

### CONTRACTOR ABBREVIATION KEY

ABBR:	DESCRIPTION:
C.M.	CONSTRUCTION MANAGER
E.C.	ELECTRICAL CONTRACTOR
G.C.	GENERAL CONTRACTOR
M.C.	MECHANICAL CONTRACTOR
P.C.	PLUMBING CONTRACTOR

### PLUMBING ABBREVIATION KEY

ABBR:	DESCRIPTION:
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
BFP	BACKFLOW PREVENTER
CI	CAST IRON
CO	CLEANOUT
CS	CLINICAL SINK
(E)	EXISTING
EE	EMERGENCY EYEWASH
ES	EMERGENCY SHOWER
ESE	EMERGENCY SHOWER/EYEWASH
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FS	FLOOR SINK
I.E.	INVERT ELEVATION (FOR REFERENCE ONLY)
MB	MOP BASIN
MV	MIXING VALVE
(N)	NEW
NIC	NOT IN CONTRACT
SCCR	SHORT CIRCUIT CURRENT RATING
SK	SINK
TYP	TYPICAL
WC	WATER CLOSET
WCO	WALL CLEANOUT

### PLUMBING SYMBOL LIST

NOT ALL SYMBOLS MAY APPLY.

SYMBOL:	DESCRIPTION:
—CW—	COLD WATER - POTABLE
—D—	DRAIN
—DI—	DEIONIZED WATER
—DIR—	DEIONIZED WATER RETURN
—HW—	HOT WATER - POTABLE
—HWC—	HOT WATER CIRCULATING - POTABLE
—UA—	UTILITY AIR
—NCW—	NON-POTABLE COLD WATER
—NHW—	NON-POTABLE HOT WATER
—PD—	PUMPED DISCHARGE
—PW—	PURE WATER
—SAN—	SANITARY DRAINAGE
—ISCW—	INDUSTRIAL SOFT COLD WATER
—ISHW—	INDUSTRIAL SOFT HOT WATER
—ISHWR—	INDUSTRIAL SOFT HOT WATER RETURN
—V—	VENT
→	PIPE CONTINUATION
→	PIPE CAP
→	PIPE DOWN
→	PIPE UP OR UP/DOWN
→	PIPE SERVING FIXTURE ON FLOOR ABOVE (EXAMPLE: FD = FLOOR DRAIN)
→	PITCH PIPE IN DIRECTION
→	DIRECTION OF FLOW IN PIPE
→	DIELECTRIC CONNECTION
→	UNION/FLANGE
→	SHUTOFF VALVE NORMALLY OPEN
→	FLOW CONTROL BALANCING VALVE
→	CHECK VALVE
→	BACKFLOW PREVENTER
→	SOLENOID VALVE
→	SAFETY/RELIEF VALVE
→	VACUUM BREAKER
→	THERMOMETER WITH WELL (DIAL TYPE)
→	THERMOMETER WITH WELL (FILLED TYPE)
→	REDUCER - REFERENCE SPECIFICATION FOR CONCENTRIC/ECCENTRIC AND FOT/FOB
→	PRESSURE REDUCING VALVE (LIQUID/GAS)
→	ALIGNMENT GUIDE
→	PIPE ANCHOR
→	EXISTING FIRE SPRINKLER PIPE
→	SEISMIC SUPPORT - REFER TO OPM DETAILS

### PLUMBING SLOPE REQUIREMENTS:

BASED ON PLUMBING CODE: [CPC-2019][UPC-2018]

INTERIOR:	1/4" PER FOOT
SANITARY WASTE:	NO SPECIFIC PITCH, PITCH TO FIXTURES
SANITARY VENT:	NO SPECIFIC PITCH, PITCH TO FIXTURES
DOMESTIC WATER:	NO SPECIFIC PITCH, PITCH TO FIXTURES

### FIRE PROTECTION SYMBOL LIST

SYMBOL:	DESCRIPTION:
(E)SPK	EXISTING RECESSED PENDENT SPRINKLER HEAD TO REMAIN
(E)SPK	EXISTING RECESSED PENDENT SPRINKLER HEAD TO BE RELOCATED

### FIRE PROTECTION GENERAL NOTES

- ALL FIRE PROTECTION SYSTEMS WORK SHALL BE PROVIDED BY A DESIGN BUILD CONTRACT BY A LICENSED C16 CONTRACTOR.
- ALL WORK AND MATERIAL SHALL COMPLY WITH THE LATEST CALIFORNIA BUILDING CODE, CALIFORNIA FIRE CODES, NFPA 13, CALIFORNIA STATE FIRE MARSHAL, AND APPLICABLE LOCAL CODES, AMENDMENTS AND REQUIREMENTS.
- CONTRACTOR TO VERIFY EXACT LOCATION OF EXISTING SPRINKLER HEADS AND ADJUST HEAD LOCATIONS AS NECESSARY, FOLLOWING NFPA 13, 2016 INSTALLATION REQUIREMENTS.
- COORDINATE NEW SPRINKLER LOCATION WITH EXISTING PIPE DROP.
- CENTER SPRINKLERS IN CEILING TILES IN BOTH DIRECTIONS IN ALL AREAS. IN AREAS WITH 2'X4' CEILING TILES CENTERING USING A 2'X2' CEILING PATTERN IS ACCEPTABLE. SPRINKLER HEADS SHALL BE ALIGNED WITH OTHER SPRINKLER HEADS, LIGHTING, DIFFUSERS, AND ANY OTHER FEATURES IN THE CEILING.
- FINAL HEAD LOCATION, TYPE AND FINISH SHALL BE REVIEWED AND APPROVED BY THE ARCHITECT.
- THE OWNER MUST BE NOTIFIED PRIOR TO EACH AND EVERY DRAINING OR RECHARGING OF THE SPRINKLER SYSTEM.
- THE CONTRACTOR SHALL PREPARE A COORDINATED SET OF SHOP DRAWINGS AND SHALL OBTAIN APPROVAL FROM THE AUTHORITIES HAVING JURISDICTION AND THE LOCAL FIRE DEPARTMENT PRIOR TO ANY INSTALLATION.
- CONTRACTOR TO MAINTAIN MAXIMUM 15'-0" BETWEEN SURROUNDING SPRINKLERS.

### PLUMBING RENOVATION NOTES:

THESE NOTES APPLY TO ALL MECHANICAL SHEETS AND TRADES, INCLUDING BUT NOT LIMITED TO, PLUMBING, MEDICAL GAS.

- EXISTING CONDITIONS ARE SHOWN BASED ON INFORMATION OBTAINED FROM FIELD SURVEYS, EXISTING BUILDING DOCUMENTS, AND STAFF. VERIFY EXISTING CONDITIONS AND REPORT ANY CONFLICTS BEFORE PROCEEDING.
- NOT ALL EXISTING PIPING IS SHOWN. VERIFY EXISTING CONDITIONS BEFORE STARTING WORK. NOTIFY ENGINEER OF ANY CONFLICTS WITH NEW WORK.
- FIELD VERIFY THE AVAILABLE CLEARANCES AND PIPING BEFORE FABRICATION. RISES AND DROPS MAY BE NECESSARY BECAUSE OF EXISTING FIELD CONDITIONS.
- EACH CONTRACTOR SHALL FIELD VERIFY ACCESSIBILITY TO THE AREA OF THEIR WORK AND SHALL NOTIFY THE CONSTRUCTION MANAGER PRIOR TO BIDDING IF OTHER UTILITIES ARE REQUIRED TO BE REMOVED OR RELOCATED TO ALLOW ACCESS TO THEIR AREA OF WORK.
- THE GENERAL CONTRACTOR IS RESPONSIBLE FOR CUTTING, REMOVAL AND PATCHING OF ROOFS, WALLS, AND FLOORS ASSOCIATED WITH WORK BY ALL CONTRACTORS. CONTRACTORS SHALL NOTIFY THE GC OF AFFECTED AREAS PRIOR TO BIDDING.
- THE GENERAL CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND REPLACEMENT OF CEILINGS, CEILING TILES, AND CEILING GRIDS ASSOCIATED WITH AREAS OF WORK BY ALL CONTRACTORS. NOTIFY THE GENERAL CONTRACTOR OF AFFECTED AREAS PRIOR TO BIDDING.
- WHERE EXISTING MECHANICAL SYSTEMS ARE LOCATED IN AREAS THAT CONFLICT WITH NEW EQUIPMENT, PIPING, OR DUCTWORK TO BE INSTALLED, EACH CONTRACTOR SHALL EITHER ARRANGE NEW EQUIPMENT, PIPING IN SUCH A FASHION THAT IT DOES NOT CONFLICT WITH EXISTING SYSTEMS, OR REWORK EXISTING MECHANICAL SYSTEMS TO ALLOW FOR INSTALLATION OF NEW EQUIPMENT, PIPING, OR DUCTWORK.
- PROVIDE TEMPORARY CONNECTIONS TO MAINTAIN EXISTING SYSTEMS IN SERVICE DURING CONSTRUCTION. MAINTAIN ACCESS TO EXISTING MECHANICAL INSTALLATIONS THAT REMAIN ACTIVE.
- OBTAIN PERMISSION FROM OWNER BEFORE SHUTTING DOWN ANY SYSTEM FOR ANY REASON. MAINTAIN SERVICE TO ALL COMPONENTS THAT ARE TO REMAIN UNTIL NEW SYSTEMS ARE INSTALLED.
- MAINTAIN EXISTING SYSTEM IN SERVICE UNTIL NEW SYSTEM IS COMPLETE AND READY FOR TIE IN AND SWITCHOVER. DRAIN SYSTEM ONLY TO MAKE SWITCHOVERS AND CONNECTIONS. OBTAIN PERMISSION FROM OWNER BEFORE PARTIALLY OR COMPLETELY DRAINING SYSTEM. MAKE CHANGEOVER TO NEW SYSTEMS WITH MINIMUM OUTAGE.

### GENERAL NOTES:

THESE NOTES APPLY TO ALL MECHANICAL SHEETS AND TRADES, INCLUDING BUT NOT LIMITED TO, PLUMBING, MEDICAL GAS.

- DRAWINGS SHOWING LOCATIONS OF EQUIPMENT, PIPING, ETC. ARE DIAGRAMMATIC AND MAY NOT ALWAYS REFLECT EXACT INSTALLATION CONDITIONS. DRAWINGS SHOW THE GENERAL ARRANGEMENT OF PIPING, EQUIPMENT, ETC., AND MAY NOT INCLUDE ALL OFFSETS AND FITTINGS REQUIRED FOR COMPLETE INSTALLATION. THE DRAWINGS SHALL BE FOLLOWED AS CLOSELY AS ACTUAL BUILDING CONSTRUCTION AND THE WORK OF OTHERS WILL PERMIT.
- DO NOT SCALE DRAWINGS. VERIFY ALL DIMENSIONS AND CLEARANCES FROM ARCHITECTURAL, STRUCTURAL, SUBMITTALS, AND OTHER APPROPRIATE DRAWINGS OR PHYSICALLY AT SITE. REVIEW ALL DRAWINGS, INCLUDING THOSE OF OTHER TRADES.
- COORDINATE ALL WORK WITH ALL OTHER TRADES PRIOR TO INSTALLATION TO PROVIDE CLEARANCES REQUIRED FOR OPERATION, MAINTENANCE, CODE COMPLIANCE, AND TO VERIFY NON-INTERFERENCE WITH OTHER WORK. DO NOT FABRICATE PRIOR TO VERIFICATION OF NECESSARY CLEARANCES FOR ALL TRADES. BRING ANY INTERFERENCES OR CONFLICTS TO THE ATTENTION OF THE ARCHITECT/ENGINEER BEFORE PROCEEDING WITH FABRICATION OR EQUIPMENT ORDERS.
- REVIEW SPACE REQUIREMENTS OF EQUIPMENT SPECIFIED OR SUBSTITUTED AND MAKE REASONABLE ACCOMMODATIONS IN LAYOUT AND POSITIONING TO PROVIDE PROPER ACCESS.
- ANY CHANGES REQUIRED TO ELIMINATE CONFLICTS OR THAT RESULT FROM A FAILURE TO COORDINATE SHALL BE MADE BY THE CONTRACTOR WITHOUT ADDITIONAL COST OR EXPENSE TO OTHERS.
- EACH CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH ELECTRICAL CHANGES REQUIRED FOR EQUIPMENT PROPOSED THAT DIFFERS FROM THE BASIS OF DESIGN.
- REFER TO ARCHITECTURAL REFLECTED CEILING PLAN, ELECTRICAL, TECHNOLOGY AUDIOVISUAL, AND OTHER MECHANICAL PLANS FOR EXACT LOCATIONS OF ALL CEILING MOUNTED DEVICES, OTHER THAN SPRINKLERS.
- EACH CONTRACTOR IS RESPONSIBLE FOR DAMAGE CAUSED BY THEIR ACTIONS TO WALLS, FLOORS, CEILINGS, AND ROOFS. THE CONTRACTOR WHOSE WORK CAUSES DAMAGE IS RESPONSIBLE FOR PATCHING TO MATCH ORIGINAL CONSTRUCTION, FIRE RATING, AND FINISH.
- IN AREAS WITH BRWALL CEILINGS COORDINATE LOCATIONS OF ACCESS PANELS WITH THE GC FOR ACCESS TO VALVES, ETC. COORDINATE PANEL TYPE AND COLOR WITH ARCHITECT. NOTIFY THE GC OF THE REQUIRED ACCESS PANELS PRIOR TO BIDDING.
- SEAL ALL FLOOR, WALL, PENETRATIONS AIRTIGHT WHERE CONDUITS, PIPING, AND DUCTS PENETRATE.
- CAULK ALL PIPE PENETRATIONS OF FULL HEIGHT NON-FIRE RATED WALL, PARTITION, FLOOR, AND ROOF ASSEMBLIES. THIS IS ESSENTIAL TO PREVENT NOISE TRANSMISSION FROM ONE ROOM TO ANOTHER AND TO PROVIDE THE DESIRED NC LEVELS WITHIN ROOMS.
- WHERE PIPES ARE SHOWN TO PENETRATE FLOORS, PROVIDE SLEEVED OPENINGS WITH THE TOP EDGE RAISED ABOVE FLOOR SURFACE IN ACCORDANCE WITH ALL RELEVANT SPEC SECTIONS. SEAL SLEEVE PERIMETER TO BE WATERTIGHT.
- EQUIPMENT SIZES AND SERVICE CLEARANCE REQUIREMENTS VARY AMONG DIFFERENT MANUFACTURERS. CONSULT APPROVED SHOP DRAWINGS FOR EQUIPMENT SIZES AND REQUIRED SERVICE CLEARANCES. COORDINATE WITH LAYOUT OF EQUIPMENT PADS, PIPING, DUCTWORK, ETC.
- DO NOT BLOCK TUBE PULL OR EQUIPMENT SERVICE CLEARANCES.
- DO NOT SUPPORT EQUIPMENT, PIPING, FROM METAL DECKING OR OTHER NON-STRUCTURAL BUILDING ELEMENTS. ANCHORS EMBEDDED IN CONCRETE SHALL BE CRACKED CONCRETE APPROVED IN ACCORDANCE WITH SPECIFICATIONS.

### APPLICABLE CODES AND STANDARDS:

2019 CALIFORNIA BUILDING STANDARDS ADMINISTRATIVE CODE  
 CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, PART 1

2019 CALIFORNIA BUILDING CODE (CBC)  
 CALIFORNIA CODE OF REGULATIONS (CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, PART 2) TITLE 24, PART 2  
 (2018 INTERNATIONAL BUILDING CODE (IBC) W/ 2019 CALIFORNIA AMENDMENTS)

2019 CALIFORNIA ELECTRICAL CODE (CEC)  
 CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, PART 3  
 (2017 NATIONAL ELECTRICAL CODE (NEC) W/ 2019 CALIFORNIA AMENDMENTS)

2019 CALIFORNIA ENERGY CODE  
 CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, PART 6

2019 CALIFORNIA FIRE CODE (CFC)  
 CALIFORNIA CODES OF REGULATIONS (CRR) TITLE 24, PART 9  
 (2018 INTERNATIONAL FIRE CODE (IFC) W/ 2019 CALIFORNIA AMENDMENTS)

2019 CALIFORNIA EXISTING BUILDING CODE  
 CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, PART 10  
 (2018 INTERNATIONAL EXISTING BUILDING CODE (IEBC))

2019 CALIFORNIA REFERENCES STANDARDS CODE  
 CALIFORNIA DOE OF REGULATIONS (CCR) TITLE 24, PART 12

AMERICANS WITH DISABILITIES ACT (ADA)  
 TITLE II - ACCESSIBILITY GUIDELINES FOR BUILDINGS AND FACILITIES (ADAG)  
 1990 STATE FIRE MARSHAL REGULATIONS AND AMENDMENTS TO-DATE

CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, CALIFORNIA STATE ACCESSIBILITY STANDARDS  
 CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 19  
 2019 CALIFORNIA GREEN BUILDING STANDARDS CODE  
 (CAL GREEN), PART II, TITLE 24 C.C.R.

NFPA 13 STANDARD FOR INSTALLATION OF SPRINKLER SYSTEMS (CA AMENDED) 2016 EDITION

### PLUMBING GENERAL NOTES:

- THE SYMBOLS AND THE MATERIAL LIST ARE FOR THE CONVENIENCE OF THE CONTRACTOR. CONTRACTOR SHALL VERIFY QUANTITIES AND FURNISH ALL MATERIALS REQUIRED FOR FULLY OPERATIONAL SYSTEMS, WHETHER SPECIFIED OR NOT.
- CATALOG NUMBERS SHALL NOT BE CONSIDERED COMPLETE, BUT ARE GIVEN AS AN AID TO THE CONTRACTOR AND TO INDICATE THE QUALITY REQUIRED. CONTRACTOR IS RESPONSIBLE FOR A COMPLETE DESCRIPTION OF MATERIAL ON THESE DRAWINGS AND IN THE SPECIFICATIONS BEFORE ORDERING. THE DESCRIPTION OF THE MATERIAL TAKES PRECEDENCE OVER THE CATALOG NUMBER. THE FIRST MANUFACTURER LISTED IS THE BASIS OF DESIGN.
- CONTRACTOR SHALL VERIFY THAT FIXTURES SUPPLIED ARE APPROVED PER ALL APPLICABLE STATE, LOCAL AND GOVERNING AUTHORITIES.
- ALL FIXTURES SHALL CONFORM TO FEDERAL ACSI S 3874
- ALL ELEVATIONS ARE FROM EXISTING DRAWINGS AND MAY NOT BE ACCURATE. VERIFY ALL ELEVATIONS BEFORE BEGINNING WORK.
- VERIFY UNDERGROUND PIPE SIZES, INVERT ELEVATIONS, AND LOCATIONS PRIOR TO BEGINNING ANY WORK.
- REFER TO THE PLUMBING ROUGH-IN SCHEDULE FOR THE SIZES OF BRANCH PIPES TO PLUMBING FIXTURES.
- FOR CLARITY, NOT ALL VALVES HAVE BEEN SHOWN. PROVIDE SHUTOFF VALVES IN DOMESTIC WATER PIPING SERVING EACH ROOM WITH FIXTURES. ANGLE STOPS SHALL NOT BE CONSIDERED SHUTOFF VALVES.
- EXISTING CONDITIONS ON DEMOLITION PLANS ARE PROVIDED TO INDICATE THE GENERAL SCOPE OF ITEMS TO BE REMOVED. REFER TO SPECIFICATION SECTION 22 05 05 FOR ADDITIONAL DEMOLITION INFORMATION.
- G.C. SHALL CUT AND PATCH EXISTING AS REQUIRED FOR NEW OR DEMOLITION WORK UNLESS NOTED OTHERWISE.

### ME COMPONENT ANCHORAGE NOTES:

1. EQUIPMENT ANCHORAGE NOTE:  
 ALL MECHANICAL, PLUMBING, AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE HCAI APPROVED CONSTRUCTION DOCUMENTS. THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2019 CBC, SECTION 1616A.18 THROUGH 1616A.1.26 AND ASCE 7-16 CHAPTERS 13.26, AND 30.

- ALL PERMANENT EQUIPMENT AND COMPONENTS.
- TEMPORARY, MOVABLE OR MOBILE EQUIPMENT THAT IS PERMANENTLY ATTACHED (E.G. HARED WIRED) TO THE BUILDING UTILITY SERVICES SUCH AS ELECTRICITY, GAS OR WATER. "PERMANENTLY ATTACHED" SHALL INCLUDE ALL ELECTRICAL CONNECTION EXCEPT PLUGS FOR 110/220 VOLT RECEPTACLES HAVING A FLEXIBLE CABLE.
- TEMPORARY, MOVABLE OR MOBILE EQUIPMENT WHICH IS HEAVIER THAN 400 POUNDS OR HAS A CENTER MASS LOCATED 4 FEET OR MORE ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENTS IS REQUIRED TO BE RETRAINED IN A MANNER APPROVED BY HCAI.

THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED DOT THE STRUCTURE, BUT NEED NOT DEMONSTRATE DESIGN COMPLIANCE WITH THE REFERENCES NOTES ABOVE. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING, AND CONDUIT. FLEXIBLE CONNECTIONS MUST ALLOW MOVEMENT IN BOTH TRANSFERS AND LONGITUDINAL DIRECTIONS.

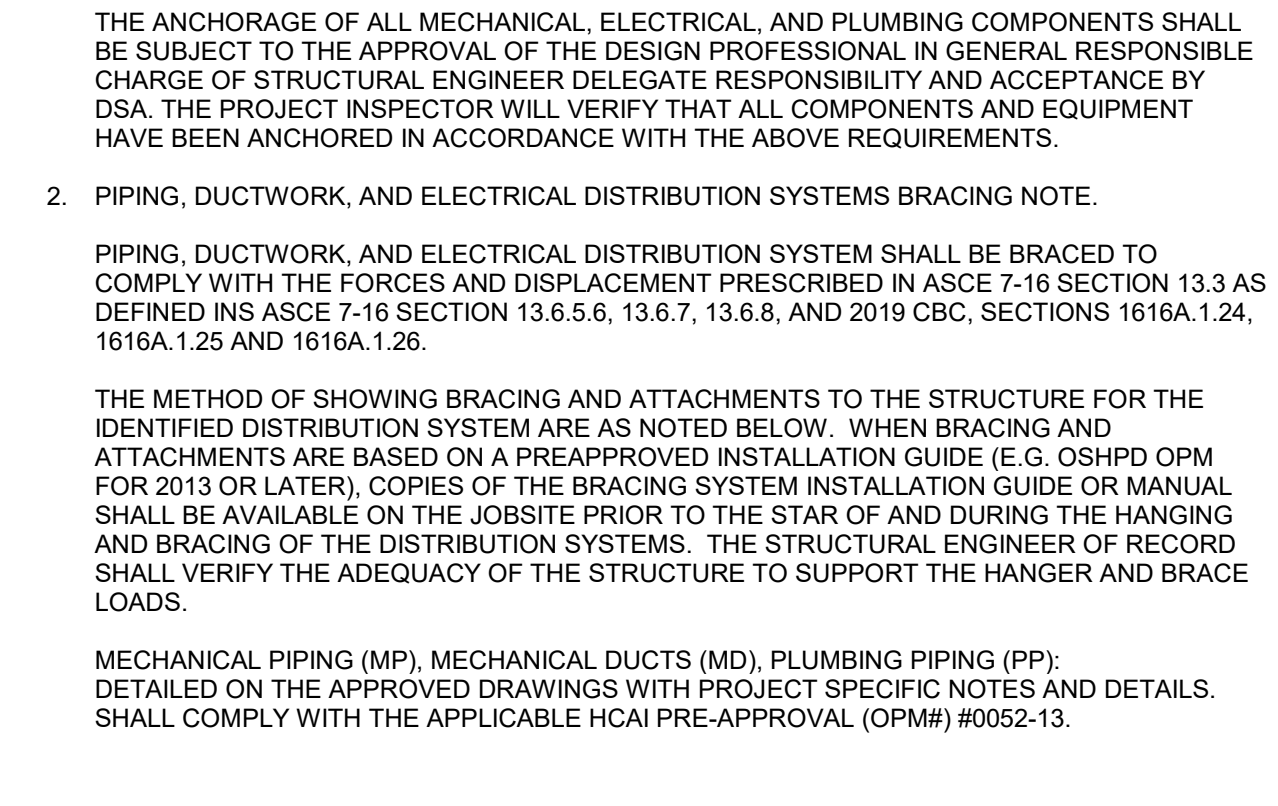
- COMPONENTS WEIGHING LESS THAN 400 POUNDS AND HAVE A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT
- COMPONENTS WEIGHING LESS THAN 20 POUNDS, OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 5 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR FLOOR OR HUNG FROM A WALL.

THE ANCHORAGE OF ALL MECHANICAL, ELECTRICAL, AND PLUMBING COMPONENTS SHALL BE SUBJECT TO THE APPROVAL OF THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE OF STRUCTURAL ENGINEER DELEGATE RESPONSIBILITY AND ACCEPTANCE BY DSA. THE PROJECT INSPECTOR WILL VERIFY THAT ALL COMPONENTS AND EQUIPMENT HAVE BEEN ANCHORED IN ACCORDANCE WITH THE ABOVE REQUIREMENTS.

2. PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS BRACING NOTE.  
 PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEM SHALL BE BRACED TO COMPLY WITH THE FORCES AND DISPLACEMENT PRESCRIBED IN ASCE 7-16 SECTION 13.3 AS DEFINED INS ASCE 7-16 SECTION 13.6.5.6, 13.6.7, 13.6.8, AND 2019 CBC, SECTIONS 1616A.1.24, 1616A.1.25 AND 1616A.1.26.

THE METHOD OF SHOWING BRACING AND ATTACHMENTS TO THE STRUCTURE FOR THE IDENTIFIED DISTRIBUTION SYSTEM ARE AS NOTED BELOW. WHEN BRACING AND ATTACHMENTS ARE BASED ON A PREAPPROVED INSTALLATION GUIDE (E.G. OSHPD OPM FOR 2013 OR LATER), COPIES OF THE BRACING SYSTEM INSTALLATION GUIDE OR MANUAL SHALL BE AVAILABLE ON THE JOBSITE PRIOR TO THE START OF AND DURING THE HANGING AND BRACING OF THE DISTRIBUTION SYSTEMS. THE STRUCTURAL ENGINEER OF RECORD SHALL VERIFY THE ADEQUACY OF THE STRUCTURE TO SUPPORT THE HANGER AND BRACE LOADS.

MECHANICAL PIPING (MP), MECHANICAL DUCTS (MD), PLUMBING PIPING (PP), DETAILED ON THE APPROVED DRAWINGS WITH PROJECT SPECIFIC NOTES AND DETAILS. SHALL COMPLY WITH THE APPLICABLE HCAI PRE-APPROVAL (OPMR) #0052-13.



### PLUMBING SHEET INDEX

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P2.0	CRAWL SPACE PLAN - PLUMBING
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P3.1	DETAILS
GRAND TOTAL: 8	

Office of Statewide Health Planning and Development

HCAI # S222347-36-00

REVIEWED IN ACCORDANCE WITH THE REQUIREMENTS OF T24, CCR

**APPROVED**

Department of Health Care Access & Information  
 Office of Statewide Hospital Planning & Development

1/4/2024, 9:00:12 AM  
 S222347-36-00  
 Allen Cheng

### REFERENCE PLAN

PHASE 1: SPD REMODEL PROJECT AREA

GROUND FLOOR  
 TEMPORARY MOBILE SPD (PROJ NO. S222348-36-00)

marks architects, inc. 2022  
 ALL REPORTS, PLANS AND DOCUMENTS PREPARED BY MARKS ARCHITECTS, INC. SHALL REMAIN THE PROPERTY OF MARKS ARCHITECTS, INC. AND ARE INTENDED FOR THE SPECIFIC PROJECT ONLY. OTHER USES ARE PROHIBITED UNLESS OTHERWISE CONTRACTED.

### PLUMBING COVERSHEET

DRAWING TITLE

DATE  
**DECEMBER 28, 2022**

REVISIONS

HCAI COMMENTS 02.13.23  
 PLAN CHECK COMMENTS 08.15.23

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REGISTERED PROFESSIONAL ENGINEER  
 WILLIAM P. SPANIER  
 No. M25602  
 Exp. 9/30/24  
 MECHANICAL  
 STATE OF CALIFORNIA

PROJECT NUMBER  
**3021027**

DRAWING NUMBER  
**P0.1**



**22 05 00 BASIC PLUMBING REQUIREMENTS**

**SCOPE OF WORK**

THE CONTRACTOR SHALL FURNISH AND INSTALL ALL NEW MATERIALS AS INDICATED ON THE DRAWINGS, AND/OR IN THESE SPECIFICATIONS, AND ALL ITEMS REQUIRED TO MAKE ASSOCIATED PORTION OF THE MECHANICAL WORK A FINISHED AND WORKING SYSTEM.

ALL WORK THAT WILL PRODUCE EXCESSIVE NOISE OR INTERFERENCE WITH NORMAL BUILDING OPERATIONS, AS DETERMINED BY THE OWNER/LANDLORD, SHALL BE SCHEDULED WITH THE OWNER/LANDLORD. IT MAY BE NECESSARY TO SCHEDULE SUCH WORK DURING UNOCCUPIED HOURS. THE OWNER/LANDLORD RESERVES THE RIGHT TO DETERMINE WHEN RESTRICTED CONSTRUCTION HOURS WILL BE REQUIRED. CONTRACTOR SHALL COORDINATE WITH THE LANDLORD DURING THE BIDDING PROCESS.

ALL CONTRACTORS SHALL ESTABLISH UTILITY ELEVATIONS PRIOR TO FABRICATION AND SHALL COORDINATE THEIR MATERIAL AND EQUIPMENT WITH OTHER TRADES.

THE MECHANICAL CONTRACTOR (FIRE PROTECTION/PLUMBING/HVAC/TEMPERATURE CONTROLS CONTRACTOR) SHALL:

BE RESPONSIBLE FOR ALL WIRING NOT SHOWN ON ELECTRICAL DRAWINGS BUT REQUIRED FOR MECHANICAL SYSTEMS.

VERIFY ALL EXISTING EQUIPMENT SIZES AND CAPACITIES WHERE UNITS ARE TO BE MODIFIED, MOVED, OR REPLACED. CONTRACTOR SHALL NOTIFY ARCHITECT/ENGINEER OF ANY DISCREPANCIES PRIOR TO ORDERING NEW UNITS OR REPLACEMENT UNITS.

