certification prior to the contract completion and must be performed by an approved successor, at no additional cost to the Project Owner, Architect, Engineer, or their designated representatives.

3. Personal used on the job site shall be either Professional Engineers or technicians, who shall have been permanent, full time employees of the firm for a minimum of six months prior to the start of work for that specified project.

4. Evidence shall be submitted to show that the personal who actually balanced the systems are qualified. Evidence showing that the personnel have passed the tests required by the Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB) shall be required.

F. ACCEPTABLE TAB FIRMS SHALL INCLUDE:

1. Engineering Air Balance Company (210-736-9494)

2. PHI Service Agency (956-464-1234)

3. Testing Specialties (210-492-8885)

4. Professional Engr. Balance Lab (210-828-6622)

1.05 SCOPE OF WORK

A. The General (Prime) Contractor will contract with a professional TAB firm under the provisions of paragraph 1.04 of this section.

B. The TAB firm will be responsible for inspecting, adjusting, balancing, and logging the data on the performance of fans, dampers in the duct system, and air distribution devices. The Contactor and the various subcontractors of the equipment installed shall cooperate with the TAB firm to furnish necessary data on the design and proper applications of the system components and provide labor ad material required to eliminate deficiencies or poor performance.

D. The work included in this section consists of furnishing labor, instruments, and tools required in testing, adjusting, and balancing the HVAC systems, as described in these specifications or shown on accompanying drawings. Services shall include checking equipment performance, taking specified measurements, recording and reporting the results. The items requiring testing, adjusting, and balancing include the following (as applicable to contract drawings):

AIR SYSTEMS

Air Handling Units
Exhaust Fans
Diffusers, Registers, & Grilles
Coils (Air Temperature)

1.06 SUBMITTALS AND RELATED DOCUMENTS:

A. The name of the selected AABC or NEBB certified firm shall be submitted to the Engineer for approval within 30 days after contract award.

B. Within 30 days after the award of contract, the TAB firm shall submit for approval an organizational chart and proof of current certification which shall identify all AABC or NEBB certified Supervisors or Specialist. The TAB firm shall submit a company resumes listing personal and project experience in air and hydronic system balancing. TAB firm will also provide information showing successful completion for three similar scope projects for which the firm is being contracted.

C. Within 30 days after the award of contract, the TAB firm will submit for approval the name of the TAB Specialist and/or Professional Engineer, who will have direct supervision of all TAB related labor through completion of project.

D. Within 30 days after the award of contract the TAB firm shall submit TAB procedures and agenda proposed to be used.

E. Within 30 days after the award of contract, but prior to TAB field measurements, the TAB firm shall submit sample report forms, sample report forms, which shall include minimum data required by either the AABC or NEBB National Standards.

F. Within 15 days of notification of approval of TAB firm and TAB Specialist by engineer, TAB firm shall conduct a Design Review of contract drawings and submit a Design Review report.

G. Proposed date and time for execution of Systems Readiness Inspection shall be submitted no later than 7 days prior to inspection. A copy of the Systems Readiness Inspection Report shall be signed by the TAB Specialist and shall bear the seal of the Professional Society or National Association used as the TAB Standard.

H. Proposed date and time to begin field measurements, making adjusting, ext., for the TAB report, shall be submitted with the Systems Readiness Inspection Report.

I. Six (6) copies of the completed TAB Report shall be submitted for approval no later than 7 days after the execution of TAB. All copies of TAB Report shall be signed by the TAB Specialist and shall bear the seal of the Professional Society or National Association used as the TAB Standard.

J. Proposed date and time to begin TAB Completion Verification, shall be submitted with the TAB Report. Six (6) copies of TAB Completion Verification Report shall be submitted no later than 7 days after execution of TAB verification.

K. Proposed date and time for execution of Opposite Season Inspection shall be submitted no later than 7 days prior to inspection.

1.07 INSTRUMENTATION

A. All instruments used for measurements shall be accurate and calibrated. TAB firm shall submit list of all instruments, to include gauges, thermometers, flow measuring hoods, and other balancing devices to be used in balancing the system. The list will indicate name of equipment, function, model number, serial number, date of the last calibration, and date calibration is due. TAB firm shall submit copies of calibration certificates for all test instruments used showing all devices were properly calibrated before proceeding with system balancing. All instruments will be within one year of calibration for duration of the project. If duration of project exceeds the tenure of instrument calibration, then said instrument must be recalibrated, and copy of calibration certificate sent to Engineer, before the instrument is placed into continued use.

1.08 TAB PREPARATION AND COORDINATION

A. It is the intent of this specification section to provide for a completely tested, adjusted, and balanced (TAB) installation without overlaps or omissions between the installing contractor and the TAB contractor. The installing contractors are those who perform the installation of this work and make all preparations for the TAB contractor who performs the testing, adjusting, and balancing described herein.

B. The contactor Manager or General Contractor performing the General construction work shall coordinate the work of the contractors performing the Mechanical, Electrical, Automatic Temperature Control, and TAB work to provide complete properly tested, adjusted, and balanced systems. The Construction Manager or General Manager shall require and provide a start-up report for each piece of equipment furnished.

C. The contractor performing the HVAC work shall coordinate all Mechanical work, including Sheet Metal work and Automatic Temperature Controls, to provide a

complete, properly tested adjusted and balanced system throughout. He shall furnish progress reports regarding this phase of the work on a regular basis as directed. At such time as the systems are started up, the Contractor performing the Mechanical work shall provide TAB Contractor with documentation that the duct systems have been tested to the satisfaction of the Duct Leak Test Specifications. The Mechanical Contractor shall insure that all comments are installed and operating, and the major components such as fans, pumps, refrigeration machines, and the like are capable of producing the scheduled capacity requirements. The requirement does not relieve the Mechanical Contractor of any other requirements specified elsewhere. Should any of these components or systems not be capable of producing these requirements, he shall make corrections within the limits of his responsibility or as otherwise authorized and shall certify in writing that the systems are ready for final testing and balancing by the Tab contractor.

D. The contractor performing the Electrical work shall work coordinate all electrical work to provide complete, properly tested, adjusted and balanced mechanical systems throughout the project. He shall furnish progress reports on a regular basis as directed. He shall certify in writing when each system is electrically operable, including the check for proper rotation of equipment.

E. The Contractor performing the Automatic Temperature Controls work shall coordinate all controls work to provide complete, properly tested, adjusted and balanced mechanical systems throughout the project. He shall furnish progress reports on a regular basis as directed. He shall certify in writing when each system is operational from an Automatic Temperature Controls standpoint. This contractor shall also provide to TAB contractor all necessary submittal information, software, and/or personal complete, properly tested, adjusted and balanced mechanical systems.

F. The TAB contractor shall from the award of contract, begin preparation.

PART 2-PRODUCTS (NOT USED)

PART 3- EXECUTION

3.01 SERVICES OF THE CONTRACTOR

A. The drawing and specifications have indicated valves, dampers, and miscellaneous adjustment devices for the purpose of adjustment to obtain optimum operating conditions, install these devices in a manner that leaves them accessible, provide access as requested by the TAB firm.

B. Have systems complete and in operational readiness prior to notifying the TAB firm the project is ready for their services, and certify in writing to the Construction Manager that such a condition exists.

C. As a part of the Work of this Section, make changes in the sheaves, belts, and dampers or the addition of dampers required for correct balance of new work as required by TAB firm, at no additional cost to owner.

D. Fully examine the existing system to be balanced, to determine, whether or not sufficient volume dampers, balancing valves, thermometers, gauges, pressure in the duct systems, means of determining water flow, and other means of taking data needed for proper water and air balancing are existing. Submit to the Engineer in

writing a listing of omitted items considered necessary to balance existing systems. Submit the list and proposal as a cost add item.

E. Verify that fresh air louvers are free of blockage, coils are clean and fresh air ducts to each air handling unit has individually adjustable volume regulating dampers.

F. Provide correct, repair, or replace deficient items or conditions found during the testing, adjusting, and balancing period.

G. In order that systems may be properly tested, balanced, and adjusted as specified, operate the systems at no expense for the Owner at the length of time necessary to properly verify their completion and readiness for TAB period.

H. Project Contract completion schedules shall allow time for allowance to permit the successful completion of TAB services to Owner's final inspection and expectance. Complete, operational readiness, prior to commencement of TAB services, shall include the following services of the Contractor:

1. Construction status of building shall permit the closing of doors, window, ceilings, installed and penetrations complete, to obtain project operating conditions.
2. AIR DISTRIBUTION SYSTEMS:
   a. Verify installation for conformity to design. Supply, return, and exhaust ducts terminated and pressure tested for leakage as specified.
   b. Volume and fire dampers properly located and functional. Dampers serving requirements of minimum and maximum outside air, return and relief shall provide tight closure and full opening, smooth and free operation.
   c. Supply return, exhaust and transfer grilles, registers and diffusers.
   d. Air handling systems, units and associated apparatus, such as heating and cooling coils, filter sections, access doors, ect., shall be blanked and sealed to eliminate excessive bypass or leakage of air.
   e. Fans (supply and exhaust) operating and verified for freedom from vibrations, proper fan rotation and belt tension; overload heater elements shall be of proper size and rating ; record motor amperage and voltage and verify that these functions do not exceed nameplate ratings.
   f. Furnish or revise fan drives or motors as necessary to attain the specified air volumes.
3. AUTOMATIC CONTROLS
   a. Verify that control components are installed in accordance with project documents and functional, electrical interlocks, damper sequences, air and water resets, fire and freeze stats.
   b. Controlling instruments shall be functional and set for design operating conditions. Factory pre-calibration of room thermostats and pneumatic equipment will not be acceptable.
   c. The temperature shall be regulation shall be adjusted for proper relationship between the controlling instruments and calibrated by the TAB Contractor. Advise Owner of deficiencies or malfunctions.

3.02 SERVICES OF THE TAB FIRM

A. The TAB firm will act as liaison between the Owner, Engineer, and Contractor and inspect the installation of mechanical piping system, sheet metal work, temperature controls and other component parts of the heating, air conditioning and ventilating

systems being retrofitted, repaired, or added under this Contract. The re-inspection of the Work will cover that part related to proper arrangement and adequate provision for the testing and balancing and will be done when the Work is 80 percent complete.

B. Upon completion of the installation and start –up of the mechanical equipment, to check, adjust, and balance system components to obtain optimum conditions in each conditioned space in the building. Prepare and submit to the Owner complete reports on the balance and operations of the systems.

C. Measurements and recorded readings of air, water and electricity that appear in the TAB reports will be done by the permanently employed technicians or engineers of the TAB firm.

D. Make an inspection in the building during the opposite season from that in which the initial adjustments were made. At the time, make necessary modifications to the initial adjustments required to produce optimum operation of system components to effect the proper conditions as indicated on the Drawings. At time of opposite season check-out, the Owner's representative will be notified before readings and adjustments are made.

E. In fan systems, the air quantities indicated on the Drawings may be varied as required to secure a maximum temperature variation of two degrees with each separately controlled space, but the total air quantity indicated for each zone must be obtained. It shall be the obligation of the Contractor to furnish or revise fan drive and motors if necessary, without cost to the Owner, to attain the specified air volumes.

F. The various existing water circulating systems shall be cleaned, filled, purged, of air, and put into operation before hydronic balancing.

3.03 PROFESSIONAL REPORT

A. Before the final acceptance of the report is made the TAB will furnish the Owner the following data to be approved by the Owner and Engineer.

1. Summary of main supply, return and exhaust duct pilot tube traverses and fan settings indicating minimum value required to achieve specified air volumes.
2. A listing of the measured air quantities at each outlet corresponding to the temperature tabulation as developed by the Engineer and TAB firm.
3. Air quantities at each return and exhaust air handling device.
4. Static pressure readings entering and leaving each supply fan exhaust fan, filter, coil, balancing dampers and other components of the systems included in the retrofit Work. These readings will be related to performance curves in terms of the CFM handled if available,
5. Motor current readings at each equipment motor on load side of capacitors. The voltages at the time of the reading shall be listed.
6. The final report shall certify test methods and instrumentation used, final velocity reading obtained, temperatures, pressure drops, RPM of equipment, amperage of motors, air balancing problems encountered, recommendations and uncompleted punch list items. The test results will be recorded on standard forms.
7. A summary of actual operating conditions shall be included with each system outlining normal and ventilation cycles of operation. The final report will act as a reference of actual operating conditions for the Owner's operating personal.

3.03 BALANCING AIR CONDITIONING SYSTEM

A. GENERAL

1. Place all equipment into full operation, and shall continue the operating during each working day of balancing and testing. If the air conditioning system is balanced during OFF-Peak cooling seasons Balancing Contractor shall return to rebalance air side system as required to put system in proper balance at that time.
2. The contractor shall submit detailed balancing and recording forms for approval. After the approval by the Architect, prepare complete set of forms for recording test data on each system. All Work shall be done under the supervision of Registered Professional Engineer. All instruments used shall be accurately calibrated to within 1% of scale and maintained in good working order.
3. Upon completion of the balancing and testing, the Balancing Contractor shall compile the test data in report forms, and forward five copies to the Architect for evaluation
4. The final report shall contain logged results of all tests, including such data as
    a. Tabulation of air volume at each outlet.
    b. Outside dry bulb and wet bulb temperature.
    c. Inside dry bulb and wet bulb temperature in each conditioned space room or area.
    d. Actual fan capacities and static pressures. Motor current and voltage readings at each fan.

B. AIR SYSTEMS: Perform the following operations as applicable to system balance and test:

1. Check fan rotation.
2. Check filters (balancing shall be done with clean filters).
3. Test and adjust blower rpm to design requirements.
4. Test and record motor full load amperes.
5. Test and record system static pressures, suction and discharge.
6. Test and adjust system for design cfm, return air and outside air (+5%). Change out fan sheaves as required to balance system.
7. Test and record entering air temperatures, db and wb.
8. Test and record leaving air temperature, db and wb
9. Adjust all zones to design cfm (+5%).
10. Test and adjust each diffuser, grille, and register to within 5% of design.

D. DX SYSTEMS:

1. Test and record suction and discharge pressures at each compressor and record ambient air temperature entering the condensing coils.
2. Test and record unit full load amps and voltage.
3. Test and record staging and unloading of unit required by sequence of operation or drawing schedule.

E. Automatic temperature controls shall be calibrated and all thermostats and dampers, adjusted so that the control system is in proper operating condition, subject to approval of the Architect.

F. The Air Balance Contractor shall report to Engineer all air distribution devices or other equipment that operate noisily so that corrective measures may be implemented by the Contractor at no additional cost to the owner.

END OF SECTION

SECTION T-16010
ELECTRICAL GENERAL PROVISIONS

PART 1 GENERAL

1.01 SCOPE:

A. The Contractor shall execute all work as hereinafter specified, as shown on the drawings or as necessary to provide complete and functioning systems. All items of labor, material or equipment not required in detail by the specifications or drawings, but incidental to or necessary for the complete installation and proper operation of all phases of work described herein, or reasonably implied in connection therewith, shall be furnished as if called for in detail by the specifications or drawings.

1.02 LAWS AND ORDINANCES:

A. All work and materials shall conform to the requirements of the federal, state, and local laws and ordinances having jurisdiction at the jobsite. The installation shall be in strict accordance with the latest edition of the National Electrical Code (NEC). The Contractor at no increase in contract price shall make all modifications to the work, which may be required by an authority having legal jurisdiction over the work.

1.03 LICENSES, FEES AND PERMITS:

A. The Contractor shall have a Master Electrician license issued by or acceptable to the city in which the work is to be performed. Additionally, and at all times while work is being performed, for every five or less craftsman working on the project site, at least one craftsman shall have a Journeyman Electrician license issued by or acceptable to the city in which the work is to be performed. A city electrical construction permit will be required for this project.

1.04 THE DRAWINGS AND SPECIFICATIONS:

A. The drawings and specifications shall be interpreted together, and any and all work included in either, though not in both, shall be part of the contracted work. The drawings are diagrammatic but shall be followed as closely as actual construction of the project and existing job site conditions will permit. Any changes due to equipment supplied, conflict with the work of other trades or to make this work conform to the National Electrical Code shall be made by the Contractor at no increase in contract price.

1.05 SITE CONDITIONS:

A. Before submitting his bid, the Contractor shall visit the site and familiarize himself with all existing conditions and his bid shall be based on accepting conditions as they exist.

1.06 MATERIALS AND EQUIPMENT:

A. All materials and equipment furnished by the Contractor shall be new. Materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacture of such materials and equipment. Where two or more units of the same item are required, they shall be products of a single manufacturer. The Contractor shall unload and properly store all electrical materials and equipment delivered to the jobsite.