**QUALITY ASSURANCE**

THE CONTRACTOR IS RESPONSIBLE FOR CONSTRUCTING COMPLETE AND OPERATING SYSTEMS. THE CONTRACTOR ACKNOWLEDGES AND UNDERSTANDS THAT THE CONTRACT DOCUMENTS ARE A TWO-DIMENSIONAL REPRESENTATION OF A THREE-DIMENSIONAL OBJECT, SUBJECT TO HUMAN INTERPRETATION. THIS REPRESENTATION MAY INCLUDE IMPERFECT DATA, INTERPRETED CODES, UTILITY GUIDELINES, THREE-DIMENSIONAL CONFLICTS, AND REQUIRED FIELD CORRECTION ITEMS. SUCH DEFICIENCIES CAN BE CORRECTED WHEN IDENTIFIED PRIOR TO ORDERING MATERIAL AND STARTING INSTALLATION. THE CONTRACTOR AGREES TO CAREFULLY STUDY AND COMPARE THE INDIVIDUAL CONTRACT DOCUMENTS AND REPORT AT ONCE IN WRITING TO THE DESIGN TEAM ANY DEFICIENCIES THE CONTRACTOR MAY DISCOVER. THE CONTRACTOR FURTHER AGREES TO REQUIRE EACH SUBCONTRACTOR TO LIKEWISE STUDY THE DOCUMENTS AND REPORT AT ONCE ANY DEFICIENCIES DISCOVERED.

THE CONTRACTOR SHALL RESOLVE ALL REPORTED DEFICIENCIES WITH THE ARCHITECT/ENGINEER PRIOR TO AWARDING ANY SUBCONTRACTS, ORDERING MATERIAL, OR STARTING ANY WORK WITH THE CONTRACTOR'S OWN EMPLOYEES. ANY WORK PERFORMED PRIOR TO RECEIPT OF INSTRUCTIONS FROM THE DESIGN TEAM WILL BE DONE AT THE CONTRACTOR'S RISK.

ONLY PRODUCTS OF REPUTABLE MANUFACTURERS ARE ACCEPTABLE.

ALL CONTRACTORS AND SUBCONTRACTORS SHALL EMPLOY ONLY WORKERS SKILLED IN THEIR TRADES.

CONSTRUCTION DRAWINGS FOR THIS PROJECT HAVE BEEN PREPARED UTILIZING AUTOCAD MEP. CONTRACTORS AND SUBCONTRACTORS MAY REQUEST ELECTRONIC MEDIA FILES OF THE CONTRACT DRAWINGS. THE ELECTRONIC CONTRACT DOCUMENTS CAN BE USED FOR PREPARATION OF SHOP DRAWINGS AND AS-BUILT DRAWINGS ONLY. THE INFORMATION MAY NOT BE USED IN WHOLE OR IN PART FOR ANY OTHER PROJECT.

**CODES AND STANDARDS**

CONFORM TO ALL STATE CODES, AND AUTHORITY HAVING JURISDICTION.

IF THE CONTRACTOR NOTES, AT THE TIME OF BIDDING, THAT ANY PARTS OF THE DRAWINGS OR SPECIFICATIONS DO NOT COMPLY WITH THE CODES OR REGULATIONS, CONTRACTOR SHALL INFORM THE ARCHITECT/ENGINEER IN WRITING, REQUESTING A CLARIFICATION. IF THERE IS INSUFFICIENT TIME FOR THIS PROCEDURE, CONTRACTOR SHALL SUBMIT WITH THE PROPOSAL A SEPARATE PRICE TO MAKE THE SYSTEM COMPLY WITH THE CODES AND REGULATIONS.

ALL CHANGES TO THE SYSTEM MADE AFTER LETTING OF THE CONTRACT, TO COMPLY WITH CODES OR REQUIREMENTS OF INSPECTORS, SHALL BE MADE BY THE CONTRACTOR WITHOUT COST TO THE OWNER.

IF THERE IS A DISCREPANCY BETWEEN MANUFACTURER'S RECOMMENDATIONS AND THESE SPECIFICATIONS, THE MANUFACTURER'S RECOMMENDATIONS SHALL GOVERN.

ALL ROTATING SHAFTS AND/OR EQUIPMENT SHALL BE COMPLETELY GUARDED FROM ALL CONTACT. PARTIAL GUARDS AND/OR GUARDS THAT DO NOT MEET ALL APPLICABLE OSHA STANDARDS ARE NOT ACCEPTABLE. CONTRACTOR IS RESPONSIBLE FOR PROVIDING THIS GUARDING IF IT IS NOT PROVIDED WITH THE EQUIPMENT SUPPLIED.

**PERMITS AND FEES**

PROCURE ALL APPLICABLE PERMITS AND LICENSES. ABIDE BY LOCAL AND STATE LAWS, REGULATIONS, AND ORDINANCES. PAY ALL CHARGES FOR PERMITS OR LICENSES. PAY ALL FEES AND TAXES IMPOSED BY STATE, MUNICIPAL, AND OTHER REGULATORY BODIES. PAY ALL CHARGES ARISING OUT OF REQUIRED INSPECTIONS BY AN AUTHORIZED BODY. PAY ALL CHARGES ARISING OUT OF REQUIRED CONTRACT DOCUMENT REVIEWS ASSOCIATED WITH THE PROJECT AND AS INITIATED BY THE OWNER OR AUTHORIZED AGENCY/CONSULTANT.

WHERE APPLICABLE, ALL FIXTURES, EQUIPMENT AND MATERIALS SHALL BE LISTED BY UNDERWRITER'S LABORATORIES, INC. AND APPROVED BY FM GLOBAL.

**SUBMITTALS**

SUBMITTALS SHALL BE REQUIRED WHERE REQUIRED IN THE SPECIFICATIONS OR ON THE DRAWINGS. THE CONTRACTOR SHALL SUBMIT ELECTRONIC COPIES OF EACH SHOP DRAWING FOR REVIEW BY THE ARCHITECT/ENGINEER BEFORE RELEASING ANY EQUIPMENT FOR MANUFACTURE OR SHIPMENT.

THE CONTRACTOR SHALL THOROUGHLY REVIEW AND APPROVE ALL SHOP DRAWINGS BEFORE SUBMITTING THEM TO THE ARCHITECT/ENGINEER. CONTRACTOR SHALL CLEARLY MARK ALL DEVIATIONS FROM THE CONTRACT DOCUMENTS ON ALL SUBMITTALS. ASSEMBLE ALL SUBMITTALS IN SETS BASED ON APPLICABLE SPECIFICATION SECTION. ALL SETS SHALL BE IDENTICAL AND CONTAIN AN INDEX OF THE ITEMS ENCLOSED WITH A GENERAL TOPIC DESCRIPTION ON THE COVER. WHERE MORE THAN ONE MODEL IS SHOWN ON A MANUFACTURER'S SHEET, CLEARLY INDICATE EXACTLY WHICH ITEM AND WHICH DATA IS RELEVANT TO THE WORK. REFER TO SUBSECTIONS FOR SPECIFIC SUBMITTAL REQUIREMENTS.

**PRODUCT DELIVERY, STORAGE, AND HANDLING**

EXERCISE CARE IN TRANSPORTING AND HANDLING TO AVOID DAMAGE TO MATERIALS. STORE MATERIALS ON THE SITE TO PREVENT DAMAGE. KEEP MATERIALS CLEAN, DRY AND FREE FROM HARMFUL CONDITIONS. IMMEDIATELY REMOVE ANY MATERIALS THAT BECOME WET OR THAT ARE SUSPECTED OF BECOMING CONTAMINATED WITH MOLD OR OTHER ORGANISMS.

KEEP ALL BEARINGS PROPERLY LUBRICATED AND ALL BELTS PROPERLY TENSIONED AND ALIGNED.

COORDINATE THE INSTALLATION OF HEAVY AND LARGE EQUIPMENT WITH THE GENERAL CONTRACTOR AND/OR OWNER. IF THE MECHANICAL CONTRACTOR DOES NOT HAVE PRIOR DOCUMENTED EXPERIENCE IN RIGGING AND LIFTING SIMILAR EQUIPMENT, HE/SHE SHALL CONTRACT WITH A QUALIFIED LIFTING AND RIGGING SERVICE THAT HAS SIMILAR DOCUMENTED EXPERIENCE. FOLLOW ALL EQUIPMENT LIFTING AND SUPPORT GUIDELINES FOR HANDLING AND MOVING.

CONTRACTOR IS RESPONSIBLE FOR MOVING EQUIPMENT INTO THE BUILDING AND/OR SITE. CONTRACTOR SHALL REVIEW SITE PRIOR TO BID FOR PATH LOCATION AND ANY REQUIRED BUILDING MODIFICATIONS TO ALLOW MOVEMENT OF EQUIPMENT. CONTRACTOR SHALL COORDINATE HIS/HER WORK WITH OTHER TRADES.

**WARRANTY**

PROVIDE MINIMUM ONE-YEAR WARRANTY COMMENCING ON DATE OF FINAL ACCEPTANCE FOR ALL FIXTURES, EQUIPMENT, MATERIALS, AND WORKMANSHIP. WARRANTY REQUIREMENTS SHALL EXTEND TO CORRECTION, WITHOUT COST TO OWNER, OF ALL WORK FOUND TO BE DEFECTIVE OR NONCONFORMING TO THE CONTRACT DOCUMENTS. REFER TO SUBSECTIONS FOR ADDITIONAL WARRANTY REQUIREMENTS.

**MATERIAL SUBSTITUTION**

WHERE SEVERAL MANUFACTURERS' NAMES ARE GIVEN, THE MANUFACTURER FOR WHICH A CATALOG NUMBER IS GIVEN IS THE BASIS OF DESIGN AND ESTABLISHES THE QUALITY REQUIRED. EQUIVALENT EQUIPMENT MANUFACTURED BY THE OTHER NAMED MANUFACTURERS MAY BE USED. CONTRACTOR SHALL ENSURE THAT ALL ITEMS SUBMITTED BY THESE OTHER MANUFACTURERS MEET ALL REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS, AND FIT IN THE ALLOCATED SPACE. THE ARCHITECT/ENGINEER SHALL MAKE THE FINAL DETERMINATION OF WHETHER A PRODUCT IS EQUIVALENT.

ANY MATERIAL, ARTICLE OR EQUIPMENT OF OTHER UNNAMED MANUFACTURERS WHICH WILL ADEQUATELY PERFORM THE SERVICES AND DUTIES IMPOSED BY THE DESIGN AND IS OF A QUALITY EQUAL TO OR BETTER THAN THE EQUIPMENT IDENTIFIED BY THE DRAWINGS MAY BE USED IF APPROVAL IS SECURED IN WRITING FROM THE ARCHITECT/ENGINEER VIA ADDENDUM.

**EXCAVATION, FILL, BACKFILL, COMPACTION**

UNDERGROUND PIPE SHALL BE AND IN DRY TRENCHES MAINTAINED FREE OF ACCUMULATED WATER ON A BED OF C&G FILL. PROVIDE AND OPERATE SUFFICIENT PUMPING EQUIPMENT TO MAINTAIN EXCAVATIONS, TRENCHES AND PITS FREE OF WATER. DISPOSE OF PUMPED WATER SO OPERATION AREAS AND OTHER FACILITIES ARE NOT FLOODED. PIPE LAYING SHALL FOLLOW EXCAVATING AS CLOSELY AS POSSIBLE.

**OBSERVATION OF WORK**

THE CONTRACTOR SHALL PROVIDE SEVEN (7) CALENDAR DAYS' NOTICE TO THE ARCHITECT/ENGINEER PRIOR TO COVERING INTERIOR PARTITIONS AND CHASES AND INSTALLING HARD OR SUSPENDED CEILINGS AND SOFFITS.

**22 05 00 CONT.**

ALL WORK ABOVE THE CEILINGS MUST BE COMPLETE PRIOR TO THE ARCHITECT/ENGINEER'S REVIEW.

IN ORDER TO PREVENT THE FINAL JOBSITE OBSERVATION FROM OCCURRING TOO EARLY, THE CONTRACTOR SHALL REVIEW THE COMPLETION STATUS OF THE PROJECT AND CERTIFY IN WRITING THAT THE JOB IS READY FOR THE FINAL JOBSITE OBSERVATION.

**PROJECT CLOSURE**

SUBMIT THE FOLLOWING: OPERATION AND MAINTENANCE MANUALS INCLUDING BOUND COPIES OF APPROVED SHOP DRAWINGS, RECORD DOCUMENTS INCLUDING REPRODUCIBLE DRAWINGS COMPLETED IN AUTOCAD, SPARE PARTS AND EXTRA MATERIALS IN QUANTITIES SPECIFIED IN THESE SPECIFICATIONS, AND INSPECTION BY STATE BOILER INSPECTOR.

**OPERATION AND MAINTENANCE MANUALS**

SUBMIT AN ELECTRONIC COPY OF THE O&M MANUALS TO THE OWNER. OPERATION AND MAINTENANCE DATA SHALL CONSIST OF WRITTEN INSTRUCTIONS FOR THE CARE, MAINTENANCE, AND OPERATION OF THE EQUIPMENT AND SYSTEMS. INSTRUCTION BOOKS, CARDS, MANUALS FURNISHED WITH THE EQUIPMENT SHALL BE INCLUDED.

ALL TEXT SHALL BE SEARCHABLE AND BOOKMARKS SHALL BE USED, DIVIDING INFORMATION BY SPECIFICATION SECTION.

**RECORD DOCUMENTS**

MAINTAIN AT THE JOB SITE A SEPARATE AND COMPLETE SET OF MECHANICAL DRAWINGS AND SPECIFICATIONS WITH ALL CHANGES MADE TO THE SYSTEMS CLEARLY AND PERMANENTLY MARKED IN COMPLETE DETAIL. MARK DRAWINGS TO INDICATE FIELD CORRECTIONS. SUBSTITUTIONS, CHANGE ORDERS, AND ACTUAL EQUIPMENT AND MATERIALS USED. ALL CHANGE ORDERS, RFI RESPONSES, CLARIFICATIONS AND OTHER SUPPLEMENTAL INSTRUCTIONS SHALL BE MARKED ON THE DOCUMENTS. RECORD DOCUMENTS THAT MERELY REFERENCE THE EXISTENCE OF THE ABOVE ITEMS ARE NOT ACCEPTABLE. RECORD CHANGES DAILY AND KEEP THEM MARKED ON DRAWINGS AVAILABLE FOR THE ARCHITECT/ENGINEER'S EXAMINATION AT ANY NORMAL WORK TIME.

UPON COMPLETING THE JOB, AND BEFORE FINAL PAYMENT IS MADE, PROVIDE REPRODUCIBLE DRAWINGS COMPLETED IN AUTOCAD TO THE ARCHITECT/ENGINEER.

**CLEANING**

THOROUGHLY CLEAN ALL EQUIPMENT AND SYSTEMS PRIOR TO THE OWNER'S FINAL ACCEPTANCE OF THE PROJECT. CLEAN ALL FOREIGN PAINT, GREASE, OIL, DIRT LABELS, STICKERS, ETC., FROM ALL EQUIPMENT. REMOVE ALL RUBBISH, DEBRIS, ETC., ACCUMULATED DURING CONSTRUCTION FROM THE PREMISES. END OF SECTION

**22 05 05 DEMOLITION FOR REMODELING**

THE DRAWINGS ARE INTENDED TO INDICATE THE GENERAL SCOPE OF WORK AND DO NOT SHOW EVERY PIPE, OR PIECE OF EQUIPMENT THAT MUST BE REMOVED. THE CONTRACTOR SHALL VISIT THE SITE AND VERIFY CONDITIONS PRIOR TO SUBMITTING A BID.

WHERE WALLS, CEILINGS, ETC., ARE SHOWN AS BEING REMOVED ON GENERAL DRAWINGS, THE CONTRACTOR SHALL REMOVE ALL MECHANICAL EQUIPMENT, DEVICES, FIXTURES, PIPING, SYSTEMS, ETC., FROM THE REMOVED AREA.

WHERE CEILINGS, WALLS, PARTITIONS, ETC., ARE TEMPORARILY REMOVED AND REPLACED BY OTHERS, THIS CONTRACTOR SHALL REMOVE, STORE, AND REPLACE EQUIPMENT, DEVICES, FIXTURES, PIPES, SYSTEMS, ETC.

VERIFY THAT ABANDONED UTILITIES SERVE ONLY ABANDONED EQUIPMENT OR FACILITIES. EXTEND SERVICES TO FACILITIES OR EQUIPMENT THAT SHALL REMAIN IN OPERATION FOLLOWING DEMOLITION.

COORDINATE WORK WITH ALL OTHER CONTRACTORS AND THE OWNER. SCHEDULE REMOVAL OF EQUIPMENT TO AVOID CONFLICTS.

THIS CONTRACTOR SHALL VERIFY ALL EXISTING EQUIPMENT SIZES AND CAPACITIES WHERE EQUIPMENT IS SCHEDULED TO BE REPLACED OR MODIFIED, PRIOR TO ORDERING NEW EQUIPMENT.

BID SUBMITTAL SHALL MEAN THE CONTRACTOR HAS VISITED THE PROJECT SITE AND VERIFIED EXISTING CONDITIONS AND SCOPE OF WORK.

**PREPARATION**

DISCONNECT MECHANICAL SYSTEMS IN WALLS, FLOORS, AND CEILINGS SCHEDULED FOR REMOVAL.

PROVIDE TEMPORARY CONNECTIONS TO MAINTAIN EXISTING SYSTEMS IN SERVICE DURING CONSTRUCTION. WHEN WORK MUST BE PERFORMED ON OPERATING EQUIPMENT, USE PERSONNEL EXPERIENCED IN SUCH OPERATIONS.

**DEMOLITION AND EXTENSION OF EXISTING MECHANICAL WORK**

DEMOLISH AND EXTEND EXISTING MECHANICAL WORK UNDER PROVISIONS OF DIVISION 2 AND THIS SECTION. REMOVE, RELOCATE, AND EXTEND EXISTING INSTALLATIONS TO ACCOMMODATE NEW CONSTRUCTION. REMOVE ABANDONED PIPING TO SOURCE OF SUPPLY AND/OR MAIN LINES.

REMOVE EXPOSED ABANDONED PIPES, INCLUDING ABANDONED PIPES ABOVE ACCESSIBLE CEILINGS. CUT PIPES ABOVE CEILINGS, BELOW FLOORS AND BEHIND WALLS. CAP REMAINING LINES. REPAIR BUILDING CONSTRUCTION TO MATCH ORIGINAL. REMOVE ALL CLAMPS, HANGERS, SUPPORTS, ETC. ASSOCIATED WITH PIPE AND DUCT REMOVAL.

REPAIR ADJACENT CONSTRUCTION AND FINISHES DAMAGED DURING DEMOLITION AND EXTENSION WORK.

EXTEND EXISTING INSTALLATIONS USING MATERIALS AND METHODS COMPATIBLE WITH EXISTING INSTALLATIONS, OR AS SPECIFIED.

**CUTTING AND PATCHING**

THIS CONTRACTOR IS RESPONSIBLE FOR ALL PENETRATIONS OF EXISTING CONSTRUCTION REQUIRED TO COMPLETE THE WORK OF THIS PROJECT. PENETRATIONS IN EXISTING CONSTRUCTION SHOULD BE REVIEWED CAREFULLY PRIOR TO PROCEEDING WITH ANY WORK.

PENETRATIONS SHALL BE NEAT AND CLEAN WITH SMOOTH AND/OR FINISHED EDGES. CORE DRILL WHERE POSSIBLE FOR CLEAN OPENING.

REPAIR EXISTING CONSTRUCTION AS REQUIRED AFTER PENETRATION IS COMPLETE TO RESTORE TO ORIGINAL CONDITION. USE SIMILAR MATERIALS AND MATCH ADJACENT CONSTRUCTION UNLESS OTHERWISE NOTED OR AGREED TO BY THE ARCHITECT/ENGINEER PRIOR TO START OF WORK.

FLOOR SLABS MAY CONTAIN CONDUIT SYSTEMS. THIS CONTRACTOR IS RESPONSIBLE FOR TAKING ANY MEASURES REQUIRED TO ENSURE NO CONDUITS OR OTHER SERVICES ARE DAMAGED. THIS INCLUDES X-RAY OR SIMILAR NON-DESTRUCTIVE MEANS.

THIS CONTRACTOR IS RESPONSIBLE FOR ALL COSTS INCURRED IN REPAIR, RELOCATIONS, OR REPLACEMENT OF ANY CABLES, CONDUITS, OR OTHER SERVICES IF DAMAGED WITHOUT PROPER INVESTIGATION.

**CLEANING AND REPAIR**

CLEAN AND REPAIR EXISTING MATERIALS AND EQUIPMENT WHICH REMAIN OR ARE TO BE REUSED. CLEAN ALL SYSTEMS ADJACENT TO PROJECT WHICH ARE AFFECTED BY THE DUST AND DEBRIS CAUSED BY THIS CONSTRUCTION.

MECHANICAL ITEMS REMOVED AND NOT RELOCATED REMAIN THE PROPERTY OF THE LANDLORD/OWNER. CONTRACTOR SHALL PLACE ITEMS RETAINED BY THE LANDLORD/OWNER IN A LOCATION COORDINATED WITH THE LANDLORD/OWNER. THE CONTRACTOR SHALL DISPOSE OF MATERIAL THE LANDLORD/OWNER DOES NOT WANT TO REUSE OR RETAIN FOR MAINTENANCE PURPOSES.

**SPECIAL REQUIREMENTS**

REVIEW LOCATIONS OF ALL NEW PENETRATIONS IN EXISTING FLOOR SLABS OR WALLS. DETERMINE CONSTRUCTION TYPE AND REVIEW FOR POSSIBLE INTERFERENCES. BRING ALL CONCERNS TO THE ATTENTION OF THE ARCHITECT/ENGINEER BEFORE PROCEEDING.

END OF SECTION

**22 07 19 PLUMBING PIPING INSULATION**

**SECTION INCLUDES**

PIPING INSULATION

**QUALITY ASSURANCE**

APPLICATOR: COMPANY SPECIALIZING IN PIPING INSULATION APPLICATION WITH FIVE YEARS MINIMUM EXPERIENCE.

MATERIALS: FLAME SPREAD/SMOKE DEVELOPED RATING OF 25/50 IN ACCORDANCE WITH ASTM E84, NFPA 255, OR UL 723 (WHERE REQUIRED).

**SUBMITTALS**

SUBMIT SHOP DRAWINGS PER SECTION 2223 05 00. INCLUDE PRODUCT DESCRIPTION, LIST OF MATERIALS AND THICKNESS FOR EACH SERVICE, AND LOCATIONS.

**INSULATION MATERIALS**

TYPE A: GLASS FIBER- ANSIA/ASTM C547; 0.24 (0.42) MAXIMUM 'K' VALUE AT 75°F (24°C); NON-COMBUSTIBLE. ALL-PURPOSE POLYMER OR POLYPROPYLENE SERVICE JACKET, LISTED AND LABELED AT NO MORE THAN 25/50 WHEN TESTED PER ASTM E84 OR UL 723 AS REQUIRED BY CODE.

**VAPOR BARRIER JACKETS**

KRAFT REINFORCED FOIL VAPOR BARRIER WITH SELF-SEALING ADHESIVE JOINTS. BEACH PUNCTURE RESISTANCE RATIO OF AT LEAST 50 UNITS. TENSILE STRENGTH: 35 PSI MINIMUM. SINGLE, SELF-SEAL ACRYLIC ADHESIVE ON LONGITUDINAL JACKET LAPS AND BUTT STRIPS.

**PREPARATION**

INSTALL INSULATION AFTER PIPING HAS BEEN TESTED. PIPE SHALL BE CLEAN, DRY AND FREE OF RUST BEFORE APPLYING INSULATION.

**GENERAL INSTALLATION REQUIREMENTS**

INSTALL MATERIALS PER MANUFACTURER'S INSTRUCTIONS, BUILDING CODES AND INDUSTRY STANDARDS.

CONTINUE INSULATION WITH VAPOR BARRIER THROUGH PENETRATIONS. THIS APPLIES TO ALL INSULATED PIPING. MAINTAIN FIRE RATING OF ALL PENETRATIONS.

NEATLY FINISH INSULATION AT SUPPORTS, PROTRUSIONS, AND INTERRUPTIONS.

**SECTION INCLUDES**

PIPING INSULATION

INSULATION JACKETS

CONTINUE INSULATION WITH VAPOR BARRIER THROUGH PENETRATIONS. THIS APPLIES TO ALL INSULATED PIPING. MAINTAIN FIRE RATING OF ALL PENETRATIONS.

**END OF SECTION**

**22 10 00 PLUMBING PIPING**

**SECTION INCLUDES**

PIPE AND PIPE FITTINGS

VALVES

DOMESTIC WATER PIPING SYSTEM

SANITARY DRAINAGE AND VENT PIPING SYSTEM

STORM DRAINAGE PIPING SYSTEM

**QUALITY ASSURANCE**

VALVES: MANUFACTURER'S NAME AND PRESSURE RATING MARKED ON VALVE BODY. REMANUFACTURED VALVES ARE NOT ACCEPTABLE.

WELDING MATERIALS AND PROCEDURES: CONFORM TO ASME CODE AND APPLICABLE STATE LABOR REGULATIONS.

WELDERS CERTIFICATION: IN ACCORDANCE WITH ANSIA/ASME SEC 9 OR ANSIA/ASME SEC 9.1.

PIPING, FITTINGS, VALVES, AND FLUX FOR POTABLE WATER SYSTEMS: ALL COMPONENTS SHALL BE LEAD FREE PER FEDERAL ACT S.3874, REDUCTION OF LEAD IN DRINKING WATER ACT.

**SUBMITTALS**

SUBMIT PRODUCT DATA UNDER PROVISIONS OF SECTION 22 05 00.

**COLD WATER - POTABLE AND NON-POTABLE**

**NOT WATER - POTABLE AND NON-POTABLE**

DESIGN PRESSURE: 175 PSI

MAXIMUM DESIGN TEMPERATURE: 200F.

**PIPING - ALL SIZES:**

1. TUBING: TYPE L HARD DRAWN SEAMLESS COPPER TUBE, ASTM B88.

2. JOINTS: SOLDER WITH 100% LEAD-FREE SOLDER AND FLUX, ASTM B32.

3. FITTINGS: WROUGHT COPPER SOLDER JOINT, ANSI B16.22.

**DOMESTIC WATER BALL VALVES:**

3" AND UNDER, 150 PSI SATURATED STEAM, 600 PSI CWP, FULL PORT, SCREWED OR SOLDER ENDS (ACCEPTABLE ONLY IF RATED FOR SOLDERING IN LINE WITH 470F MELTING POINT OF LEAD-FREE SOLDER). BRONZE BODY OF A COPPER ALLOY CONTAINING LESS THAN 15% ZINC, STAINLESS STEEL BALL AND TRIM, TEFLON SEATS AND SEALS.

**DOMESTIC WATER CHECK VALVES:**

2" AND UNDER, 125# STEAM @ 406F, 200# CWP @ 150F, SCREWED, BRONZE, HORIZONTAL SWING.

2-1/2" THRU 12", 200# CWP, DOUBLE DISC WATER TYPE, BRONZE OR IRON BODY, BRONZE TRIM, METAL-TO-METAL OR VITON SEAT, 316 SS SHAFT, INCONEL 600 SPRING, M

**DOMESTIC WATER STRAINERS:**

BRONZE BODY, SCREWED ENDS, SCREWED COVER, 150 PSI S @ 350F, 200 PSI CWP @ 150F.

2-1/2" THRU 8", BRONZE BODY, FLANGED ENDS, FLANGED COVER, 150# STEAM, 225# CWP. MUELLER STEAM SPECIALTY CO. #851.

**DEIONIZED WATER**

DESIGN PRESSURE: 150 PSI.

MAXIMUM DESIGN TEMPERATURE: 140F.

PIPE ALL SIZES: SCHEDULE 80 POLYVINYLIDENE FLUORIDE PVDF FROM VIRGIN, UNPIGMENTED RESIN MEETING ASTM D3222. PIPE WILL MEET ALL DIMENSIONAL TOLERANCES OF ASTM D2447.

JOINTS: FUSED TYPE.

FITTINGS: POLYVINYLIDENE FLUORIDE PVDF, SCHEDULE 80, SOCKET FUSED FITTINGS, ASTM 2657.

**22 10 00 PLUMBING PIPING CONT.**

**SANITARY DRAINAGE (ABOVE GROUND)**

**SANITARY INDIRECT DRAINAGE (ABOVE GROUND)**

**SANITARY VENT (ABOVE GROUND)**

DESIGN PRESSURE: GRAVITY

MAXIMUM DESIGN TEMPERATURE: 180F.

**PIPING - ALL SIZES:**

1. PIPE AND FITTINGS: STANDARD WEIGHT NO-HUB CAST IRON SOIL PIPE, ASTM A74, CISPI TRADEMARK. 2. JOINTS: HEAVY DUTY NEOPRENE SLEEVE GASKET, ASTM C-364, 300 SERIES STAINLESS STEEL SHIELD, CLAMP, AND SCREWS WITH AT LEAST FOUR SCREW TYPE CLAMPS, FM 1680 OR ASTM C1540.

3. ADAPTERS: TRANSITIONS FROM CAST IRON SOIL PIPE TO OTHER PIPE MATERIALS WITH MANUFACTURED ADAPTERS. HEAVY DUTY NEOPRENE SLEEVE GASKET, ASTM C-364, 300 SERIES STAINLESS STEEL SHIELD, CLAMP, AND SCREWS WITH NOT LESS THAN FOUR SCREW TYPE CLAMPS, FM 1680 OR ASTM C1540.

**COMPRESSED UTILITY AIR**

DESIGN PRESSURE: 150

MAXIMUM DESIGN TEMPERATURE: 80F

**PIPING - ALL SIZES:**

TUBING: TYPE L HARD DRAWN SEAMLESS COPPER TUBE, ASTM B88.

JOINTS: SOLDER WITH 100% LEAD-FREE SOLDER AND FLUX, ASTM B32.

FITTINGS: WROUGHT COPPER SOLDER JOINT, ANSI B16.22.

**UNIONS**

COPPER PIPE, WROUGHT COPPER FITTING, GROUND JOINT.

BLACK STEEL (SCHEDULE 40) PIPE, MALLEABLE IRON, GROUND JOINT, 150 PSI, BRONZE TO BRONZE SEAT.

UNLESS OTHERWISE INDICATED, STRAINERS SHALL BE Y-PATTERN AND HAVE STAINLESS STEEL SCREENS WITH PERFORATIONS AS FOLLOWS.

PIPE SIZE 1/4" - 2" 2-1/2" - 10" 12" - 16"

AIR 1/32" 3/64" 1/16" 1/8"

WATER 3/64" 1/16" 1/8"

LUBE, HYDRAULIC, NO. 6 FUEL AND WASTE OILS 3/16" 3/16" 3/16"

FURNISH PIPE NIIPPLE WITH SHUTOFF VALVE TO BLOW DOWN ALL STRAINER SCREENS.

USE BRONZE BODY STRAINERS IN COPPER PIPING AND IRON BODY STRAINERS IN FERROUS PIPING.