1.07 UTILITY CONNECTIONS AND SERVICE:

A. The Contractor shall make arrangements for connection with the electrical utility company that will serve the jobsite and shall comply with all the rules, regulations and requirements of the utility company. The Contractor shall examine the site, confer with the utility company and verify the requirements for connections prior to bidding the work. The Contractor shall verify with the utility company the exact location of service tie-in points, cable routes, etc. Failure of the Contractor to contact the utility company and obtain such information prior to bidding the work shall not be considered as a basis for additional compensation. Where outages to existing electrical service are required, the Contractor shall coordinate the timing and duration of such outages with Owner's representative.

B. The Contractor shall furnish and install a meter enclosure for the utility company meter. The enclosure and installation shall be in accordance with utility company requirements.

1.08 SAFETY:

A. It shall be the responsibility of the electrical Contractor to initiate, maintain, and supervise all safety precautions required by local, state, and federal laws, including OSHA.

1.09 SUBMITTALS:

A. Submittals for Approval:

1. Submit in accordance with Section 01300 except as otherwise stated herein.
2. Within 30 calendar days after award of contract, the Contractor shall furnish seven (7) sets of drawings and data as described herein for Engineer approval. No item of equipment or material shall be ordered or shipped to the job site until the Engineer has given written approval of the submittal data.
3. The submittal data shall be bound in a 3-ring binder with dividers. The binder shall include a cover and a table of contents with the contractors name as well as the name of the project. All data shall be divided by specification section.
4. The submittal data for each item shall include descriptive literature, performance data, shop drawings technical literature and any other necessary data to readily identify that the equipment will meet the requirements of the drawings and specifications.
5. One complete submittal of drawings and data shall be made for all required items. Partial or incomplete submittals will be returned without comment. All copies furnished shall be manufacturer’s original copies of good quality,

legible photocopies or blue line prints. **<u>Copies transmitted by facsimile machine are not acceptable.</u>**

6. Submittal documents shall be job specific. Where manufacturer's standard drawings or catalog sheets are provided, they shall be marked to show specifically what is being furnished. Drawings shall be marked to show Owner's name, plant location, project description and equipment designation.
7. Substitutions for specified products shall be in compliance with Paragraph 1.10.
8. The Contractor shall review all manufacturers' submittals for completeness, accuracy and compliance with project specifications before submitting to Engineer.
9. The Engineer will review the complete submittal package and return five (5) sets to the Contractor with individual items marked in one of the following three forms:

   Reviewed as submitted
   Reviewed with comments
   Disapproved

   Items that are disapproved shall be corrected as required and shall be resubmitted to the Engineer for approval.

B. Approval of submittals, etc. shall not be construed as releasing the Contractor from further responsibility, but rather as a means to coordinate the work and to aid in the proper selection and installation of the materials and equipment. All materials and equipment shall be subject to final acceptance by the Engineer at completion of the project.

C. Submittal of Record Data:

1. Record Data: Provide seven (7) sets of record data books containing information listed below. The material shall be bound into appropriately sized 3 ring binders, organized with dividers and index sheets. The binders shall be appropriately labeled with the Owner's name, project name and location. The data books shall include:
   a. Certified as-built shop drawings for all fabricated equipment.
   b. Approved product data for all items required in Paragraph 1.09A.
   c. Spare parts lists
   d. Test records.

2. Record Drawings: Provide one (1) set of project drawings marked neatly and legibly in colored pencil to show any significant deviation between actual conditions and original design layout.
3. Operation and Maintenance Data: Provide seven (7) sets of manufacturer's operation and maintenance data on equipment and components. The data shall be organized into loose-leaf binders with dividers and master index.

1.10 SUBSTITUTIONS:

A. Requirements for Substitutions: It is the intention of the drawings and specifications to establish a definite standard when a particular manufacturer's product is mentioned. Written request for substitutions of equivalent products will be considered provided all the following conditions are met. Substitutions for specified products will not be permitted unless all of the following conditions are met:

1. Written request shall be received in the Engineer's office ten (10) days prior to the day of bid opening. Requests after ten days prior to the day of bid opening will not be considered.

2. Request shall include complete technical data, i.e. product data sheets, curve, ratings, etc.

3. Request shall include a complete written comparison of differences and similarities between the proposed and specified product. Provide a written comparison for each substitution being requested.

4. Space and clearance requirements are adequate for products mentioned. It is the responsibility of the Contractor to verify space and clearance requirements for products proposed for substitution.

5. If modifications to the drawings and specifications are necessary for the proper installation of a product proposed for substitution, the request shall explain such in detail, accompanied by drawings if necessary.

B. Approval: If the above has been complied with, and in the Engineer's opinion the product proposed for substitution is equivalent to that mentioned, the product will be approved for substitution and all prospective bidders will be so notified.

1.11 PROTECTION:

A. All new work, equipment and materials shall be protected at all times to prevent damage or breakage, either in transit, storage, installation or testing. All openings shall be closed with caps or plugs during installation. All materials and equipment shall be covered and protected against dirt, water, chemical or mechanical injury. This shall include the erection of all required temporary shelters, cribbing of any apparatus above floor construction and covering of apparatus in incomplete buildings with tarpaulins or other protective covering. Temporary electric heaters shall be installed to keep apparatus dry. All rotating equipment and/or machinery shall be properly lubricated and rotated on a regular basis. All electrical materials and equipment damaged during handling, storage, and installation, until the Owner has accepted the project, shall be repaired or replaced by the Contractor with no increase in contract price.

1.12 COORDINATION:

A. The Contractor shall not hinder and/or delay any work being accomplished by other construction companies at or near the general construction site; nor shall

the Contractor impede normal operation of the Owner at any time except as otherwise indicated.

1.13 WORKMANSHIP:

A. All labor shall be performed in the best and most workmanlike manner by mechanics skilled in their particular trades. All installations shall be complete in both effectiveness and appearance whether finally enclosed or left exposed. The Engineer reserves the right to direct the removal or replacement of any item which, in his opinion, does not present a reasonably neat or workmanlike appearance, providing that same can be properly installed in an orderly way by usual methods for such work. All specialties and appurtenances shall be installed to conform to the manufacturer's recommendations unless otherwise specified.

1.14 EQUIPMENT BY OTHERS:

A. This Contractor shall make electrical connections to equipment installed by other trades. The mechanical contractor shall install all motor driven equipment and motors furnished under this contract.

1. The Contractor shall verify the electrical requirements of equipment and appliances furnished by others with data provided by the successful vendor or vendors. The Contractor shall provide the proper sized circuits, circuit breakers, starters, disconnect switches, receptacles, etc. as required to connect this equipment. If changes are required to electrical systems shown on the drawings, the Contractor shall make these changes at no additional cost to Owner.

1.15 CUTTING AND REPAIRING:

A. The Contractor shall coordinate the work to eliminate cutting of the construction except as specified. Where it becomes necessary to cut through the construction to permit the installation of work or the repair of defective work, it shall be done by mechanics skilled in the trade of erecting the type of work involved. The Contractor without additional compensation shall pay the cost of cutting and repairing. No cutting shall be done to any structural members unless the Engineer grants specific permission, in writing.

1.16 SLEEVES, INSERTS, SUPPORTS, ANCHOR BOLTS, FLASHING AND FOUNDATIONS:

A. Furnish and install all sleeves, inserts, supports, anchor bolts, flashing, counter flashing and foundations required for the proper installation of the proposed work.

1.17 CLEANING:

A. All debris resulting from the construction shall be removed from the project site daily. Upon completion of the project, unused materials and equipment shall be removed from the project site. All visible labels, dirt overspray, paint, grease,

and stains shall be removed from all electrical equipment. Labels indicating testing laboratory approval or giving parts numbers shall be left in place.

1.18 TESTING:

A. The Contractor shall test the entire wiring system for proper voltage level and balance, and for short circuits and grounds in accordance with established methods upon completion of work. The system shall operate satisfactorily in every respect. This Contractor shall make all corrections to accomplish such.

1.19 INSPECTIONS:

A. The Contractor shall cooperate with and provide assistance to the Engineer or the Engineer's Inspector in making periodic and final inspections of the work. This assistance shall include, but not necessarily be limited to, the furnishing of labor, tools, etc. to operate equipment and demonstrate its proper functioning. Also included shall be the removal of outlet, junction box and panel covers, etc. as necessary for the Engineer to inspect the work.

1.20 GUARANTEE:

A. Any defects from imperfect or improper materials or faults arising from improper workmanship that may appear within a period of twelve (12) months from the date of final acceptance of the system shall be amended and made good by the Contractor at his own cost. Any defects or faults shall be attended to within ten (10) days after receiving written notice from the Engineer. Failure to promptly attend to said defects or faults shall be sufficient cause for the Owner to correct the problem with the Owner's forces or the forces of others and invoice the Contractor for any and all charges, including management and overhead, related to correcting said problem.

END OF SECTION

SECTION T-16060
GROUNDING

PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:

1. Solid grounding of electrical systems, equipment, machine frames, enclosures, appliances and structures.

2. Basic requirements for grounding for protection of life, equipment, circuits, and systems.

3. Grounding requirements specified in this Section may be supplemented in other sections of these Specifications.

1.02 REFERENCES:

A. American Society for Testing and Materials (ASTM):

1. B3 Standard Specification for Soft or Annealed Copper Wire.

2. B8 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard or Soft.

3. B33 Standard Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes.

B. National Fire Protection Association (NFPA):

1. 70 National Electrical Code

2. 78 Lightning Protection Code

C. Underwriters Laboratories Inc. (UL)

1. 467 UL Standard for Safety Grounding and Bonding Equipment.

1.03 SUBMITTALS – FOR APPROVAL:

A. Procedure: Submit in accordance with Section 01300 and 16010.

B. Product Data: Submit for grounding conductors, ground rods, clamps, connectors, wells and insulating materials.

1.04 SUBMITTALS – RECORD DATA:

A. Submit in accordance with Section 01300.

B. Product Data: Approved, as furnished data as listed above.

C. Test Reports

1.05 QUALITY ASSURANCE:

A. Items provided under this Section shall be listed or labeled by UL.

B. Regulatory Requirements:

1. National Electrical Code (NEC): Provide components and installation as required by National Fire Protection Association (NFPA) 70, Article 250.

PART 2 PRODUCTS

2.01 GENERAL:

A. Provide products in quantities, sizes and ratings to comply with the NEC or the design drawings, whichever requirements are more stringent.

B. Conductor Materials: Copper

C. Connector Materials: Copper or bronze, tin-plated where required for corrosion resistance.

2.02 CONDUCTORS:

A. Grounding Electrode Conductor: Soft drawn copper, Class B stranded per ASTM B-8, 600 volt TW, THW or THWN insulation. Size per NEC 250.

B. Equipment Grounding Conductor: Soft drawn copper, Class B stranded per ASTM B-8 except that conductor sizes Nos. 12 and 10 AWG used in lighting and receptacle branch circuits may be solid conductor. All conductors shall have 600 volt, TW, THW or THWN insulation.

C. Grounding Grid Conductor: Medium hard drawn bare copper, Class B stranded per ASTM B-8, No. 2/0 AWG or as otherwise indicated on the drawings.

D. Color Code: Insulation color shall be green, except that sizes No. 2 AWG and larger may be black with green colored tape spirally applied over all visible surfaces within enclosures.

2.03 WIRE CONNECTORS:

A. Terminal Lugs: Copper alloy, tin-plated, compression type, Burndy type, YA, NEMA 1 hole for sizes No. 6 through No. 1/0 AWG. Burndy type YGHA, NEMA 2 hole pad for sizes No. 2/0 AWG and larger.

B. Split Bolt Connectors: Burndy SERVIT, type KS

C. Taps and Splices:

1. Grounding Grid below Grade: Exothermic type (Cadweld) or compression type (Burndy Hyground).

2. Above Grade: Compression type.

2.04 CONDUIT CONNECTORS:

A. Conduit Clamps: Burndy type GAR or GD.

B. Grounding Bushings: 0-Z/GEDNEY

2.05 GROUNDING ELECTRODES:

A. Ground Rods: ¾ inch diameter, 10 feet long, copper clad steel with high strength sheath, molten welded to core.

B. Rod Connectors:

1. Exothermic type: Cadweld

2. Mechanical type: Burndy type GAR or GD

C. Test Wells: (Not Required)

2.06 INSULATING MATERIALS:

A. Tape: Scotch 33+ vinyl plastic.

B. Mastic Pads: Scotch EZ – Seal

PART 3 EXECUTION

3.01 INSTALLATION:

A. General:

1. Provide grounding of systems, equipment and structures in accordance with NEC Article 250, the requirements of the authority having jurisdiction and the design drawings.

B: Service Entrance:

1. Provide a main bonding jumper between the service neutral conductor, the service equipment ground bus and the service equipment enclosure.

2. Provide a grounding electrode conductor to connect the service neutral conductor to the main grounding electrode.

B. Building Steel and Piping:

1. Provide bonding jumper from the service neutral to the building steel and metallic piping systems.

E. Equipment Grounding:

1. Provide a green insulated equipment grounding conductor in <u>all</u> branch circuits and feeder conduits. Size conductor in accordance with NEC 250 unless otherwise indicated on the drawings.

2. Connect the equipment grounding conductor to panelboard or switchgear ground bus and to all metallic raceways, outlet boxes, lighting fixtures, equipment enclosures, appliances and motor frames.

3. Where metallic raceways are installed, both the raceway and the internal equipment grounding conductor shall be utilized for equipment grounding.

F. Grounding Grid:

1. Excavate and backfill for main grounding grid conductor. Locate conductors at least 3 feet away from foundation. Conductor depth shall be 18 to 24 inches below finished grade.

2. Install ground rods vertically in undisturbed soil so that the top of the rod is 18 to 24 inches below finished grade, except that in test wells the top of rods shall be 6 to 8 inches below grade. Space rods a minimum of 10 feet apart.

3. Make underground cable to cable connections using either exothermic or compression type connections.

4. Provide test wells where indicated on the drawings. Install top of test well flush with finished grade or pavement. Use only bolted type rod connectors in test wells.

5. In addition to equipment grounding conductor connections, make connections from the grounding grid to the following items using green, insulated conductors:

a. Electrical equipment ground busses

b. Electrical equipment enclosures

c. Motor frames

d. Steel support frames for electrical equipment

e. Building steel frame

6. Grounding conductors stubbed up from below grade shall be enclosed in a 1 inch Schedule 40 PVC protective sleeve.

G. Conduit:

1. Provide grounding bushings where metallic conduits connect to non-metallic enclosures or stub-up into open-bottom, floor-mounted enclosures.

2. Provide conduit grounding clamps where metallic conduit stub-ups are connected to non-metallic underground conduits.

END OF SECTION

SECTION T-16075
ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:

1. Equipment nameplates and labels
2. Warning and caution signs
3. Operational instruction signs
4. Identification labeling of conduits, cables

B. Related Sections:

1. Additional identification requirements are specified in other Sections of Division 16.

1.02 REFERENCES:

A. Code of Federal Regulations (CFR)

1. 29CFR1910.145 Specification for Accident Prevention Signs

B. National Fire Protection Association (NFPA)

1. 70 National Electrical Code

1.03 SUBMITTALS FOR APPROVAL:

A. Procedure: Submit in accordance with Section 01300 and 16010.

B. Product Data: Submit for each type of product used on project.

C. Schedules: Nameplate engraving schedule.

PART 2 PRODUCTS

2.01 ELECTRICAL IDENTIFICATION PRODUCTS:

A. Engraved Nameplates and Signs:

1. Material: 3 ply plastic laminate, matte-finish, 0.125 inch thickness, white with black center core except that material used for warning signs shall be

red with white center core. Provide punched mounting holes for mechanical fasteners.

2. Size: Minimum size to be 1 inch by 2.5 inches, rectangular shape with square corners.
3. Engraving: Accurately align lettering and engrave into center core. Lettering shall be normal block style. Character size shall be 3/8 inch high for grouped equipment and load designation and ¼ inch for individual equipment, loads and devices.

B. Warning Signs:

1. Fiberglass reinforced polyester, non-adhesive backed, indoor-outdoor with punched mounting holes, Brady B-120.
2. Polyester overlaminated with plastic coating, adhesive-backed, indoor-outdoor, Brady B-302.
3. High Voltage warning signs to read “Danger-High Voltage-Keep Out.”
4. Provide identical signs for each application.

PART 3 EXECUTION

3.01 INSTALLATION:

A. General:

1. Provide labels and signs in accordance with NEC requirements.
2. Install labels and signs at locations for best convenience of viewing without interference with operation and maintenance of equipment.
3. All nameplates and signs used on the project shall be of similar size, style and appearance.

B. Equipment Nameplates:

1. Provide engraved identification nameplates for each of the following:
   a. Panelboards
   b. Circuit breakers
   c. Switches
   d. Contactors
   e. Pull and junction boxes

2. Nameplate legends shall include the equipment identification number as indicated on the design drawings and an appropriate service description.
3. Nameplates for switchgear assemblies, panelboards, and separately enclosed breakers, switches, starters and contactors shall include the operating voltage.