**RELIEF VALVES**

DOMESTIC HOT WATER PRESSURE AND TEMPERATURE RELIEF, CAST BRONZE BODY AND INTERNAL PARTS, STAINLESS STEEL SPRING, TEST LEVER, THREADED INLET AND OUTLET, MAXIMUM SETTING OF 150 PSI AND 210F TEMPERATURE. CAPACITIES ASME CERTIFIED AND LABELED. ACCEPTABLE MANUFACTURERS: CASH SERIES FV, WATTS #40, #120, #240, #340.

PROVIDE A NOMOGRAPH TO DETERMINE FLOW FROM METER READING AND VALVE POSITION ON UNITS WHICH SENSE PRESSURE ACROSS A VALVE). GRAPH SHALL EXTEND BELOW THE SPECIFIED MINIMUM FLOW.

FLOW RATE OF 0.5 GPM OR LARGER: VALVES IN COPPER PIPING SHALL BE BRASS OR BRONZE. ACCEPTABLE MANUFACTURERS: FLOW DESIGN "ACCUSETTTER", PRESO "B", ARMSTRONG "CVB", BELL & GOSSETT "CIRCUIT SETTER PLUS", GRISWOLD "QUICKSET", GERAND "BALVALVE VENTURI" OR NIBCO GLOBE STYLE BALANCING VALVE.

FLOW RATE LESS THAN 0.5 GPM: VALVES IN COPPER PIPING SHALL BE BRASS OR BRONZE. CV VALUE SHALL BE LESS THAN 1.0 WHEN VALVE IS COMPLETELY OPEN, AND MINIMUM BALANCEABLE FLOW RATE SHALL NOT EXCEED 0.1 GPM WITH A METER READING OF AT LEAST 2.5 FEET. ACCEPTABLE MANUFACTURERS: BELL & GOSSETT "CIRCUIT SETTER RF", FLOW DESIGN, PRESO, ARMSTRONG, GRISWOLD, GERAND, OR NIBCO BALANCING VALVE.

MANUFACTURER SHALL SIZE BALANCING VALVES FOR THE SCHEDULED FLOW RATE. FLOW RATE SHALL BE MEASURABLE ON MANUFACTURER'S STANDARD METERS.

**DRAIN VALVES**

DRAIN VALVES SHALL BE SHUTOFF VALVES AS SPECIFIED FOR THE INTENDED SERVICE WITH ADDED 3/4" MALE HOSE THREAD OUTLET AND CAP.

**CONNECTIONS BETWEEN DISSIMILAR METALS**

22 10 00 PLUMBING PIPING CONT.

TESTING PIPING
SANITARY DRAINAGE:
SANITARY VENT:
STORM DRAINAGE:
1. TEST ALL PIPING AS REQUIRED IN 2019 CPC

HOT WATER - POTABLE AND NON-POTABLE:
COLD WATER - POTABLE AND NON-POTABLE:
TEMPERED WATER - POTABLE AND NON-POTABLE:
SERVICE WATER:
DEIONIZED WATER:
1. TEST ALL PIPING AS REQUIRED IN 2019 CPC

CLEANING PIPING
BEFORE ASSEMBLING PIPE SYSTEMS, REMOVE ALL LOOSE DIRT, SCALE, OIL AND OTHER FOREIGN MATTER ON INTERNAL OR EXTERNAL SURFACES BY MEANS CONSISTENT WITH GOOD PRACTICE SUBJECT TO APPROVAL OF THE ARCHITECT/ENGINEER'S REPRESENTATIVE. BLOW CHIPS AND BURRS FROM MACHINERY OR THREAD CUTTING OPERATION OUT OF PIPE BEFORE ASSEMBLY. WIPE CUTTING OIL FROM INTERNAL AND EXTERNAL SURFACES.

DURING FABRICATION AND ASSEMBLY, REMOVE SLAG AND WELD SPATTER FROM BOTH INTERNAL AND EXTERNAL JOINTS BY PEENING, CHIPPING AND WIRE BRUSHING.

PRIOR TO BLOWING OR FLUSHING ERECTED PIPING SYSTEMS, DISCONNECT ALL INSTRUMENTATION AND EQUIPMENT, OPEN WIDE ALL VALVES, AND BE CERTAIN ALL STRAINER SCREENS ARE IN PLACE.

ALL WATER PIPING:
1. FLUSH ALL PIPING USING FAUCETS, FLUSH VALVES, ETC. UNTIL THE FLOW IS CLEAN.
2. AFTER FLUSHING, THOROUGHLY CLEAN ALL INLET STRAINERS, AERATORS, AND OTHER SUCH DEVICES.
3. IF NECESSARY, REMOVE VALVES TO CLEAN OUT ALL FOREIGN MATERIAL.

GENERAL INSTALLATION REQUIREMENTS
PROVIDE DIELECTRIC CONNECTIONS BETWEEN DISSIMILAR METALS. ROUTE PIPING IN ORDERLY MANNER AND MAINTAIN GRADIENT. INSTALL TO CONSERVE BUILDING SPACE. GROUP PIPING WHENEVER PRACTICAL AT COMMON ELEVATIONS. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE, JOINTS, OR EQUIPMENT. SLOPE WATER PIPING AND ARRANGE TO DRAIN AT LOW POINTS.

WHERE PIPE SUPPORTS ARE WELDED TO STRUCTURAL BUILDING FRAMING, SCRAPE, BRUSH CLEAN, AND APPLY ONE COAT OF ZINC RICH PRIMER TO WELDS. SEAL PIPES PASSING THROUGH EXTERIOR WALLS WITH A WALL SEAL PER SECTION 22 05 29. PROVIDE SCHEDULE 40 GALVANIZED SLEEVE AT LEAST 2 PIPE SIZES LARGER THAN THE PIPE.

ALL NON-POTABLE OUTLETS SHALL BE CLEARLY MARKED WITH A PERMANENTLY AFFIXED LAMINATED SIGN WITH 3/8" HIGH LETTERING SAYING "NON-POTABLE WATER NOT FOR HUMAN CONSUMPTION." SIGN SHALL HAVE BLACK LETTERING ON A YELLOW BACKGROUND.

ALL VERTICAL PIPE DROPS TO SINKS OR OTHER EQUIPMENT INSTALLED BELOW THE CEILING SHALL BE ROUTED WITHIN A WALL CAVITY, UNLESS SPECIFICALLY NOTED OTHERWISE TO BE SURFACE MOUNTED. FOR RENOVATION PROJECTS, THIS CONTRACTOR IS RESPONSIBLE FOR OPENING AND PATCHING EXISTING WALLS FOR INSTALLATION OF PIPING. WALL PATCHING SHALL MATCH EXISTING CONDITION.

INSTALLATION REQUIREMENTS IN ELECTRICAL ROOMS:
1. DO NOT INSTALL PIPING OR OTHER EQUIPMENT ABOVE ELECTRICAL SWITCHBOARDS OR PANELBOARDS. THIS INCLUDES A DEDICATED SPACE EXTENDING 25 FEET FROM THE FLOOR TO THE STRUCTURAL CEILING WITH WIDTH AND DEPTH EQUAL TO THE EQUIPMENT.

VALVES/FITTINGS AND ACCESSORIES:
1. INSTALL SHUTOFF VALVES THAT PERMIT THE ISOLATION OF EQUIPMENT/FIXTURES IN EACH ROOM WITHOUT ISOLATING ANY OTHER ROOM OR PORTION OF THE BUILDING. INDIVIDUAL FIXTURE ANGLE STOPS DO NOT MEET THIS REQUIREMENT. EXCEPTION: BACK-TO-BACK ROOMS IN NO MORE THAN TWO ADJACENT ROOMS. [SPECIFIER: REQUIRED IN ILLINOIS, GOOD PRACTICE IN OTHER STATES.]
2. PROVIDE CLEARANCE FOR INSTALLATION OF INSULATION AND ACCESS TO VALVES AND FITTINGS.
3. PROVIDE ACCESS DOORS FOR CONCEALED VALVES AND FITTINGS.
4. INSTALL VALVE STEMS UPRIGHT OR HORIZONTAL, NOT INVERTED.
5. PROVIDE ONE PLUG VALVE WRENCH FOR EVERY TEN PLUG VALVES 2" AND SMALLER, MINIMUM OF ONE. PROVIDE EACH PLUG VALVE 2, 1/2" AND LARGER WITH A WRENCH WITH SET SCREW.
6. INSTALL BALANCING VALVES WITH STRAIGHT, UNOBSTRUCTED PIPE SECTION BOTH UPSTREAM AND DOWNSTREAM AS REQUIRED, PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.

DRAINING AND VENTING
UNLESS OTHERWISE INDICATED ON THE DRAWINGS, ALL HORIZONTAL WATER AND COMPRESSED AIR LINES, INCLUDING BRANCHES, SHALL PITCH 1" IN 40 FEET TO LOW POINTS FOR COMPLETE DRAINAGE, REMOVAL OF CONDENSATE AND VENTING.

MAINTAIN ACCURATE GRADE WHERE PIPES PITCH OR SLOPE FOR VENTING AND DRAINAGE. NO PIPES SHALL HAVE POCKETS DUE TO CHANGES IN ELEVATION.

PROVIDE DRAIN VALVES AT ALL LOW POINTS OF WATER PIPING SYSTEMS FOR COMPLETE OR SECTIONALIZED DRAINING.

PROVIDE DRIP LEGS AT LOW POINTS AND AT THE BASE OF ALL RISERS IN COMPRESSED AIR PIPES. DRIP LEGS SHALL BE FULL LINE SIZE ON PIPES THROUGH 4" AND AT LEAST 4", BUT NOT LESS THAN HALF LINE SIZE OVER 4". DRIP LEGS SHALL BE 12" MINIMUM LENGTH, CAPPED WITH A REDUCER TO A DRAIN VALVE.

USE ECCENTRIC REDUCING FITTINGS ON HORIZONTAL RUNS WHEN CHANGING SIZE OF PIPES FOR PROPER DRAINAGE AND VENTING. INSTALL COMPRESSED AIR AND GRAVITY DRAIN PIPES WITH BOTTOM OF PIPE AND ECCENTRIC REDUCERS IN A CONTINUOUS LINE; ALL OTHER LIQUID LINES WITH TOP OF PIPE AND ECCENTRIC REDUCERS IN A CONTINUOUS LINE.

PROVIDE AIR VENTS AT HIGH POINTS AND WHEREVER ELSE REQUIRED TO ELIMINATE AIR IN ALL WATER PIPING SYSTEMS.

INSTALL AIR VENTS IN ACCESSIBLE LOCATIONS. IF NECESSARY TO TRAP AND VENT AIR IN A REMOTE LOCATION, INSTALL A 1/8" PIPE FROM THE TAPPING LOCATION TO AN ACCESSIBLE LOCATION AND TERMINATE WITH A VENTING DEVICE.

ALL VENT AND DRAIN PIPING SHALL BE OF SAME MATERIALS AND CONSTRUCTION FOR THE SERVICE INVOLVED.

BRANCH CONNECTIONS
FOR DOMESTIC WATER AND VENT SYSTEMS ONLY, MAKE BRANCH CONNECTIONS WITH STANDARD TEE OR CROSS FITTINGS OF THE TYPE REQUIRED FOR THE SERVICE.

REDUCERS ARE GENERALLY NOT SHOWN, WHERE PIPE SIZES CHANGE AT TEE, THE TEE SHALL BE THE SIZE OF THE LARGEST PIPE SHOWN CONNECTING TO IT.

DO NOT USE DOUBLE WYE OR DOUBLE COMBINATION WYE AND EIGHTH BEND DWV FITTINGS IN HORIZONTAL PIPING.

BRANCH CONNECTIONS FROM THE HEADERS AND MAINS MAY BE MECHANICALLY FORMED USING AN EXTRACTION DEVICE. THE BRANCH PIPING CONNECTION SHALL BE BRAZED CONNECTION FOR THE FOLLOWING SERVICES ONLY:
1. DOMESTIC WATER PIPING ABOVE GRADE.

FURTHER LIMIT USE OF MECHANICALLY FORMED FITTINGS AS FOLLOWS:
1. MUST HAVE AT LEAST SAME PRESSURE RATING AS THE MAIN.
2. MAIN MUST BE TYPE K OR L COPPER TUBING.
3. PERMANENT MARKING SHALL INDICATE INSERTION DEPTH AND ORIENTATION.
4. BRANCH PIPE SHALL CONFORM TO THE INNER CURVE OF THE PIPING MAIN.
5. MAIN MUST BE 1" OR LARGER.
6. BRANCH MUST BE 3/4" OR LARGER.

22 10 00 PLUMBING PIPING CONT.

BRANCH CONNECTIONS FROM HEADERS AND MAINS MAY BE CUT INTO BLACK STEEL PIPE USING FORGED WELD ON FITTINGS.

FORGED WELD-ON FITTINGS ARE LIMITED AS FOLLOWS:
1. MUST HAVE AT LEAST SAME PRESSURE RATING AS THE MAIN.
2. MAIN MUST BE 2, 1/2" OR LARGER.
3. BRANCH LINE IS AT LEAST TWO PIPE SIZES UNDER MAIN SIZE.

JOINING OF PIPE
SOLDER JOINTS:
MAKE UP JOINTS WITH 100% LEAD-FREE SOLDER, ASTM B32. CUT TUBING SO ENDS ARE PERFECTLY SQUARE AND REMOVE ALL BURRS INSIDE AND OUTSIDE. THOROUGHLY CLEAN SOCKETS OF FITTINGS AND ENDS OF TUBING TO REMOVE ALL OXIDE, DIRT AND GREASE JUST PRIOR TO SOLDERING. APPLY FLUX EVENLY, BUT SPARINGLY, OVER ALL SURFACES TO BE JOINED. HEAT JOINTS UNIFORMLY SO SOLDER WILL FLOW TO ALL MATED SURFACES. WIPE EXCESS SOLDER, LEAVING A UNIFORM FILLET AROUND CUP OF FITTING. FLUX SHALL BE NON\_AQ TYPE.

SOLDER END VALVES MAY BE INSTALLED DIRECTLY IN THE PIPING SYSTEM IF THE ENTIRE VALVE IS SUITABLE FOR USE WITH 470F MELTING POINT SOLDER. REMOVE DISCS AND SEALS DURING SOLDERING IF THEY ARE NOT SUITABLE FOR 470F.

FUSION WELD:
MAKE ALL FIELD CUTS OF PIPE SQUARE AND TRUE USING A PIPE CUTTER DESIGNED FOR PLASTIC PIPE. MAKE SURE PROPER HEATING HEADS ARE USED FOR MALE AND FEMALE SITUATIONS. BEVEL THE LEADING EDGE OF PIPE SECTION WITH A 45° CHAMFER. UTILIZE A FUSION WELDING TOOL RECOMMENDED AND/OR PROVIDED BY THE PIPE AND FITTING MANUFACTURER. NOT RECOMMENDED FOR TEMPERATURES BELOW 40°F. FOLLOW THE MANUFACTURER'S COLD WEATHER INSTALLATION PROCEDURES. ALL INSTALLERS SHALL UNDERGO TRAINING PROVIDED BY THE MANUFACTURER OR MANUFACTURER'S REPRESENTATIVE. FOLLOW ALL MANUFACTURER'S INSTALLATION INSTRUCTIONS.

COMPRESSION GASKET JOINTS SANITARY PIPE AND STORM PIPE:
JOINT SHALL BE ONE PIECE DOUBLE SEAL COMPRESSION TYPE GASKET MADE SPECIFICALLY FOR JOINING CAST IRON SOIL PIPE. GASKET SHALL BE NEOPRENE, PERMITTING JOINT TO FLEX AS MUCH AS 5 DEGREES WITHOUT LOSS OF SEAL. GASKET SHALL BE EXTRA HEAVY WEIGHT CLASS, CONFORMING TO ASTM C\_564.

DISINFECTANT OF DOMESTIC WATER PIPING SYSTEM
DISINFECT WATER PIPE AS REQUIRED BY THE 2019 CPC

22 10 30 PLUMBING SPECIALTIES

SECTION INCLUDES
CLEANOUTS
TRAPS
TRAP PRIMERS
BACKFLOW PREVENTERS
WATER HAMMER ARRESTERS
QUALITY ASSURANCE
FOR EACH PRODUCT SPECIFIED, PROVIDE COMPONENTS BY SAME MANUFACTURER THROUGHOUT.

INSTALL SHUTOFF VALVES THAT PERMIT THE ISOLATION OF EQUIPMENT/FIXTURES IN EACH ROOM WITHOUT ISOLATING ANY OTHER ROOM OR PORTION OF THE BUILDING. INDIVIDUAL FIXTURE ANGLE STOPS DO NOT MEET THIS REQUIREMENT. EXCEPTION: BACK-TO-BACK ROOMS IN NO MORE THAN TWO ADJACENT ROOMS. [SPECIFIER: REQUIRED IN ILLINOIS, GOOD PRACTICE IN OTHER STATES.]

CLEANOUTS
PROVIDE CLEANOUTS AS SHOWN AND SPECIFIED ON THE DRAWINGS AS WELL AS REQUIRED BY CODE. COORDINATE FLOOR CLEANOUT COVER WITH SURROUNDING FLOOR FINISH. PROVIDE EITHER SOLID, RECESSED FOR TILE OR TERRAZZO OR CARPET MARKER AS APPLICABLE.

CLEANOUTS ON EXPOSED PIPES SHALL BE CAST IRON WITH HEAVY DUTY CAST BRASS PLUG WITH RAISED HEAD.

CLEANOUT SHALL BE SAME SIZE AS THE PIPE UP TO 6" AND 6" FOR LARGER PIPES.

TRAPS
PROVIDE ALL INDIVIDUAL CONNECTIONS TO THE SANITARY SYSTEM WITH P-TRAPS, EXCEPT WHERE SUCH DRAINS DISCHARGE DIRECTLY INTO A PROPERLY TRAPPED COLLECTION BASIN OR SUMP. UNLESS OTHERWISE SPECIFIED OR SHOWN, TRAPS SHALL BE:
1. CHROMIUM PLATED CAST BRASS WHEN USED WITH PLUMBING FIXTURES OR WHEN INSTALLED EXPOSED IN FINISHED SPACES.
2. INACCESSIBLE LAVATORIES.
3. CAST IRON, DEEP-SEAL PATTERN WHERE CONCEALED ABOVE CEILING, BELOW GRADE OR IN UNFINISHED AREAS.

ALL TRAPS SHALL HAVE ACCESSIBLE, REMOVABLE CLEANOUTS, EXCEPT WHERE INSTALLED ON FLOOR DRAINS WITH REMOVABLE STRAINERS.

EACH TRAP SHALL BE COMPLETELY FILLED WITH WATER AT THE END OF CONSTRUCTION BUT BEFORE BUILDING SPACE TURNOVER TO THE OWNER. ALL FLOOR DRAINS, FLOOR SINKS, TRENCH DRAINS, ETC. SHALL BE FILLED WITH WATER AND A 1/2" MINIMUM LAYER OF MINERAL OIL.

WATER HAMMER ARRESTERS
PROVIDE WATER HAMMER ARRESTERS AS SHOWN AND SPECIFIED ON THE DRAWINGS AS WELL AS REQUIRED BY CODE.

ANSI A112.28.1: SIZED AND LOCATED IN ACCORDANCE WITH PDI WH\_201. PRECHARGED FOR OPERATION BETWEEN -100F AND 300F AND MAXIMUM 450 PSIG WORKING PRESSURE.

INSTALLATION AND APPLICATION
COORDINATE CONSTRUCTION TO RECEIVE DRAINS AT REQUIRED INVERT ELEVATIONS.

INSTALL ALL ITEMS PER MANUFACTURER'S INSTRUCTIONS.

WATER HAMMER ARRESTERS:
INSTALL WATER HAMMER ARRESTERS IN ACCESSIBLE LOCATIONS. PROVIDE ACCESS DOORS AS REQUIRED. COORDINATE TYPE WITH ARCHITECT/ENGINEER/OWNER.

WATER HAMMER ARRESTORS SHALL BE INSTALLED IN COLD AND HOT WATER LINES UPSTREAM OF ALL PLUMBING FIXTURES OR EQUIPMENT, WITH A QUICK ACTING VALVE OR MULTIPLE QUICK ACTING VALVES. QUICK ACTING VALVES SHALL BE DEFINED AS SOLENOID ACTUATED VALVES, MANUAL FLUSH VALVES, SENSOR ACTUATED FAUCETS AND FLUSH VALVES, SQUEEZE HANDLE SPRAY FAUCETS, AND OTHER SIMILAR TYPE VALVES.

INSTALL MULTIPLE WATER HAMMER ARRESTORS IN TOILET GROUP BRANCH PIPING GREATER THAN 20 FEET IN DEVELOPED LENGTH FROM THE COLD AND HOT WATER MAINS.

CLEANOUTS:
PROVIDE CLEANOUTS WHERE SHOWN ON THE DRAWINGS AND AS REQUIRED BY CODE, BUT IN NO CASE FARTHER APART THAN 100 FEET APART.

PROVIDE CLEANOUTS AT BASES OF ALL SANITARY AND STORM RISERS AS SHOWN ON THE DRAWINGS AND AS REQUIRED BY CODE.

EXTEND CLEANOUTS TO THE FLOOR WITH LONG SWEEP ELBOWS.

INSTALL A FULL SIZE, TWO-WAY CLEANOUT WITHIN 5 FEET OF THE FOUNDATION INSIDE OR OUTSIDE OF BUILDING.

EXTEND CLEANOUTS TO FINISHED FLOOR OR WALL SURFACE. LUBRICATE THREADED CLEANOUT PLUGS WITH GRAPHITE AND LINSEED OIL. ENSURE CLEARANCE AT CLEANOUTS FOR RODDING OF DRAINAGE SYSTEM.

WALL CLEANOUTS SHALL BE INSTALLED ABOVE THE FLOW LINE OF THE PIPE THEY SERVE, BUT NO LESS THAN 12" ABOVE THE FINISHED FLOOR.

FLOOR DRAINS:
DRAINS IN UPPER FLOORS SHALL HAVE A FLASHING OF EPDM OR SIMILAR MEMBRANE SHEET. THE SHEET SHALL BE AT LEAST 36" X 36" SQUARE WITH THE DRAIN IN THE CENTER. CLAMP MEMBRANE IN AUXILIARY CLAMPING RING OF FLOOR DRAIN. MEMBRANE IS NOT REQUIRED IF UPPER FLOOR CONSTRUCTION IS SINGLE POUR, CAST-IN-PLACE CONCRETE.

USE ALTERNATE SEALING METHOD WHEN INSTALLING DRAINS IN EXISTING FLOOR SLABS.

COORDINATE SLOPING REQUIREMENTS WITH THE ARCHITECTURAL PLANS AND SPECIFICATIONS.

21 13 00 FIRE PROTECTION SYSTEMS-DEFERRED

QUALITY ASSURANCE
WELDING MATERIALS AND PROCEDURES: CONFORM TO ASME CODE.

EQUIPMENT AND COMPONENTS: BEAR UL/FM LABEL OR MARKING.

VALVES: BEAR UL/FM LABEL OR MARKING. PROVIDE MANUFACTURER'S NAME AND PRESSURE RATING MARKED ON VALVE BODY. PRESSURE RATING SHALL MATCH SPECIFIED PIPE SYSTEM PRESSURE RATING. REMANUFACTURED VALVES ARE NOT ACCEPTABLE.

SPECIALIST FIRM: COMPANY SPECIALIZING IN SPRINKLER SYSTEMS WITH MINIMUM THREE YEARS EXPERIENCE.

SPRINKLER DESIGN DRAWINGS SUBMITTED BY THE CONTRACTOR SHALL BE DESIGNED, CERTIFIED, AND SHALL INCLUDE THE NICET CERTIFICATION BLOCK OR THE PROFESSIONAL ENGINEER SEAL OF THE FIRE PROTECTION DESIGNER. FIRE PROTECTION DESIGNER SHALL BE NICET LEVEL III OR LEVEL IV CERTIFIED OR BE A LICENSED PROFESSIONAL ENGINEER.

SUBMITTALS
SUBMIT SHOP DRAWINGS PER SECTION 21 05 00. INDICATE PIPE MATERIALS, JOINING METHODS, SUPPORTS, FLOOR AND WALL PENETRATION SEALS, SPRINKLERS, EQUIPMENT DATA AND RATINGS, AND HYDRAULIC CALCULATIONS.

SUBMIT DETAILED PIPE AND SPRINKLER LAYOUT AND OTHER CALCULATIONS AND FORMS AS DESCRIBED IN NFPA 13.

SUBMIT DETAILED WORKING DRAWINGS AND OBTAIN REVIEW OF THEM IN THE FOLLOWING ORDER:

- 1. ENGINEER/ARCHITECT
2. STATE FIRE MARSHAL/AUTHORITY HAVING JURISDICTION
3. OWNER'S INSURANCE COMPANY
4. ARCHITECT/ENGINEER
5. LOCAL FIRE DEPARTMENT

BEGIN CONSTRUCTION AFTER ALL APPROVALS ARE RECEIVED.

WORKING DRAWINGS SHALL INCLUDE PIPING AND SPRINKLER LAYOUT, SPRINKLER TYPES AND RATINGS, SECTIONS AND ELEVATIONS AT CRITICAL POINTS. SHOW COORDINATION WITH LIGHTING, DUCTWORK, AND DIFFUSERS, AND INDICATE BASIC FLOW AND HYDRAULIC DESIGN INFORMATION, INCLUDING MAIN LOCATION AND DATE THAT THE TEST WAS TAKEN.

PROVIDE THE OWNER WITH ONE COPY OF NFPA 25, STANDARD FOR THE INSPECTION TESTING AND MAINTENANCE OF WATER-BASED FIRE PROTECTION SYSTEMS.

EXTRA STOCK
PROVIDE METAL STORAGE CABINET, WRENCHES FOR EACH SPRINKLER TYPE, AND EXTRA SPRINKLERS PER NFPA 13 AND APPLICABLE BUILDING CODE.

DELIVERY, STORAGE, AND HANDLING
STORE VALVES AND SPRINKLERS IN SHIPPING CONTAINERS, WITH LABELS IN PLACE.

PROVIDE TEMPORARY PROTECTIVE COATING ON IRON AND STEEL VALVES.

MAINTAIN TEMPORARY END GAPS AND CLOSURES IN PLACE UNTIL INSTALLATION.

WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS
FURNISH SLEEVES TO GENERAL CONTRACTOR FOR PLACEMENT IN WALLS AND FLOORS. SLEEVE LOCATION TO BE DETERMINED BY THE FIRE PROTECTION CONTRACTOR PRIOR TO CONSTRUCTION. IF ADDITIONAL SLEEVES ARE REQUIRED, THEY SHALL BE CORE DRILLED BY THE FIRE PROTECTION CONTRACTOR.

SYSTEM DESCRIPTION
SYSTEM SHALL COVER BUILDING AREAS NOTED.

SYSTEM SHALL INTERFACE WITH BUILDING FIRE ALARM SYSTEM. PROVIDE ALL REQUIRED WIRING.

EXTEND EXISTING WET PIPE SPRINKLER SYSTEMS TO NFPA 13 AND BUILDING CODE REQUIREMENTS AS REQUIRED BY OWNER'S INSURANCE COMPANY AND AS SHOWN ON THE DRAWINGS.

REGULATORY REQUIREMENTS
ALL MATERIAL, EQUIPMENT, AND INSTALLATION SHALL BE APPROVED BY THE AUTHORITIES HAVING JURISDICTION AND THE OWNER'S INSURANCE COMPANY. THE AUTHORITIES HAVING JURISDICTION AND THE OWNER'S INSURANCE COMPANY SHALL HAVE PRECEDENCE OVER THE DRAWINGS AND SPECIFICATIONS IN CASE OF DISCREPANCIES. THE ENTIRE INSTALLATION SHALL COMPLY WITH ALL APPLICABLE CODES.

SYSTEM DESIGN
DESIGN AND INSTALL A COMPLETE, HYDRAULICALLY CALCULATED WET PIPE SPRINKLER SYSTEM FOR THE ENTIRE AREA OF WORK IDENTIFIED ON DRAWINGS. PROVIDE ALL REQUIRED EQUIPMENT AND ACCESSORIES.

SYSTEM SHALL INCLUDE A 5 PSI ALLOWANCE FOR FUTURE DECREASE IN AVAILABLE PRESSURE AND AN ALLOWANCE FOR INSIDE AND OUTSIDE HOSE STREAMS.

PROVIDE MONITOR SWITCHES ON ALL SHUTOFF VALVES.

PROVIDE MAIN DRAIN VALVE PIPED TO OUTSIDE OF THE BUILDING. LOCATE SO DISCHARGE DOES NOT DAMAGE LAWN OR OTHER SURFACES.

OPERATION AND MAINTENANCE DATA
SUBMIT MANUFACTURERS' OPERATION AND MAINTENANCE DATA. INCLUDE WRITTEN MAINTENANCE DATA ON COMPONENTS OF SYSTEM, SERVICING REQUIREMENTS, AND RECORD DRAWINGS.

JOB CONDITIONS
FIRE PROTECTION CONTRACTOR SHALL DETERMINE THE FLOW AND PRESSURE AVAILABLE AT THE SERVICE CONNECTION. THE FIRE PROTECTION CONTRACTOR IS RESPONSIBLE TO VERIFY THIS INFORMATION AND MAKE ALL TESTS REQUIRED. BASE ALL PIPE SIZING AND HYDRAULIC CALCULATIONS ON FLOW TEST DATA NO OLDER THAN 12 MONTHS.

CONTRACTOR IS RESPONSIBLE FOR FINAL SIZING FROM HYDRAULIC CALCULATIONS.

PIPE AND FITTINGS
STEEL PIPE (INSIDE BUILDING ABOVE GRADE):
1. PIPE: 2" AND UNDER - SCHEDULE 40, BLACK STEEL, ASTM A53. THREADED AND COUPLED OR FLANGED.
2. JOINTS: 2" AND UNDER - SCREWED OR FLANGED.
3. FITTINGS: SCREWED - CAST IRON, 125 LB., BLACK, ANSI/ASME B16.4 OR MALLEABLE IRON, 150 LB., BLACK, ANSI/ASME B16.3. FLANGED CAST IRON, 125 LB., ANSI/ASME B16.1.

STEEL PIPE (INSIDE BUILDING ABOVE GRADE):
1. PIPE: 2-1/2" AND OVER - SCHEDULE 40, BLACK STEEL, GROOVED, ASTM A53.
2. JOINTS: MECHANICALLY COUPLED GROOVED.
3. FITTINGS: 500 LB. WOG, BLACK, MALLEABLE IRON, ASTM A47.
4. PLAIN END FITTINGS AND COUPLINGS ARE NOT ACCEPTABLE.

UNIONS AND COUPLINGS
UNIONS: 175 PSI MALLEABLE IRON FOR THREADED FERROUS PIPING.