4. Attach engraved nameplates to equipment with self-tapping, stainless steel, round head screws. Use adhesive attachment only where the substrate material is not suitable for screw attachment.

C. Warning Signs:

1. Voltage warning signs where required by the NEC, where indicated on drawing and as follows:
   a. Equipment Rooms: On all doors to equipment rooms containing equipment or circuits over 600 volts or containing exposed live parts. Minimum size shall be 7 inches x 10 inches.
   b. Pull Boxes: On removable covers for all pull and junction boxes containing circuits over 600 volts.
   c. Equipment: On front and rear compartment access doors and covers enclosing live parts. Signs provided as part of equipment that meet these requirements are acceptable.
   d. Fences: On each gate and on each side of fences that enclose equipment or circuits over 600 volts or exposed live parts. Minimum size shall be 10 inches by 14 inches. Locate at intervals not exceeding 30 feet.

2. Multiple Source Signs:
   a. Where enclosures contain voltages from more than one source which are not interrupted by opening the local unit disconnecting means, provide an engraved nameplate bearing the following (or similar) legend:

      "WARNING – MULTIPLE ELECTRICAL SOURCES EXIST WITHIN THIS ENCLOSURE"

      OR

      "WARNING – VOLTAGE MAY BE PRESENT WITH DISCONNECT SWITCH OPEN"

3. Hazardous Operation:
   a. Where operation of an electric switch or control device may create an unsafe or undesirable operating condition, provide an engraved plastic sign with appropriate warning statement.

D. Multiple Services:

1. Where multiple services exist, provide each service disconnect with an additional sign which states the name and location of other service disconnects.

E. Conduits:

1. Identify conduits at each termination and at all transitions from exposed to concealed or underground installation.
2. Mark conduits legibly with a permanent marker pen to indicate conduit per circuit number.

F. Cables:

1. Identify cables in pull and junction boxes, vaults, manholes and where entering switchgear panelboard assembly.
2. Provide an engraved plastic nameplate or other suitable permanent tag for each cable or cable assembly. Attach with self-locking nylon cable tie.
3. Cable identification shall include circuit number and phase as indicated on drawings.

END OF SECTION

SECTION T-16123
WIRE AND CABLE

PART 1 GENERAL

1.01 SUMMARY:

A. Section includes copper wire, cable, associated connectors, and termination hardware used on systems operating at 600 volts or less.

1.02 REFERENCES:

A. American Society for Testing and Materials (ASTM)

1. B8 Concentric-Lay-Stranded Copper Conductor, Hard, Medium Hard, Or Soft.

B. National Electrical Contractor Association (NECA)

1. Standard of Installation

C. National Fire Protection Association (NFPA)

1. 70 National Electrical Code

D. Underwriters Laboratories Inc. (UL)

1. 44 Rubber-Insulated Wires and Cables
2. 83 Thermoplastic-Insulated Wires and Cables
3. 486A Wire Connectors and Soldering Lugs for Use With Copper Conductors
4. 486C Splicing Wire Connectors
5. 510 Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
6. 1569 Metal-Clad Cables

1.03 SUBMITTALS – FOR APPROVAL:

A. Procedures: Submit in accordance with Section 01300 and 16010.

B. Product Data: Submit for each type of wire and cable, terminal lugs, connectors, and cable fittings.

1.04 SUBMITTALS – RECORD DATA:

A. Procedure: Submit in accordance with Section 01300.

B. Product Data: Approved, as furnished data as listed above.

1.05 QUALITY ASSURANCE:

A. Furnish wire, cable, associated connectors, and termination hardware bearing UL label.

PART 2 PRODUCTS

2.01 BUILDING WIRE:

A. Single conductor, soft drawn, annealed copper conductor, Class B stranded except that sizes No. 10 AWG and smaller used for lighting and power branch circuits may be solid. Insulation shall be 600 volt, type THHN/THWN per UL 83 or type XHHW per UL 44.

2.02 TYPE MC CABLE: Metal Clad Cable type MC multi-conductor cabling as manufactured by AFC Cable Systems or equivalent having the following construction features:

A. Conductor: Bare, soft annealed copper, Class B stranded per ASTM B-8.

B. Insulation: Polypropylene tape assembly with 600 volt, 90°C (dry) type THHN insulation with printed number and color identification.

C. Neutral conductor: White – 120v circuits; Gray – 480Y277v circuits

D. Grounding conductor: Green insulated copper ground conductor.

E. Assembly: Three insulated conductors with grounding conductor, non-hygroscopic fillers and overall binder tape per UL 1569.

F. Sheath: High strength, lightweight galvanized interlocking steel strip and color coded on the out side for easy identification.

G. U.L rated 1569

2.03 CONNECTORS AND TERMINALS:

A. Insulated Crimp Type Connectors and Terminals: Nylon insulated, Burndy INSULINK and INSULUG, or Thomas & Betts Sta-Kon.

B. Split Bolts: High-conductivity copper alloy, Burndy SERVIT or Thomas & Betts Split-Bolt.

C. Two Bolt Connectors: High-conductivity copper alloy, Burndy OKLIP, Type KVS or Blackburn 2BU.

D. Compression Terminals: Copper, long barrel, Burndy HYLUG or Thomas & Betts Color-Keyed.

E. Bolted Terminals: Cast copper alloy, Burndy QIKLUG or Thomas & Betts Locktite.

F. Spring Wire Connectors: Insulated, twist-on type, Ideal Wire Nut or 3M Scotchlok

2.04 CABLE TERMINATIONS:

A. Type MC Cable: Steel set screw connectors

2.05 MISCELLANEOUS COMPONENTS:

A. Tape: UL 510

1. Vinyl Plastic: 3M Scotch 33+ or Scotch 88.
2. Varnished Cambric (VC): 3M Irvington 2920.
3. Friction: Black friction tape.

B. Pulling Lubricants: Ideal Yellow 77 or Polywater Type J.

C. Wire Markers:

1. Individual Wires: Heat shrink, machine printed, Raychem.
2. Multi-Conductor Cables or Groups of Wires as a Cable: Nylon tie on marker, Thomas & Betts Nylon I.D. Ties, Ty-Raps.

D. Wire and Cable Ties: Thomas & Betts Ty-Raps.

PART 3 EXECUTION

3.01 APPLICATION:

A. Wire and Cable:

1. THWN-THHN for power wiring through No. 250 AWG and control wiring in conduit. XHHW for sizes above No. 250 AWG in conduit.
2. TW or THW for equipment grounding conductor.
3. Type MC cable for fixture wipes no longer than 6’ and in accordance with NEC Article 334.
4. No. 12 AWG minimum for power circuits and No. 14 AWG minimum for control circuits unless noted otherwise on drawings.

B. Splices and Taps:

1. Use insulated spring wire connectors for lighting and receptacle branch circuits No. 10 AWG and smaller.
2. Use solderless pressure connectors for branch circuit conductors No. 8 AWG and larger.
3. Do not make splices or taps in feeder circuits or control circuits.

C. Terminals:

1. Use copper compression terminals, NEMA 1 hole for sizes No. 4 AWG and smaller, NEMA 2 hole for sizes No. 2 AWG and larger.
2. Use insulated, ring tongue terminals for signal and control conductors.

3.02 INSTALLATION:

A. Install wire and cable in accordance with the NECA Standard of Installation.

B. Installation in Conduit:

1. Swab conduits completely and thoroughly before pulling in conductors.
2. Pull all conductors into conduit at same time.
3. Use suitable wire pulling lubricant for building wire No. 4 AWG and larger.
4. Do not pull in conductors until conduit system is completed. Do not pull through boxes, fittings or enclosures where a change of conduit alignment or direction occurs.
5. Limit pulling tension to maximum values as recommended by manufacturer.
6. Do not combine circuits into a common conduit other than as indicated on the drawings.

C. Direct Burial Cable:

1. Trench and backfill for direct burial cables. Minimum depth of installation shall be 24 inches.
2. Terminate and ground metallic cable sheath with suitable fittings.

D. Compression Connectors and Terminals:

1. Install on wire and cable with approved tool and die to recommended compression pressure. Do not cut strands from conductors to fit lugs or terminals.

E. Bolted Connectors and Terminals:

1. Torque to manufacturer's recommended foot-pounds for size and class of connector.
2. Where manufacturer's published torquing requirements are not indicated, tighten connectors and terminals to comply with UL 486A torque values.
3. Use galvanized steel bolts, nuts, split-lock washers and flat washers on terminal connections.

F. Wiring in Enclosures:

1. Form and tie conductors in panelboards, cabinets, control panels, motor controllers, wireways, and wiring troughs in a neat and orderly manner.
2. Use Thomas & Betts wire and cable ties of appropriate size and type.
3. Limit spacing between ties to not more than 6 inches.

G. Taping:

1. Above Ground and Dry Locations: Fill voids and irregularities with half-lapped layers of VC (two minimum) or electrical insulation putty. Insulate with three half-lapped layers of vinyl plastic and one half-layer of friction tape.
2. In damp or wet locations, wrap insulated spring wire connectors with 2 layers of vinyl plastic tape.

3.03 COLOR CODING:

A. Power Wiring: Provide color coding for single and multi-conductor power circuits as follows:

Voltage	ΦA	ΦB	ΦC	Neutral
240 volts and below	Black	Red	Blue	White
250 – 600 volts	Brown	Purple	Yellow	Gray

1. For specified insulation and jackets not manufactured with integral colors, use conductors with black insulation or jacket and color-coding tape.

2. Color code conductors entering boxes, troughs, cabinets, and other enclosures.

3. Color code conductors in wireways, trenches, and other locations where conductors are continuously accessible at intervals not exceeding 5 feet.

B. Insulated Equipment Ground: Green.

C. Isolated Ground conductor: Green with Yellow tracer.

3.04 WIRING IDENTIFICATION

A. Control Circuits: Install a permanent wire label at each termination. Identifying numbers shall match approved schematic and wiring diagrams.

B. Feeder and Branch Circuits: Install a permanent wire label at each termination. Identifying numbers shall include source panel designation and circuit number.

3.05 FIELD TESTS:

A. Test conductors after installation is complete and prior to connection to equipment.

B. Perform insulation resistance test on each conductor phase-to-ground with adjacent conductors grounded and test conductor disconnected from equipment. Applied potential shall be 1000 volts dc for one minute. Minimum acceptable test values shall be 50 megohms. Investigate deviations in test values between adjacent phases.

C. Verify tightness of bolted connections with a calibrated torque wrench. Torque values shall be terminal lug manufacturer's recommendations.

END OF SECTION

SECTION T-16136
RACEWAYS

PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:

1. Rigid Galvanized Steel Conduit (RGS)
2. PVC-Coated Rigid Steel Conduit (CRGS)
3. Rigid Aluminum Conduit (RAC)
4. Electrical Metallic Tubing (EMT)
5. PVC Conduit (PVC)
6. Flexible Conduit
7. Associated Fittings
8. Wireways
9. Pull and Junction Boxes

1.02 REFERENCES:

A. American National Standards Institute (ANSI):

1.	C80.1	Rigid Steel Conduit – Zinc Coated
2.	C80.3	Electrical Metallic Tubing – Zinc Coated
3.	C80.5	Rigid Aluminum Conduit

B. National Electrical Manufacturers Association (NEMA):

1.	TC 2	Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
2.	TC 3	PVC Fitting for Use with Rigid PVC Conduit and Tubing
3.	TC 13	Electrical Nonmetallic Tubing (ENT)
4.	TC 14	Filament-Wound Reinforced Thermosetting Resin Conduit and Fittings.

C. National Fire Protection Association (NFPA):

1.	70	National Electrical Code

D. Underwriters Laboratories Inc. (UL):

1.	1	Flexible Metal Conduit
2.	5	Surface Metal Raceways and Fittings
3.	5A	Nonmetallic Surface Raceways and Fittings
4.	6	Rigid Metal Conduit
5.	360	Liquid-Tight Flexible Steel Conduit
6.	514B	Fittings for Conduit and Outlet Boxes
7.	797	Electrical Metallic Tubing
8.	870	Wireways, Auxiliary Gutters, and Associated Fittings
9.	886	Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations

10. 1660 Liquid-Tight Flexible Nonmetallic Conduit

1.03 SUBMITTALS – FOR APPROVAL:

A. Procedure: Submit in accordance with Section 01300 and 16010.

B. Product Data: Submit for each type of conduit, fitting, connector, pull and junction box, and wireway used on the project.

1.04 SUBMITTALS – RECORD DATA:

A. Procedure: Submit in accordance with Section 01300.

B. Product Data: Approved, as furnished data as listed above.

PART 2 PRODUCTS

2.01 RIGID GALVANIZED STEEL (RGS):

A. Conduit: Conduit including elbows, couplings, and nipples shall be standard weight zinc-coated steel, rigid threaded conduit; shall meet the requirements of ANSI C80.1; and shall be hot-dipped galvanized inside, outside and over threads and lacquered inside.

B. Fittings: Conduit fittings and accessories for use with RGS conduit shall be cast malleable iron or ferrous alloy, hot-dipped galvanized or zinc-electro-plated and lacquered. Fittings shall have threaded hubs and gasketed covers. Fittings shall be the product of Crouse-Hinds, Appleton or Gedney or an equal.

C. Boxes: Device and outlet boxes for use with RGS conduit shall be cast malleable iron, hot-dipped galvanized or zinc-electro-plated and lacquered. Boxes shall have threaded hubs and gasketed covers. Boxes shall be the product of Crouse-Hinds, Appleton, Gedney or equal.

D. Fasteners and Supports: All clamps, straps, framing and supporting materials shall be hot-dipped galvanized steel or malleable iron. Bolts, nuts, screws, washers, etc. shall be stainless steel. Cadmium-plated or zinc-plated fasteners and hardware will not be acceptable.

2.02 POLYVINYL CHLORIDE (PVC - SCHEDULE 40):

A. Conduit: Conduit, elbows and couplings shall be Schedule 40 rigid polyvinyl chloride (PVC) conduit per NEMA TC 2 with a 90^0 UL rating, and shall be the standard product of Krayloy or Carlon or approved equal.

B. Fittings: Fittings and accessories for use with Schedule 40 PVC conduit shall conform to NEMA TC 3 and shall be of the same material and manufacturer as the conduit.

2.03 PVC COATED STEEL CONDUIT (CRGS):

A. Conduit: Prior to coating, all conduits, elbows, couplings, nipples etc. shall be standard weight rigid, threaded steel and shall be hot dipped galvanized inside

and out and over the ends. The conduit shall meet the requirements of ANSI C80.1, UL 6, and NEMA RN-1, 1980.

B. Fittings: Prior to coating, fittings shall be cast malleable iron, hot dipped galvanized, Appleton Form 35 or Crouse-Hinds or equivalent with cast cover and neoprene gasket.

C. Boxes: Device and outlet boxes for use with PVC coated conduit shall be cast malleable iron, hot dipped galvanized with threaded hubs and gasketed cast covers or device plates. Boxes shall be the product of Appleton or Crouse-Hinds.

D. PVC Coating: Conduit, fittings, boxes and accessories shall be Plasti-Bond 2 coated, as produced by Robroy Industries Inc. or an approved equal. Before coating, the galvanized surfaces shall be coated with an epoxy-acrylic primer. Exterior surfaces shall have a 40 mil PVC coating applied by dip method. Interior surfaces of conduits, fittings, boxes, etc. shall have a fusion bonded phenolic coating with a thickness of 4-6 mils.

E. Fasteners and Supports: U-bolts, conduit clamps, straps, modular framing channels shall be 1-5/8 1-5/8 minimum section dimensions, Type 304 stainless steel, and shall be the product of Unistrut. Fasteners and attachment hardware shall be Type 304 stainless steel.

2.04 RIGID ALUMINUM CONDUIT:

A. Conduit: Conduit, including elbows, couplings and nipples shall be standard weight, threaded, rigid aluminum 6063 alloy, with a copper content not to exceed 0.20%. The conduit shall have a silicon or lacquer coating inside.

B. Fittings: Fittings, accessories and device boxes for aluminum conduit systems shall be the standard threaded type as manufactured by Crouse-Hinds, Appleton, or equal. Both fittings and covers shall be aluminum containing less than 0.4 of 1% copper. All screws shall be stainless steel. Covers shall be gasketed.

C. Fasteners: All straps and clamps used to support aluminum conduit shall be hot-dipped galvanized steel or malleable iron, with a 40 mil fused PVC coating, Plastibond, Ocal or equivalent. Strut type framing channels shall be either PVC coated galvanized steel or fiberglass.

D. Hardware: Nuts, bolts, screws, washers, etc. shall be stainless steel. Galvanized or cadmium-plated hardware will not be acceptable for use with aluminum conduit.

2.05 ELECTRICAL METALLIC TUBING (EMT):

A. Conduit: Conduit, including elbows, couplings, and nipples shall be hot dipped galvanized steel inside and out with an organic corrosion resistant coating applied to the inside.

B. Fittings and Boxes: Conduit fittings, boxes, and accessories for use with EMT conduit shall be cast malleable iron or ferrous alloy, hot-dipped galvanized or zinc-electro-plated and lacquered. Fittings shall be compression type. Setscrew

fittings are not acceptable. Fittings shall be the product of Crouse-Hinds, Appleton, OZ Gedney or an equal.

C. Fasteners and Supports: All clamps, straps, framing and supporting materials shall be hot-dipped galvanized steel or malleable iron.

2.06 LIQUID-TIGHT FLEXIBLE METAL CONDUIT:

A. Flexible Conduit: Flexible conduit shall have a spiraled, flexible, galvanized steel inner core and an outer jacket of neoprene. Sizes 3/8" through 4" shall have a continuous, internal copper ground. Liquid-tight connectors shall be galvanized steel or malleable iron with neoprene sealing gaskets, external ground lugs and insulated throats. Connectors shall be Appleton type STB or Gedney or equal.

2.07 WIREWAYS:

A. Sheet Metal:

1. Indoor, dry locations: NEMA 1, sheet steel per UL 870 with hinged cover per NEMA ICS 6. Finish being manufacturer's standard gray enamel.
2. Outdoor and damp locations: NEMA 3R, galvanized sheet steel per UL 870 with hinged cover per NEMA ICS 6.

B. Non-Metallic:

1. NEMA 4X, Robroy Industries fiberglass trough with gasketed cover attached with non-metallic fasteners.

C. Fittings and Accessories: Include couplings, hubs, elbows, adapters, end caps and other fittings to match and mate with type of wireway furnished as required for a complete system.

PART 3 EXECUTION

3.01 APPLICATION:

A. General:

1. All field wiring shall be installed in conduit except as otherwise indicated.
2. Minimum conduit size shall be 1/2-inch nominal diameter.

B. Exposed:

1. Conduit installed outdoors exposed shall be rigid galvanized steel.
2. Conduit installed indoors exposed and below 7 feet shall be rigid galvanized steel. Exposed conduit above 7 feet installed indoors may be EMT.

C. Underground:

1. Conduit installed underground shall be Schedule 40 PVC. See section 3.02-E for additional requirements.
2. Elbows used for underground conduit stub-ups from below grade shall be PVC coated rigid galvanized steel, non-metallic Schedule 80 PVC, or

Rigid Galvanized Steel completely taped with non-corrosive protective tape.

D. Concealed:

1. Conduit installed concealed above lay-in ceilings and in dry wall construction shall be EMT.

E. Flexible Connections:

1. Indoor-dry areas: Flexible metal conduit.
2. Indoor-wet, damp areas: Liquid-tight, flexible metal conduit.
3. Outdoors: Liquid-tight, flexible metal conduit.

3.02 INSTALLATION:

A. General:

1. Installation Methods: Conduit shall be installed concealed in walls or above ceiling or underground as indicated on the drawings.

2. Cleaning: All conduit systems shall be completed and shall be swabbed clean before conductors are pulled in.

3. Field cuts: Do not cut conduit with pipe cutters.

4. Bends: Field made bends and offsets shall be made with a hickey or conduit bending machine. Crushed or deformed raceways shall not be installed. The maximum number of 90 bends, or equivalent between pulling points in any conduit run shall be three. Pull and junction fittings and/or boxes shall be provided as necessary to satisfy this requirement.

5. Protection: The ends of all conduit runs shall be closed immediately after installation to prevent the accumulation of water, dirt and other foreign material.

6. Locknuts: Conduits shall be fastened to all sheet metal boxes and cabinets with two locknuts. Locknuts shall have sharp edges for digging into the wall of metal enclosures. Bushings shall be installed on the ends of all conduits and shall be the insulating type.

7. Conduit couplings shall be threaded type for RGS or RA conduit and compression type for EMT conduit. Set-screw couplings are not acceptable.

8. Spare conduits: Spare conduits shall have a pull cord installed. The pull cord shall be plastic with a minimum tensile strength of 200 pounds. Not less that 12 inches of slack shall be left at each end of the pull cord.

9. Supports: Supports shall be provided a minimum of every 10’ and within 3’ of all enclosures. In addition, conduits shall be rigidly supported between couplings, on either side of bends and at terminations and fittings.

10. Boxes: Boxes shall be provided in the raceway system as indicated on the drawings and also wherever required for pulling of wires or making connections. Unless otherwise shown on the drawings, boxes installed in normally wet locations or on the outside of exterior surfaces shall be NEMA 3R, stainless steel sheet construction. Boxes shall be furnished with hinged and gasketed doors and stainless steel back panels. Each box shall have the volume required by the NEC for the number of conductors enclosed in the box. All boxes shall be securely anchored in place.

11. Flexible Connections: Flexible connections of short length shall be provided for equipment subject to vibration, noise transmission or movement. A separate ground conductor shall be provided across all flexible connections. Flexible conduit connections shall be rigidly and securely supported in an approved manner at intervals not exceeding 24 inches in length and within 12 inches of each conduit termination. Lengths of not more than 36 inches may be installed without such supports where flexibility is required.

12. Identification: Identify conduits in accordance with Section 16075.

13. PVC: PVC conduit joints shall be solvent cement welded and shall be watertight. All PVC conduits shall have a separate grounding conductor installed. Where transition is made to the metallic conduit or enclosures, the grounding conductor shall be bonded to the metal conduit or enclosure.

14. Penetrations through walls, floors, and roof: All penetrations shall be sealed with a UL listed fire sealant equal to Dow Corning #3-6548.

B. Exposed Conduit:

1. Routing: Exposed conduit shall be run straight and true to structure lines. Changes in direction of runs shall be made with fittings or symmetrical bends. Conduit in damp locations or outdoors shall be exposed to the air on all sides and shall not be installed tight against walls, ceilings and structural members, etc. Clamp backs and/or offsets shall be used as necessary to maintain uniform clearances.

2. Supports: Acceptable supporting and clamping materials for exposed conduit include one-hole straps and clampback, "U" bolts, parallel or right angle conduit clamps, hot-dipped galvanized structural steel frames or modular stainless steel channel as manufactured by Unistrut or equal. Perforated steel tape, stamped steel one- and two-hole straps shall not be used. Conduits shall be supported in accordance with NEC 346-12.

3. Obstructions: Conduit shall be routed so as not to create any tripping or head banging hazard and so as not to create any obstruction to Owner's operation and maintenance activities.

4. Hubs: Watertight conduit hubs shall be installed where conduits enter the tops or sides of sheet metal or non-metallic enclosures.

5. Drains: Drain fittings shall be installed at low points throughout the conduit system where condensation is likely to occur.

C. PVC Coated Conduit:

1. PVC coated conduit requires special care to minimize damage to the PVC coating during cutting, threading, bending and installation. Contractor shall install conduit in accordance with manufacturer's recommended installation procedures.

2. Contractor shall be responsible for providing strap wrenches, cutting dies, vises, and other special tools required to install PVC coated conduit. Standard pipe wrenches, chain wrenches or channel locks shall not be used. Conduit bending equipment shall have the proper diameter shoes or dies to allow for the thickness of the PVC coating.

3. PVC coated conduit shall be supported with Type 304 stainless steel clamps, straps, hangers and supports. Attachment hardware shall be Type 316 stainless steel.

4. All PVC coated conduit and fittings that have teeth marks, cuts, nicks or are otherwise damaged shall be repaired by coating damaged area with a liquid PVC touch-up compound. Spray-type compound is not acceptable.

5. Unistrut channel supports and related accessories for use with PVC coated conduit shall be Type 304 stainless steel.

D. Aluminum:

1. Aluminum conduit shall not be installed in direct contact with earth, concrete, steel, copper, brass or bronze. Where aluminum conduit comes into contact with dissimilar metals or passes through concrete walls or floors, it shall be wrapped with 2 layers, half-lapped, of corrosion preventative pipe tape, Scotch 50 or equal.

2. Aluminum conduit threads shall have a Penetrox, No-Ox-Id or equal, applied when installed.

E. Underground Conduit:

1. Under Landscaping (i.e. sod or grass):

a. Underground conduit runs shall be laid in sand and covered with a 4” red concrete cap. The conduit shall be surrounded by a minimum of 3-inches of virgin sand (top, bottom, and sides).

b. Where conduits are routed under paved areas that are accessible to vehicles, the conduit shall be encased in steel reinforced concrete duct bank. See Section 16136-3.02-E-2.

c. The top of concrete cap or duct bank shall be a minimum of 24 inches below grade, unless otherwise indicated and must go below conflicts, such as yard piping, if the 24 inches minimum depth cannot be met. Compact trench backfill to original density.

2. Concrete Encasement (Under Driveways and Roads):

   a. Underground conduit runs shall be encased in red concrete. The minimum thickness of cover shall be 3 inches.

   b. Where conduits rise above grade, the concrete encasement shall extend to 6 inches above grade. Exposed concrete shall be natural color, not red. Where conduits run through equipment foundations or floor slabs, the concrete encasement shall butt the underside of the slab.

   c. The top of concrete encasement shall be a minimum of 24 inches below grade, unless otherwise indicated and must go below conflicts, such as yard piping, if the 24 inches minimum depth cannot be met. Compact trench backfill to original density.

   d. The concrete encasement shall be reinforced with a minimum of four (4) No. 4 steel reinforcing bars.

3. Separation: Minimum separation between the outside edges of adjacent conduits shall be 3 inches.

4. Elbows: All elbows shall be long radius type.

5. Spacers: Conduit spacers shall be installed at 5 feet on centers.

6. Expansion Fittings: Provide expansion fittings in aboveground, vertical portion of each underground conduit stub-up.

END OF SECTION

SECTION T-16140
WIRING DEVICES

PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:

1. Receptacles
2. Ground Fault Circuit Interrupter Receptacles
3. Snap Switches
4. Wall Plates

1.02 REFERENCES:

A. National Electrical Manufacturers Association (NEMA):

1. WD1-83 General Requirements for Wiring Devices

B. National Fire Protection Association (NFPA):

1. 70 National Electrical Code

C. Underwriters Laboratories Inc. (UL):

1. 20-86 Standard for Safety General Use Snap Switches
2. 94-91 Standard for Safety Tests for Flammability of Plastic Materials for Parts in Devices and Appliances
3. 498091 Standard for Safety Attachment Plugs and Receptacles

1.03 SUBMITTALS:

A. Procedures: Submit for approval and record purposes in accordance with Section 01300 and 16010.

B. Product Data: Submit for each type of device used on project.

1.04 QUALITY ASSURANCE:

A. Items provided under this section shall be listed and labeled by UL or other Nationally Recognized Testing Laboratory (NRTL).

1. Term "NRTL" shall be as defined in OSHA Regulation 1910.7.
2. Terms "listed" and "labeled" shall be defined as they are in National Electrical Code, Article 100.

B. Regulatory Requirements:

1. National Electrical Code: Components and installation shall comply with NFPA 70.

PART 2 PRODUCTS

2.01 WIRING DEVICES:

A. General: Provide wiring devices, in types, characteristics, grades, colors, and electrical ratings for applications indicated which are UL listed and which comply with NEMA WD 1 and other applicable UL and NEMA Standards.

B: Receptacles, General Use Duplex Receptacles: 125 volt, 15 or 20 amp, heavy duty, grounding type:

Manufacturer	Color	5-15R Duplex	5-20-R Duplex
Hubbell	Ivory	5262-I	5362-I
Leviton	Ivory	5262-I	5362-I
P& S	Ivory	5262-I	5362-I

C: Ground-Fault Circuit Interrupter (GFCI) Receptacles: 125 volt, 15 or 20 amp, heavy duty, grounding type "non feed-through" conforming to UL 498 and UL 943:

Manufacturer	Color	5 - 15R	5 - 20R
Hubbell	Ivory	GF5262-I	GF5362-IA
Leviton	Ivory	7599-I	7899-I
P & S	Ivory	1591-RI	2091-IL

D: Snap Switches: 120/277 volt, 20 ampere, quiet rated, heavy duty, complying with UL 20 and NEMA WD1:

Manufacturer	Color	1 Pole	2 Pole	3 Way	4 Way
Hubbell	Ivory	1221-I	1222-I	1223-I	1224-I
Leviton	Ivory	1221-2I	1222-2I	1223-2I	1224-2I
P & S	Ivory	20AC1-I	20AC2-I	20AC3-I	20AC4-I

2.02 WIRING DEVICE ACCESSORIES:

A. Wall Plates:

1. Single and combination, of types, sizes, and with ganging and cutouts as required by devices.
2. Provide plates which mate and match with wiring devices to which attached.
3. Provide metal screws for securing plates to devices with screw heads colored to match finish of plates.
4. Provide plates possessing following additional construction features.

   a. Device plates: stainless steel.
   b. Device plates for surface mounted, 4 inch sq boxes: 1/2 inch stainless steel covers.
   c. Weatherproof covers for exterior devices or devices in damp locations: Raintight while in use, UL listed, molded UV stabilized poly-carbonate with stainless steel screws and mounting gaskets. Tay Mac Corporation safety outlet enclosure, or equal.

PART 3 EXECUTION

3.01 INSTALLATION:

A. Install wiring devices and accessories as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and in accordance with recognized industry practices to fulfill project requirements.

B. Coordinate with other Work, including painting, electrical boxes and wiring installations, as necessary to interface installation of wiring devices with other Work.

C. Install wiring devices only in electrical boxes that are clean; free from building materials, dirt and debris.

D. Mounting Heights: Unless otherwise indicated or directed, boxes for wiring devices shall be mounted so that the centerline of the device is at the following height above finished floor (AFF) or above finished grade (AFG).

DEVICE	FINISHED AREAS	UNFINISHED AREAS
Snap switches	48"	48"
Convenience Receptacles	18"	18"

E. Install wiring devices after wiring work is completed.

F. Install wall plates after painting work is completed.

G. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A. Use properly scaled torque indicating hand tool.

H. Do not use terminals on wiring devices (hot or neutral) for feed-through connections, looped or otherwise. Make circuit connections via wire connectors and pigtails.

I. Ground receptacles with insulated green ground wire from device ground screw to bolted outlet box connection.

3.02 PROTECTION:

A. Protect installed components from damage. Replace damaged items prior to final acceptance.

3.03 FIELD QUALITY CONTROL:

A. Testing: Prior to energizing circuits, test wiring for electrical continuity and for short circuits. Ensure proper polarity of connections is maintained. Subsequent

to energizing, test wiring devices and demonstrate compliance with requirements, operating each operable device at least six (6) times.

B. Test receptacles with Hubbell 5200, Woodhead 1750 or equal for correct polarity, proper ground connection and wiring faults.

C. Test ground fault interrupter operation with both local and remote fault simulations in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 16235

EMERGENCY/STANDBY POWER SYSTEMS

GENERATOR SET(S)

PART 1. GENERAL

1.01 SCOPE

A. Provide complete factory assembled generator set equipment with digital (microprocessor-based) electronic generator set controls, digital governor, and digital voltage regulator.

B. Provide factory test, startup by a supplier authorized by the equipment manufacturer(s), and on-site testing of the system.

C. The generator set manufacturer shall warrant all equipment provided under this section, whether or not is manufactured by the generator set manufacturer, so that there is one source for warranty and product service. Technicians specifically trained and certified by the manufacturer to support the product and employed by the generator set supplier shall service the generator sets.

1.02 CODES AND STANDARDS

A. The generator set installation and on-site testing shall conform to the requirements of the following codes and standards, as applicable. The generator set shall include necessary features to meet the requirements of these standards.

1. CSA 282, 1989 Emergency Electrical Power Supply for Buildings
2. IEEE446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
3. NFPA37 –
4. NFPA70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
5. NFPA99 – Essential Electrical Systems for Health Care Facilities
6. NFPA110 – Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Level 1prototype tests required by this standard shall have been performed on a complete and functional unit, component level type tests will not substitute for this requirement.

B. The generator set and supplied accessories shall meet the requirements of the following standards:

1. NEMA MG1-1998 part 32. Alternator shall comply with the requirements of this standard.
2. UL142 – Sub-base Tanks
3. UL1236 – Battery Chargers
4. UL2200. The generator set shall be listed to UL2200 or submit to an independent third party certification process to verify compliance as installed..

C. The control system for the generator set shall comply with the following requirements.

1. CSA C22.2, No. 14 – M91 Industrial Control Equipment.
2. EN50082-2, Electromagnetic Compatibility – Generic Immunity Requirements, Part 2: Industrial.
3. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.
4. FCC Part 15, Subpart B.
5. IEC8528 part 4. Control Systems for Generator Sets
6. IEC Std 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions.
7. UL508. The entire control system of the generator set shall be UL508 listed and labeled.
8. UL1236 –Battery Chargers.