MECHANICAL GROOVED COUPLINGS: MALLEABLE IRON HOUSING CLAMPS TO ENGAGE AND LOCK, DESIGNED TO PERMIT SOME ANGULAR AND LONGITUDINAL DEFLECTION; "C" SHAPED COMPOSITION SEALING GASKET, STEEL BOLTS, NUTS, AND WASHERS. 175 PSI, ASTM A47. PLAIN END FITTINGS AND COUPLINGS ARE NOT ACCEPTABLE. ROLLED GROOVE COUPLINGS FOR SCHEDULE 10 PIPE. CUT GROOVE COUPLINGS FOR SCHEDULE 40 PIPE. COUPLINGS SHALL BE ENAMEL COATED FOR WET SYSTEMS AND GALVANIZED FOR DRY PIPE SYSTEMS. ACCEPTABLE MANUFACTURERS: VICTAULIC, ITT, GRINNELL, CENTRAL, ANVIL GRUVLOK, STAR FITTINGS.

COUPLINGS USED IN SEISMIC AREAS SHALL BE "FLEXIBLE" TYPE.

COUPLING GASKETS FOR WET SYSTEMS SHALL BE GRADE "E" EPDM TYPE A.

VALVE CONNECTIONS
PROVIDE ALL CONNECTIONS TO MATCH PIPE JOINTS. VALVES SHALL BE SAME SIZE AS PIPE.

INSTALLATION - PIPING
COORDINATE PIPING AND SPRINKLER LOCATIONS WITH ALL OTHER TRADES. DUCTWORK, DIFFUSERS AND LIGHT FIXTURE LOCATIONS SHALL HAVE PRIORITY OVER SPRINKLER PIPING AND SPRINKLERS. LOCATE PIPING TO MINIMIZE OBSTRUCTION OF OTHER WORK. ROUTE PIPING IN CONCEALED SPACES ABOVE FINISHED CEILING. USE FULL AND DOUBLE LENGTHS OF PIPE WHEREVER POSSIBLE. SLOPE ALL PIPING FOR COMPLETE DRAINAGE. INSTALL AUXILIARY DRAINS FOR ALL TRAPPED PIPING PER NFPA 13.

REAM PIPE AND TUBE ENDS TO FULL INSIDE DIAMETER. REMOVE BURRS. REMOVE SCALE AND FOREIGN MATERIAL, INSIDE AND OUTSIDE, BEFORE ASSEMBLY.

DIE CUT SCREW JOINTS WITH FULL CUT STANDARD TAPER PIPE THREADS. COAT THREADS WITH PIPE JOINT COMPOUND OR WRAP WITH TEFLON TAPE.

REDUCERS ARE GENERALLY NOT SHOWN, WHERE PIPE SIZES CHANGE AT TEE, THE TEE SHALL BE THE SIZE OF THE LARGEST PIPE SHOWN CONNECTING TO IT.

COMPLY WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS.

WALL/FLOOR PENETRATION:
PROVIDE SLEEVES WHEN PENETRATING FLOORS AND WALLS.

SEAL PIPES PASSING THROUGH EXTERIOR WALLS WITH A WALL SEAL PER SECTION 21 05 29. PROVIDE SCHEDULE 40 GALVANIZED SLEEVE AT LEAST 2 PIPE SIZES LARGER THAN THE PIPE. SLEEVES THROUGH FLOORS SHALL EXTEND MINIMUM 1.5' ABOVE FINISHED FLOOR.

FIRE SEAL ALL PIPE AND SLEEVE PENETRATIONS (BOTH WALL AND FLOOR) TO MAINTAIN FIRE SEPARATION REQUIRED WITHOUT RESTRAINING PIPE.

INSTALLATION REQUIREMENTS IN ELECTRICAL ROOMS:
DO NOT INSTALL PIPING OR OTHER EQUIPMENT ABOVE ELECTRICAL SWITCHBOARDS OR PANELBOARDS. THIS INCLUDES A DEDICATED SPACE EXTENDING 25 FEET FROM THE FLOOR TO THE STRUCTURAL CEILING WITH WIDTH AND DEPTH EQUAL TO THE EQUIPMENT. FIRE PROTECTION EQUIPMENT DEDICATED TO THE ELECTRICAL EQUIPMENT ROOM OR SPACE MAY BE INSTALLED ABOVE EQUIPMENT IF OTHER ALTERNATIVES ARE NOT AVAILABLE.

HANGERS AND SUPPORTS:
PROVIDE HANGERS AND SUPPORTS AS REQUIRED BY NFPA 13 AND UL/FM, WITH THE FOLLOWING EXCEPTIONS:
1. DO NOT USE POWDER DRIVEN DEVICES, EXPLOSIVE DEVICES, WOODEN PLUGS, OR PLASTIC INSERTS.
2. DO NOT INSTALL FASTENERS TO CARRY THE LOAD IN TENSION, UNLESS ABSOLUTELY NECESSARY.

EXPOSED PIPING:
1. INSTALL CHROME PLATED STEEL ESCUTCHEONS WHERE EXPOSED PIPES PENETRATE WALLS OR FLOORS.

INSTALLATION - VALVES
INSTALL GATE VALVES WITH STEMS UPRIGHT OR HORIZONTAL, NOT INVERTED, PROVIDE DRAIN VALVES AT MAIN SHUTOFF VALVES, LOW POINTS OF PIPING AND APPARATUS.

INSTALLATION - EQUIPMENT
LOCATE SPRINKLERS TO CLEAR LIGHTS, DUCTS AND DIFFUSERS. DO NOT RUN SPRINKLER PIPES THROUGH DUCTS. DUCTWORK HAS PRIORITY OVER SPRINKLER PIPES. OFFSET PIPES AS NEEDED. CENTER SPRINKLERS IN TWO DIRECTIONS IN CEILING TILES AND PROVIDE OFFSETS AS REQUIRED.

DO NOT ALLOW CONCEALED SPRINKLER COVER PLATES TO BE PAINTED. SPRINKLER COVER PLATES ARE TO BE FACTORY PAINTED ONLY. DO NOT FIELD PAINT.

APPLY STRIPPABLE OR PAPER COVERS SO CONCEALED SPRINKLER COVER PLATES DO NOT RECEIVE FIELD PAINT FINISH.

SYSTEMS CLEANING AND TESTING
ALL WATER USED FOR TESTING AND REMAINING IN THE PIPING SYSTEM SHALL BE OBTAINED FROM A POTABLE WATER SOURCE.

INTERIOR PIPING
VERIFY ADEQUATE WATER FLOW AT THE INSPECTOR'S TEST CONNECTION.

FLUSH ALL INTERIOR PIPING TO REMOVE SCALE AND OTHER FOREIGN MATERIAL BEFORE PLACING SYSTEM INTO SERVICE.

HYDROSTATICALLY TEST THE ENTIRE INTERIOR PIPING SYSTEM AT A MINIMUM OF 200 PSIG OR 50 PSIG IN EXCESS OF THE NORMAL SYSTEM WORKING PRESSURE FOR SYSTEMS SUBJECTED TO PRESSURES IN EXCESS OF 150 PSIG. MAINTAIN TEST PRESSURE FOR 2 HOURS WITHOUT LOSS OF PRESSURE. TEST SHALL BE PERFORMED WITH DRY PIPE VALVES IN OPEN POSITION TO PREVENT VALVE DAMAGE.

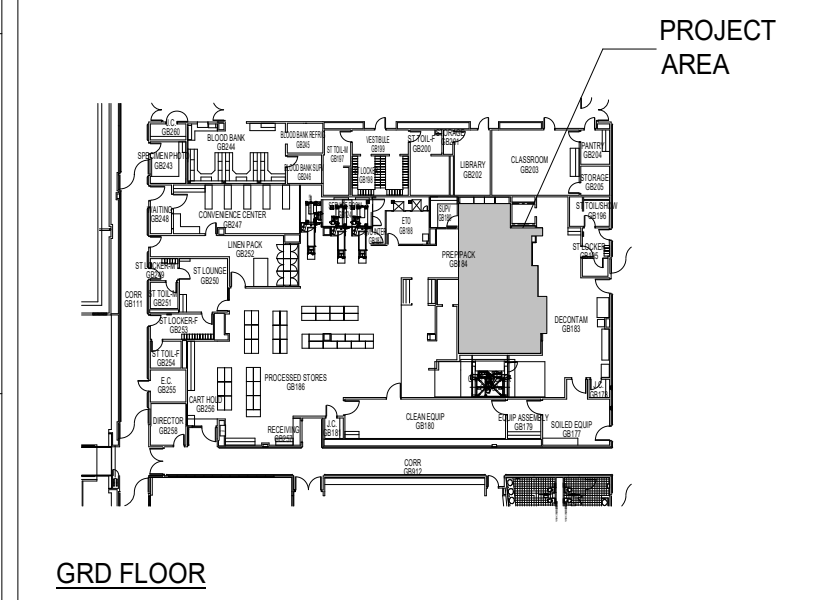
FIRE ALARM SYSTEM
TEST THE ALARM SYSTEM BY OPERATING THE INSPECTOR'S TEST CONNECTION OR THE ALARM TEST VALVES. VERIFY THAT THE BUILDING FIRE ALARM SYSTEM ACTIVATES. ADJUST ALL MONITOR SWITCHES FOR PROPER OPERATION.

PROJECT TITLE
STERILIZATION SYSTEM
INSTALLATION
FOR THE
ARROWHEAD REGIONAL
MEDICAL CENTER
400 N. PEPPER AVE.
COLTON, CA, 92324
WBSE #: 10.10.1142
CIP #: 21-154
CAF# #: COL003

Office of Statewide Health Planning and Development
HCAI # S222347-36-00



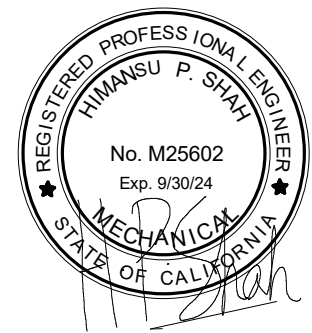
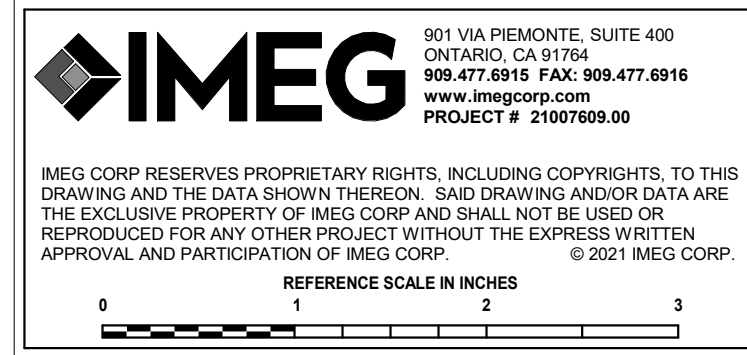
REFERENCE PLAN



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Table with columns for DATE (12/28/2022), REVISIONS, and DRAWING NUMBER (P0.4). Includes a professional seal for David William Clarke, Registered Professional Engineer, State of California, No. M25602, Exp. 9/30/24.



ARMC SPD Sterilization Washer Replacement 5/10/2023 6:21:00 PM 21007609.00











**ELECTRICAL GENERAL NOTES:**

1. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE NEW AND SHALL BE LISTED BY UNDERWRITER'S LABORATORIES (UL) AND BEAR THEIR LABEL, OR LISTED AND CERTIFIED BY A NATIONALLY RECOGNIZED TESTING AUTHORITY WHERE UL DOES NOT HAVE A LISTING. CUSTOM MADE EQUIPMENT SHALL HAVE COMPLETE TEST DATA SUBMITTED BY THE MANUFACTURER TO ITS SAFETY. IN ADDITION, THE MATERIALS, EQUIPMENT, AND INSTALLATION SHALL COMPLY WITH THE REQUIREMENTS OF THE FOLLOWING: AMERICAN SOCIETY OF TESTING MATERIALS (ASTM) INSULATED POWER CABLE ENGINEERS ASSOCIATION (IPCEA) NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA) AMERICAN STANDARD ASSOCIATION (ASA) NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) AMERICAN NATIONAL STANDARD INSTITUTE (ANSI) CALIFORNIA ELECTRICAL CODE (CEC) - 2019 EDITION CALIFORNIA CODE OF REGULATIONS TITLE 24 (CCR) INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE) ALL LOCAL CODES HAVING JURISDICTION, WHERE THE CODES HAVE DIFFERENT LEVELS OF REQUIREMENTS, THE MOST STRINGENT RULE SHALL APPLY.
2. THE CONTRACTOR SHALL VISIT THE SITE INCLUDING ALL AREAS INDICATED ON THE DRAWINGS. HE SHALL THOROUGHLY FAMILIARIZE HIMSELF WITH THE EXISTING CONDITIONS, OR A BID FOR BY SUBMITTING A BID, ACCEPTS THE CONDITIONS UNDER WHICH HE SHALL BE REQUIRED TO PERFORM HIS WORK.
3. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN A COMPLETE SET OF CONTRACT DOCUMENTS, ADDENDA, DRAWINGS AND SPECIFICATIONS. HE SHALL CHECK THE DRAWINGS OF THE OTHER TRADES AND SHALL CAREFULLY READ THE ENTIRE SPECIFICATIONS AND DETERMINE HIS RESPONSIBILITIES. FAILURE TO DO SO SHALL NOT RELEASE THE CONTRACTOR FROM DOING THE WORK IN COMPLETE ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS.
4. THE CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS, FEES, CHARGES, AND INCIDENTAL COSTS NECESSARY FOR EXECUTION AND COMPLETION OF ELECTRICAL WORK, INCLUDING ALL CHARGES BY STATE, COUNTY AND LOCAL GOVERNMENTAL AGENCIES.
5. THE CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHER TRADES AT THE SITE. ANY COSTS TO INSTALL WORK TO ACCOMPLISH SAID COORDINATION WHICH DIFFERS FROM THE WORK AS SHOWN ON THE DRAWINGS SHALL BE INCURRED BY THE CONTRACTOR. ANY DISCREPANCIES, AMBIGUITIES OR CONFLICTS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT DURING BID TIME FOR CLARIFICATION. ANY SUCH CONFLICTS NOT CLARIFIED PRIOR TO BID SHALL BE SUBJECT TO THE INTERPRETATION OF THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER, BUILDING AUTHORITY.
6. THE CONTRACTOR SHALL PROVIDE AND KEEP UP-TO-DATE A COMPLETE SET OF DRAWINGS. THESE PRINTS SHALL BE CORRECTED DAILY AND SHOW EVERY CHANGE FROM THE ORIGINAL DRAWINGS. THIS SET OF DRAWINGS SHALL BE KEPT ON THE JOB SITE AND SHALL BE USED ONLY AS A RECORD SET. THIS SHALL NOT BE CONSTRUED AS AUTHORIZATION FOR THE CONTRACTOR TO MAKE CHANGES IN THE LAYOUT WITHOUT FINITE INSTRUCTION IN EACH CASE. UPON COMPLETION OF THE WORK, A SET OF REPRODUCIBLE CONTRACT DRAWINGS SHALL BE OBTAINED FROM THE ARCHITECT, AND ALL CHANGES AS NOTED ON THE RECORD SET OF DRAWINGS SHALL BE INCORPORATED THEREON WITH BLACK INK IN A NEAT, LEGIBLE, UNDERSTANDABLE AND PROFESSIONAL MANNER. FAILURE TO KEEP RECORD DRAWINGS UP-TO-DATE SHALL CONSTITUTE CAUSE FOR WITHHOLDING OF PROGRESS PAYMENTS.
7. IN SOME INSTANCES, IT MAY BE NECESSARY TO DEFER WORK IN CERTAIN AREAS AND LOCATIONS UNTIL SUCH TIME AS EXISTING FACILITIES CAN BE TEMPORARILY OR PERMANENTLY REARRANGED BY THE OWNER. THEREFORE, WHENEVER IT BECOMES NECESSARY FOR THE CONTRACTOR TO PERFORM WORK UNDER THIS CONTRACT IN EXISTING AREAS IN WHICH THE OWNER'S WORK IS BEING PERFORMED, THE CONTRACTOR SHALL ADVISE THE ARCHITECT AND THE OWNER RELATIVE TO THIS REQUIREMENT AND SHALL FOLLOW CLOSELY THE DIRECTION ISSUED BY THE ARCHITECT INsofar AS TIME AND PROCEDURE ARE CONCERNED. THE CONTRACTOR SHALL INCLUDE IN HIS BID ALL PREMIUM TIME TO WHICH HE MAY BE SUBJECT FOR PERFORMING WORK IN SUCH PROCEDURE AND AT SUCH TIMES AS MAY BE NECESSARY TO CAUSE THE LEAST INTERFERENCE WITH THE OPERATIONS OF THE OWNER.
8. ALL INTERRUPTION OF ELECTRICAL POWER SHALL BE KEPT TO A MINIMUM. HOWEVER, WHEN AN INTERRUPTION IS NECESSARY, THE SHUTDOWN MUST BE COORDINATED WITH THE OWNER AND ARCHITECT 14 CALENDAR DAYS PRIOR TO THE OUTAGE. ANY OVERTIME PAY SHALL BE INCLUDED IN THE CONTRACTOR'S BID. WORK IN EXISTING SWITCHBOARDS OR PANELBOARDS SHALL BE COORDINATED WITH THE OWNER PRIOR TO REMOVING ACCESS PANELS OR DOORS.
9. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE TEMPORARY POWER FACILITIES AND CONNECTIONS FOR ALL FEEDERS OR SYSTEMS BEING DISCONNECTED IN ORDER TO MAINTAIN SYSTEMS IN OPERATION OR WHERE SAID FEEDERS OR SYSTEMS REQUIRE EMERGENCY STANDBY POWER.
10. SHOP DRAWINGS SHALL BE SUBMITTED AS PER CONTRACT SPECIFICATION.
11. AFTER ALL REQUIREMENTS OF THE SPECIFICATIONS AND/OR THE DRAWINGS HAVE BEEN FULLY COMPLETED, REPRESENTATIVES OF THE OWNER AND BUILDING AUTHORITY WILL INSPECT THE WORK. THE CONTRACTOR SHALL PROVIDE COMPETENT PERSONNEL TO DEMONSTRATE THE OPERATION OF ANY ITEM OR SYSTEM TO THE FULL SATISFACTION OF EACH REPRESENTATIVE. FINAL ACCEPTANCE OF THE WORK WILL BE MADE BY THE OWNER AFTER RECEIPT OF APPROVAL AND RECOMMENDATION OF ACCEPTANCE FROM EACH REPRESENTATIVE.
12. THE CONTRACTOR SHALL FURNISH A ONE YEAR WRITTEN GUARANTEE OF MATERIALS AND WORKMANSHIP FROM THE DATE OF SUBSTANTIAL COMPLETION.
13. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REVIEW AND TO COORDINATE WITH THE MECHANICAL, FIRE PROTECTION AND PLUMBING DRAWINGS FOR DUCTS, LINES AND EQUIPMENT.
14. ALL EQUIPMENT MOUNTED ON ROOF FOR CONNECTION OF HVAC EQUIPMENT SHALL BE MOUNTED ON UNISTRUT STANDS UTILIZING APPROVED PITCH POCKETS, FLASHING, ETC.
15. ALL FINAL CONNECTIONS TO OWNER FURNISHED EQUIPMENT SHALL BE MADE BY THE CONTRACTOR.
16. COORDINATE WITH OTHER TRADES AS TO THE EXACT LOCATION OF THEIR RESPECTIVE EQUIPMENT. SUPPLY POWER AND MAKE CONNECTION TO MOTORS AND EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS AS INDICATED ON THE SINGLE LINE DIAGRAM, ELECTRICAL DRAWINGS, AND DRAWINGS OF OTHER TRADES. REVIEW THE DRAWINGS OF OTHER TRADES FOR CONTROL DIAGRAMS, SIZE AND LOCATION OF EQUIPMENT, DISCONNECT SWITCHES, STARTERS, WIRING, CONTROLS, AND CONDUIT FOR MECHANICAL AND PLUMBING OPERATIONS SHALL BE PROVIDED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING MANUFACTURER'S SHOP DRAWINGS PRIOR TO ROUGHING IN ALL CONDUIT TO THIS EQUIPMENT.
17. EXACT METHOD AND LOCATION OF CONDUIT PENETRATION AND OPENINGS IN CONCRETE WALLS OR FLOORS OR STRUCTURAL STEEL MEMBERS SHALL BE AS DIRECTED BY THE STRUCTURAL ENGINEER. PERFORM CORING, SAWCUTTING, PATCHING, AND REFINISHING OF EXISTING WALLS, AND SURFACES WHEREVER IT IS NECESSARY TO PENETRATE. OPENINGS SHALL BE SEALED IN AN APPROVED METHOD TO MEET THE FIRE RATING OF THE PARTICULAR WALL, FLOOR OR CEILING. EXACT METHOD AND LOCATIONS OF CONDUIT PENETRATIONS AND OPENINGS IN CONCRETE WALLS OR FLOORS SHALL BE UL APPROVED.
18. CONNECTIONS TO VIBRATING EQUIPMENT AND SEISMIC SEPARATIONS: LIQUID-TIGHT FLEXIBLE STEEL CONDUIT IN DRY INTERIOR LOCATIONS. LIQUID TIGHT FLEXIBLE STEEL CONDUIT IN AREAS EXPOSED TO WEATHER, DAMP LOCATIONS, CONNECTIONS TO TRANSFORMER ENCLOSURES AND FINAL CONNECTIONS TO MOTORS. PROVIDE SEPARATE INSULATED EQUIPMENT GROUNDING CONDUCTOR IN FLEXIBLE CONDUIT RUNS. MAXIMUM LENGTH SHALL BE SIX FEET UNLESS OTHERWISE NOTED.
19. EQUIPMENT OUTLETS, CONDUIT, WIRE, AND CONNECTION METHODS IN HVAC AIR-PLenums SHALL BE APPROVED FOR USE IN PLENUMS AND SHALL CONFORM TO THE CEC.
20. ROUTE EXPOSED CONDUIT AND CONDUIT ABOVE ACCESSIBLE CEILING SPACES PARALLEL AND PERPENDICULAR TO WALLS AND ADJACENT PIPING.

21. CONDUIT SHALL NOT BE INSTALLED IN ANY FLOOR SLAB. CONDUIT SHALL BE INSTALLED CONCEALED IN THE CEILING SPACE, CONCEALED IN WALLS, OR 18" BELOW BOTTOM SLAB ON GRADE UNLESS NOTED OTHERWISE.
22. THE CONTRACTOR SHALL STRATEGICALLY LOCATE BOXES, ETC., IN AN ACCESSIBLE CEILING SPACE TO PROVIDE AN ACCESS PANEL FOR INACCESSIBLE CEILING SYSTEMS.
23. COORDINATE REQUIRED ACCESS DOORS IN NON-ACCESSIBLE CEILINGS TO SUIT FIELD CONDITIONS, THE EXACT SIZES AND PHYSICAL LOCATIONS SHALL SUIT ACCESSIBILITY AND CONSTRUCTION CONDITIONS. ACCESS DOORS SHALL BE PROVIDED IN OTHER SECTIONS OF THE SPECIFICATIONS. ACCESS DOORS SHALL HAVE A FIRE RATING EQUAL TO THE CEILING ASSEMBLY IN WHICH THEY ARE INSTALLED.
24. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SAWCUTTING, TRENCHING, BACKFILLING, COMPACTION AND PATCHING OF CONCRETE AND ASPHALT AS REQUIRED TO PERFORM HIS WORK. ATTENTION IS CALLED TO THE FACT THAT THERE ARE EXISTING UNDERGROUND UTILITY LINES. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN TRENCHING FOR HIS WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER AND APPROVED REPAIR OF ANY AND ALL DAMAGES CAUSED BY HIM OR HIS WORK.
25. OCCUR ON OPPOSITE SIDES OF THE WALL WITHIN 24 INCH HORIZONTAL DISTANCE OF ONE ANOTHER. IN THIS CASE, ONLY ONE OUTLET BOX NEED TO BE PROTECTED BY AN APPROVED FIRESTOP MATERIAL OR DETAIL TO CORRECT THIS CONDITION. OCCUR WITH OUTLET BOXES OF ANY SIZE SUCH THAT THE AGGREGATE AREA OF UNPROTECTED OUTLET BOXES EXCEEDS 100 SQUARE INCHES IN ANY 100 SQUARE FEET OF WALL AREA. IN THIS CASE, ONLY A SUFFICIENT NUMBER OF OUTLET BOXES NEED BE PROTECTED BY AN APPROVED MATERIAL OR DETAIL TO DECREASE THE AGGREGATE AREA OF UNPROTECTED OUTLET BOXES TO LESS THAN 100 SQUARE INCHES IN ANY 100 SQUARE FEET OF WALL.

STEEL ELECTRICAL OUTLET BOXES WHICH EXCEED 16 SQUARE INCHES IN AREA, AND ALL OTHER STEEL UTILITY OUTLET BOXES REGARDLESS OF SIZE, SHALL BE PROTECTED BY AN APPROVED FIRESTOP MATERIAL AS LISTED OR EQUAL.

**FIRESTOPPING MATERIAL:** MPP-1 MOLDABLE PUTTY PADS 3M CONTRACTOR PRODUCTS MINNEAPOLIS, MN FSP FIRESTOP PUTTY PADS HEVI-DUTY NELSON PRODUCTS TULSA, OK FLAMESAFE FSP 1077 FIRESTOP PADS INTERNATIONAL PROTECTIVE COATINGS OAKHURST, NJ

STEEL UTILITY BOXES WHICH EXCEED 100 SQUARE INCHES IN AREA SHALL BE PROTECTED BY ENCASEMENT. UTILITY AND ELECTRICAL OUTLETS OR BOXES SHALL BE SECURELY FASTENED TO THE STUD OF FRAMING OF THE WALL, PARTITION OR CEILING ASSEMBLY. THE OPENING IN THE GYPSUM BOARD FACING SHALL BE CUT SO THAT THE CLEARANCE BETWEEN THE BOX AND THE GYPSUM BOARD DOES NOT EXCEED 1/8 INCH. IN SMOKE WALLS OR PARTITIONS, THE 1/8 INCH CLEARANCE SHALL BE FILLED WITH AN APPROVED FIRE-RATED SEALANT.

REFER TO SINGLE LINE DIAGRAM AND FEEDER SCHEDULES FOR CONDUIT AND CONDUCTOR SIZE TO PANELS, TRANSFORMERS, MECHANICAL AND PLUMBING EQUIPMENT, ETC. CONDUIT RUNS MAY NOT BE SHOWN ON DRAWINGS, BUT ARE PART OF THIS CONTRACT.

28. ALL CONDUCTORS SHALL BE COPPER #12 AWG MINIMUM SIZE. TYPE THHN/THWN THERMOPLASTIC, 600 VOLT, 75 DEGREES CELSIUS WET AND 90 DEGREES CELSIUS DRY AND UL LISTED UNLESS NOTED OTHERWISE. CONDUCTORS #12 AWG AND SMALLER SHALL BE SOLID. CONDUCTORS # 10 AWG AND LARGER SHALL BE STRANDED.

29. MAXIMUM NUMBER OF CONDUCTORS IN OUTLET OR JUNCTION BOXES SHALL CONFORM TO THE CALIFORNIA ELECTRICAL CODE, ARTICLE 314.16(A), BUT IN NO CASE SHALL CONTAIN MORE THAN THE FOLLOWING NUMBER OF #12 AWG CONDUCTORS FOR THE SIZE OF BOX INDICATED. THE MINIMUM SIZE OUTLET OR JUNCTION BOX PERMITTED IN A WALL IS FOUR INCHES SQUARE BY 1-1/2 INCHES DEEP.

4" SQ.	BY 1-1/2" D = 9 CONDUCTORS
4" SQ.	BY 2-1/8" D = 13 CONDUCTORS
4 1/16" SQ.	BY 1-1/2" D = 11 CONDUCTORS
4 1/16" SQ.	BY 2-1/8" D = 18 CONDUCTORS

ALL OUTLET BOXES CONTAINING MORE THAN ONE DEVICE SHALL BE GANGED. TWO DEVICES DOUBLE GANGED. MINIMUM.

30. WHERE MULTIHOMERUNS ARE INDICATED ON DRAWINGS, INDICATING THE SAME PANELBOARD CIRCUIT NUMBER, PROVIDE JUNCTION BOX ABOVE ACCESSIBLE CEILING AND ROUTE ONE SET OF WIRES TO CIRCUIT BREAKERS.

31. THE EXACT LOCATION OF ALL ELECTRICAL DEVICES AND EQUIPMENT SHALL BE COORDINATED WITH THE ARCHITECTURAL ELEVATIONS, DETAILS, OR SECTIONS PRIOR TO INSTALLATION. ALL ELECTRICAL DEVICES AND EQUIPMENT SHALL BE RECESSED IN WALLS UNLESS OTHERWISE NOTED. OUTLETS NOT INDICATED ON ARCHITECTURAL ELEVATIONS SHALL BE COORDINATED WITH THE ARCHITECT PRIOR TO ROUGH-IN UNLESS OTHERWISE NOTED. MOUNT ELECTRICAL DEVICES AT THE FOLLOWING HEIGHTS:

- WALL SWITCH +4'-0" SET VERTICALLY TO TOP OF DEVICE CONVENIENCE RECEPTACLE +1'-6" SET VERTICALLY TO CENTER OF DEVICE.
- MOUNTING HEIGHTS OF ALL DEVICES AND EQUIPMENT ARE FROM FINISHED FLOOR TO CENTER OF DEVICES AND EQUIPMENT UNLESS OTHERWISE NOTED. BOXES INSTALLED IN LOCATIONS NOT APPROVED BY THE ARCHITECT SHALL BE RELOCATED AS DIRECTED BY THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER.

32. DRAWINGS OF AUTOMATIC ONLY ROUTING OR RACEWAYS SHALL BE AT THE OPTION OF THE CONTRACTOR UNLESS OTHERWISE NOTED AND SHALL BE COORDINATED WITH OTHER SECTIONS. DO NOT SCALE THE ELECTRICAL DRAWINGS FOR LOCATIONS OF ANY ELECTRICAL ARCHITECTURAL, STRUCTURAL, CIVIL OR MECHANICAL ITEMS OR FEATURES.

33. RIGID GALVANIZED STEEL CONDUIT SHALL BE FULL WEIGHT THREADED TYPE ALUMINUM OR STEEL ELECTRICAL METALLIC TUBING (EMT) MAY BE USED IN WALLS OR CEILING SPACES WHERE NOT SUBJECT TO MECHANICAL DAMAGE. PVC SCHEDULE 40 MAY BE INSTALLED BENEATH SLAB OR BELOW GRADE FLEXIBLE STEEL CONDUIT MAY BE USED AT FIXTURE AND OUTLET CONNECTIONS WITH RUNS LONGER THAN SIX FEET. AN EQUIPMENT GROUNDING CONDUCTOR SHALL BE PROVIDED IN ALL CONDUIT RUNS.

34. RIGID GALVANIZED STEEL CONDUIT FITTINGS SHALL BE THREADED AND THROUGH RIGID GALVANIZED ELECTRICAL METALLIC TUBING (EMT) CONDUIT FITTINGS SHALL BE STEEL RAINIGHT THREADEDLESS COMPRESSION TYPE, DIE CAST, SET SCREW, OR INDENTER TYPES ARE NOT ACCEPTABLE. FLEXIBLE STEEL CONDUIT FITTINGS SHALL BE MALLEABLE IRON CLAMP, SQUEEZE TYPE OR STEEL TWIST-IN TYPE WITH INSULATED THREADED SET SCREW TYPE IS NOT ACCEPTABLE.

35. INTENT OF THE DRAWINGS, THE INTENT OF THE DRAWINGS AND SPECIFICATIONS IS TO RECONSTRUCT THE HOSPITAL BUILDING IN ACCORDANCE WITH CALIFORNIA BUILDING STANDARDS CODE, TITLE 24, CALIFORNIA CODE OF REGULATIONS. SHOULD ANY CONDITION DEVELOP NOT COVERED BY THE APPROVED PLANS AND SPECIFICATIONS, WHETHER THE FINISHED WORK WILL NOT COMPLY WITH TITLE 24, CALIFORNIA CODE OF REGULATIONS, A CHANGE ORDER DETAILING AND SPECIFYING THE REQUIRED WORK SHALL BE SUBMITTED TO AND APPROVED BY OSHPD BEFORE PROCEEDING WITH THE WORK.

**DEMOLITION NOTES:**

1. IN GENERAL, THE DEMOLITION PLAN SHOWS ALL EXISTING EQUIPMENT TO BE REMOVED; HOWEVER, ELECTRICAL EQUIPMENT, WHETHER SHOWN ON THIS DRAWING OR NOT THAT IS LOCATED IN REMOVED WALLS, FLOORS OR CEILINGS, SHALL BE REMOVED UNLESS OTHERWISE NOTED.
2. IT SHALL BE THE ELECTRICAL CONTRACTOR'S RESPONSIBILITY TO DISCONNECT AND REMOVE ALL EXISTING RECEPTACLES, FIRE ALARM DEVICES, ETC., AFFECTED BY THE REMODELED AREA. THIS WILL INCLUDE REROUTING, OR THE EXTENSION OF, EXISTING CONDUIT AND FEEDERS AND N/C CABLING WHERE NECESSARY TO MAINTAIN THE CONTINUITY OF EXISTING EQUIPMENT REMAINING.
3. ALL CIRCUIT NUMBERS AND EXISTING CONDUIT HOMERUNS SHOWN ON THESE DRAWINGS WERE TAKEN FROM EXISTING RECORD DRAWINGS. IT IS THIS CONTRACTOR'S RESPONSIBILITY TO VERIFY LOCATIONS OF HOMERUNS, AND ADJUST CIRCUIT NUMBERS ACCORDING TO EXISTING CONDITIONS IF REQUIRED.
4. IT SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR TO MAINTAIN CONTINUITY OF ALL ELECTRICAL AND LOW VOLTAGE SYSTEMS, EQUIPMENT, ETC., REMAINING IN OPERATION WHICH ARE BEING FED BY AN ABANDONED UTILITY. MAINTAINING CONTINUITY SHALL CONSIST OF REROUTING CONDUIT, WIRING, ETC., AS REQUIRED.
5. ALL ELECTRICAL DEVICES, ETC., THAT ARE REMOVED, SHALL BE REMOVED COMPLETELY, INCLUDING CONDUIT AND WIRING BACK TO THE DEVICE, ETC., REMAINING IN SERVICE.
6. EXISTING CIRCUITS WHICH ARE REMOVED AND NOT REUSED SHALL BE IDENTIFIED ON THE PANEL SCHEDULE AS "SPARE".
7. THE ELECTRICAL CONTRACTOR SHALL COORDINATE WITH THE OWNER PRIOR TO REMOVAL OF EXISTING ELECTRICAL EQUIPMENT AND TURN OVER REMOVED EQUIPMENT THAT THE OWNER REQUESTS IN AN "AS-FOUND" CONDITION. EQUIPMENT THAT IS TO BE TURNED OVER SHALL BE BOXED AND TAGGED TO IDENTIFY THE SPECIFIC EQUIPMENT.
8. WHERE NEW CIRCUITS ARE SHOWN TO EXISTING PANELS, INSTALL NEW CIRCUIT BREAKERS (MAGNETIC SINGLE POLE) AS CALLED FOR ON DRAWINGS. IDENTIFY EACH NEW CIRCUIT ON PANEL SCHEDULE.
9. EXISTING CONDUIT MAY BE REUSED IF ADEQUATELY SIZED, BUT IN NO CASE SHALL ANY EXISTING CONDUCTORS BE REUSED.
10. IN SOME INSTANCES, IT MAY BE NECESSARY FOR THE ELECTRICAL CONTRACTOR TO TEMPORARILY RELOCATE, REROUTE, ETC., EXISTING ELECTRICAL EQUIPMENT. THIS SHALL BE DONE SO THAT THE SYSTEMS IN ALL PHASES (THOSE COMPLETED AND THOSE YET TO BEGIN), ARE IN COMPLETE, OPERABLE, CONDITION AS CONSTRUCTION PROCEEDS THROUGH EACH PHASE.
11. ALL ABANDONED OUTLETS SHALL BE COVERED AND PATCHED TO MATCH THE FINISH OF SURROUNDING WALL OR CEILING TO THE SATISFACTION OF THE OWNER.

36. DISCONNECT SWITCH: SUBMIT SHOP DRAWINGS INCLUDING PRODUCT DATA, DIMENSIONS, WEIGHTS, PERFORMANCE, RATINGS, ENCLOSURE TYPE, CURRENT, VOLTAGE, AND SHORT-CIRCUIT RATINGS.

FUSIBLE AND NON-FUSIBLE SWITCHES: ACCEPTABLE MANUFACTURERS: SQUARE D 3110 SERIES, EATON DH SERIES, ABB TH SERIES, SIEMENS HNF / HF SERIES, FUSIBLE SWITCH ASSEMBLIES, HEAVY DUTY TYPE, QUICK-MAKE, QUICK-BREAK, LOAD INTERRUPTER ENCLOSED KNIFE SWITCH, HANDLE LOCKABLE IN OFF POSITION, CLASS 'R' FUSE, NON-FUSIBLE SWITCH ASSEMBLIES, HEAVY DUTY TYPE, QUICK-MAKE, QUICK-BREAK, LOAD INTERRUPTER ENCLOSED KNIFE SWITCH, HANDLE LOCKABLE IN OFF POSITION.

37. MOLDED CASE CIRCUIT BREAKERS: ACCEPTABLE MANUFACTURERS: SQUARE D, EATON, ABB, SIEMENS. MOLDED CASE CIRCUIT BREAKER, INTERRUPTING CAPACITY TO MEET AVAILABLE FAULT CURRENTS. THERMAL MAGNETIC CIRCUIT BREAKERS SHALL HAVE INVERSE TIME-CURRENT ELEMENT FOR LOW-LEVEL OVERLOADS AND INSTANTANEOUS MAGNETIC TRIP ELEMENT FOR SHORT CIRCUITS. PROVIDE ADJUSTABLE MAGNETIC TRIP SETTING FOR CIRCUIT-BREAKER FRAME SIZES 250 A AND LARGER. ADJUSTABLE INSTANTANEOUS TRIP CIRCUIT BREAKERS: MAGNETIC TRIP ELEMENT WITH FRONT-MOUNTED, FIELD-ADJUSTABLE TRIP SETTINGS.

**ELECTRICAL SHEET INDEX**

E0.1	ELECTRICAL COVERSHEET
E0.2	SINGLE LINE DIAGRAM
E1.0	OVERALL GROUND LEVEL PLAN - ELECTRICAL
E1.1	GROUND LEVEL DEMOLITION PLAN - ELECTRICAL
E2.1	GROUND LEVEL PLAN - ELECTRICAL
E3.1	DETAILS
GRAND TOTAL: 6	

**APPLICABLE CODES**

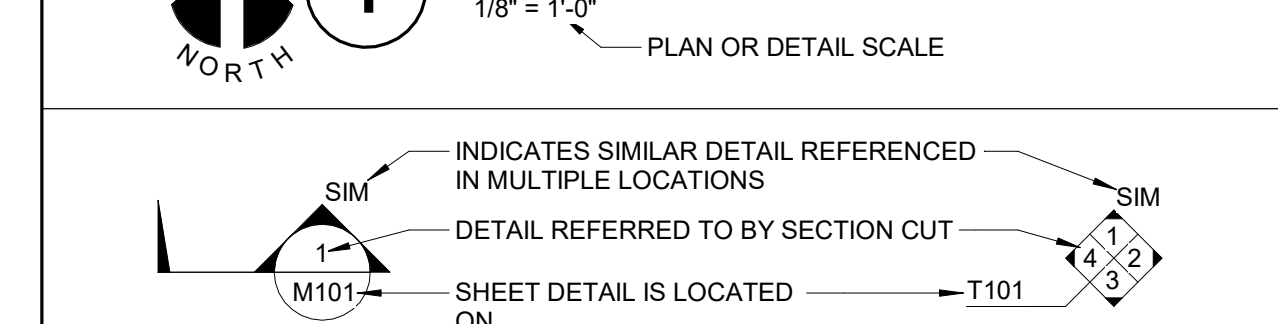
CONTRACTOR SHALL COMPLY WITH APPLICABLE CODES AND LOCAL AMENDMENTS.

- 2019 CALIFORNIA ADMINISTRATIVE CODE (CAC) PART 1, TITLE 24, CALIFORNIA CODE OF REGULATIONS (CCR)
- 2019 CALIFORNIA BUILDING CODE (CBC) PART 2, TITLE 24, CCR
- 2019 CALIFORNIA INTERNATIONAL BUILDING CODE (IBC) PART 4, TITLE 24, CCR
- 2019 CALIFORNIA ELECTRICAL CODE (CEC) PART 3, TITLE 24, CCR
- 2019 CALIFORNIA MECHANICAL CODE (CMC) PART 4, TITLE 24, CCR
- 2019 CALIFORNIA MECHANICAL CODE (CMC) PART 5, TITLE 24, CCR
- 2019 CALIFORNIA MECHANICAL CODE (CMC) PART 6, TITLE 24, CCR
- 2019 CALIFORNIA MECHANICAL CODE (CMC) PART 7, TITLE 24, CCR
- 2019 CALIFORNIA MECHANICAL CODE (CMC) PART 8, TITLE 24, CCR
- 2019 CALIFORNIA MECHANICAL CODE (CMC) PART 9, TITLE 24, CCR
- 2019 CALIFORNIA MECHANICAL CODE (CMC) PART 10, TITLE 24, CCR
- 2019 CALIFORNIA MECHANICAL CODE (CMC) PART 11, TITLE 24, CCR
- 2019 CALIFORNIA MECHANICAL CODE (CMC) PART 12, TITLE 24, CCR
- 2019 NFPA 99 HEALTHCARE FACILITIES CODE
- 2018 NFPA 101 LIFE SAFETY CODE

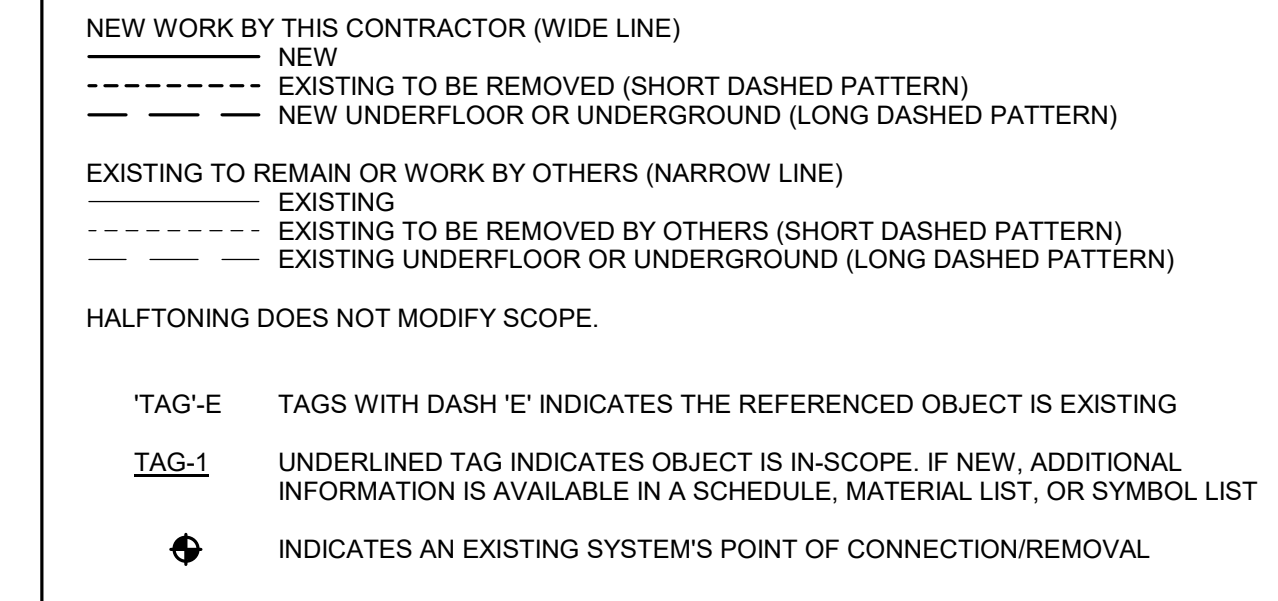
**VIEW KEY**



**VIEW NAME**



**LINE TYPE AND TAG KEY:**

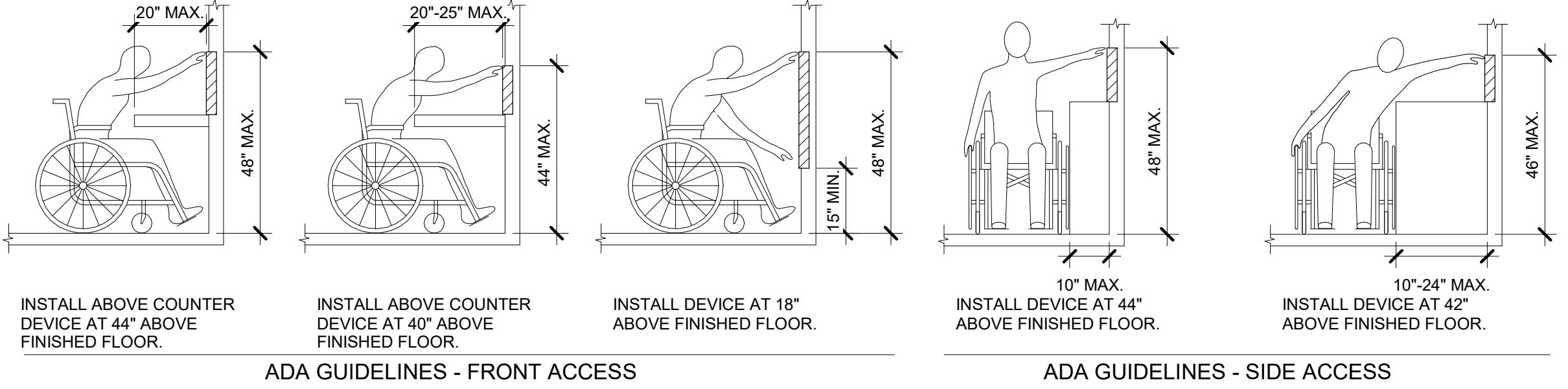


**ELECTRICAL SYMBOL LIST**

SYMBOL:	DESCRIPTION:
[Symbol]	GROUND BUS
[Symbol]	ELECTRICAL CONNECTION
[Symbol]	JUNCTION BOX
[Symbol]	PANELBOARD - RECESS MOUNT
[Symbol]	PANELBOARD - SURFACE MOUNT
[Symbol]	CIRCUIT BREAKER - SURFACE MOUNTED.
[Symbol]	CIRCUIT BREAKER - FLUSH MOUNTED.
[Symbol]	DISCONNECT SWITCH.

**ELECTRICAL ABBREVIATION KEY**

ABBR:	DESCRIPTION:
AFF	ABOVE FINISHED FLOOR
C	CONDUIT
GFI	GROUND FAULT INTERRUPTER
N.C.	NORMALLY CLOSED
NIC	NOT IN CONTRACT
N/O	NORMALLY OPEN
SV	SOLENOID VALVE
TYN	TYPICAL
UON	UNLESS OTHERWISE NOTED



**ADA STANDARDS FOR ACCESSIBLE DESIGN**

**IMEG** 901 VIA PIEMONTE, SUITE 400  
ONTARIO, CA 91764  
909-477-8915 FAX: 909-477-8916  
www.imegcorp.com  
PROJECT # 21007609.00

REGISTERED PROFESSIONAL ENGINEER  
MECHANICAL ENGINEERING  
Lic. E16934  
Exp. 6-30-2023

REFERENCE SCALE IN INCHES  
0 1 2 3

PROJECT TITLE  
**STERILIZATION SYSTEM  
INSTALLATION  
FOR THE  
ARROWHEAD REGIONAL  
MEDICAL CENTER**  
400 N. PEPPER AVE.  
COLTON, CA, 92324  
WBSE #: 10.10.1142  
CIF #: 21-154  
CAF #: COL003

Office of Statewide Health Planning and Development  
**HCAI # S222347-36-00**

REVIEWED IN ACCORDANCE WITH THE REQUIREMENTS OF T24, CCR  
**APPROVED**  
Department of Health Care Access & Information  
Office of Statewide Hospital Planning & Development  
1/4/2024, 9:00:12 AM  
S222347-36-00  
Allen Cheng

**REFERENCE PLAN**

PROJECT AREA

GRD FLOOR

Urutria marks architects 2022 ALL REPORTS, PLANS AND DOCUMENTS PREPARED BY URUTRIA MARKS ARCHITECTS SHALL REMAIN THE PROPERTY OF URUTRIA MARKS ARCHITECTS AND ARE INTENDED FOR THIS SPECIFIC PROJECT ONLY.

**ELECTRICAL COVERSHEET**

DATE **12/28/2022**

REVISIONS

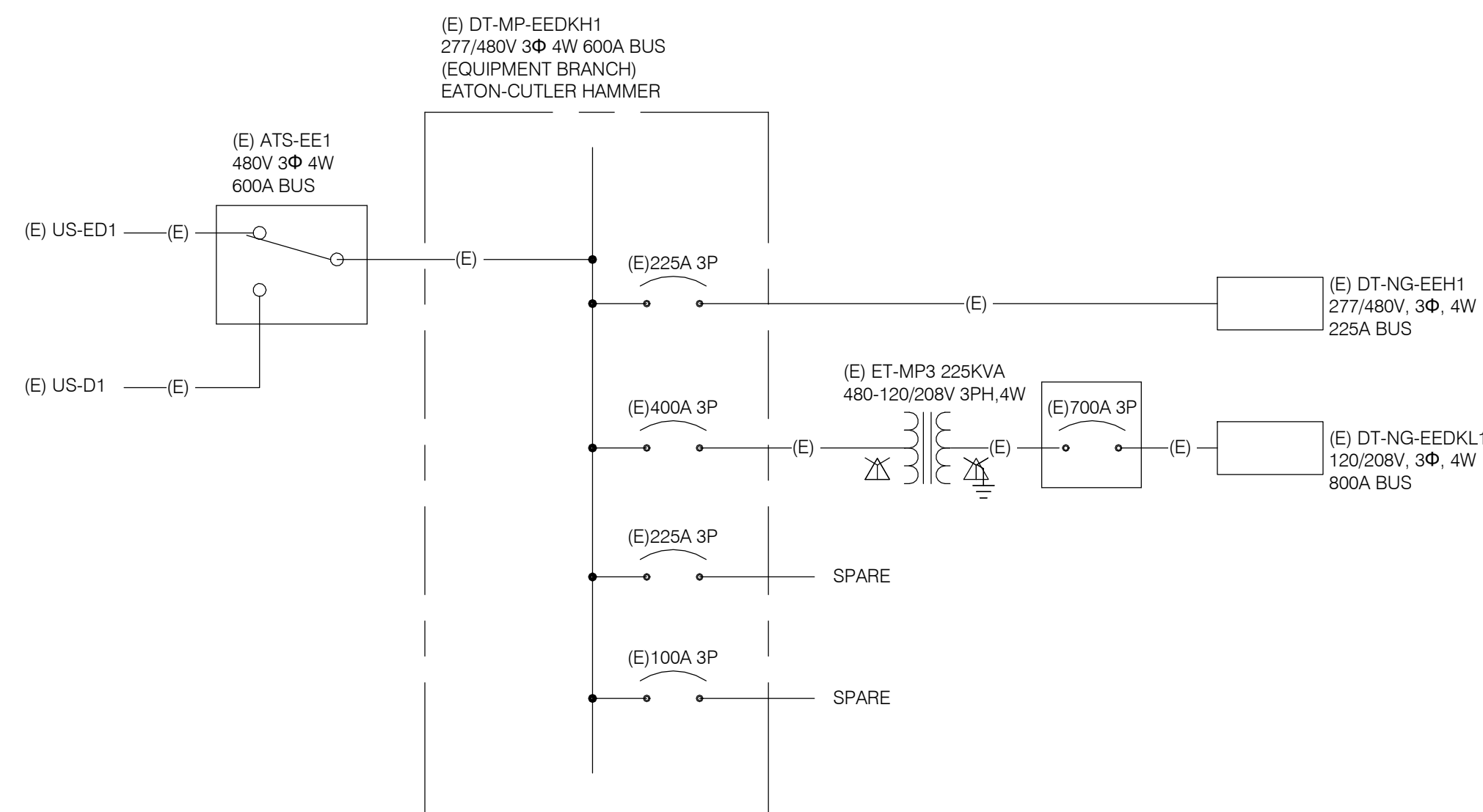
HCAI COMMENTS 2/13/2023

PROJECT NUMBER **3021022**

DRAWING NUMBER **E0.1**

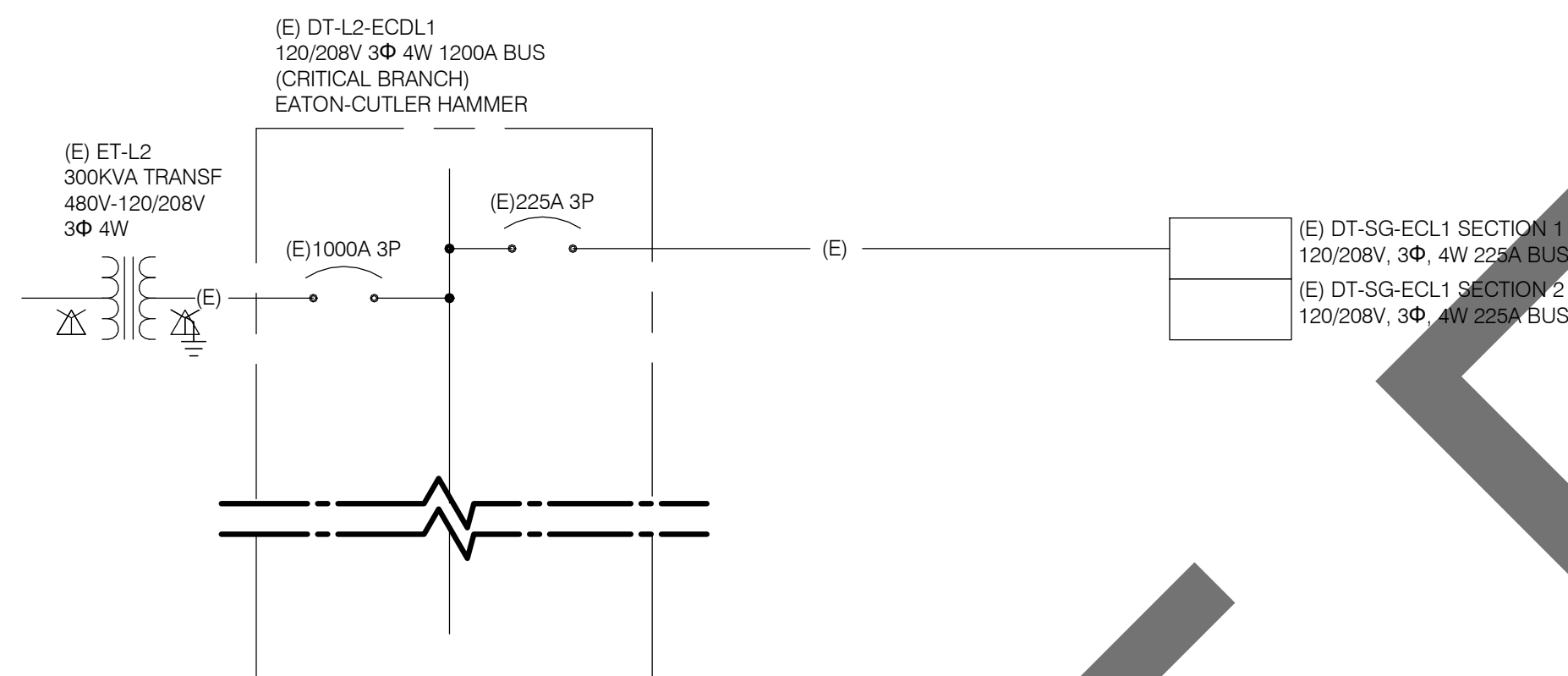
marks architects  
73121 fred waring drive  
suite 200  
palm deserf, ca 92260  
760-327-6800

REGISTERED ARCHITECT  
DAVID WILLIAM CLARK  
C-21219  
30-23  
EXPIRES  
DATE



(E)DT-MP-EEDKH1 600A BUS	
(E) DEMAND LOAD =	125 A
03/10/2022-04/11/2022	
X 1.25%	= 156 A
REMOVED LOAD =	16 A
ADDED LOAD =	68 A
<b>TOTAL LOAD =</b>	<b>208 A</b>

(E) DT-NG-EEH1 225A BUS	
(E) DEMAND LOAD =	53 A
03/10/2022-04/11/2022	
X 1.25%	= 66 A
REMOVED LOAD =	16 A
ADDED LOAD =	68 A
<b>TOTAL LOAD =</b>	<b>118 A</b>



(E) DT-SG-ECL1 225A BUS	
(E) DEMAND LOAD =	120 A
03/10/2022-04/11/2022	
X 1.25%	= 150 A
ADDED LOAD =	1.5 A
<b>TOTAL LOAD =</b>	<b>151.5 A</b>

NOTES:  
1. DEMAND LOAD RECORDING CONDUCTED BETWEEN 03/10/2022 AND 04/11/2022.

**ELECTRICAL SYSTEM COORDINATION:**  
THE ELECTRICAL SYSTEM HAS BEEN EVALUATED FOR COORDINATION AND THE ELECTRICAL SYSTEM WILL MEET THE COORDINATION REQUIREMENTS OF THE CEC, ARTICLE 700 AND 701.  
SIGNATURE: \_\_\_\_\_

**1 SINGLE LINE DIAGRAM**  
NO SCALE

**\*\* (E) PANEL DT-NG-EEH1**  
(EQUIPMENT BRANCH)  
MOUNTING: SURFACE  
ENCLOSURE: NEMA PB 1  
FED FROM: DT-MP-EEDKH1  
LOCATION: E.C. GB 150  
MFR.: EATON

MAIN: 225 A MCB  
VOLTS: 480/277 Wye  
PHASE: 3  
WIRE: 4  
SCCR: 22 KA  
ISC: 22.00 KA

CRITICAL BRANCH  
SOLID NEUTRAL  
GROUND BUS

NOTES:

KEY	CKT NO.	LOAD DESCRIPTION	OC PD AMPS	P	WIRE SIZE	VD %	A	B	C	VD %	WIRE SIZE	OC PD AMPS	LOAD DESCRIPTION	CKT NO.	KEY
--	1	(E)SUMP PUMP #6	20 A	3			0	0				3	15 A	(E)ACID WASTE EJECT AWE-1	2
--	3														4
--	5														6
--	7	(E)SUMP PUMP #7	20 A	3			0	0				3	20 A	(E)ENDUST WAST EJECT IWE-1	8
--	9														10
--	11														12
--	13	(E)CART WASHER	20 A	3			0	0				3	20 A	(E)SE-5	14
--	15														16
--	17														18
--	19	(E)SE-4	20 A	3			0	4.71				3	20 A	(N)DOUBLE DOOR WASHER	20
--	21														22
--	23														24
1	25	(N)DOUBLE DOOR WASHER	20 A	3			4.71	4.71				3	20 A	(N)DOUBLE DOOR WASHER	26
1	27														28
1	29														30
--	31	(N)DOUBLE DOOR WASHER	20 A	3			4.71					1		SPACE	32
--	33											1		SPACE	34
--	35											1		SPACE	36
--	37	SPACE		1								1		SPACE	38
--	39	SPACE		1								1		SPACE	40
--	41	SPACE		1								1		SPACE	42
<b>Total Load:</b>			18.84 kVA		18.84 kVA		18.22 kVA								
<b>Total Amps:</b>			68.34		68.34		65.77								

LOAD CLASSIFICATION: Spare  
CONNECTED LOAD: 55.889 kVA  
DEMAND FACTOR: 80.00%  
ESTIMATED DEMAND: 44.711 kVA

TOTALS\*  
TOTAL CONNECTED LOAD: 55.89 kVA  
TOTAL ESTIMATED DEMAND LOAD: \*  
TOTAL CONNECTED AMPS: \*  
TOTAL ESTIMATED DEMAND AMPS: \*

\*TOTAL DEMAND CALCS SUBTRACT ANY REDUNDANT LOAD AND THE SMALLER OF ANY NONCOINCIDENT HVAC LOADS. THIS CALC IS DONE AT EACH PANEL.  
CIRCUIT KEY NOTES: 1. EXISTING 20A 1P CIRCUIT BREAKERS TO BE REMOVED AND REPLACED WITH NEW 20A 3P CIRCUIT BREAKER WITH THE SAME EXIST AIC RATING.  
2. REPLACE EXISTING 30A, 3P CIRCUIT BREAKER WITH NEW 20A, 3P CIRCUIT BREAKER WITH THE SAME EXIST AIC RATINGS.

\* REFER TO THE DEMAND LOAD CALCULATION OF EXISTING PANEL DT-NG-EEH1 ON SINGLE LINE DIAGRAM.  
\*\* UPDATE PANEL CIRCUIT DIRECTORY WITH NEW CIRCUIT DIRECTORY SHOWING THE NEW LOADS.