D. The generator set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

1.03 ACCEPTABLE MANUFACTURERS

A. Only approved bidders shall supply equipment provided under this contract. Equipment specifications for this project are based on generator sets manufactured by Cummins Power Generation with microprocessor-based controls.

B. Acceptable manufacturers include:

1. Kolher
2. Generac
3. Caterpillar
4. Taylor Power Systems

C. Requests for substitutions must be submitted 10 days prior to the bid date for consideration. See section 16010-1.10 for substitution submittal requirements. Proposals must include a line by line compliance statement based on this specification.

1.04 SUBMITTALS

A. Procedure: Submit in accordance with Section 01300, 16010, and as stated herein.

B. Within 10 days after award of contract, provide six sets of the following information for review:

- Manufacturer’s product literature and performance data, sufficient to verify compliance to specification requirements.
- A paragraph by paragraph specification compliance statement, describing the differences between the specified and the proposed equipment.
- Manufacturer's certification of prototype testing.

- Manufacturer's published warranty documents.
- Shop drawings showing plan and elevation views with certified overall dimensions, as well as wiring interconnection details.
- Interconnection wiring diagrams showing all external connections required; with field wiring terminals marked in a consistent point-to-point manner.
- Manufacturer's installation instructions.

PART 2. PRODUCTS

2.01 GENERATOR SET

A. Ratings

1. The generator set shall operate at 1800 rpm and at a voltage of: 120/208 Volts AC, Three phase, 4 wire, 60 hertz.
2. The generator set shall be rated at 60kW, 75kVA at 0.8 PF, Standby rating, based on site conditions of : Altitude 1000ft. , ambient temperatures up to 104 degrees F (40 degrees C).
3. The generator set rating shall be based on emergency/standby service.

B. Performance

1. Voltage regulation shall be plus or minus 0.5 percent for any constant load between no load and rated load. Random voltage variation with any steady load from no load to full load shall not exceed plus or minus 0.5 percent.
2. Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.5%.
3. The diesel engine-generator set shall accept a single step load of 100% nameplate kW and power factor, less applicable derating factors, with the engine-generator set at operating temperature.
4. Motor starting capability shall be a minimum of 78kVA. The generator set shall be capable of recovering to a minimum of 90% of rated no load voltage following the application of the specified kVA load at near zero power factor applied to the generator set. Maximum voltage dip on application of this load, considering both alternator performance and engine speed changes shall not exceed 25%.
5. The alternator shall produce a clean AC voltage waveform, with not more than 5% total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3% in any single harmonic, and no 3rd order harmonics or their multiples. Telephone influence factor shall be less than 40.
6. The generator set shall be certified by the engine manufacturer to be suitable for use at the installed location and rating, and shall meet all applicable exhaust emission requirements at the time of commissioning.

C. Construction

1. The engine-generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails.

2. All switches, lamps, and meters in the control system shall be oil-tight and dust-tight. All active control components shall be installed within a UL/NEMA 3R enclosure. There shall be no exposed points in the control (with the door open) that operate in excess of 50 volts.

D. Connections

1. The generator set load connections shall be composed of silver or tin plated copper bus bars, drilled to accept mechanical or compression terminations of the number and type as shown on the drawings. Sufficient lug space shall be provided for use with cables of the number and size as shown on the drawings.

2. Power connections to auxiliary devices shall be made at the devices, with required protection located at a wall-mounted common distribution panel.

3. Generator set control interfaces to other system components shall be made on a permanently labeled terminal block assembly. Labels describing connection point functions shall be provided.

2.02 ENGINE AND ENGINE EQUIPMENT

The engine shall be diesel, 4 cycle, radiator and fan cooled. Minimum displacement shall be 239.0 cubic inches, with 4 - cylinders. The horsepower rating of the engine at its minimum tolerance level shall be sufficient to drive the alternator and all connected accessories. Two cycle engines are not acceptable. Engine accessories and features shall include:

A. An electronic governor system shall provide automatic isochronous frequency regulation. The control system shall actively control the fuel rate and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed. The governing system shall include a programmable warm up at idle and cool down at idle function. While operating in idle state, the control system shall disable the alternator excitation system.

B. Skid-mounted radiator and cooling system rated for full load operation in 122 degrees F (50 degrees C) ambient as measured at the alternator air inlet. Radiator fan shall be suitable for use in a system with 0.5 in H_2O restriction. Radiator shall be sized based on a core temperature that is 20F higher than the rated operation temperature, or prototype tested to verify cooling performance of the engine/radiator/fan operation in a controlled environment. Radiator shall be provided with a duct adapter flange. The equipment manufacturer shall fill the cooling system with a 50/50-ethylene glycol/water mixture prior to shipping. Rotating parts shall be guarded against accidental contact.

C. Electric starter(s) capable of three complete cranking cycles without overheating.

D. Positive displacement, mechanical, full pressure, lubrication oil pump.

E. Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator.

F. An engine driven, mechanical, positive displacement fuel pump. Fuel filter with replaceable spin-on canister element. Fuel cooler, suitable for operation of the generator set at full rated load in the ambient temperature specified shall be provided if required for operation due to the design of the engine and the installation.

G. Replaceable dry element air cleaner with restriction indicator.

H. Flexible supply and return fuel lines.

I. Engine mounted battery charging alternator, 40-ampere minimum, and solid-state voltage regulator.

J. Coolant heater

1. Engine mounted, thermostatically controlled, coolant heater(s) for each engine. Heater voltage shall be as shown on the project drawings. The coolant heater shall be UL499 listed and labeled.

2. The coolant heater shall be installed on the engine with silicone hose connections. Steel tubing shall be used for connections into the engine coolant system wherever the length of pipe run exceeds 12 inches. The coolant heater installation shall be specifically designed to provide proper venting of the system. The coolant heaters shall provisions to isolate the heater for replacement of the heater element without draining the coolant from the generator set. The quick disconnect/automatic sealing couplers shall allow the heater element to be replaced without draining the engine cooling system or significant coolant loss.

3. The coolant heater shall be provided with a DC thermostat, installed at the engine thermostat housing. An AC power connection box shall be provided for a single AC power connection to the coolant heater system.

4. The coolant heater(s) shall be sized as recommended by the engine manufacturer to warm the engine to a minimum of 104F (40C) in a 40F (4C) ambient, in compliance with NFPA110 requirements, or the temperature required for starting and load pickup requirements of this specification.

K. Provide vibration isolators, spring/pad type, quantity as recommended by the generator set manufacturer. Isolators shall include seismic restraints if required by site location.

L. Starting and Control Batteries shall be calcium/lead antimony type, 12 volt DC, sized as recommended by the engine manufacturer, complete with battery cables and connectors. The batteries shall be capable of a minimum of three complete 15-second cranking cycles at 40F ambient temperature when fully charged.

M. Provide exhaust silencer(s) for each engine of size and type as recommended by the generator set manufacturer and approved by the engine manufacturer. The mufflers shall be critical grade. Exhaust system shall be installed according to the engine manufacturer's recommendations and applicable codes and standards.

N. Provide a dual wall sub-base fuel storage tank with a minimum of 75 gallons capacity. The tank shall be constructed of corrosion resistant steel and shall be UL listed. The equipment, as installed, shall meet all local and regional requirements for above ground tanks.

2.03 AC GENERATOR

A. The AC generator shall be; synchronous, four pole, 2/3 pitch, revolving field, drip-proof construction, single prelubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc. All insulation system components shall meet NEMA MG1 temperature limits for Class H insulation system and shall be UL1446 listed. Actual temperature rise measured by resistance method at full load shall not exceed 105 degrees Centigrade.

B. The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.

C. A permanent magnet generator (PMG) shall be included to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single phase or three phase fault at approximately 300% of rated current for not more than 10 seconds.

D. The subtransient reactance of the alternator shall not exceed 15 percent, based on the standby rating of the generator set.

2.04 GENERATOR SET CONTROLS.

The generator set shall be provided with a microprocessor-based control system that is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification.

The control shall be mounted on the generator set, or may be mounted in a free-standing panel next to the generator set if adequate space and accessibility is available. The control shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered.

The generator set mounted control shall include the following features and functions:

A. Control Switches

1. Mode Select Switch. The mode select switch shall initiate the following control modes. When in the RUN or MANUAL position the generator set shall start, and accelerate to rated speed and voltage as directed by the operator. A separate push-button to initiate starting is acceptable. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.
2. EMERGENCY STOP Switch: Switch shall be Red "mushroom-head" push-button. Depressing the emergency stop switch shall cause the generator set to immediately shut down, and be locked out from automatic restarting.
3. RESET switch. The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.
4. PANEL LAMP switch: Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.

B. Generator Set AC Output Metering. The generator set shall be provided with a metering set including the following features and functions:

1. Digital metering set, 1% accuracy, to indicate generator RMS voltage and current, frequency, output current, output KW, KW-hours, and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three-phase voltages (line to neutral or line to line) simultaneously.
2. Analog voltmeter, ammeter, frequency meter, power factor meter, and kilowatt (KW) meter. Voltmeter and ammeter shall display all three phases. Meter scales shall be color coded in the following fashion: green shall indicate normal operating condition, amber shall indicate operation in ranges that indicate potential failure, and red shall indicate failure impending.

Metering accuracy shall be within 1% at rated output. Both analog and digital metering are required.

3. The control system shall monitor the total load on the generator set, and maintain data logs of total operating hours at specific load levels ranging from 0 to 110% of rated load, in 10% increments. The control shall display hours of operation at less than 30% load and total hours of operation at more than 90% of rated load.
4. The control system shall log total number of operating hours, total kWH, and total control on hours, as well as total values since reset.

C. Generator Set Alarm and Status Display.

1. The generator set control shall include LED alarm and status indication lamps. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. Functions indicated by the lamps shall include:

   - The control shall include five configurable alarm-indicating lamps. The lamps shall be field adjustable for any status, warning, or shutdown function monitored by the genset. They shall also be configurable for color, and control action (status, warning, or shutdown).
   - The control shall include green lamps to indicate that the generator set is running at rated frequency and voltage, and that a remote start signal has been received at the generator set. The running signal shall be based on actual sensed voltage and frequency on the output terminals of the generator set.
   - The control shall include a flashing red lamp to indicate that the control is not in automatic state, and red common shutdown lamp.
   - The control shall include an amber common warning indication lamp.

2. The generator set control shall indicate the existence of the warning and shutdown conditions on the control panel. All conditions indicated below for warning shall be field-configurable for shutdown. Conditions required to be annunciated shall include:

   low oil pressure (warning)
   low oil pressure (shutdown)
   oil pressure sender failure (warning)
   low coolant temperature (warning)
   high coolant temperature (warning)
   high coolant temperature (shutdown)
   high oil temperature (warning)
   engine temperature sender failure (warning)
   low coolant level (warning)
   fail to crank (shutdown)
   fail to start/overcrank (shutdown)
   overspeed (shutdown)
   low DC voltage (warning)
   high DC voltage (warning)
   weak battery (warning)
   low fuel-daytank (warning)
   high AC voltage (shutdown)
   low AC voltage (shutdown)
   under frequency (shutdown)
   over current (warning)

over current (shutdown)
short circuit (shutdown)
over load (warning)
emergency stop (shutdown)
(4) configurable conditions

3. Provisions shall be made for indication of four customer-specified alarm or shutdown conditions. Labeling of the customer-specified alarm or shutdown conditions shall be of the same type and quality as the above-specified conditions. The non-automatic indicating lamp shall be red, and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.

D. Engine Status Monitoring.

1. The following information shall be available from a digital status panel on the generator set control :

   engine oil pressure (psi or kPA)
   engine coolant temperature (degrees F or C)
   engine oil temperature (degrees F or C)
   engine speed (rpm)
   number of hours of operation (hours)
   number of start attempts
   battery voltage (DC volts)

2. The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set, as well as total time of operation at various loads, as a percent of the standby rating of the generator set.

E. Engine Control Functions.

1. The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15-second rest period between cranking periods.
2. The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled.
3. The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting.
4. The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.
5. The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature which is capable of discriminating between failed sender or wiring components, and an actual failure conditions.

F. Alternator Control Functions:

1. The generator set shall include a full wave rectified automatic digital voltage regulation system that is matched and prototype tested by the engine manufacturer with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase line to neutral RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below an adjustable frequency threshold. Torque matching characteristic shall be adjustable for roll-off frequency and rate, and be capable of being curve-matched to the engine torque curve with adjustments in the field. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alphanumeric LED readout to indicate setting level. Rotary potentiometers for system adjustments are not acceptable.

2. Controls shall be provided to monitor the output current of the generator set and initiate an alarm (over current warning) when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (over current shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.

3. Controls shall be provided to individually monitor all three phases of the output current for short circuit conditions. The control/protection system shall monitor the current level and voltage. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (short circuit shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.

4. Controls shall be provided to monitor the KW load on the generator set, and initiate an alarm condition (over load) when total load on the generator set exceeds the generator set rating for in excess of 5 seconds. Controls shall include a load shed control, to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.

5. An AC over/under voltage monitoring system that responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds.

G. Other Control Functions

1. A battery monitoring system shall be provided which initiates alarms when the DC control and starting voltage is less than 25VDC or more than 32 VDC. During engine cranking (starter engaged), the low voltage limit shall be disabled, and DC voltage shall be monitored as load is applied to the battery, to detect impending battery failure or deteriorated battery condition.

H. Control Interfaces for Remote Monitoring:

1. The control system shall provide four programmable output relays. These relay outputs shall be configurable for any alarm, shutdown, or status condition monitored by the control. The relays shall be configured to indicate: (1) generator set operating at rated voltage and frequency, (2) common warning, (3) common shutdown, (4) load shed command.

2. A fused 10 amp switched 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit whenever the generator set is running.

3. A fused 10 amp 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit at all times from the engine starting/control batteries.

4. The control shall be provided with a direct serial communication link for the LonWorks communication network interface as described elsewhere in this specification and shown on the drawings.

2.05 OTHER EQUIPMENT TO BE PROVIDED WITH THE GENERATOR SET

A. Provide and install a 20-light LED type remote alarm annunciator with horn, located as shown on the drawings or in a location that can be conveniently monitored by facility personnel. The remote annunciator shall provide all the audible and visual alarms called for by NFPA Standard 110 for level 1 systems for the local generator control panel. Spare lamps shall be provided to allow future addition of other alarm and status functions to the annunciator. Provisions for labeling of the annunciator in a fashion consistent with the specified functions shall be provided. Alarm silence and lamp test switch(es) shall be provided. LED lamps shall be replaceable, and indicating lamp color shall be capable of changes needed for specific application requirements. Alarm horn shall be switchable for all annunciation points. Alarm horn (when switched on) shall sound for first fault, and all subsequent faults, regardless of whether first fault has been cleared, in compliance with NFPA110 3-5.6.2. The interconnecting wiring between the annunciator and other system components shall be monitored and failure of the interconnection between components shall be displayed on the annunciator panel.

B. The annunciator shall include the following alarm labels, audible annunciation features, and lamp colors:

Condition	Lamp Color	Audible Alarm
Normal Power (to Loads)	Green	No
Genset Supplying Load	Amber	No
Genset Running	Green	No
Not in Auto	Red (Flashing)	Yes
High Battery Voltage	Red	Yes
Low Battery Voltage	Red	Yes

Charger AC Failure	Red	Yes
Fail to Start	Red	Yes
Low Engine Temperature	Amber	Yes
Pre-High Engine Temperature	Amber	Yes
High Engine Temperature	Red	Yes
Pre-Low Oil Pressure	Amber	Yes
Low Oil Pressure	Red	Yes
Overspeed	Red	Yes
Low Coolant Level	Amber	Yes
Low Fuel Level	Amber	Yes
Network OK	Green	Yes
(4) Spares	Configurable	Configurable

Low battery voltage lamp shall also be lighted for low cranking voltage or weak battery alarm.

C. The generator set shall be provided with a mounted main line circuit breaker, sized to carry the rated output current of the generator set. The circuit breaker shall incorporate an electronic trip unit that operates to protect the alternator under all overcurrent conditions, or a thermal-magnetic trip with other overcurrent protection devices that positively protect the alternator under overcurrent conditions. The supplier shall submit time overcurrent characteristic curves and thermal damage curve for the alternator, demonstrating the effectiveness of the protection provided.

D. Outdoor Weather-Protective Enclosure

1. The generator set shall be provided with an outdoor enclosure, with the entire package listed under UL2200. The package shall comply with the requirements of the National Electrical Code for all wiring materials and component spacing. The total assembly of generator set, enclosure, and sub-base fuel tank (when used) shall be designed to be lifted into place using spreader bars. Housing shall provide ample airflow for generator set operation at rated load in an ambient temperature of 100F. The housing shall have hinged access doors as required to maintain easy access for all operating and service functions. All doors shall be lockable, and include retainers to hold the door open during service. Enclosure roof shall be cambered to prevent rainwater accumulation. Openings shall be screened to limit access of rodents into the enclosure. All electrical power and control interconnections shall be made within the perimeter of the enclosure.