**EXISTING PANEL DT-SG-ECL1**  
MOUNTING: SURFACE  
ENCLOSURE: NEMA PB 1  
FED FROM: 20 A/3P @  
LOCATION: ELEC CLOSET GB 206A

CRITICAL BRANCH  
SOLID NEUTRAL  
GROUND BUS

MAIN: 225 A MCB  
VOLTS: 120/208 Wye  
PHASE: 3  
WIRE: 4  
SCCR: 14 KA  
ISC: 14.00 KA

NOTES:

KEY	CKT NO.	LOAD DESCRIPTION	OC PD AMPS	P	WIRE SIZE	VD %	A	B	C	VD %	WIRE SIZE	OC PD AMPS	LOAD DESCRIPTION	CKT NO.	KEY
1	43	(E)SEROLOGY	20 A	1			0	0				1	20 A	(E)CHEMISTRY	44
1	45	(E)SEROLOGY	20 A	1				0	0			1	20 A	(E)CHEMISTRY	46
1	47	(E)FLUOR MIC	20 A	1					0	0		1	20 A	(E)CHEMISTRY	48
1	49	(E)DATA RM	20 A	1			0	0				1	20 A	(E)SEROLOGY	50
1	51	(E)DATA RM	20 A	1				0	0			1	20 A	(E)SEROLOGY	52
1	53	(E)DATA RM	30 A	1					0	0		1	20 A	(E)SEROLOGY	54
1	55	(E)STERILIZER AREA	20 A	1			0	0				1	20 A	(E)SEC DOORS SYS-LV	56
1	57	(E)STERILIZER AREA	20 A	1				0	0			1	20 A	(E)SEC DOORS SYS-LV	58
1	59	(E)ELEV. PIT LIGHT	20 A	1					0	0		1	20 A	(E)SEC DOORS SYS-LV	60
1	61	(E)CORR	20 A	1			0	0				1	20 A	(E)SENSOR TOILETS & SINKS	62
1	63	(E)PROCESSED STORE	20 A	1				0	0			2	30 A	(E)CABLE TRAY	64
1	65	(E)PROCESSED STORE	20 A	1					0	0					66
1	67	(E)COMM EQUIPMENT	20 A	1			0	0				1	20 A	(E)FLUOR MIC SAFETY LIGHTS	68
1	69	(E)COMM EQUIPMENT	20 A	1				0	0			1	20 A	(E)STERILIZER	70
1	71	(E)CB207A DATA	30 A	2					0	0		1	20 A	SPARE	72
1	73						0	0				1	20 A	SPARE	74
1	75	(E)CB207A DATA	30 A	2				0	0			1	20 A	SPARE	76
1	77								0	0		1	20 A	SPARE	78
1	79	(E)STERILIZER RM POWER...	20 A	1			0	0				3	90 A	(E)PANEL DT-SG-ECL2 DATA...	80
1	81	(E)STERILIZER RM POWER...	20 A	1				0	0						82
2	83	STERILIZER RM POWER POLE	20 A	1					0.18	0					84
<b>Total Load:</b>			0.00 kVA		0.00 kVA		0.18 kVA								
<b>Total Amps:</b>			0.00		0.00		1.50								

LOAD CLASSIFICATION: Spare  
CONNECTED LOAD: 0.18 kVA  
DEMAND FACTOR: 80.00%  
ESTIMATED DEMAND: 0.144 kVA

TOTALS\*  
TOTAL CONNECTED LOAD: 0.18 kVA  
TOTAL ESTIMATED DEMAND LOAD: 0.144 kVA  
TOTAL CONNECTED AMPS: 0.50 A  
TOTAL ESTIMATED DEMAND AMPS: 0.4 A

\*TOTAL DEMAND CALCS SUBTRACT ANY REDUNDANT LOAD AND THE SMALLER OF ANY NONCOINCIDENT HVAC LOADS. THIS CALC IS DONE AT EACH PANEL.  
CIRCUIT KEY NOTES: 1. EXISTING LOAD TO REMAIN. 2. EXISTING CIRCUIT BREAKER WITH NEW LOAD.

**IMEG**  
901 VIA PIEMONTE, SUITE 400  
ONTARIO, CA 91764  
909.477.8915 FAX: 909.477.8916  
www.imegcorp.com  
PROJECT # 21007609.00

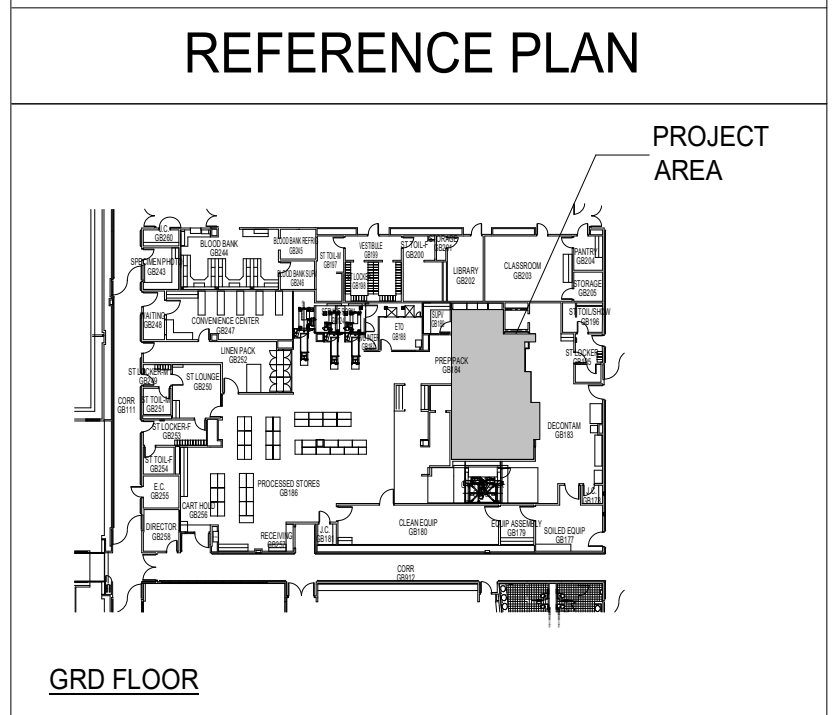
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REFERENCE SCALE IN INCHES  
0 1 2 3

REGISTERED PROFESSIONAL ENGINEER  
NORTH CAROLINA  
Lic. E18934  
Exp. 6-30-2023

PROJECT TITLE  
**STERILIZATION SYSTEM  
INSTALLATION  
FOR THE  
ARROWHEAD REGIONAL  
MEDICAL CENTER**  
400 N. PEPPER AVE.  
COLTON, CA, 92324  
WBSE #: 10.10.1142  
CIP #: 21-154  
CAF# #: COL003

Office of Statewide Health Planning and Development  
HCAI # S222347-36-00

REVIEWED IN ACCORDANCE WITH THE REQUIREMENTS OF T24, CCR  
**APPROVED**  
Department of Health Care Access & Information  
Office of Statewide Hospital Planning & Development  
1/4/2024, 9:00:12 AM  
S222347-36-00  
Allen Cheng



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marks architects  
73121 fred waring drive suite 200  
palm deserf, ca 92260  
760-327-6800

DRAWING TITLE  
**SINGLE LINE DIAGRAM**

DATE  
**12/28/2022**

REVISIONS

REGISTERED ARCHITECT  
DAVID WILLIAM CLARKE  
C-21219  
30-23  
REVISED DATE

PROJECT NUMBER  
**3021022**

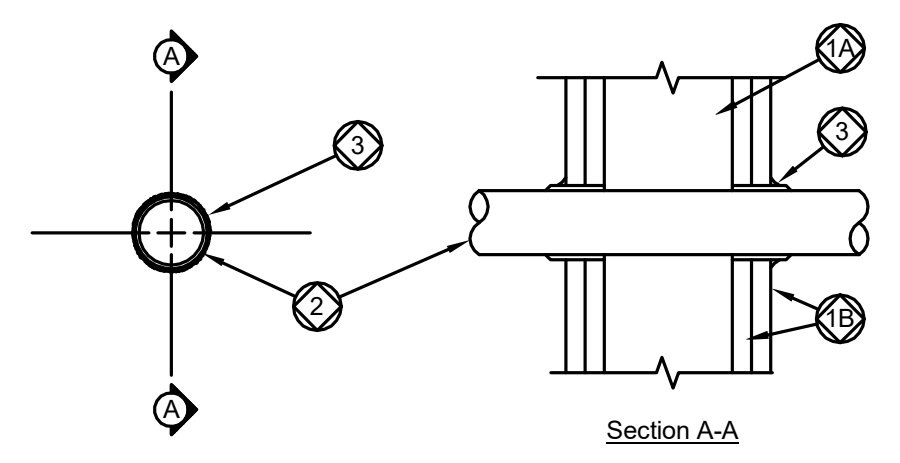
DRAWING NUMBER  
**E0.2**







SYSTEM NO. W-L-1001  
 F RATINGS - 1, 2, 3 and 4 HR (SEE ITEMS 2 and 3)  
 T RATINGS - 0, 1, 2, 3 and 4 HR (SEE ITEM 3)  
 L RATING AT AMBIENT - 1 CFM/SQ FT  
 L RATING AT 400 F - LESS THAN 1 CFM/SQ FT



2. THROUGH PENETRANT - ONE METALLIC PIPE, CONDUIT OR TUBING INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. THE ANNULAR SPACE BETWEEN PIPE, CONDUIT OR TUBING AND PERIPHERY OF OPENING SHALL BE MIN. OF 0 IN. (POINT CONTACT) TO MAX 2 IN. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDERS OF WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUIT OR TUBING MAY BE USED:
  - A. NOM 24 IN. DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE
  - B. NOM 24 IN. DIAM (OR SMALLER) SERVICE WEIGHT (OR HEAVIER) CAST IRON SOIL PIPE, NOM 12 IN. DIAM (OR SMALLER) CLASS 50 (OR HEAVIER) DUCTILE IRON PRESSURE PIPE
  - C. NOM 6 IN. DIAM (OR SMALLER) STEEL CONDUIT OR NOM 4 IN. DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING
  - D. NOM 6 IN. DIAM (OR SMALLER) TYPE L OR (OR HEAVIER) COPPER TUBING
  - E. NOM 6 IN. DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE
3. STEEL ELECTRICAL METALLIC TUBING
  - D. NOM 6 IN. DIAM (OR SMALLER) TYPE L OR (OR HEAVIER) COPPER TUBING
  - E. NOM 6 IN. DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE

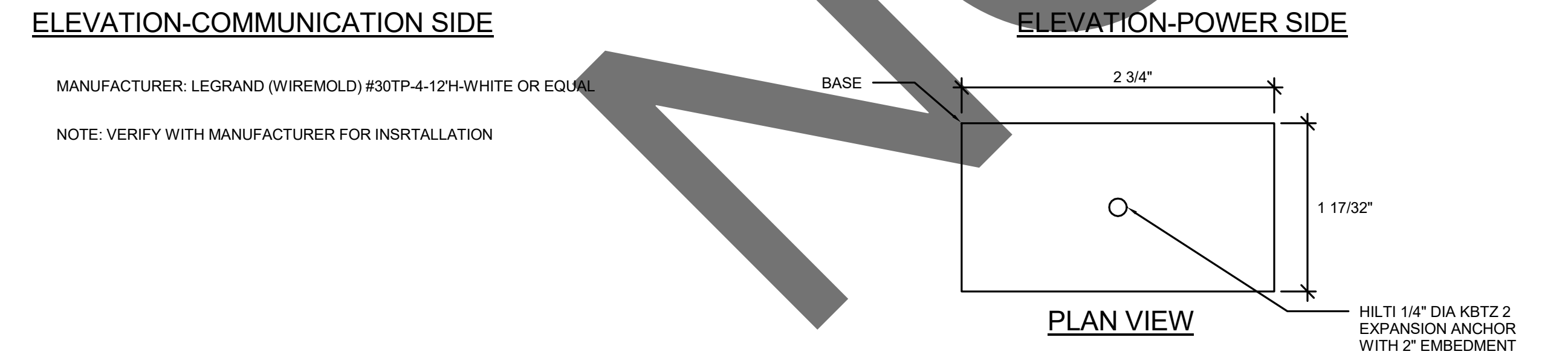
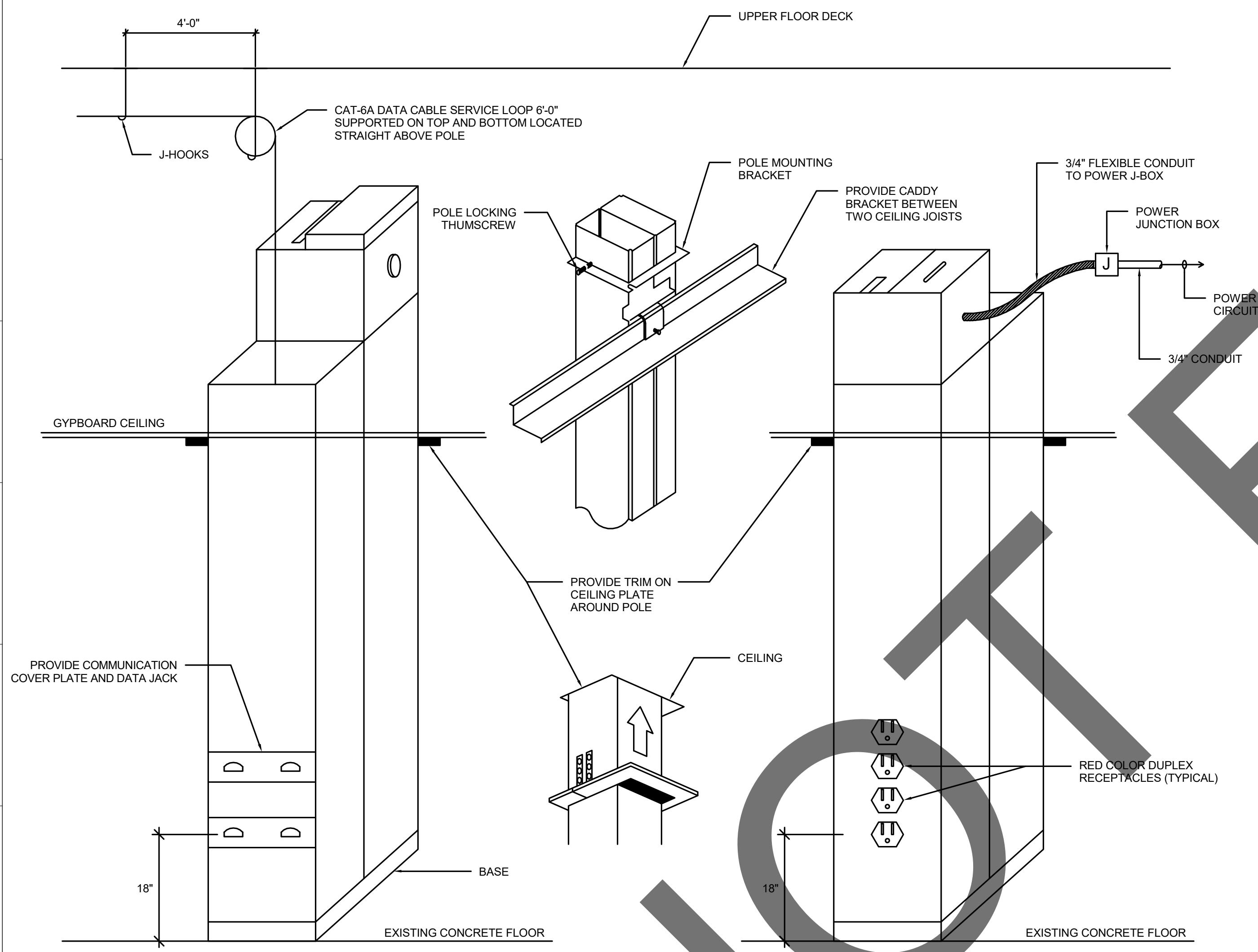
FILL, VOID OR CAVITY MATERIAL - CAULK OR SEALANT - MIN. 5/8, 1-1/4, 1-7/8 AND 2-1/2 IN. THICKNESS OF CAULK FOR 1, 2, 3 AND 4 HR RATED ASSEMBLIES, RESPECTIVELY, APPLIED WITHIN ANNULUS, FLUSH WITH BOTH SURFACES OF WALL. MIN 1/4 IN. DIAM. BEAD OF CAULK APPLIED TO GYPSUM BOARD/PENETRANT INTERFACE AT POINT CONTACT LOCATION ON BOTH SIDERS OF WALL. THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED, AS SHOWN IN THE FOLLOWING TABLE. THE HOURLY T RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE TYPE OR SIZE OF THE PIPE OR CONDUIT AND THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED AS TABULATED BELOW:

MAX PIPE OR CONDUIT DIAM, IN	F RATING HR	T RATING, HR
1	1 OR 2	0** 1 OR 2
3	1 OR 4	3 OR 4
4	1 OR 2	0
6	3 OR 4	0
12	1 OR 2	0

\*\*WHEN COPPER PIPE IS USED, T RATING IS 0 H.  
 3M COMPANY - CP 25WB+ OR FB-3000 WT  
 \*BEARING THE UL CLASSIFICATION MARKING

1. WALL ASSEMBLY - THE 1, 2, 3 OR 4 HR FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER DESCRIBED IN THE INDIVIDUAL U300 OR U400 SERIES WALL OR PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:
  - A. STUDS - WALL FRAMING TO CONSIST OF STEEL CHANNEL STUDS. STEEL STUDS TO BE MIN 3-5/8 IN. WIDE BY 1-3/8 IN. DEEP CHANNELS SPACED MAX 24 IN. OC.
  - B. GYPSUM BOARD\* - NOM 1/2 OR 5/8 IN. THICK, 4 FT. WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM WALLBOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES DESIGN IN THE UL FIRE RESISTANCE DIRECTORY. MAX DIAM OF OPENING IS 26 IN.

**CONDUIT PENETRATION THRU 2-HOUR CONCRETE FLOOR/WALL DETAIL** NTS 1



**TELE-POWER POLE DETAIL** NTS 2

**EXISTING PANEL DT-JG-H1**

MOUNTING: SURFACE  
 ENCLOSURE: NEMA PB 1  
 FED FROM: (E) US - D1  
 LOCATION: E.C. GB240

NORMAL BRANCH  
 SOLID NEUTRAL  
 GROUND BUS

MAIN: 225 A MCB  
 VOLTS: 480/277 Wye  
 PHASE: 3  
 WIRE: 4  
 SCCR: 22 kA  
 ISC: 19.00 kA

NOTES:

KEY	CKT NO.	LOAD DESCRIPTION	OCPD AMPS	P	WIRE SIZE H	WIRE SIZE N	WIRE SIZE G	VD %	A			B			C			VD %	WIRE SIZE H	WIRE SIZE N	WIRE SIZE G	OCPD AMPS	LOAD DESCRIPTION	CKT NO.	KEY	
									1	2	3	1	2	3	1	2	3									
1	1	(E)LIGHTING	20 A	1	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20 A	(E)LIGHTING	2	1	
1	3	(E)LIGHTING	20 A	1	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20 A	(E)LIGHTING	4	1	
1	5	(E)LIGHTING	20 A	1	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20 A	(E)LIGHTING	6	1	
1	7	(E)LIGHTING	20 A	1	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20 A	(E)LIGHTING	8	1	
1	9	(E)LIGHTING	20 A	1	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20 A	(E)LIGHTING	10	1	
1	11	(E)LIGHTING	20 A	1	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20 A	(E)LIGHTING	12	1	
1	13	(E)PREVACUUM STERILIZER	20 A	3	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20 A	(E)LIGHTING	14	1	
1	15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20 A	SPARE	16	1	
1	17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20 A	SPARE	18	1	
2	19	SPARE	20 A	3	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20 A	SPARE	20	1	
2	21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20 A	SPARE	22	1	
2	23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20 A	SPARE	24	1	
1	25	(E)STEAM STERILIZER 1	20 A	3	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20 A	(E)STEAM STERILIZER 1	26	1	
1	27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	28	1	
1	29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	30	1	
--	31	SPACE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	SPACE	32	--	
--	33	SPACE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	SPACE	34	--	
--	35	SPACE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	SPACE	36	--	
--	37	SPACE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	SPACE	38	--	
--	39	SPACE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	SPACE	40	--	
--	41	SPACE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	SPACE	42	--	
			Total Load:			0.00 kVA	0.00 kVA	0.00 kVA																		
			Total Amps:			0.00	0.00	0.00																		

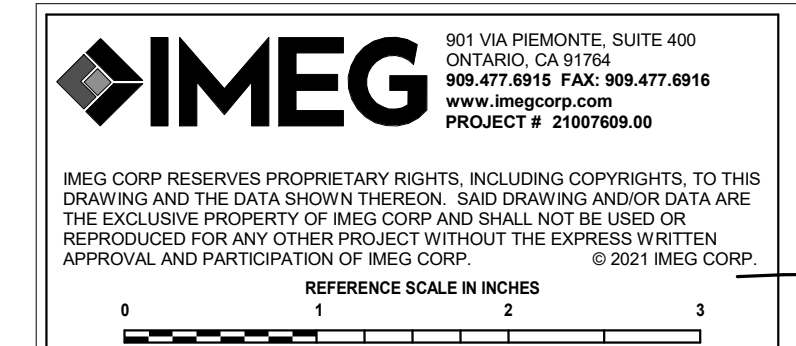
LOAD CLASSIFICATION

CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	TOTALS*
			TOTAL CONNECTED LOAD: 0.00 kVA
			TOTAL ESTIMATED DEMAND LOAD: 0 kVA
			TOTAL CONNECTED AMPS: 0.00 A
			TOTAL ESTIMATED DEMAND AMPS: 0 A

\*TOTAL DEMAND CALCUS SUBTRACT ANY REDUNDANT LOAD AND THE SMALLER OF ANY NONCOINCIDENT HVAC LOADS. THIS CALC IS DONE AT EACH PANEL.  
 CIRCUIT KEY NOTES: 1. EXISTING LOAD TO REMAIN. 2. EXITING CIRCUIT BREAKER WITH REMOVED LOAD.

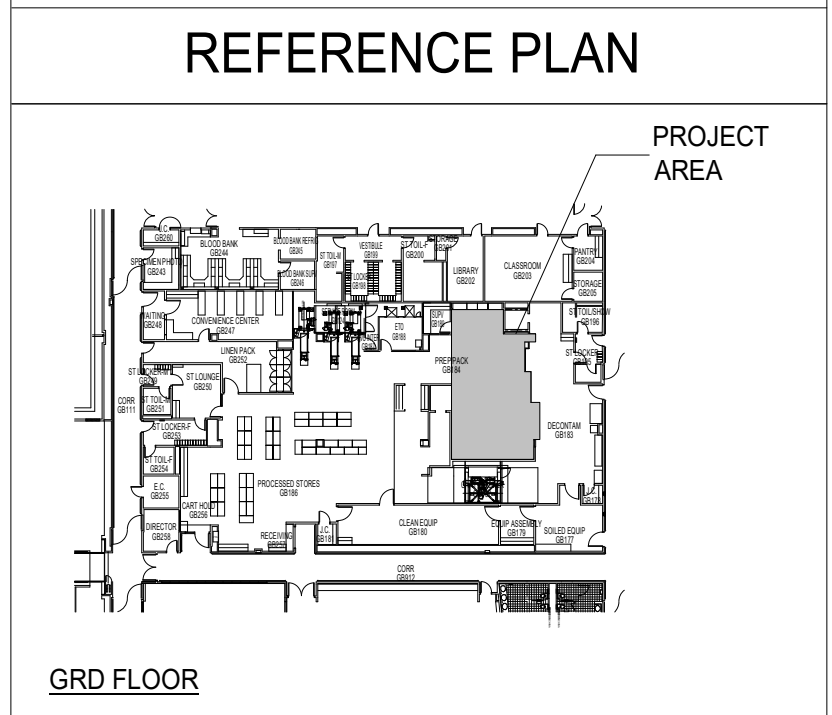
**PANEL SCHEDULE** NTS 3

NOT USED



Office of Statewide Health Planning and Development  
**HCAI # S222347-36-00**

REVIEWED IN ACCORDANCE WITH THE REQUIREMENTS OF T24, CCR  
**APPROVED**  
 Department of Health Care Access & Information  
 Office of Statewide Hospital Planning & Development  
 1/4/2024, 9:00:12 AM  
 S222347-36-00  
 Allen Cheng



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**marks architects**  
 73121 fred waring drive suite 200 palm deserf, ca 92260 760-327-6800

**DETAILS**

DATE: **12/28/2022**

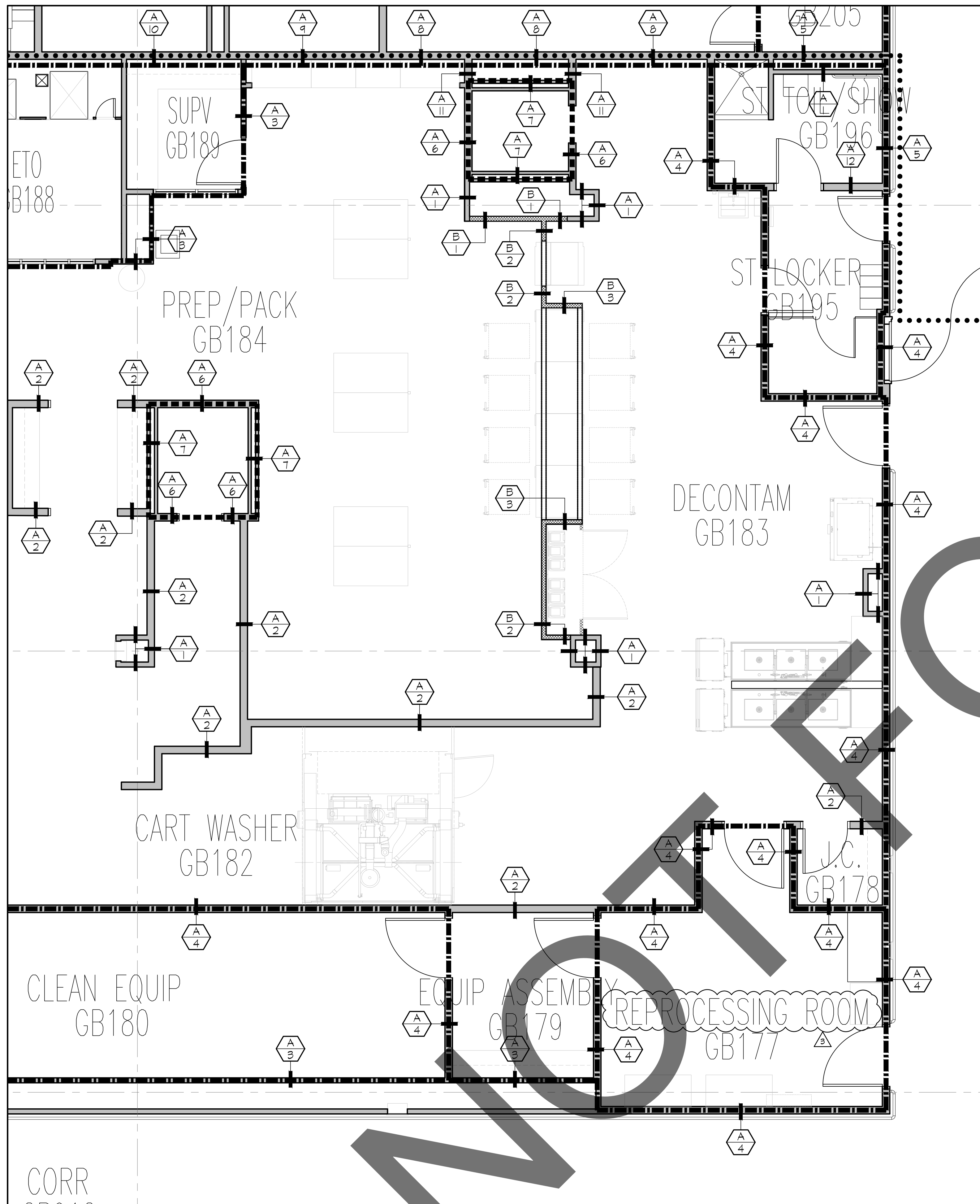
REVISIONS

PROJECT NUMBER: **3021022**

DRAWING NUMBER: **E3.1**

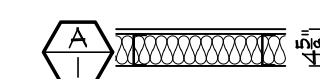
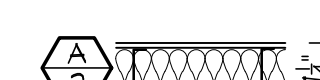


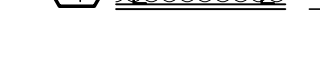




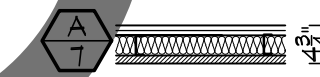




S:\Active Projects\County of San Bernardino\On Coll Projects\Arrowhead Regional Medical Center\3021027 ARMC - Sterilizer Installation\3021027 A2.2.dwg Oct 16, 2023 - 11:15am


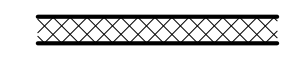


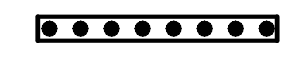


LIFE SAFETY FLOOR PLAN

1/4"=1'-0" 1

- 
 EXISTING INT. NON-RATED WALL - 4"x16 GA. METAL STUDS AT 16" O.C. W/ (1) LAYER OF 5/8" GYP. BD. ON ONE SIDE OF THE WALL VERT. OR HORIZ. ATTACHED W/ TYPE 'S' DRYWALL SCREWS @ 7" O.C. W/ END JOINTS ON NAILING MEMBERS. STAGGER JOINTS, GYP. BD. HEIGHT IS 6" ABOVE (E) CEILING. WALL FILLED W/ KRAFT FACED INSULATION. CONTINUOUS ACOUSTICAL SEALANT @ TOP & BOTTOM OF WALL.
- 
 EXISTING NON-RATED INT. WALL - 6"x16 GA. METAL STUDS AT 16" O.C. W/ (1) LAYER OF 5/8" GYP. BD. ON EACH SIDE OF THE WALL VERT. OR HORIZ. ATTACHED W/ TYPE 'S' DRYWALL SCREWS @ 7" O.C. W/ END JOINTS ON NAILING MEMBERS. STAGGER JOINTS, GYP. BD. HEIGHT IS 6" ABOVE (E) CEILING. WALL FILLED W/ KRAFT FACED INSULATION. CONTINUOUS ACOUSTICAL SEALANT @ BOTTOM OF WALL.
- 
 EXISTING UL RATED ONE-HOUR FIRE RESISTIVE PARTITION (ONE HOUR PARTITION OCCUPANCY/SEPARATION) INT. WALL - 6"x16 GA. METAL STUDS AT 16" O.C. W/ (1) LAYER OF 5/8" GYP. BD. ON EACH SIDE OF THE WALL VERT. OR HORIZ. ATTACHED W/ TYPE 'S' DRYWALL SCREWS @ 7" O.C. W/ END JOINTS ON NAILING MEMBERS. STAGGER JOINTS, HEIGHT OF GYP. BD. TO BOTTOM OF STRUCTURE. WALL FILLED W/ ACOUSTICAL BATT INSULATION. FIRE STOP SEALANT. CONTINUOUS FIRE BARRIER - SEALANT TOP & BOTH SIDES - 3M CP 25 MB, HILTI CS240, ALBI CLAD 151C. CONTINUOUS ACOUSTICAL SEALANT @ BOTTOM OF WALL. FLUTES @ TOP OF WALL FILLED W/ THERMFIBER OR EQUIVALENT. (U.L. DESIGN: U465).
- 
 EXISTING UL RATED ONE-HOUR FIRE RESISTIVE PARTITION (ONE HOUR PARTITION OCCUPANCY/SEPARATION) INT. WALL - 6"x16 GA. METAL STUDS AT 16" O.C. W/ (1) LAYER OF 5/8" GYP. BD. ON EACH SIDE OF THE WALL VERT. OR HORIZ. ATTACHED W/ TYPE 'S' DRYWALL SCREWS @ 7" O.C. W/ END JOINTS ON NAILING MEMBERS. STAGGER JOINTS, HEIGHT OF GYP. BD. TO BOTTOM OF STRUCTURE. WALL FILLED W/ ACOUSTICAL BATT INSULATION. FIRE STOP SEALANT. CONTINUOUS FIRE BARRIER - SEALANT TOP & BOTH SIDES - 3M CP 25 MB, HILTI CS240, ALBI CLAD 151C. CONTINUOUS ACOUSTICAL SEALANT @ BOTTOM OF WALL. FLUTES @ TOP OF WALL FILLED W/ THERMFIBER OR EQUIVALENT. (U.L. DESIGN: U465).
- 
 EXISTING UL RATED ONE-HOUR FIRE RESISTIVE PARTITION (ONE HOUR RATED SMOKE BARRIER & ONE HOUR PARTITION OCCUPANCY/SEPARATION) INT. WALL - 6"x16 GA. METAL STUDS AT 16" O.C. W/ (1) LAYER OF 5/8" GYP. BD. ON EACH SIDE OF THE WALL VERT. OR HORIZ. ATTACHED W/ TYPE 'S' DRYWALL SCREWS @ 7" O.C. W/ END JOINTS ON NAILING MEMBERS. STAGGER JOINTS, HEIGHT OF GYP. BD. TO BOTTOM OF STRUCTURE. WALL FILLED W/ ACOUSTICAL BATT INSULATION. FIRE STOP SEALANT. CONTINUOUS FIRE BARRIER - SEALANT TOP & BOTH SIDES - 3M CP 25 MB, HILTI CS240, ALBI CLAD 151C. CONTINUOUS ACOUSTICAL SEALANT @ BOTTOM OF WALL. FLUTES @ TOP OF WALL FILLED W/ THERMFIBER OR EQUIVALENT. (U.L. DESIGN: U465).
- 
 EXISTING UL RATED TWO-HOUR FIRE RESISTIVE PARTITION INT. SHAFT WALL - 6"x16 GA. METAL STUDS AT 16" O.C. W/ 1" THICK CAVITY SHAFT WALL LINER ON ONE SIDE OF THE WALL AND (2) LAYER OF 5/8" TYPE 'X' GYP. BD. ON THE OPPOSITE SIDE OF THE WALL VERT. OR HORIZ. ATTACHED W/ TYPE 'S' DRYWALL SCREWS @ 7" O.C. W/ END JOINTS ON NAILING MEMBERS. STAGGER JOINTS, HEIGHT OF GYP. BD. TO BOTTOM OF STRUCTURE. WALL FILLED W/ ACOUSTICAL BATT INSULATION. FIRE STOP SEALANT. CONTINUOUS FIRE BARRIER - SEALANT TOP & BOTH SIDES - 3M CP 25 MB, HILTI CS240, ALBI CLAD 151C. CONTINUOUS ACOUSTICAL SEALANT @ BOTTOM OF WALL. FLUTES @ TOP OF WALL FILLED W/ THERMFIBER OR EQUIVALENT. (U.L. DESIGN: U438).
- 
 EXISTING UL RATED TWO-HOUR FIRE RESISTIVE PARTITION INT. SHAFT WALL - 2"x12 GA. MIN. METAL STUDS AT 24" O.C. W/ 1" THICK CAVITY SHAFT WALL LINER ON ONE SIDE OF THE WALL AND (2) LAYER OF 5/8" TYPE 'X' GYP. BD. ON THE OPPOSITE SIDE OF THE WALL VERT. OR HORIZ. ATTACHED W/ TYPE 'S' DRYWALL SCREWS @ 7" O.C. W/ END JOINTS ON NAILING MEMBERS. STAGGER JOINTS, HEIGHT OF GYP. BD. TO BOTTOM OF STRUCTURE. WALL FILLED W/ ACOUSTICAL BATT INSULATION. FIRE STOP SEALANT. CONTINUOUS FIRE BARRIER - SEALANT TOP & BOTH SIDES - 3M CP 25 MB, HILTI CS240, ALBI CLAD 151C. CONTINUOUS ACOUSTICAL SEALANT @ BOTTOM OF WALL. FLUTES @ TOP OF WALL FILLED W/ THERMFIBER OR EQUIVALENT. (U.L. DESIGN: U438).
- 
 EXISTING UL RATED ONE-HOUR FIRE RESISTIVE PARTITION (ONE HOUR RATED SMOKE BARRIER & ONE HOUR PARTITION OCCUPANCY/SEPARATION) INT. WALL - 6"x16 GA. METAL STUDS AT 16" O.C. W/ (1) LAYER OF 5/8" GYP. BD. ON ONE SIDE OF THE WALL VERT. OR HORIZ. ATTACHED W/ TYPE 'S' DRYWALL SCREWS @ 7" O.C. W/ END JOINTS ON NAILING MEMBERS. STAGGER JOINTS, HEIGHT OF GYP. BD. TO BOTTOM OF STRUCTURE. WALL FILLED W/ R-18 BATT INSULATION MIN. FIRE STOP SEALANT. CONTINUOUS FIRE BARRIER - SEALANT TOP & BOTH SIDES - 3M CP 25 MB, HILTI CS240, ALBI CLAD 151C. CONTINUOUS ACOUSTICAL SEALANT @ BOTTOM OF WALL. FLUTES @ TOP OF WALL FILLED W/ THERMFIBER OR EQUIVALENT. (U.L. DESIGN: U465).
- 
 EXISTING NON-RATED INT. WALL - 6"x16 GA. METAL STUDS AT 16" O.C. W/ (1) LAYER OF 5/8" GYP. BD. ON ONE SIDE OF THE WALL VERT. OR HORIZ. ATTACHED W/ TYPE 'S' DRYWALL SCREWS @ 7" O.C. W/ END JOINTS ON NAILING MEMBERS. STAGGER JOINTS, HEIGHT OF GYP. BD. TO BOTTOM OF STRUCTURE. WALL FILLED W/ KRAFT FACED INSULATION. CONTINUOUS ACOUSTICAL SEALANT @ BOTTOM OF WALL.
- 
 NEW NON-RATED INT. WALL - 3"x10 GA. METAL STUDS W/ 3" BATT INSULATION AND 1/2 GA. S.S. SHEET METAL PANELS ON ONE SIDE OF WALL.
- 
 NEW NON-RATED INT. WALL - 3"x10 GA. METAL STUDS W/ 3" BATT INSULATION AND 1/2 GA. S.S. SHEET METAL PANELS ON EA. SIDE OF WALL.
- 
 NEW NON-RATED INT. WALL - 3"x10 GA. METAL STUDS W/ 3" BATT INSULATION AND 1/2 GA. S.S. SHEET METAL PANELS ON ONE SIDE OF THE WALL. INSTALL (1) LAYER OF 5/8" GYP. BD. ON THE OPPOSITE SIDE OF THE WALL VERT. OR HORIZ. ATTACHED W/ TYPE 'S' DRYWALL SCREWS @ 7" O.C. W/ END JOINTS ON NAILING MEMBERS. STAGGER JOINTS, GYP. BD. HEIGHT IS 6" ABOVE (E) CEILING.

WALL TYPES

- 
 EXISTING WALL TO REMAIN. SEE WALL TYPES.
- 
 NEW WALL. SEE WALL TYPES.
- 
 EXISTING ONE-HOUR PARTITION OCCUPANCY SEPARATION TO REMAIN. SEE WALL TYPES.
- 
 EXISTING TWO-HOUR RATED PARTITION AND/OR SHAFTWALLS TO REMAIN. SEE WALL TYPES.
- 
 EXISTING ONE-HOUR RATED SMOKE BARRIER WALL TO REMAIN. SEE WALL TYPES.

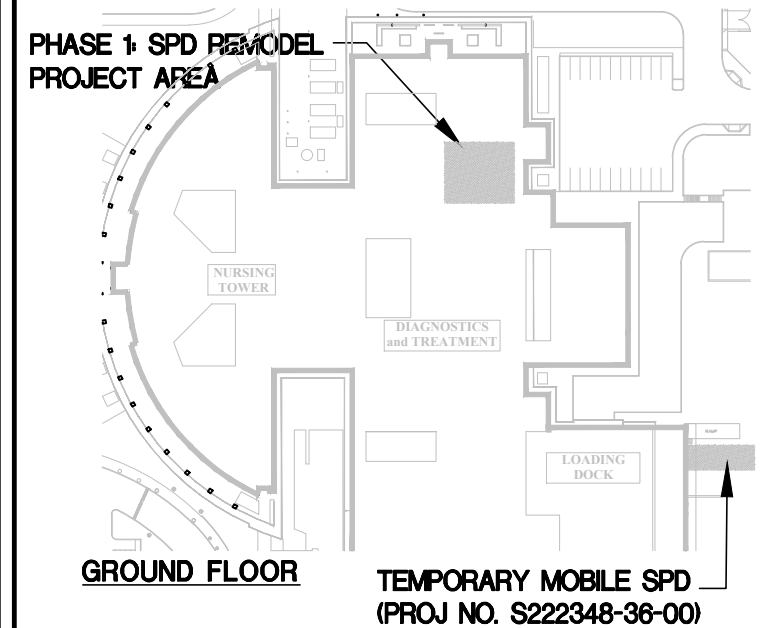
WALL LEGEND

PROJECT TITLE  
**STERILIZATION SYSTEM  
 INSTALLATION**  
 FOR THE  
**ARROWHEAD REGIONAL  
 MEDICAL CENTER**  
 400 N. PEPPER AVE.  
 COLTON, CA. 92324  
 WBSE #10.10.1142 - CIP #21-154 - CAFM #COL003

Department of Health Care Access and Information  
**HCAI # S222347-36-00**



REFERENCE PLAN



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LIFE SAFETY FLOOR PLAN



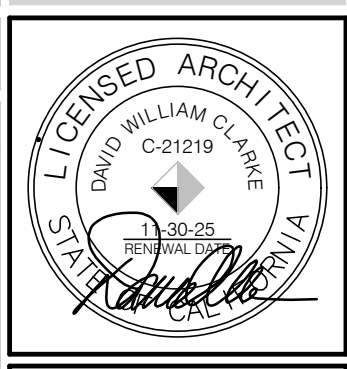
73121 fred waring drive  
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 palm desert, ca 92260  
 760-327-6800

DRAWING TITLE: LIFE SAFETY FLOOR PLAN

DATE: **DECEMBER 28, 2022**

REVISIONS

▲	PLAN CHECK COMMENTS - 02.13.2023
▲	AMC0001 - 06.13.2023
▲	PLAN CHECK COMMENTS - 06.27.2023
▲	PLAN CHECK COMMENTS - 08.15.2023



PROJECT NUMBER  
**3021021**

DRAWING NUMBER  
**A2.2**

**SCOPE OF WORK**  
THE CONTRACTOR SHALL FURNISH AND INSTALL ALL NEW MATERIALS AS INDICATED ON THE DRAWINGS, AND/OR IN THESE SPECIFICATIONS, AND ALL ITEMS REQUIRED TO MAKE ASSOCIATED PORTION OF THE MECHANICAL WORK A FINISHED AND WORKING SYSTEM.

HVAC WORK SHALL INCLUDE BUT IS NOT NECESSARILY LIMITED TO:  
STAINLESS STEEL EXHAUST DUCT  
GALVANIZED DUCT  
STEAM AND CONDENSATE PIPING  
AIR DEVICES

ALL WORK THAT WILL PRODUCE EXCESSIVE NOISE OR INTERFERENCE WITH NORMAL BUILDING OPERATIONS, AS DETERMINED BY THE OWNER/LANDLORD, SHALL BE SCHEDULED WITH THE OWNER/LANDLORD. IT MAY BE NECESSARY TO SCHEDULE SUCH WORK DURING UNOCCUPIED HOURS. THE OWNER/LANDLORD RESERVES THE RIGHT TO DETERMINE WHEN RESTRICTED CONSTRUCTION HOURS WILL BE REQUIRED. CONTRACTOR SHALL COORDINATE WITH THE LANDLORD DURING THE BIDDING PROCESS.

ALL CONTRACTORS SHALL ESTABLISH UTILITY ELEVATIONS PRIOR TO FABRICATION AND SHALL COORDINATE THEIR MATERIAL AND EQUIPMENT WITH OTHER TRADES.

THE MECHANICAL CONTRACTOR (PLUMBING/HVAC/TEMPERATURE CONTROLS CONTRACTOR) SHALL BE RESPONSIBLE FOR ALL WIRING NOT SHOWN ON ELECTRICAL DRAWINGS BUT REQUIRED FOR MECHANICAL SYSTEMS.

VERIFY ALL EXISTING EQUIPMENT SIZES AND CAPACITIES WHERE UNITS ARE TO BE MODIFIED, MOVED, OR REPLACED. CONTRACTOR SHALL NOTIFY ARCHITECT/ENGINEER OF ANY DISCREPANCIES PRIOR TO ORDERING NEW UNITS OR REPLACEMENT UNITS.

**QUALITY ASSURANCE**  
THE CONTRACTOR IS RESPONSIBLE FOR CONSTRUCTING COMPLETE AND OPERATING SYSTEMS. THE CONTRACTOR ACKNOWLEDGES AND UNDERSTANDS THAT THE CONTRACT DOCUMENTS ARE A TWO-DIMENSIONAL REPRESENTATION OF A THREE-DIMENSIONAL OBJECT, SUBJECT TO HUMAN INTERPRETATION. THIS REPRESENTATION MAY INCLUDE IMPERFECT DATA, INTERPRETED CODES, UTILITY GUIDELINES, THREE-DIMENSIONAL CONFLICTS, AND REQUIRED FIELD COORDINATION ITEMS. SUCH DEFICIENCIES CAN BE CORRECTED WHEN IDENTIFIED PRIOR TO ORDERING MATERIAL AND STARTING INSTALLATION. THE CONTRACTOR AGREES TO CAREFULLY STUDY AND COMPARE THE INDIVIDUAL CONTRACT DOCUMENTS AND REPORT AT ONCE IN WRITING TO THE DESIGN TEAM ANY DEFICIENCIES THE CONTRACTOR MAY DISCOVER. THE CONTRACTOR FURTHER AGREES TO REQUIRE EACH SUBCONTRACTOR TO LIKEWISE STUDY THE DOCUMENTS AND REPORT AT ONCE ANY DEFICIENCIES DISCOVERED.

THE CONTRACTOR SHALL RESOLVE ALL REPORTED DEFICIENCIES WITH THE ARCHITECT/ENGINEER PRIOR TO AWARDING ANY SUBCONTRACTS, ORDERING MATERIAL, OR STARTING ANY WORK WITH THE CONTRACTOR'S OWN EMPLOYEES. ANY WORK PERFORMED PRIOR TO RECEIPT OF INSTRUCTIONS FROM THE DESIGN TEAM WILL BE DONE AT THE CONTRACTOR'S RISK.

ONLY PRODUCTS OF REPUTABLE MANUFACTURERS ARE ACCEPTABLE.

ALL CONTRACTORS AND SUBCONTRACTORS SHALL EMPLOY ONLY WORKERS SKILLED IN THEIR TRADES. CONSTRUCTION DRAWINGS FOR THIS PROJECT HAVE BEEN PREPARED UTILIZING REVIT MEP. CONTRACTORS AND SUBCONTRACTORS MAY REQUEST ELECTRONIC MEDIA FILES OF THE CONTRACT DRAWINGS. THE ELECTRONIC CONTRACT DOCUMENTS CAN BE USED FOR PREPARATION OF SHOP DRAWINGS AND AS-BUILT DRAWINGS ONLY. THE INFORMATION MAY NOT BE USED IN WHOLE OR IN PART FOR ANY OTHER PROJECT.

**CODES AND STANDARDS**  
CONFORM TO ALL REQUIREMENTS OF THE LOCAL CITY CODES, LAWS, ORDINANCES AND OTHER REGULATIONS HAVING JURISDICTION.

CONFORM TO ALL STATE CODES.

IF THE CONTRACTOR NOTES, AT THE TIME OF BIDDING, THAT ANY PARTS OF THE DRAWINGS OR SPECIFICATIONS DO NOT COMPLY WITH THE CODES OR REGULATIONS, CONTRACTOR SHALL INFORM THE ARCHITECT/ENGINEER IN WRITING, REQUESTING A CLARIFICATION. IF THERE IS INSUFFICIENT TIME FOR THIS PROCEDURE, CONTRACTOR SHALL SUBMIT WITH THE PROPOSAL A SEPARATE PRICE TO MAKE THE SYSTEM COMPLY WITH THE CODES AND REGULATIONS.

ALL CHANGES TO THE SYSTEM MADE AFTER LETTING OF THE CONTRACT, TO COMPLY WITH CODES OR REQUIREMENTS OF INSPECTORS, SHALL BE MADE BY THE CONTRACTOR WITHOUT COST TO THE OWNER.

IF THERE IS A DISCREPANCY BETWEEN MANUFACTURER'S RECOMMENDATIONS AND THESE SPECIFICATIONS, THE MANUFACTURER'S RECOMMENDATIONS SHALL GOVERN.

ALL ROTATING SHAFTS AND/OR EQUIPMENT SHALL BE COMPLETELY GUARDED FROM ALL CONTACT. PARTIAL GUARDS AND/OR GUARDS THAT DO NOT MEET ALL APPLICABLE OSHA STANDARDS ARE NOT ACCEPTABLE. CONTRACTOR IS RESPONSIBLE FOR PROVIDING THIS GUARDING IF IT IS NOT PROVIDED WITH THE EQUIPMENT SUPPLIED.

**PERMITS AND FEES**  
PROCURE ALL APPLICABLE PERMITS AND LICENSES. ABIDE BY LOCAL AND STATE LAWS, REGULATIONS, AND ORDINANCES. PAY ALL CHARGES FOR PERMITS OR LICENSES, PAY ALL FEES AND TAXES IMPOSED BY STATE, MUNICIPAL, AND OTHER REGULATORY BODIES. PAY ALL CHARGES ARISING OUT OF REQUIRED INSPECTIONS BY AN AUTHORIZED BODY. PAY ALL CHARGES ARISING OUT OF REQUIRED CONTRACT DOCUMENT REVIEWS ASSOCIATED WITH THE PROJECT AND AS INITIATED BY THE OWNER OR AUTHORIZED AGENCY/CONSULTANT.

WHERE APPLICABLE, ALL FIXTURES, EQUIPMENT AND MATERIALS SHALL BE LISTED BY UNDERWRITER'S LABORATORIES, INC. AND APPROVED BY FM GLOBAL.

**SUBMITTALS**  
SUBMITTALS SHALL BE REQUIRED WHERE REQUIRED IN THE SPECIFICATIONS OR ON THE DRAWINGS. THE CONTRACTOR SHALL SUBMIT ELECTRONIC COPIES OF EACH SHOP DRAWING FOR REVIEW BY THE ARCHITECT/ENGINEER BEFORE RELEASING ANY EQUIPMENT FOR MANUFACTURE OR SHIPMENT.

THE CONTRACTOR SHALL THOROUGHLY REVIEW AND APPROVE ALL SHOP DRAWINGS BEFORE SUBMITTING THEM TO THE ARCHITECT/ENGINEER. CONTRACTOR SHALL CLEARLY MARK ALL DEVIATIONS FROM THE CONTRACT DOCUMENTS ON ALL SUBMITTALS. ASSEMBLE ALL SUBMITTALS IN SETS BASED ON APPLICABLE SPECIFICATION SECTION. ALL SETS SHALL BE IDENTICAL AND CONTAIN AN INDEX OF THE ITEMS ENCLOSED WITH A GENERAL TOPIC DESCRIPTION ON THE COVER. WHERE MORE THAN ONE MODEL IS SHOWN ON A MANUFACTURER'S SHEET, CLEARLY INDICATE EXACTLY WHICH ITEM AND WHICH DATA IS RELEVANT TO THE WORK. REFER TO SUBSECTIONS FOR SPECIFIC SUBMITTAL REQUIREMENTS.

**PRODUCT DELIVERY, STORAGE, AND HANDLING**  
EXERCISE CARE IN TRANSPORTING AND HANDLING TO AVOID DAMAGE TO MATERIALS. STORE MATERIALS ON THE SITE TO PREVENT DAMAGE. KEEP MATERIALS CLEAN, DRY AND FREE FROM HARMFUL CONDITIONS. IMMEDIATELY REMOVE ANY MATERIALS THAT BECOME WET OR THAT ARE SUSPECTED OF BECOMING CONTAMINATED WITH MOLD OR OTHER ORGANISMS.

KEEP ALL BEARINGS PROPERLY LUBRICATED AND ALL BELTS PROPERLY TENSIONED AND ALIGNED.

COORDINATE THE INSTALLATION OF HEAVY AND LARGE EQUIPMENT WITH THE GENERAL CONTRACTOR AND/OR OWNER. IF THE MECHANICAL CONTRACTOR DOES NOT HAVE PRIOR DOCUMENTED EXPERIENCE IN RIGGING AND LIFTING SIMILAR EQUIPMENT, HE/SHE SHALL CONTRACT WITH A QUALIFIED LIFTING AND RIGGING SERVICE THAT HAS SIMILAR DOCUMENTED EXPERIENCE. FOLLOW ALL EQUIPMENT LIFTING AND SUPPORT GUIDELINES FOR HANDLING AND MOVING.

CONTRACTOR IS RESPONSIBLE FOR MOVING EQUIPMENT INTO THE BUILDING AND/OR SITE. CONTRACTOR SHALL REVIEW SITE PRIOR TO BID FOR PATH LOCATION AND ANY REQUIRED BUILDING MODIFICATIONS TO ALLOW MOVEMENT OF EQUIPMENT. CONTRACTOR SHALL COORDINATE HIS/HER WORK WITH OTHER TRADES.

**WARRANTY**  
PROVIDE MINIMUM ONE-YEAR WARRANTY COMMENCING ON DATE OF FINAL ACCEPTANCE FOR ALL FIXTURES, EQUIPMENT, MATERIALS, AND WORKMANSHIP. WARRANTY REQUIREMENTS SHALL EXTEND TO CORRECTION, WITHOUT COST TO OWNER, OF ALL WORK FOUND TO BE DEFECTIVE OR NON-COMFORMING TO THE CONTRACT DOCUMENTS. REFER TO SUBSECTIONS FOR ADDITIONAL WARRANTY REQUIREMENTS.

**MATERIAL SUBSTITUTION**  
WHERE SEVERAL MANUFACTURERS' NAMES ARE GIVEN, THE MANUFACTURER FOR WHICH A CATALOG NUMBER IS GIVEN IS THE BASIS OF DESIGN AND ESTABLISHES THE QUALITY REQUIRED. EQUIVALENT EQUIPMENT MANUFACTURED BY THE OTHER NAMED MANUFACTURERS MAY BE USED. CONTRACTOR SHALL ENSURE THAT ALL ITEMS SUBMITTED BY THESE OTHER MANUFACTURERS MEET ALL REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS, AND FIT IN THE ALLOCATED SPACE. THE ARCHITECT/ENGINEER SHALL MAKE THE FINAL DETERMINATION OF WHETHER A PRODUCT IS EQUIVALENT.

ANY MATERIAL, ARTICLE OR EQUIPMENT OF THE OTHER UNNAMED MANUFACTURERS WHICH WILL ADEQUATELY PERFORM THE SERVICES AND DUTIES IMPOSED BY THE DESIGN AND IS OF A QUALITY EQUAL TO OR BETTER THAN THE EQUIPMENT IDENTIFIED BY THE DRAWINGS MAY BE USED IF APPROVAL IS SECURED IN WRITING FROM THE ARCHITECT/ENGINEER VIA ADDENDUM.

**OBSERVATION OF WORK**  
THE CONTRACTOR SHALL PROVIDE SEVEN (7) CALENDAR DAYS' NOTICE TO THE ARCHITECT/ENGINEER PRIOR TO COVERING INTERIOR PARTITIONS AND CHASES AND INSTALLING HARD OR SUSPENDED CEILING AND SOFFITS.

ALL WORK ABOVE THE CEILINGS MUST BE COMPLETE PRIOR TO THE ARCHITECT/ENGINEER'S REVIEW. THIS INCLUDES, BUT IS NOT LIMITED TO:

IN ORDER TO PREVENT THE FINAL JOBSITE OBSERVATION FROM OCCURRING TOO EARLY, THE CONTRACTOR SHALL REVIEW THE COMPLETION STATUS OF THE PROJECT AND CERTIFY IN WRITING THAT THE JOB IS READY FOR THE FINAL JOBSITE OBSERVATION.

**PROJECT CLOSURE/OUT**  
SUBMIT THE FOLLOWING: OPERATION AND MAINTENANCE MANUALS INCLUDING BOUND COPIES OF APPROVED SHOP DRAWINGS, RECORD DOCUMENTS INCLUDING BIDDING DRAWINGS COMPLETED IN AUTOCAD, SPARE PARTS AND EXTRA MATERIALS IN QUANTITIES SPECIFIED IN THESE SPECIFICATIONS, AND INSPECTION BY HCAI INSPECTOR.

**OPERATION AND MAINTENANCE MANUALS**  
SUBMIT AN ELECTRONIC COPY OF THE O&M MANUALS TO THE OWNER. OPERATION AND MAINTENANCE DATA SHALL CONSIST OF WRITTEN INSTRUCTIONS FOR THE CARE, MAINTENANCE, AND OPERATION OF THE EQUIPMENT AND SYSTEMS. INSTRUCTION BOOKS, CARDS, MANUALS FURNISHED WITH THE EQUIPMENT SHALL BE INCLUDED.

ALL TEXT SHALL BE SEARCHABLE AND BOOKMARKS SHALL BE USED, DIVIDING INFORMATION BY SPECIFICATION SECTION.

**RECORD DOCUMENTS**  
MAINTAIN AT THE JOB SITE A SEPARATE AND COMPLETE SET OF MECHANICAL DRAWINGS AND SPECIFICATIONS WITH ALL CHANGES MADE TO THE SYSTEMS CLEARLY AND PERMANENTLY MARKED IN COMPLETE DETAIL. MARK DRAWINGS TO INDICATE APPROVED SUBSTITUTIONS; CHANGE ORDERS; AND ACTUAL EQUIPMENT AND MATERIALS USED. ALL CHANGE ORDERS, RFI RESPONSES, CLARIFICATIONS AND OTHER SUPPLEMENTAL INSTRUCTIONS SHALL BE MARKED ON THE DOCUMENTS. RECORD DOCUMENTS THAT MERELY REFERENCE THE EXISTENCE OF THE ABOVE ITEMS ARE NOT ACCEPTABLE. RECORD CHANGES DAILY AND KEEP THE MARKED DRAWINGS AVAILABLE FOR THE ARCHITECT/ENGINEER'S EXAMINATION AT ANY NORMAL WORK TIME.

UPON COMPLETING THE JOB, AND BEFORE FINAL PAYMENT IS MADE, PROVIDE REPRODUCIBLE DRAWINGS COMPLETED IN AUTOCAD TO THE ARCHITECT/ENGINEER.

**CLEANING**  
THOROUGHLY CLEAN ALL EQUIPMENT AND SYSTEMS PRIOR TO THE OWNER'S FINAL ACCEPTANCE OF THE PROJECT. CLEAN ALL FOREIGN PAINT, GREASE, OIL, DIRT, LABELS, STICKERS, ETC. FROM ALL EQUIPMENT. REMOVE ALL RUBBISH, DEBRIS, ETC., ACCUMULATED DURING CONSTRUCTION FROM THE PREMISES.

**23 05 06 MECHANICAL DEMOLITION FOR REMODELING**

THE DRAWINGS ARE INTENDED TO INDICATE THE GENERAL SCOPE OF WORK AND DO NOT SHOW EVERY PIPE, DUCT, OR PIECE OF EQUIPMENT THAT MUST BE REMOVED. THE CONTRACTOR SHALL VISIT THE SITE AND VERIFY CONDITIONS PRIOR TO SUBMITTING A BID.

WHERE WALLS, CEILINGS, ETC., ARE SHOWN AS BEING REMOVED ON GENERAL DRAWINGS, THE CONTRACTOR SHALL REMOVE ALL MECHANICAL EQUIPMENT, DEVICES, FIXTURES, PIPING, DUCTS, SYSTEMS, ETC., FROM THE REMOVED AREA.

WHERE CEILINGS, WALLS, PARTITIONS, ETC., ARE TEMPORARILY REMOVED AND REPLACED BY OTHERS, THIS CONTRACTOR SHALL REMOVE, STORE, AND REPLACE EQUIPMENT, DEVICES, FIXTURES, PIPES, DUCTS, SYSTEMS, ETC.

VERIFY THAT ABANDONED UTILITIES SERVE ONLY ABANDONED EQUIPMENT OR FACILITIES. EXTEND SERVICES TO FACILITIES OR EQUIPMENT THAT SHALL REMAIN IN OPERATION FOLLOWING DEMOLITION.

COORDINATE WORK WITH ALL OTHER CONTRACTORS AND THE LANDLORD/OWNER. SCHEDULE REMOVAL OF EQUIPMENT TO AVOID CONFLICTS.

THIS CONTRACTOR SHALL VERIFY ALL EXISTING EQUIPMENT SIZES AND CAPACITIES WHERE EQUIPMENT IS SCHEDULED TO BE REPLACED OR MODIFIED, PRIOR TO ORDERING NEW EQUIPMENT.

BID SUBMITTAL SHALL MEAN THE CONTRACTOR HAS VISITED THE PROJECT SITE AND VERIFIED EXISTING CONDITIONS AND SCOPE OF WORK.

**PREPARATION**  
DISCONNECT MECHANICAL SYSTEMS IN WALLS, FLOORS, AND CEILINGS SCHEDULED FOR REMOVAL.

**DEMOLITION AND EXTENSION OF EXISTING MECHANICAL WORK**  
DEMOLISH AND EXTEND EXISTING MECHANICAL WORK UNDER PROVISIONS OF THIS SECTION. REMOVE, RELOCATE, AND EXTEND EXISTING INSTALLATIONS TO ACCOMMODATE NEW CONSTRUCTION. REMOVE ABANDONED DUCTS AND PIPING TO SOURCE OF SUPPLY AND/OR MAIN LINES.

REMOVE EXPOSED ABANDONED PIPES AND DUCTS, INCLUDING ABANDONED PIPES AND DUCTS ABOVE ACCESSIBLE CEILINGS. CUT DUCTS FLUSH WITH WALLS AND FLOORS. CAP DUCT THAT REMAINS, AND PATCH SURFACES. CUT PIPES ABOVE CEILINGS, BELOW FLOORS, AND BEHIND WALLS. CAP REMAINING LINES. REPAIR BUILDING CONSTRUCTION TO MATCH ORIGINAL. REMOVE ALL CLAMPS, HANGERS, SUPPORTS, ETC. ASSOCIATED WITH PIPE AND DUCT REMOVAL.