2. All sheet metal shall be primed for corrosion protection and finish painted with the manufacturers standard color using a two step electrocoating paint process, or equal meeting the performance requirements specified below. All surfaces of all metal parts shall be primed and painted. The painting process shall result in a coating that meets the following requirements:

   Primer thickness, 0.5-2.0 mils. Top coat thickness, 0.8-1.2 mils.

   Gloss, per ASTM D523-89, 80% plus or minus 5%. Gloss retention after one year shall exceed 50%.

   Crosshatch adhesion, per ASTM D3359-93, 4B-5B.

   Impact resistance, per ASTM D2794-93, 120-160 inch-pounds.

   Salt Spray, per ASTM B117-90, 1000+ hours.

Humidity, per ASTM D2247-92, 1000+ hours.

Water Soak, per ASTM D2247-92, 1000+ hours.

3. Painting of hoses, clamps, wiring harnesses, and other non-metallic service parts shall not be acceptable. Fasteners used shall be corrosion resistant, and designed to minimize marring of the painted surface when removed for normal installation or service work.
4. Enclosure shall be constructed of minimum 12 gauge steel for framework and 14 gauge steel for panels. All hardware and hinges shall be stainless steel.
5. A factory-mounted exhaust silencer shall be installed inside the enclosure. The exhaust shall exit the enclosure through a rain collar and terminate with a rain cap. Exhaust connections to the generator set shall be through seamless flexible connections.
6. The enclosure shall include the following maintenance provisions:
   - Flexible coolant and lubricating oil drain lines, that extend to the exterior of the enclosure, with internal drain valves
   - External radiator fill provision.

E. Provide a sub-base fuel tank for the generator set, sized to allow for full load operation of the generator set for 24 hours. The sub-base fuel tank shall be UL142 listed and labeled. Installation shall be in compliance to NFPA37. The fuel tank shall be a double-walled, steel construction and include the following features:

1. Emergency tank and basin vents.
2. Mechanical level gauge.
3. Fuel supply and return lines, connected to generator set with flexible fuel lines as recommended by the engine manufacturer and in compliance to UL2200 and NFPA 37 requirements.
4. Leak detection provisions, wired to the generator set control for local and remote alarm indication.
5. High and low level float switches to indicate fuel level. Wire switches to generator control for local and remote indication of fuel level
6. Basin drain.
7. Integral lifting provisions.

PART 3. EXECUTION

3.01 SEQUENCE OF OPERATION

A. Generator set shall start on receipt of a start signal from remote equipment. The start signal shall be via hardwired connection to the generator set control. The generator set shall complete a time delay start period as programmed into the control.

B. The generator set control shall initiate the starting sequence for the generator set. The starting sequence shall include the following functions:

C. The control system shall verify that the engine is rotating when the starter is signaled to operate. If the engine does not rotate after two attempts, the control system shall shut down and lock out the generator set, and indicate “fail to crank” shutdown.

D. The engine shall fire and accelerate as quickly as practical to start disconnect speed. If the engine does not start, it shall complete a cycle cranking process as described elsewhere in this specification. If the engine has not started by the completion of the cycle cranking sequence, it shall be shut down and locked out, and the control system shall indicate “fail to start”.

E. The engine shall accelerate to rated speed and the alternator to rated voltage. Excitation shall be disabled until the engine has exceeded programmed idle speed, and regulated to prevent over voltage conditions and oscillation as the engine accelerates and the alternator builds to rated voltage.

F. On reaching rated speed and voltage, the generator set shall operate as dictated by the control system in isochronous state.

G. When all start signals have been removed from the generator set, it shall complete a time delay stop sequence. The duration of the time delay stop period shall be adjustable by the operator.

H. On completion of the time delay stop period, the generator set control shall switch off the excitation system and shall shut down.

I. Any start signal received after the time stop sequence has begun shall immediately terminate the stopping sequence and return the generator set to isochronous operation.

3.02 OTHER REQUIREMENTS

A. Factory Testing

1. The generator set manufacturer shall perform a complete operational test on the generator set prior to shipping from the factory. A certified test report shall be provided. Equipment supplied shall be fully tested at the factory for function and performance.

2. Generator set factory tests on the equipment shall be performed at rated load and rated power factor. Generator sets that have not been factory tested at rated power factor will not be acceptable. Tests shall include: run at full load, maximum power, voltage regulation, transient and steady-state governing, single step load pickup, and function of safety shutdowns.

3.03 INSTALLATION

A. Equipment shall be installed by the contractor in accordance with final submittals and contract documents. Installation shall comply with applicable state and local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's instructions and instructions included in the listing or labeling of UL listed products.

B. Installation of equipment shall include furnishing and installing all interconnecting wiring between all major equipment provided for the on-site power system. The contractor shall also perform interconnecting wiring between equipment sections (when required), under the supervision of the equipment supplier.

C. Equipment shall be installed on concrete housekeeping pads. Equipment shall be permanently fastened to the pad in accordance with manufacturer’s instructions and seismic requirements of the site.

D. Equipment shall be initially started and operated by representatives of the manufacturer.

E. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to initial operation and final testing of the system.

3.04 ON-SITE ACCEPTANCE TEST:

A. The complete installation shall be tested for compliance with the specification following completion of all site work. Testing shall be conducted by representatives of the manufacturer, with required fuel supplied by Contractor. The Engineer shall be notified in advance and shall have the option to witness the tests.

B. Installation acceptance tests to be conducted on-site shall include a "cold start" test, a two hour full load test, and a one step rated load pickup test in accordance with NFPA 110. Provide a resistive load bank and make temporary connections for full load test, if necessary.

3.05 TRAINING

A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than 4 hours in duration and the class size shall be limited to 5 persons. Training date shall be coordinated with the facility owner.

3.06 SERVICE AND SUPPORT

A. The manufacturer of the generator set shall maintain service parts inventory at a central location which is accessible to the service location 24 hours per day, 365 days per year.

B. The generator set shall be serviced by a local service organization that is trained and factory certified in generator set service. The supplier shall maintain an inventory of critical replacement parts at the local service organization, and in service vehicles. The service organization shall be on call 24 hours per day, 365 days per year.

C. The manufacturer shall maintain model and serial number records of each generator set provided for at least 20 years.

3.07 WARRANTY

A. The generator set and associated equipment shall be warranted for a period of not less than 5 years from the date of commissioning against defects in materials and workmanship.

B. The warranty shall be comprehensive. No deductibles shall be allowed for travel time, service hours, repair parts cost, etc.

END OF SECTION

SECTION 16300
AUTOMATIC TRANSFER SWITCH

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Automatic Transfer Switches

1.02 SYSTEM

A. Furnish the automatic transfer switches to automatically transfer between the normal and emergency power source.

1.03 APPLICABLE STANDARDS

A. The automatic transfer switches covered by these specifications shall be designed, tested, and assembled in strict accordance with all applicable standards of ANSI, U.L., IEEE and NEMA.

1.04 SUBMITTALS

A. Manufacturer shall submit shop drawings for review, which shall include the following, as a minimum:

1. Descriptive literature

2. Plan, elevation, side, and front view arrangement drawings, including overall dimension, weights and clearances, as well as mounting or anchoring requirements and conduit entrance locations.

3. Schematic diagrams.

4. Wiring diagrams.

5. Accessory list.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Russelectric
B. ASCO
C. Zenith

2.02 CONSTRUCTION

A. General

1. The automatic transfer switch shall be furnished as shown on the drawings. Voltage and continuous current ratings and number of poles shall be as

shown. The automatic transfer switch shall be Service Entrance Rated, unless otherwise indicated

2. On 3 phase, 4 wire systems, utilizing ground fault protection, a true 4-pole switch shall be supplied with all four poles mounted on a common shaft. The continuous current rating and the closing and withstand rating of the fourth pole shall be identical to the rating of the main poles.

3. The transfer switch shall be mounted in a NEMA 1 enclosure, unless otherwise indicated. Enclosures shall be fabricated from 12-gauge steel. The enclosure shall be sized to exceed minimum wire bending space required by UL 1008.

4. The transfer switch shall be equipped with an internal welded steel pocket, housing an operations and maintenance manual.

5. The transfer switch shall be top and bottom accessible.

6. The main contacts shall be capable of being replaced without removing the main power cables.

7. The main contacts shall be visible for inspection without any major disassembly of the transfer switch.

8. All bolted bus connections shall have Belleville compression type washers.

9. When a solid neutral is required, a fully rated bus bar with required AL-CU neutral lugs shall be provided.

10. Control components and wiring shall be front accessible. All control wires shall be multiconductor 18 gauge 600-volt SIS switchboard type point to point harness. All control wire terminations shall be identified with tubular sleeve-type markers.

11. The switch shall be equipped with 90 degrees C rated copper/aluminum solderless mechanical type lugs.

12. The complete transfer switch assembly shall be factory tested to ensure proper operation and compliance with the specification requirements. A copy of the factory test report shall be available upon request.

B. Automatic Transfer Switch

1. The transfer switch shall be double throw, actuated by a <u>single electrical operator</u> momentarily energized, and connected to the transfer mechanism by a simple over center type linkage. Total transfer time shall not exceed one half second

2. The normal and emergency contacts shall be positively interlocked mechanically and electrically to prevent simultaneous closing. Main contacts shall be mechanically locked in both the normal and emergency positions without the use of hooks, latches, magnets, or springs, and shall be silver-

tungsten alloy. Separate arcing contacts with magnetic blowouts shall be provided on all transfer switches. Interlocked, molded case circuit breakers or contactors are not acceptable.

3. The transfer switch shall be equipped with a safe external manual operator, designed to prevent injury to operating personnel. The manual operator shall provide the same contact to contact transfer speed as the electrical operator to prevent a flashover from switching the main contacts slowly. The external manual operator shall be safely operated from outside of the transfer switch enclosure while the enclosure door is closed.

C. Automatic Transfer Switch Controls

1. The transfer switch shall be equipped with a microprocessor based control system, to provide all the operational functions of the automatic transfer switch. The controller shall have two asynchronous serial ports. The controller shall have a real time clock with NiCad battery back up.

2. The CPU shall be equipped with self diagnostics which perform periodic checks of the memory I/O and communication circuits, with a watchdog/power fail circuit

3. The controller shall use industry standard open architecture communication protocol for high-speed serial communications via multidrop connection to other controllers and to a master terminal with up to 4000 ft of cable, or further, with the addition of a communication repeater. The serial communication port shall be RS422/485 compatible.

4. The serial communication port shall allow interface to either the manufacturers or owner furnished remote supervisory control.

5. The controller shall have password protection required to limit access to qualified and authorized personnel.

6. The controller shall include a 20 character, LCD display, with a keypad, which allows access to the system.

7. The controller shall include over/under voltage, over/under frequency, phase sequence detection and phase differential monitoring on both normal and emergency sources.

8. The controller shall be capable of storing the following records in memory for access either locally or remotely:

   a. Number of hours transfer switch is in the emergency position (total since record reset).

   b. Number of hours emergency power is available (total since record reset).

   c. Total transfer in either direction (total since record reset).

d. Date, time, and description of the last four source failures.

e. Date of the last exercise period.

f. Date of record reset.

D. Sequence of Operation

1. When the voltage on any phase of the normal source drops below 80% or increases to 120%, or frequency drops below 90%, or increase to 110%, or 20% voltage differential between phases occurs, after a programmable time delay period of 0-9999 seconds factory set at 3 seconds to allow for momentary dips, the engine starting contacts shall close to start the generating plant.

2. The transfer switch shall transfer to emergency when the generating plant has reached specified voltage and frequency on all phases.

3. After restoration of normal power on all phases to a preset value of at least 90% to 110% of rated voltage, and at least 95% to 105% of rated frequency, and voltage differential is below 20%, an adjustable time delay period of 0-9999 seconds (factory set at 300 seconds) shall delay retransfer to allow stabilization of normal power. If the emergency power source should fail during this time delay period, the switch shall automatically return to the normal source.

4. After retransfer to normal, the engine generator shall be allowed to operate at no load for a programmable period of 0-9999 seconds, factory set at 300 seconds.

E. Automatic Transfer Switch Accessories

1. Programmable three phase sensing of the normal source set to pickup at 90% and dropout at 80% of rated voltage and overvoltage to pickup at 120% and dropout out at 110% of rated voltage. Programmable frequency pickup at 95% and dropout at 90% and over frequency to pickup at 110% and dropout at 105% of rated frequency. Programmable voltage differential between phases, set at 20%, and phase sequence monitoring.

2. Programmable three phase sensing of the emergency source set to pickup at 90% and dropout at 80% of rated voltage and overvoltage to pickup at 120% and dropout out at 110% of rated voltage programmable frequency pickup at 95% and dropout at 90% and over frequency to pickup at 110% and dropout at 105% of rated frequency. Programmable voltage differential between phases set at 20%, and phase sequence monitoring.

3. Time delay for override of momentary normal source power outages (delays engine start signal and transfer switch operation). Programmable 0-9999 seconds. Factory set at 3 seconds, if <u>not</u> otherwise specified.

4. Time delay on retransfer to normal, programmable 0-9999 seconds, factory set at 300 seconds if not otherwise specified, with overrun to provide

programmable 0-9999 second time delay, factory set at 300 seconds, unloaded engine operation after retransfer to normal.

5. Time delay on transfer to emergency, programmable 0-9999 seconds, factory set at 3 seconds.

6. A maintained type load test switch shall be included to simulate a normal power failure, keypad initiated.

7. A remote type load test switch shall be included to simulate a normal power failure, remote switch initiated.

8. A time delay bypass on retransfer to normal shall be included. Keypad initiated.

9. Contact, rated 10 Amps 30 volts DC, to close on failure of normal source to initiate engine starting.

10. Contact, rated 10 Amps 30 volts DC, to open on failure of normal source for customer functions.

11. Light emitting diodes shall be mounted on the microprocessor panel to indicate: switch is in normal position, switch is in emergency position and controller is running.

12. A plant exerciser shall be provided with (10) 7-day events, programmable for any day of the week and (24) calendar events, programmable for any month/day, to automatically exercise generating plant programmable in one-minute increments. Also include selection of either "no load" (switch will <u>not</u> transfer) or "load" (switch will transfer) exercise period. Keypad initiated.

13. Provision to select either "no commit" or "commit" to transfer operation in the event of a normal power failure shall be included. In the "no commit position," the load will transfer to the emergency position unless normal power returns before the emergency source has reach 90% of it's rated values (switch will remain in normal). In the "commit position" the load will transfer to the emergency position after any normal power failure. Keypad initiated.

14. Two auxiliary contacts rated 10 Amp, 120 volts AC (for switches 100 to 800 amps) 15 amp, 120 volts AC (for switches 1000 to 4000 amps), shall be mounted on the main shaft, one closed on normal, the other closed on emergency. Both contacts will be wired to a terminal strip for ease of customer connections.

15. A three phase digital LCD voltage readout, with 1% accuracy shall display all three separate phase to phase voltages simultaneously, for both the normal and emergency source.

16. A digital LCD frequency readout with 1% accuracy shall display frequency for both normal and emergency source.

17. An LCD readout shall display normal source and emergency source availability.

F. The following accessories shall be available by simple activation, via the keypad:

1. Include (2) time delay contacts that open simultaneously just (milliseconds) prior to transfer in either direction. These contacts close after a time delay upon transfer. Programmable 0-9999 seconds after transfer.

2. A block transfer function shall be included, energized from a 24VDC signal from the generator control switchgear, to allow transfer to emergency.

3. A load-shed function shall be included, energized from a 24VDC signal from the generator control switchgear, to disconnect the load from the emergency source when an overload condition occurs.

4. A peak shave function shall be included, energized from a 24VDC signal from the generator control switchgear. This function will start the emergency generator and transfer the ATS to the emergency source reducing the utility supply to the building. After the peak shave signal is removed, the transfer switch will retransfer to the normal supply, bypassing the retransfer time delay.

G. Approval

1. As a condition of approval, the manufacturer of the automatic transfer switches shall verify that their switches are listed by Underwriters Laboratories, Inc., Standard UL-1008 with 3 cycle short circuit closing and withstand as follows:

RMS Symmetrical Amperes 480 VAC

Amperes	Current Limiting Closing and Withstand	Fuse Rating
100 – 400	42,000	200,000
600 – 800	65,000	200,000
1000 – 1200	85,000	200,000
1600 – 4000	100,000	200,000

2. During the 3 cycle closing and withstand tests, there shall be no contact welding or damage. The 3 cycle tests shall be performed without the use of current limiting fuses. The test shall verify that contact separation has not occurred, and there is contact continuity across all phases. Test procedures shall be in accordance with UL-1008, and testing shall be certified by Underwriters' Laboratories, Inc.

3. When conducting temperature rise tests to UL-1008, the manufacture shall include post-endurance temperature rise tests to verify the ability of the transfer switch to carry full rated current after completing the overload and endurance tests.

4. The microprocessor controller shall meet the following requirements:

- Storage conditions - 25 degrees C to 85 degrees C
- Operation conditions - 20 degrees C to 70 degrees C ambient
- Humidity 0 to 99% relative humidity, noncondensing
- Capable of withstanding infinite power interruptions
- Surge withstand per ANSI/IEEE C-37.90A-1978

5. Manufacturer shall provide copies of test reports upon request.

H. Manufacturer

1. The transfer switch manufacturer shall employ a nationwide factory-direct, field service organization, available on a 24-hour a day, 365 days a year, call basis.

2. The manufacture shall include an 800-telephone number, for field service contact, affixed to each enclosure.

3. The manufacturer shall maintain records of each transfer switch, by serial number, for a minimum 20 years.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Automatic Transfer Switches shall be provided with adequate lifting means for ease of installation of wall or floor mounted enclosures.

B. Provide access and working space as indicated or as required.

3.02 ADJUSTMENTS

A. Tighten assembled bolted connections with appropriate tools to manufacturer's torque recommendations prior to first energization.

END OF SECTION

SECTION T-16441
DISCONNECT SWITCHES

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall furnish and install the low-voltage fused and non-fused switches as specified herein and as shown on the contract drawings.

1.02 RELATED SECTIONS

1.03 REFERENCES

A. The switches and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of NEMA and UL.

1.04 SUBMITTALS -- FOR REVIEW/APPROVAL

A. Procedure: Submit in accordance with Section 01300, 16010, and as stated herein.

B. The following information shall be submitted to the Engineer:

1. Master drawing index
2. Dimensioned outline drawing
3. Conduit entry/exit locations
4. Switch ratings including:
    a. Short-circuit rating
    b. Voltage
    c. Continuous current
5. Fuse ratings and type
6. Cable terminal sizes.

1.05 SUBMITTALS -- FOR INFORMATION

A. When requested by the Engineer the following product information shall be submitted:

1. Descriptive bulletins
2. Product sheets.

1.06 SUBMITTALS--FOR CLOSEOUT

A. The following information shall be submitted for record purposes:

1. Final as-built drawings and information for items listed in section 1.04

1.07 QUALIFICATIONS

A. For the equipment specified herein, the manufacturer shall be ISO 9000, 9001 or 9002 certified.

1.08 NOT USED

1.09 DELIVERY, STORAGE AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

A. FIELD MEASUREMENTS

A. Contractor shall field verify all dimensions prior to installation. Installation of all switches shall comply with the National Electric Codes clearance and mounting height requirements.

B. OPERATION AND MAINTENANCE MANUALS

A. Three (3) copies of these instruction manuals shall be submitted with the closeout documents listed in section 1.06.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cutler-Hammer
B. Square D
C. Siemens

2.02 DISCONNECT SWITCHES

A. Provide switches as shown on drawings, with the following ratings:

1. 30 to 1200 amperes
2. 250 volts AC, DC; 600 volts AC (30A to 200A 600 volts DC)
3. 2, 3, 4, and 6 poles
4. Non-Fusible and Fusible
5. Copper/aluminum standard mechanical lugs.

B. Construction
1. Switchblades and jaws shall be plated copper.
2. Switches shall have a handle that is easily pad lockable in the OFF position.

3. Switches shall have defeat-able door interlocks that prevent the door from opening when the handle is in the ON position.
4. Switch assembly and operating handle shall be an integral part of the enclosure base.
5. Fusible switches rated 100A to 1200A shall have reinforced fuse clips.
6. Switch blades shall be readily visible in the OFF position.

7. Switch operating mechanism shall be non-teasible, positive quick-make/quick-break type (except 30A plug fuse-type).
8. Fusible switches shall be suitable for service entrance equipment.
9. Switches shall have line terminal shields.
10. All exterior switches shall be heavy-duty type.
11. All interior switches shall be general-duty type unless otherwise noted.

C. Enclosures

A. Exterior: All enclosures shall be NEMA 3R rainproof unless otherwise noted.

B. Interior: All enclosures shall be NEMA 1 unless otherwise noted.

D. Fuses

1. Fuses shall be dual element, current limiting type such as Bussmann Low-Peak Yellow or equal.

2.04 NAMEPLATES

A. Manufacturers nameplates shall be front cover mounted, contain a permanent record of switch type, ampere rating, and maximum voltage rating.

PART 3 EXECUTION

A. EXAMINATION

A. All switches shall be cleaned free of debris after installation and prior to final acceptance by the owner. Remove all miscellaneous paint markings, grease and tar.

3.02 FACTORY TESTING

A. Standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.

3.03 INSTALLATION

A. The equipment shall be installed per the manufacturer's recommendations.

END OF SECTION

SECTION 16442
LOW VOLTAGE PANELBOARDS

PART 1 GENERAL

1.01 SCOPE:

A. Furnish and install panelboards as specified herein and as indicated on the drawings.

B. Panelboard types included in this Section are:

1. Power distribution panelboards
2. Lighting and appliance panelboards

1.02 REFERENCES:

A. National Electrical Contractors Association (NECA)

1. Standard of Installation

B. National Electrical Manufacturers Association (NEMA)

1.	AB 1	Molded Case Circuit Breakers
2.	PB 1	Panelboards
3.	PB1.1	General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

C. Underwriters Laboratories Inc. (UL)

1.	50	Cabinets and Boxes
2.	67	Panelboards

1.03 SUBMITTALS - FOR APPROVAL:

A. Procedure: Submit in accordance with Section 01300, 16010, and as stated herein.

B. Product Data:

1. Descriptive bulletins
2. Enclosure outline drawing with complete dimensions
3. Breaker layout drawing
4. Component list
5. Conduit entry/exit locations
6. Assembly ratings including:
   a. Short circuit current
   b. Voltage
   c. Continuous current
7. Cable terminal sizes.
8. Installation Instructions

1.04 SUBMITTALS – RECORD DATA:

A. Procedure: Submit in accordance with Section 01300.

B. The following information shall be submitted for record purposes:

1. Final (as-built) drawings and information for items listed in Paragraph 1.03
2. Installation, operation and maintenance instruction
3. Spare parts list

1.05 QUALIFICATIONS:

A. The manufacturer of the panelboard shall be the manufacturer of the major components within the assembly, including circuit breakers.

B. For the equipment specified herein, the manufacturer shall be ISO 9000, 9001 or 9002 certified.

1.06 DELIVERY, STORAGE, AND HANDLING:

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. Cutler-Hammer

B. Square D

C. Siemens

2.02 RATINGS:

A. Panelboards rated 240 Vac or less shall have short circuit ratings as indicated on the drawings or as herein scheduled, but not less than 10,000 amperes RMS symmetrical.

B. Panelboards rated 480 Vac shall have short circuit ratings as indicated on the drawings or as herein scheduled, but not less than 14,000 amperes RMS symmetrical.

C. Panelboards shall be labeled with a UL short circuit rating. All panelboards shall be fully rated. Series ratings shall not be used.

2.03 CONSTRUCTION:

A. Interiors shall be completely factory assembled devices. They shall be designed such that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors.

B. Trims for lighting and appliance panelboards shall be supplied with a hinged door covering all circuit breaker handles. Doors in panelboard trims shall not uncover any live parts. Doors shall have a semiflush, cylinder lock and catch assembly. Doors over 48 inches in height shall have auxiliary fasteners.

C. Distribution panelboard trims shall cover all live parts. Switching device handles shall be accessible.

D. Surface trims shall be same height and width as box. Flush trims shall overlap the box by 3/4 inch on all sides. Trims shall be secured to box with concealed clamps.

E. A directory card with a clear plastic cover shall be supplied and mounted on the inside of each door in a metal frame.

F. All locks shall be keyed alike.

2.04 BUS:

A. Main bus bars shall be tin-plated copper, sized in accordance with UL standards to limit temperature rise on any current carrying part to a maximum of 65^0 C above an ambient of 40^0 C maximum.

B. A bolted ground bus shall be included in all panels.

C. Full-size (100%-rated) insulated neutral bars shall be included for panelboards indicated to have a neutral bus. Bus bar taps for panels with single-pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral busing shall have a suitable lug for each outgoing feeder requiring a neutral connection. 200%-rated neutrals shall be supplied for panels designated on drawings with oversized neutral conductors.

2.05 DISTRIBUTION PANELBOARDS:

A. Distribution panelboards including circuit breakers contained therein shall have fully rated interrupting ratings as indicated on the drawings. Panelboards shall have bolt-on, molded case circuit breakers as indicated below.

B. Molded case circuit breakers shall provide circuit overcurrent protection with inverse time and instantaneous tripping characteristics. Ground fault protection shall be provided where indicated.

C. Circuit breakers shall be operated by a toggle-type handle and shall have a quick-make, quick-break, over-center switching mechanism that is mechanically trip-free. Automatic tripping of the breaker shall be clearly indicated by the handle position. Contacts shall be nonwelding silver alloy and arc extinction shall be accomplished by means of arc chutes. A push-to-trip button on the front of the circuit breaker shall provide a local manual means to exercise the trip mechanism.

D. Where indicated, circuit breakers shall be current limiting.

E. Circuit breakers below 600-ampere shall have thermal-magnetic trip units and inverse time-current characteristics.

F. Circuit breakers 600-ampere through 1200-ampere shall be provided with microprocessor-based RMS sensing trip units.

1. Each molded case circuit breaker microprocessor-based tripping system shall consist of three (3) current sensors, a trip unit, and a flux-transfer shunt trip. The trip unit shall use microprocessor-based technology to provide the adjustable time-current protection functions. True RMS sensing circuit protection shall be achieved by analyzing the secondary current signals received from the circuit breaker current sensors and initiating trip signals to the circuit breaker trip actuators when predetermined trip levels and time delay settings are reached.

2. Interchangeable rating plugs shall establish the continuous trip ratings of each circuit breaker. Rating plugs shall be fixed or adjustable as indicated. Rating plugs shall be interlocked so they are not interchangeable between frames, and interlocked such that a breaker cannot be closed and latched with the rating plug removed.

3. The microprocessor-based trip unit shall have thermal memory capabilities to prevent the breaker from being reset following an overload condition until after a preset time delay.

4. When the adjustable instantaneous setting is omitted, the trip unit shall be provided with an instantaneous override. Internal ground fault protection adjustable pick-up ratings shall not exceed 1200 amperes. Provide neutral ground fault current sensor for four-wire loads.

5. Breakers shall have built-in test points for testing the long-time delay, instantaneous, and ground fault functions of the breaker, by means of a 120-volt operated test set. Provide one test set capable of testing all breakers 600-ampere and above.

6. System coordination shall be provided by the following microprocessor-based, time-current curve shaping adjustments:

Adjustable long-time pick-up
Adjustable short-time pick-up and delay, with selective curve shaping
Adjustable instantaneous pick-up
Adjustable ground fault pick-up and delay, with selective curve shaping.

G. Where indicated, provide circuit breakers UL listed for application at 100% of their continuous ampere rating in their intended enclosure.

H. Provide shunt trips, bell alarms, and auxiliary switches as indicated on the drawings.

I. Circuit breakers supplying air conditioning branch circuits shall be UL listed as type HACR.

2.06 LIGHTING AND APPLIANCE PANELBOARDS:

A. The minimum integrated short circuit rating for branch circuit panelboards shall be indicated on the drawings.

B. Bolt-in type, heavy-duty, quick-make, quick-break, single- and multi-pole circuit breakers of the types specified herein, shall be provided for each circuit with toggle handles that indicate when unit has tripped.

C. Circuit breakers shall be thermal magnetic type with common type handle for all multiple pole circuit breakers. Circuit breakers shall be minimum 100-ampere frame and through 100-ampere trip sizes shall take up the same pole spacing. Circuit breakers shall be UL listed as type SWD for lighting circuits and HACR for air conditioning branch circuits.

1. Circuit breaker handle locks shall be provided for all circuits that supply exit signs, emergency lights, energy management and control system (EMCS) panels and fire alarm panels.

2.07 ENCLOSURE:

A. General: Enclosures shall be at least 20 inches wide and made from galvanized steel. Provide minimum gutter space in accordance with the National Electrical Code. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be sized to include the additional required wiring space. At least four interior mounting studs with adjustable nuts shall be provided. Enclosures shall be provided with blank ends.

B. Rating: NEMA type 12 enclosure except where other enclosure requirements are indicated.

2.08 FINISH:

A. Surfaces of the trim assembly shall be properly cleaned, primed, and a finish coat of the manufacturers standard paint color shall be applied.

2.09 MISCELLANEOUS DEVICES

A. Provide TVSS system integral to distribution panelboards and appliance panelboards where indicated on drawings. Reference section 16671 for specifications on TVSS units.

PART 3 EXECUTION

3.01 EXAMINATION:

A. Confirm installation space and clearance requirements for panelboards in accordance with NEC requirements.

3.02 INSTALLATION:

A. General: Install panelboards as indicated on the drawings and in accordance with manufacturer's published instructions, NEMA PB 1.1, and NECA "Standard of Installation".

B. Mounting Heights: Top of trim 6 feet 2 inches above finished floor, except as otherwise indicated.

C. Mounting:

1. Plumb and rigid without distortion of box.
2. Mount flush panels uniformly flush with wall finish.

D. Circuit Directory: Typed directory indicating final circuit connections. Obtain approval before installing.

E. Install filler plates in unused breaker spaces.

F. Provisions for Future Circuits at Flush Panelboards:

1. Stub four 1-inch empty conduits from panel into accessible ceiling space or space designated to be ceiling space in future.
2. Stub four 1-inch empty conduits into raised floor space or below slab other than slabs on grade.

G. Wiring in Panel Gutters: Train conductors neatly in groups, bundle, and wrap with wire ties after completion of load balancing.

3.03 IDENTIFICATION:

A. Identify field-installed wiring and components and provide unit nameplate in accordance with Section 16075.

B. Provided one (1) 8-1/2"x11" stainless steel nameplate engraved with one-line diagram and year installed. One-line diagram shall include panel voltages, amps, AIC ratings, and feeder sizes. Nameplate shall be mounted to the exterior door of the main distribution panel – LB.

3.04 GROUNDING:

A. Connections: Make equipment grounding connections for panelboards as required in Section 16060.

B. Provide ground continuity to main electrical ground bus.

C. Provide isolated ground bars for panels serving sensitive electronic equipment and as indicated on panel schedules.

3.05 CONNECTIONS:

A. Tighten electrical connectors and terminals, including grounding connections, in accordance with manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A.

3.06 FIELD TESTING:

A. Inspect for compliance with drawings and specifications.

B. Inspect for defects, damaged or missing parts.

C. Operate each breaker a minimum of three (3) times to insure proper operation.

D. Perform insulation resistance test on complete assembly at 1000 Vdc. Disconnect any solid-state devices prior to testing. Minimum acceptable test results are 100 megohms.

3.07 CLEANING:

A. Upon completion of installation, inspect interior and exterior of panelboards.

B. Remove paint splatters and other spots, dirt, and debris.

C. Touch up scratches and mars of finish to match original finish.

D. Clean interior of panelboard.

3.08 FIELD ADJUSTMENTS:

A. Balancing Loads: Prior to final acceptance, conduct load-balancing measurements and circuit changes as follows:

1. Perform measurements during period of normal working load as advised by Owner.
2. Advise Engineer of load imbalances exceeding 20% or of loads exceeding 80% of circuit ratings. Reconnect branch circuit loads as directed by Engineer.
3. Perform load-balancing circuit changes outside the normal occupancy/working schedule of the facility. Make special arrangements with Owner to avoid disrupting critical circuits.
4. Recheck loads after circuit changes during normal load period. Record load readings before and after changes and submit test records.

END OF SECTION

SECTION T-16510
LUMINAIRES

PART I GENERAL

1.01 SUMMARY:

A. Section Includes:

1. Lighting fixtures
2. Lamps
3. Ballasts
4. Emergency lighting units

1.02 REFERENCES:

A. American National Standards Institute (ANSI):

1.	C78 Series	Lamps
2.	C82.1-97	Electric Lamp Ballast - Line Frequency Fluorescent Lamp Ballast
3.	C82.2-84	Fluorescent Lamp Ballasts - Methods of Measurements
4.	C82.4-92	Ballasts for High Intensity Discharge and Low-Pressure Sodium Lamps (Multiple Supply Type)
5.	C82.11-93	High Frequency Fluorescent Lamp Ballasts

B. Institute of Electrical and Electronics Engineers (IEEE):

1.	C62.11-93	IEEE Recommended Practice on Metal Oxide Surge Arresters for Alternating Current Power Circuits

C. National Fire Protection Association (NFPA):

1.	70	National Electrical Code

D. Underwriters Laboratories Inc. (UL):

1.	844-95	Electric Lighting Fixtures for Use in Hazardous (Classified) Locations
2.	924-95	Emergency Lighting and Power Equipment
3.	935-95	Fluorescent Lamp Ballast
4.	1029-94	High Intensity Discharge Lamp Ballasts
5.	1570-95	Fluorescent Lighting Fixtures
6.	1571-95	Incandescent Lighting Fixtures
7.	1572-97	High Intensity Discharge Lighting Fixtures

1.03 DEFINITIONS:

A. Emergency Lighting Unit: Fixture with integral emergency battery power supply and means for controlling and charging battery. Emergency units are available with integral lamps only.

B. Fixture: Complete lighting unit, exit sign, or emergency lighting unit. Fixtures include lamps and parts required to distribute light, position and protect lamps, and connect lamps to power supply. Internal battery powered exit signs and emergency lighting units also include battery and means for controlling and recharging battery. Emergency lighting units are available with and without integral lamp heads and lamps.

C. Luminaire: Fixture.

D. Average Life: Time after which 50% will have failed and 50% will have survived under normal conditions.

E. Total Harmonic Distortion (THD): The root mean square (RMS) of all the harmonic current components divided by total fundamental (60 hz) current.

1.04 SUBMITTALS:

A. Procedures: Submit in accordance with Section 01300, 16010, and as stated herein.

B. Product Data:

1. Describe fixtures, lamps, ballasts, and emergency lighting units. Arrange product data for fixtures in order of fixture designation. Include data on features and accessories and the following information:

a. Outline drawings of fixtures indicating dimensions and principal features.

b. Electrical ratings and photometric data with specified lamps and certified results of independent laboratory tests.

c. Data on batteries and chargers of emergency lighting units.

C. Shop Drawings:

1. Detail nonstandard fixtures indicating dimensions, weights, methods of field assembly, components, features, and accessories.

D. Supplies:

1. Submit sample of fixture if different than specified.

E. Miscellaneous:

1. For substitutes only, product certifications signed by manufacturers of lighting fixtures certifying that their fixtures comply with specified requirements.

2. Warranty for rechargeable battery.

3. Coordination drawings for fixtures that require coordination with other equipment installed in the same space.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Deliver lighting fixtures in factory-fabricated containers or wrappings, which properly protect fixtures from damage.

B. Store lighting fixtures in original packaging. Store inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity; laid flat and blocked off ground.

C. Handle lighting fixtures carefully to prevent damage, breaking, and scarring of finishes. Do not install damaged units or components; replace with new.

1.06 QUALITY ASSURANCE:

A. Items provided under this section shall be listed and labeled by UL or other Nationally Recognized Testing Laboratory (NRTL).

1. Term “NRTL” shall be as defined in OSHA Regulation 1910.7.

2. Terms “listed and “labeled” shall be as defined in National Electrical Code, Article 100.

B. Regulatory Requirements:

1. National Electrical Code: Components and installation shall comply with NFPA 70.

C. Coordinate fixtures mounting hardware and trim with ceiling system.

PART 2 PRODUCTS

2.01 FIXTURES, GENERAL:

A. Comply with requirements specified in Paragraphs below and lighting fixture schedule.

2.02 FIXTURE COMPONENTS, GENERAL:

A. Metal Parts: Free from burrs, sharp corners and edges.

B. Sheet Metal Components: Steel, except as indicated. Form and support components to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating and free from light leakage under operating conditions. Arrange to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers and other pieces to prevent accidental falling during relamping and when secured in operating position.

D. Reflecting Surfaces: Minimum reflectances as follows, except as otherwise indicated:

1. White Surfaces: 85%
2. Specular Surfaces: 83%
3. Diffusing Specular Surfaces: 75%
4. Laminated Silver Metallized Film: 90%

E. Lenses, Diffusers, Covers, and Globes: 100% virgin acrylic plastic or water white, annealed crystal glass except as indicated.

1. Plastic: High resistance to yellowing and other changes due to aging, exposure to heat and UV radiation.
2. Lens Thickness: 0.125 inch, minimum.

2.03 SUSPENDED FIXTURE SUPPORT COMPONENTS:

A. Single-Stem Hangers: ½-inch steel tubing with swivel ball fitting and ceiling canopy. Finish same as fixture.

B. Twin-Stem Hangers: Two, ½-inch steel tubes with single canopy arranged to mount single fixture. Finish same as fixture.

C. Rod Hangers: ¼-inch diameter cadmium plated, threaded steel rod.

D. Hook Hanger: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord and locking-type plug.

2.04 FLUORESCENT FIXTURES:

A. Fixtures: Conform to UL 1570.

B. Ballasts: Electronic type. Conform to UL 935, ANSI C82.11 and NFPA 70.

1. Certification: By Electrical Testing Laboratory (ETL).
2. Labeling: By Certified Ballast Manufacturers Association (CBM).
3. Type: Class P, 0.95 P.F. minimum.
4. Sound Rating: “A” rating, except as indicated otherwise.

5. Voltage: Match connected circuits.
6. Temperature: Start and operate at minimum of 50^0 F.
7. THD: 10 percent maximum.

C. Low Temperature Ballast: Start and maintain operation at a minimum of 0^0 F.

D. T-8 Lamp Ballasts: Full-light output type, compatible with energy-saving lamps. Following are required average input wattages when tested according to ANSI C82.2.

1. 39 or less when operating one F32T8 lamp.
2. 62 or less when operating two F32T8 lamps.
3. 95 or less when operating three F32T8 lamps.
4. 114 or less when operating four F32T8 lamps.

E. Recessed fluorescent fixtures shall have 100% acrylic prismatic lenses with a minimum thickness of 0.125 inch unless otherwise indicated.

2.05 HIGH INTENSITY DISCHARGE (HID) FIXTURES:

A. Fixtures: Conform to UL 1572.

B. Ballasts: Conform to UL 1029 and ANSI C82.4. Provide ballasts with following features, except as otherwise indicated.

1. Constant wattage autotransformer (CWA) or regulator, high-power-factor type.
2. Voltage rating matches system voltage.
3. Single-Lamp Ballasts: Minimum starting temperature of -30^0 C.
4. Normal ambient operating temperature is 40^0 C.
5. Open circuit operation will not reduce average life.
6. Noise Suppression: Manufacturer's standard epoxy encapsulated model designed to minimize audible fixture noise.

2.06 INCANDESCENT FIXTURES:

A. Conform to UL 1571.

2.07 FIXTURES FOR HAZARDOUS LOCATIONS:

A. Conform to UL 844 or provide units that have Factory Mutual Engineering and Research Corporation (FM) certification for indicated class and division of hazard.

2.08 EXIT SIGNS:

A. Conform to UL 924.

1. Sign Colors: Conform to local code.

B. Self-Powered Exit Signs (Battery Backup): Integral automatic high/low trickle charger in self-contained power pack.

1. Battery: Sealed, maintenance-free, nickel cadmium type 1.5 hour minimum emergency run time.

2.09 EMERGENCY LIGHTING UNITS:

A. Conform to UL 924. Provide self-contained units with features and characteristics as indicated on the drawings.

2.10 LAMPS:

A. Conform to ANSI C78 series applicable to each type of lamp.

B. Fluorescent Lamps: Color temperature of 3500^0 K.

2.11 FINISH:

A. Steel Parts: Manufacturer's standard finish applied over corrosion-resistant primer, free of streaks, runs, holidays, stains, blisters and defects. Remove fixtures showing evidence of corrosion during project warranty period and replace with new fixtures.

B. Other Parts: Manufacturer's standard finish.

PART 3 EXECUTION

3.01 INSTALLATION:

A. Set units plumb, square and level with ceiling and walls, in alignment with adjacent fixtures, and secure according to manufacturer's printed instructions and approved submittals.

B. Mounting heights specified or indicated shall be to the bottom of fixture for ceiling-mounted fixtures and to the center of fixture for wall-mounted fixtures.

C. Obtain approval of the exact mounting for lighting fixtures on the job prior to commencing installation and, where applicable, after coordinating with the type, style and pattern of ceiling being installed.

D. Where recessed fixtures are supported by ceiling support grid, install additional support wires near each corner of the fixture.

E. Make branch circuit wiring connections with conductors having an insulation temperature rating suitable for the fixture.

F. Ground and bond fixtures in accordance with Section 16060.

G. Install lamp units according to manufacturer's instructions and fixture schedule.

3.02 FIELD QUALITY CONTROL:

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Give 7-days notice of dates and times for field tests.

C. Verify normal operation of each fixture after fixtures have been installed and circuits have been energized with normal power source.

D. Interrupt electrical energy to demonstrate proper operation of emergency lighting installation.

1. Duration of supply.
2. Low battery voltage shut-down.
3. Normal transfer to battery source and retransfer to normal.
4. Low supply voltage transfer.

E. Replace or repair malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.03 ADJUSTING AND CLEANING:

A. Clean fixtures upon completion of installation. Use methods and materials recommended by manufacturer.

B. Adjust aimable fixtures to provide required light intensities.

C. Set and adjust photocells and/or time switches for proper operation as directed by Owner.

END OF SECTION

SECTION 16740
TELEPHONE/DATA SYSTEMS

PART 1 – GENERAL

1.01 GENERAL

A. Applicable provisions of the General Conditions, Supplemental General Conditions and Special Conditions govern work under this Section.

1.02 DESCRIPTION OF WORK

A. This section includes work required to provide a system of raceways, outlet boxes with covers, cables, connectors, terminations, terminal boards, and grounding to accommodate the installation under separate contract the telephone/data system equipment.

1.03 RELATED SECTIONS

A. Division 16 – ELECTRICAL

1.04 REFERENCES

A. National Electrical Code (NEC)

1.05 SYSTEM DESCRIPTION

A. It is the intent of this Specification to provide a system of raceways and outlets to accommodate the installation of telephone and data cabling by the owner's vendor. The Contract Documents indicate the location and size of the main telephone service raceway and the location of telephone/data outlets and terminal boards. Routing of raceway system between outlets and terminal points shall be determined in the field by the contractor. Design of the system is based upon the premise that the telephone/data system installer will provide UL listed low smoke producing plenum cabling conforming to NEC requirements, permitting open wiring in plenum areas above accessible ceilings.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Raceways: All raceways shall be furnished and installed in accordance with the requirements of this Section and Section 16136.
B. Outlet Cover Plates: All outlet coverplates shall be in accordance with the requirements of Section 16140.
C. Terminal Boards: Terminal boards shall be ¾-inch type Marine grade plywood having two coats of insulating oil base exterior enamel paint applied before installation on both sides and all edges. The quantity and dimensions shall be as indicated on the drawings.
D. Cabling: By owner's vendor
E. Jacks: By owner's vendor.

PART 3 – EXECUTION

3.01 CONSTRUCTION

A. Install terminal boards straight and level at locations indicated on drawings. Attach to masonry walls using expansion anchors, to CMU walls using toggle bolts, and to sheetrock and plaster walls using wood or sheet metal lag bolts fastened into the wall supporting the structure. The use of toggle bolts in sheetrock and plaster walls is not acceptable. Install anchors at a maximum of 24-inches on center at the perimeter of each board.
B. At the main terminal board, stub-up the service entrance conduits at one end of the board within 3 inches of the supporting wall.
C. Service entrance conduits shall be rigid galvanized steel or PVC encased in concrete with steel reinforced where it passes through the foundation and for at least 5' beyond the building line.
D. Unless otherwise indicated, distribution raceways shall be electrical metallic tubing, except the PVC Schedule 40 may be used where raceway is buried in concrete slabs, columns, or beams. Provide insulating bushings at the ends of all raceways.
E. The conduit size for each outlet shall be 1-inch minimum.
F. Boxes shall be steel having the minimum dimensions of 4"x4"x2-1/8".
G. Provide conduit from each outlet location to an accessible location above a lay-in type ceiling. Terminate conduit with bushing.
H. Provide raceways sufficient to accommodate telephone cabling where passing through mechanical and electrical equipment rooms, pipe chases, mechanical chases, areas without ceilings (exposed structure), and nonaccessible areas such as ceiling plenums and crawl spaces.
I. Provide ¾-inch conduit with #6 AWG bare copper ground wire from main terminal location and bond to building grounding system as indicated on drawings.
~~J. Install cabling and terminate per TIA/EIA 568B using RJ45 jacks at both ends.~~
K. Contact local telephone company to coordinate the exact telephone service entrance location and requirements prior to installing the telephone service raceways. All telephone company charges for service work shall be included in the contractor's bid.
L. Refer to construction drawings for additional requirements.

END OF SECTION

SECTION 16750

CABLE TV SYSTEMS

PART 1 – GENERAL

1.01 GENERAL

A. Applicable provisions of the General Conditions, Supplemental General Conditions and Special Conditions govern work under this Section.

1.02 DESCRIPTION OF WORK

A. This section includes work required to provide a system of raceways, outlet boxes with covers, terminal boards, cabling, splitters, amplifiers, connectors, and grounding of a cable TV system.

1.03 RELATED SECTIONS

A. Division 16 – ELECTRICAL

1.04 REFERENCES

A. National Electrical Code (NEC)

1.05 SYSTEM DESCRIPTION

A. It is the intent of this Specification to provide a system of raceways, cables and outlets to accommodate a complete working CATV system. The Contract Documents indicate the location and size of the main Cable service raceway and the location of TV outlets. Routing of raceway system between outlets and terminal points shall be determined in the field by the contractor. Design of the system is based upon the premise that the cable TV system installer will provide UL listed low smoke producing plenum cabling conforming to NEC requirements, permitting open wiring in plenum areas above accessible ceilings.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Raceways: All raceways shall be furnished and installed in accordance with the requirements of this Section and Section 16136.
B. Outlet Cover Plates: Provide outlet coverplates in accordance with the requirements of Section 16140.
C. Horizontal cabling: Provide RG6 coax cable that is U.L. Listed as low smoke producing plenum cabling conforming to the NEC requirements for open wiring in plenum areas above accessible ceilings. Provide cabling from each outlet to the closest IDF/MDF closet. Terminate cable on splitter/amplifier. Label cabling at both ends with the room number.
D. CATV Backbone cable shall be RG11 coax cable that is U.L. Listed as low smoke producing plenum cabling conforming to the NEC requirements for open wiring in plenum areas above accessible ceilings. Provide cabling from each IDF closet to the MDF closet. Terminate cable(s) on splitter/amplifier. Label cabling at both ends with the room number.
E. TV Outlets: Outlets shall be single port with type F connector. Terminal cable to outlet with proper RG6 connector.
F. Splitters: Provide cable splitters in IDF and MDF rooms as required too interconnect all drops.
G. Amplifiers: Provide amplifiers as required in IDF and MDF rooms as required too amplify signal.
H. Terminal Boards: Terminal boards shall be ¾-inch type Marine grade plywood having two coats of insulating oil base exterior enamel paint applied before installation on both sides and all edges. The quantity and dimensions shall be as indicated on the drawings. Label terminal board “CATV”.

PART 3 – EXECUTION

3.01 CONSTRUCTION

A. Install terminal boards straight and level at locations indicated on drawings. Attach to masonry walls using expansion anchors, to CMU walls using toggle bolts, and to sheetrock and plaster walls using wood or sheet metal lag bolts fastened into the wall supporting the structure. The use of toggle bolts in sheetrock and plaster walls is not acceptable. Install anchors at a maximum of 24-inches on center at the perimeter of each board.
B. At the main terminal board, stub-up the service entrance conduits at one end of the board within 3 inches of the supporting wall.
C. Unless otherwise indicated, distribution raceways shall be electrical metallic tubing, except the PVC Schedule 40 may be used where raceway is buried in concrete slabs, columns, or beams. Provide insulating bushings at the ends of all raceways.
D. The conduit size for each outlet shall be 3/4-inch minimum.
E. Boxes shall be steel having the minimum dimensions of 4”x4”x2-1/8”.
F. Provide conduit from each outlet location to an accessible location above a lay-in type ceiling. Terminate conduit with bushing.
G. Install RG6 cabling from each outlet to the closest IDF/MDF closet. Connect cables to splitters/amplifiers in IDF/MDF closets.
H. Terminate cable at outlet with proper RG6 connector.
I. Install RG11 cabling from each IDF closest to the MDF closet. Connect cables to splitters/amplifiers in the MDF closet as required.
J. Terminate RG11 cable with proper connectors.
K. Provide raceways sufficient to accommodate cabling where passing through mechanical and electrical equipment rooms, pipe chases, mechanical chases, areas without ceilings (exposed structure), and nonaccessible areas such as ceiling plenums and crawl spaces.
L. Provide ¾-inch conduit with #6 AWG bare copper ground wire from main terminal location and bond to building grounding system as indicated on drawings.
M. Provide pull wire or mylar cord in any empty conduit.
N. Coordinate final termination with the Architect, School District MIS department and the Local Cable TV provider.

END OF SECTION