REMOVE UNUSED SECTIONS OF SUPPLY AND RETURN AIR DUCTWORK BACK TO MAINS. PATCH OPENING WITH SHEET METAL AND SEAL AIRTIGHT. PATCH EXISTING INSULATION TO MATCH EXISTING. WHERE EXISTING DUCTWORK IS TO BE CAPPED AND REUSED, LOCATE THE END CAP WITHIN 6" OF THE LARGER BRANCH. END CAPS SHALL BE 3" PRESSURE CLASS AND SEAL CLASS "A".

DISCONNECT AND REMOVE MECHANICAL DEVICES AND EQUIPMENT SERVING EQUIPMENT THAT HAS BEEN REMOVED. MAINTAIN ACCESS TO EXISTING MECHANICAL INSTALLATIONS WHICH REMAIN. MODIFY INSTALLATION OR PROVIDE ACCESS PANELS AS APPROPRIATE.

REPAIR ADJACENT CONSTRUCTION AND FINISHES DAMAGED DURING DEMOLITION AND EXTENSION WORK.

EXTEND EXISTING INSTALLATIONS USING MATERIALS AND METHODS COMPATIBLE WITH EXISTING INSTALLATIONS, OR AS SPECIFIED.

PROPERLY RECLAIM AND DISPOSE OF ALL REFRIGERANT IN DEMOLISHED EQUIPMENT AND AS REQUIRED FOR EXTENSION OF EXISTING EQUIPMENT.

**CUTTING AND PATCHING**  
THIS CONTRACTOR IS RESPONSIBLE FOR ALL PENETRATIONS OF EXISTING CONSTRUCTION REQUIRED TO COMPLETE THE WORK OF THIS PROJECT. PENETRATIONS IN EXISTING CONSTRUCTION SHOULD BE REVIEWED CAREFULLY PRIOR TO PROCEEDING WITH ANY WORK.

PENETRATIONS SHALL BE NEAT AND CLEAN WITH SMOOTH AND/OR FINISHED EDGES. CORE DRILL WHERE POSSIBLE FOR CLEAN OPENING.

REPAIR EXISTING CONSTRUCTION AS REQUIRED AFTER PENETRATION IS COMPLETE TO RESTORE TO ORIGINAL CONDITION. USE SIMILAR MATERIALS AND MATCH ADJACENT CONSTRUCTION UNLESS OTHERWISE NOTED OR AGREED TO BY THE ARCHITECT/ENGINEER PRIOR TO START OF WORK.

THIS CONTRACTOR IS RESPONSIBLE FOR ALL COSTS INCURRED IN REPAIR, RELOCATIONS, OR REPLACEMENT OF ANY CABLES, CONDUITS, OR OTHER SERVICES IF DAMAGED WITHOUT PROPER INVESTIGATION.

**CLEANING AND REPAIR**  
CLEAN AND REPAIR EXISTING MATERIALS AND EQUIPMENT WHICH REMAIN OR ARE TO BE REUSED. CLEAN ALL SYSTEMS ADJACENT TO PROJECT WHICH ARE AFFECTED BY THE DUST AND DEBRIS CAUSED BY THIS CONSTRUCTION.

MECHANICAL ITEMS REMOVED AND NOT RELOCATED REMAIN THE PROPERTY OF THE LANDLORD/OWNER. CONTRACTOR SHALL PLACE ITEMS RETAINED BY THE LANDLORD/OWNER IN A LOCATION COORDINATED WITH THE LANDLORD/OWNER. THE CONTRACTOR SHALL DISPOSE OF MATERIAL THE LANDLORD/OWNER DOES NOT WANT TO REUSE OR RETAIN FOR MAINTENANCE PURPOSES.

**SPECIAL REQUIREMENTS**  
INSTALL TEMPORARY FILTER MEDIA COVER OUTSIDE AIR AND RETURN AIR INTAKES WHICH ARE WITHIN 100 FEET OF THE LIMITS OF CONSTRUCTION OR AS NOTED ON THE DRAWINGS. THIS CONTRACTOR SHALL COMPLETE ANY CLEANING REQUIRED FOR EXISTING SYSTEMS WHICH ARE AFFECTED BY CONSTRUCTION DUST AND DEBRIS.

REVIEW LOCATIONS OF ALL NEW PENETRATIONS IN EXISTING FLOOR SLABS OR WALLS. DETERMINE CONSTRUCTION TYPE AND REVIEW FOR POSSIBLE INTERFERENCES. BRING ALL CONCERNS TO THE ATTENTION OF THE ARCHITECT/ENGINEER BEFORE PROCEEDING.

**23 05 29 SUPPORTS AND ANCHORS**

**SECTION INCLUDES**  
HANGERS, SUPPORTS, AND ASSOCIATED ANCHORS  
EQUIPMENT BASES AND SUPPORTS  
SLEEVES AND SEALS  
FLASHING AND SEALING OF EQUIPMENT AND PIPE STACKS  
CUTTING OF OPENINGS  
ESCUTCHEON PLATES AND TRIM

**SUBMITTALS**  
SUBMIT SHOP DRAWINGS AND PRODUCT DATA UNDER PROVISIONS OF SECTION 23 05 00. INCLUDE PLASTIC PIPE MANUFACTURERS' SUPPORT SPACING REQUIREMENTS.

**HANGER RODS**  
HANGER RODS FOR SINGLE ROD HANGERS SHALL CONFORM TO THE FOLLOWING:

PIPE SIZE	HANGER ROD DIAMETER
2" AND SMALLER	3/8"
2-1/2" THROUGH 3-5/8"	1/2"
4" AND 5"	5/8"

COLUMN #1 COLUMN #2  
COLUMN #1: STEEL PIPE.  
COLUMN #2: COPPER, PLASTIC AND FIBERGLASS REINFORCED PIPE.

RODS FOR DOUBLE ROD HANGERS MAY BE REDUCED ONE SIZE. MINIMUM ROD DIAMETER IS 3/8 INCHES. HANGER RODS AND ACCESSORIES USED IN MECHANICAL SPACES OR OTHERWISE DRY AREAS SHALL HAVE ASTM B833 ELECTRO-PLATED ZINC FINISH.

ALL HANGER RODS, NUTS, WASHERS, CLEVISSES, ETC., IN DAMP AREAS SHALL HAVE ASTM A123 HOT-DIP GALVANIZED FINISH APPLIED AFTER FABRICATION. THIS APPLIES TO THE FOLLOWING AREAS:  
1. DISHWASHER AREA

**PIPE HANGERS AND SUPPORTS**  
ALL PIPE HANGERS, CLAMPS, AND SUPPORTS SHALL CONFORM TO MANUFACTURERS STANDARDIZATION SOCIETY MSS-SP-58 AND 127 (WHERE APPLICABLE).

OVERSIZE ALL HANGERS, CLAMPS, AND SUPPORTS ON INSULATED PIPING TO ALLOW INSULATION AND JACKET TO PASS THROUGH UNBROKEN. THIS APPLIES TO BOTH HOT AND COLD PIPES.

FERROUS HOT PIPING 2-1/2 INCHES AND LARGER SHALL HAVE STEEL SADDLES TACK WELDED TO THE PIPE AT EACH SUPPORT AT A DEPTH NOT LESS THAN THE SPECIFIED INSULATION. FACTORY FABRICATED INSERTS MAY BE USED.

**ACCEPTABLE PRODUCTS:**  
ANVIL - FIG. 160, 161, 162, 163, 164, 165  
COOPER/B-LINE - FIG. 3160, 3161, 3162, 3163, 3164, 3165  
ERICO - MODEL 630, 631, 632, 633, 634, 635  
NIBCO/TOLCO - FIG. 260-1, 261-1/2, 262-2, 263-2 1/2, 264-3, 265-4

ON ALL INSULATED PIPING, PROVIDE A SEMI-CYLINDRICAL METALLIC SHIELD AND FIRE RESISTANT VAPOR BARRIER JACKET.

AS AN ALTERNATIVE TO SEPARATE PIPE INSULATION INSERT AND SADDLE, PROPERLY SIZED INTEGRAL RIGID INSULATION SECTIONS MAY BE USED FOR THIS APPLICATION.

**ACCEPTABLE PRODUCTS:**  
COOPER/B-LINE - FIG. B3380 THROUGH B3384  
PIPE SHIELDS - A1000, A2000  
ERICO - MODEL 124, 127

SUPPORT AND LATERALLY BRACE VERTICAL PIPES AT EVERY FLOOR LEVEL IN MULTI-STORY STRUCTURES, AND MORE FREQUENTLY WHEN REQUIRED BY APPLICABLE CODES, BUT NEVER AT INTERVALS OVER 15 FEET. SUPPORT VERTICAL PIPES WITH RISER CLAMPS INSTALLED BELOW HUBS, COUPLINGS OR LUGS. PROVIDE SUFFICIENT FLANGE STIFFNESS TO ACCOMMODATE EXPANSION AND CONTRACTION WITHOUT COMPROMISING FIRE BARRIER PENETRATIONS AND OTHER FIXED TAKE-OFF LOCATIONS.

**ACCEPTABLE PRODUCTS:**  
ANVIL - FIG. C7121  
COOPER/B-LINE - FIG. B3373CT  
ERICO - MODEL 510NIBCO/TOLCO - FIG. 82

PLACE RESTRAINED NEOPRENE MOUNTS BENEATH VERTICAL PIPE RISER CLAMPS TO PREVENT SWEATING OF COLD PIPES. INSULATE OVER MOUNTS.

**ACCEPTABLE PRODUCTS:** MASON RBA, RCA, GR BR.

HANGERS IN DIRECT CONTACT WITH COPPER PIPE SHALL BE COATED WITH PLASTIC WITH APPROPRIATE TEMPERATURE RANGE. HYDRA-ZORB CLAMPS ARE PERMITTED FOR THIS APPLICATION FOR BARE PIPES WITHIN THEIR TEMPERATURE LIMITS OF -65°F TO +275°F.

UNLESS OTHERWISE INDICATED, HANGERS SHALL BE AS FOLLOWS:

CLEVIS TYPE:	SERVICE: BARE METAL PIPE, RIGID PLASTIC PIPE, INSULATED COLD PIPE, INSULATED HOT PIPE - 3 INCHES AND SMALLER	ACCEPTABLE PRODUCTS	BARE STEEL, PLASTIC, INSULATED PIPE	BARE COPPER PIPE
ANVIL	FIG. 260			FIG. B3100C
COOPER/B-LINE	FIG. 3100			
ERICO	MODEL 400			FIG. 81PVC2
NIBCO/TOLCO	FIG. 1			

**ROLLER TYPE:**  
SERVICE: INSULATED HOT PIPE - 4 INCHES AND LARGER  
ACCEPTABLE PRODUCTS  
ANVIL - FIG. 181, 271  
COOPER/B-LINE - FIG. 3110, 3117  
ERICO - MODEL 610, MODEL 605  
NIBCO/TOLCO - FIG. 324, 327, FIG. 322, 327

**PADDED CLEVIS TYPE:**  
SERVICE: GLASS PIPE  
ACCEPTABLE PRODUCTS  
HANGERS PADS  
ANVIL - FIG. 260, FIG. 3195  
COOPER/B-LINE - FIG. 3100  
ERICO - MODEL 400  
NIBCO/TOLCO - FIG. 1  
NOTE: PADS MUST BE USED WITH ALL HANGERS LISTED ABOVE.

**CONTINUOUS CHANNEL WITH CLEVIS TYPE:**  
SERVICE: PLASTIC TUBING, FLEXIBLE HOSE, SOFT COPPER TUBING  
ACCEPTABLE PRODUCTS:  
COOPER/B-LINE - FIG. B3106, WITH FIG. B3106V  
ERICO - MODEL 104, WITH MODEL 104V  
NIBCO/TOLCO - FIG. 1V

ADJUSTABLE SWIVEL RING TYPE:	SERVICE: BARE METAL PIPE - 4 INCHES AND SMALLER	ACCEPTABLE PRODUCTS	BARE STEEL PIPE	BARE COPPER PIPE
ANVIL	FIG. 69			
COOPER/B-LINE	FIG. B3170NF		FIG. B3170CTC	
ERICO	MODEL FCN		102A0 SERIES	
NIBCO/TOLCO	FIG. 200		FIG. 203	

SUPPORT MAY BE FABRICATED FROM U-CHEANNEL STRUT OR SIMILAR SHAPES. PIPING LESS THAN 4" IN DIAMETER SHALL BE SECURED TO STRUT WITH CLAMPS OF PROPER DESIGN AND CAPACITY AS REQUIRED TO MAINTAIN SPACING AND ALIGNMENT. STRUT SHALL BE INDEPENDENTLY SUPPORTED FROM HANGER DROPS OR BUILDING STRUCTURE. SIZE AND SUPPORT SHALL BE PER MANUFACTURER'S INSTALLATION REQUIREMENTS FOR STRUCTURAL SUPPORT OF PIPING. CLAMPS SHALL NOT INTERRUPT THE INSTALLATION.

1. STRUT USED IN MECHANICAL SPACES OR OTHERWISE DRY AREAS SHALL HAVE ASTM B833 ELECTRO-PLATED ZINC FINISH.  
2. STRUT USED IN DAMP AREAS LISTED IN HANGER RODS SHALL HAVE ASTM A123 HOT-DIP GALVANIZED FINISH APPLIED AFTER FABRICATION.

UNLESS OTHERWISE INDICATED, PIPE SUPPORTS FOR USE WITH STRUTS SHALL BE AS FOLLOWS:

**CLAMP TYPE:**  
SERVICE: BARE METAL PIPE, RIGID PLASTIC PIPE, INSULATED COLD PIPE, INSULATED HOT PIPE - 3 INCHES AND SMALLER  
ACCEPTABLE PRODUCTS  
CLAMPS IN DIRECT CONTACT WITH COPPER PIPE SHALL BE PLASTIC COATED.  
b. PIPES SUBJECT TO EXPANSION AND CONTRACTION SHALL HAVE CLAMPS SLIGHTLY OVERSIZED TO ALLOW LIMITED PIPE MOVEMENT.  
**ACCEPTABLE PRODUCTS**  
ANVIL - FIG. P1100 OR P2500  
COOPER/B-LINE - FIG. B2000 OR B2400  
NIBCO/TOLCO - FIG. A-14 OR 25TR

**ROLLER TYPE:**  
SERVICE: INSULATED HOT PIPE - 4 INCHES AND LARGER.  
ACCEPTABLE PRODUCTS  
UNISTRUT - FIG. P2474  
COOPER/B-LINE - FIG. B219  
NIBCO/TOLCO - FIG. ROL-12, FIG. ROL-13

UNLESS OTHERWISE SHOWN, UPPER ATTACHMENTS FOR HANGER RODS OR SUPPORT STRUTS SHALL BE AS FOLLOWS:

**BEAM CLAMPS:**  
ACCEPTABLE PRODUCTS  
ANVIL - FIG. 228, 292  
COOPER/B-LINE - FIG. B3054  
ERICO - MODEL 360  
NIBCO/TOLCO - FIG. 329

**CONCRETE INSERTS, SINGLE ROD GALVANIZED:**  
ACCEPTABLE PRODUCTS:  
ANVIL - FIG. 282  
COOPER/B-LINE - FIG. B3014  
ERICO - MODEL 355  
NIBCO/TOLCO - FIG. 310

**CONCRETE INSERTS, CONTINUOUS STRIP GALVANIZED:**  
ACCEPTABLE PRODUCTS:  
UNISTRUT CORR - P320A SERIES  
COOPER/B-LINE - FIG. B22J  
ERICO - CONCT

**CONCRETE ANCHORS:** FASTEN TO CONCRETE USING CAST-IN OR POST-INSTALLED ANCHORS DESIGNED PER THE REQUIREMENTS OF APPENDIX D OF ACI 318-19. POST-INSTALLED ANCHORS SHALL BE QUALIFIED FOR USE IN CRACKED CONCRETE BY ACI-308.2.

**MASONRY ANCHORS:** FASTEN TO CONCRETE, MASONRY UNITS WITH EXPANSION ANCHORS OR SELF-TAPPING MASONRY SCREWS FOR EXPANSION ANCHORS INTO HOLLOW CONCRETE BLOCK. USE SLEEVE-TYPE ANCHORS DESIGNED FOR THE SPECIFIC APPLICATION. DO NOT FASTEN IN MASONRY JOINTS. DO NOT USE POWDER ACTUATED FASTENERS, WOODEN PLUGS, OR PLASTIC INSERTS.

WALL SUPPORTS SHALL BE USED WHERE VERTICAL HEIGHT OF STRUCTURE EXCEEDS MINIMUM SPACING REQUIREMENTS. INSTALL WALL SUPPORTS AT SAME SPACING AS HANGERS OR STRUT SUPPORTS ALONG VERTICAL LENGTH OF PIPE RUNS.

**WELDING**  
UNLESS OTHERWISE NOTED, HANGERS, CLIPS, AND AUXILIARY SUPPORT STEEL MAY BE WELDED IN LIEU OF BOLTING, CLAMPING OR RIVETING TO THE BUILDING STRUCTURAL FRAME. TAKE ADEQUATE PRECAUTIONS DURING ALL WELDING OPERATIONS FOR FIRE PREVENTION AND FOR PROTECTING WALLS AND CEILINGS FROM BEING DAMAGED BY SMOKE.

**FOUNDATIONS, BASES, AND SUPPORTS**  
FURNISH AND INSTALL FOUNDATIONS, BASES, AND SUPPORTS (NOT SPECIFICALLY INDICATED ON THE DRAWINGS OR IN THE SPECIFICATIONS OF EITHER THE GENERAL CONSTRUCTION OR MECHANICAL WORK AS PROVIDED BY ANOTHER CONTRACTOR) FOR MECHANICAL EQUIPMENT.

ALL CONCRETE FOUNDATIONS, BASES AND SUPPORTS, SHALL BE REINFORCED. ALL STEEL BASES AND SUPPORTS SHALL RECEIVE A PRIME COAT OF ZINC CHROMATE OR RED METAL PRIMER. AFTER COMPLETION OF WORK, GIVE STEEL SUPPORTS A FINAL COAT OF GRAY ENAMEL.

**CONCRETE BASES (HOUSEKEEPING PADS)**  
1. UNLESS SHOWN OTHERWISE ON THE DRAWINGS, CONCRETE BASES SHALL BE NOMINAL 4 INCHES THICK AND SHALL EXTEND 3 INCHES ON ALL SIDES OF THE EQUIPMENT (8 INCHES LARGER THAN FACTORY BASE).  
2. WHERE A BASE IS LESS THAN 12 INCHES FROM A WALL, EXTEND THE BASE TO THE WALL TO PREVENT A "DIRT TRAP".  
3. CONCRETE MATERIALS AND WORKMANSHIP REQUIRED FOR THE CONTRACTOR'S WORK SHALL BE PROVIDED BY CONTRACTOR. MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE APPLICABLE STANDARDS OF THE PORTLAND CEMENT ASSOCIATION. REINFORCE WITH 6"X6", W1.4-W1.4 WELDED WIRE FABRIC. CONCRETE SHALL WITHSTAND 3,000 POUNDS COMPRESSION PER SQUARE INCH AT 28 DAYS.  
4. EQUIPMENT REQUIRING BASES IS AS FOLLOWS:  
a. CONDENSATE PUMP

**SUPPORTS**  
PROVIDE SUFFICIENT CLIPS, INSERTS, HANGERS, RACKS, RODS, AND AUXILIARY STEEL TO SECURELY SUPPORT ALL SUSPENDED MATERIAL, EQUIPMENT AND CONDUIT WITHOUT SAG.

HANG HEAVY EQUIPMENT FROM CONCRETE FLOORS OR CEILINGS WITH ARCHITECT/ENGINEER-APPROVED CONCRETE INSERTS. FURNISHED AND INSTALLED BY THE CONTRACTOR WHOSE WORK REQUIRES THEM, EXCEPT WHERE INDICATED OTHERWISE.

**GROUT**  
GROUT SHALL BE NON-SHRINKING PREMIXED (MASTER BUILDERS COMPANY "EMBECCO"), UNLESS OTHERWISE INDICATED ON THE DRAWINGS OR APPROVED BY THE ARCHITECT/ENGINEER.

USE MIX NO. 1 FOR CLEARANCES OF 1" OR LESS, AND MIX NO. 2 FOR ALL LARGER CLEARANCES.

GROUT UNDER EQUIPMENT BASES, AROUND PIPES, AT PIPE SLEEVES, ETC., AND WHERE SHOWN ON THE DRAWINGS.

**OPENINGS IN FLOORS, WALLS AND CEILINGS**  
EXACT LOCATIONS OF ALL OPENINGS FOR THE INSTALLATION OF MATERIALS SHALL BE DETERMINED BY THE CONTRACTOR AND GIVEN TO THE GENERAL CONTRACTOR FOR INSTALLATION OR CONSTRUCTION AS THE STRUCTURE IS BUILT.

COORDINATE ALL OPENINGS WITH OTHER CONTRACTORS.

HIRE THE PROPER TRADESMAN AND FURNISH ALL LABOR, MATERIAL AND EQUIPMENT TO CUT OPENINGS IN OR THROUGH EXISTING STRUCTURES, OR OPENINGS IN NEW STRUCTURES THAT WERE NOT INSTALLED, OR ADDITIONAL OPENINGS. REPAIR ALL SPALLING AND DAMAGE TO THE SATISFACTION OF THE ARCHITECT/ENGINEER. MAKE SAW CUTS BEFORE BREAKING OUT CONCRETE TO ENSURE EVEN AND UNIFORM OPENING EDGES.

SAID CUTTING SHALL BE AT THE COMPLETE EXPENSE OF EACH CONTRACTOR. FAILURE TO COORDINATE OPENINGS WITH OTHER CONTRACTORS SHALL NOT EXEMPT THE CONTRACTOR FROM PROVIDING OPENINGS AT CONTRACTORS' EXPENSE.

DO NOT CUT STRUCTURAL MEMBERS WITHOUT WRITTEN APPROVAL OF THE ARCHITECT OR STRUCTURAL ENGINEER.

**ROOF PENETRATIONS**  
SEAL PIPES WITH SURFACE TEMPERATURE BELOW 150°F PENETRATING SINGLE-PLY ROOFS WITH CONICAL STEPPED PIPE FLASHINGS AND STAINLESS STEEL CLAMPS EQUAL TO PORTALS PLUS PIPE BOOTS. MATERIAL SHALL MATCH ROOFING MEMBRANE.

BREAK INSULATION ONLY AT THE CLAMP FOR PIPES BETWEEN 60°F AND 150°F. SEAL OUTDOOR INSULATION EDGES WATER TIGHT.

**SLEEVES AND LINTELS**  
EACH CONTRACTOR SHALL PROVIDE SLEEVES AND LINTELS FOR ALL DUCT AND PIPE OPENINGS REQUIRED FOR THE CONTRACTOR'S WORK IN MASONRY WALLS AND FLOORS, UNLESS SPECIFICALLY SHOWN AS BEING BY OTHERS.

FABRICATE ALL SLEEVES FROM STANDARD WEIGHT BLACK STEEL PIPE OR AS INDICATED ON THE DRAWINGS. PROVIDE CONTINUOUS SLEEVE. CUT OR SPLIT SLEEVES ARE NOT ACCEPTABLE.

FABRICATE ALL LINTELS FOR MASONRY WALLS FROM STRUCTURAL STEEL SHAPES OR AS INDICATED ON THE DRAWINGS. HAVE ALL LINTELS APPROVED BY THE ARCHITECT OR STRUCTURAL ENGINEER.

SLEEVES THROUGH THE FLOORS ON EXPOSED RISERS SHALL BE FLUSH WITH THE CEILING, WITH PLANED SQUARED ENDS EXTENDING 1" ABOVE THE FLOOR IN UNFINISHED AREAS, AND FLUSH WITH THE FLOOR IN FINISHED AREAS, TO ACCEPT SPRING CLOSING FLOOR PLATES.

SLEEVES SHALL NOT PENETRATE STRUCTURAL MEMBERS OR MASONRY WALLS WITHOUT APPROVAL FROM THE STRUCTURAL ENGINEER. SLEEVES SHALL THEN COMPLY WITH THE ARCHITECT/ENGINEER'S DESIGN.

OPENINGS THROUGH UNEXCAVATED FLOORS AND/OR FOUNDATION WALLS BELOW THE FLOOR SHALL HAVE A S

WHERE PIPES RISE THROUGH CONCRETE FLOORS THAT ARE ON EARTHEN GRADE, PROVIDE 3/4" RESILIENT EXPANSION JOINT MATERIAL (ASPHALT AND CORK) WRAPPED AROUND THE PIPE, THE FULL DEPTH OF CONCRETE, AT THE POINT OF PENETRATION. SECURE TO PREVENT SHIFTING DURING CONCRETE PLACEMENT AND FINISHING.

SIZE SLEEVES LARGE ENOUGH TO ALLOW EXPANSION AND CONTRACTION MOVEMENT. PROVIDE CONTINUOUS INSULATION WRAPPING.

**WALL SEALS ("LINK-SEALS")**  
WHERE SHOWN ON THE DRAWINGS, PIPES PASSING THROUGH WALLS, CEILINGS, OR FLOORS SHALL HAVE THEIR ANNULAR SPACE (SLEEVE OR DRILLED HOLE - NOT TAPERED HOLE MADE WITH KNOCKOUT PLUG) SEALED BY PROPERLY SIZED SEALING ELEMENTS CONSISTING OF A SYNTHETIC RUBBER MATERIAL COMPOUNDED TO RESIST AGING, OZONE, SUNLIGHT, WATER AND CHEMICAL ACTION.

SLEEVES, IF USED, SHALL BE STANDARD WEIGHT STEEL WITH PRIMED FINISH AND WATERSTOP/ANCHOR CONTINUOUSLY WELDED TO SLEEVE. IF PIPING CARRIES ONLY FLUIDS BELOW 120°F, SLEEVES MAY BE THERMOPLASTIC WITH INTEGRAL WATER SEAL AND TEXTURED SURFACE.

SLEEVES SHALL BE AT LEAST 2 PIPE SIZES LARGER THAN THE PIPES.

PRESSURE SHALL BE MAINTAINED BY STAINLESS STEEL BOLTS AND OTHER PARTS. PRESSURE PLATES MAY BE OF COMPOSITE MATERIAL FOR MODELS S AND OS.

SEALING ELEMENT SHALL BE AS FOLLOWS:

MODEL SERVICE	ELEMENT MATERIAL	TEMPERATURE RANGE
S STANDARD (STAINLESS)	EPDM	-402°F TO 250°F
T HIGH/LOW TEMPERATURE STEAM	SILICONE	-67°F TO 400°F
T FIRE SEALS (1 HOUR)	SILICONE	-67°F TO 400°F
FS FIRE SEALS (3 HOURS)	SILICONE	-67°F TO 400°F

ACCEPTABLE MANUFACTURERS: THUNDERLINE CORPORATION "LINK-SEALS", O-Z/GEDNEY COMPANY, CALPICO, INC., INNERLYNX, OR METRAFLEX COMPANY (COLD SERVICE ONLY).

**ESCUTCHEON PLATES AND TRIM**  
FIT ESCUTCHEONS TO ALL INSULATED OR UNINSULATED EXPOSED PIPES PASSING THROUGH WALLS, FLOORS, OR CEILINGS OF FINISHED ROOMS.

WHERE PIPES RISE THROUGH CONCRETE FLOORS THAT ARE ON EARTHEN GRADE, PROVIDE 3/4" RESILIENT EXPANSION JOINT MATERIAL (ASPHALT AND CORK) WRAPPED AROUND THE PIPE, THE FULL DEPTH OF CONCRETE, AT THE POINT OF PENETRATION. SECURE TO PREVENT SHIFTING DURING CONCRETE PLACEMENT AND FINISHING.

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SLEEVES, IF USED, SHALL BE STANDARD WEIGHT STEEL WITH PRIMED FINISH AND WATERSTOP/ANCHOR CONTINUOUSLY WELDED TO SLEEVE. IF PIPING CARRIES ONLY FLUIDS BELOW 120°F, SLEEVES MAY BE THERMOPLASTIC WITH INTEGRAL WATER SEAL AND TEXTURED SURFACE.

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FS FIRE SEALS (3 HOURS)	SILICONE	-67°F TO 400°F

ACCEPTABLE MANUFACTURERS: THUNDERLINE CORPORATION "LINK-SEALS", O-Z/GEDNEY COMPANY, CALPICO, INC., INNERLYNX, OR METRAFLEX COMPANY (COLD SERVICE ONLY).

**ESCUTCHEON PLATES AND TRIM**  
FIT ESCUTCHEONS TO ALL INSULATED OR UNINSULATED EXPOSED PIPES PASSING THROUGH WALLS, FLOORS, OR CEILINGS OF FINISHED ROOMS.

ESCUTCHEONS SHALL BE HEAVY GAUGE, COLD ROLLED STEEL, COPPER COATED UNDER A CHROMIUM PLATED FINISH, HEAVY SPRING CLIP, RIGID HINGE AND LATCH.

INSTALL GALVANIZED STEEL (UNLESS OTHERWISE INDICATED) TRIM STRIP TO COVER VACANT SPACE AND RAW CONSTRUCTION EDGES OF ALL RECTANGULAR OPENINGS IN FINISHED ROOMS. THIS INCLUDES PIPE OPENINGS.

**PIPE PENETRATIONS**  
SEAL ALL PIPE PENETRATIONS. SEAL NON-RATED WALLS AND FLOOR PENETRATIONS WITH GROUT OR CAULK. BACKING MATERIAL MAY BE USED.

SEAL FIRE RATED WALL AND FLOOR PENETRATIONS WITH FIRE SEAL SYSTEM AS SPECIFIED.

**PIPE ANCHORS**  
PROVIDE ALL ITEMS NEEDED TO ALLOW ADEQUATE EXPANSION AND CONTRACTION OF ALL PIPING. ALL PIPING SHALL BE SUPPORTED, GUIDED, ALIGNED, AND ANCHORED AS REQUIRED.

REPAIR ALL PIPING LEAKS AND ASSOCIATED DAMAGE. PIPES SHALL NOT RUB ON ANY PART OF THE BUILDING.

**FINISH**  
PRIME COAT EXPOSED STEEL HANGERS AND SUPPORTS. HANGERS AND SUPPORTS IN CRAWL SPACES, PIPE SHAFTS, AND SUSPENDED CEILING SPACES ARE NOT CONSIDERED EXPOSED.

**HVAC SUPPORTS AND ANCHORS INSTALLATION**  
INSTALL ALL ITEMS PER MANUFACTURER'S INSTRUCTIONS. COORDINATE THE LOCATION AND METHOD OF SUPPORT OF PIPING SYSTEMS WITH ALL INSTALLATIONS UNDER OTHER DIVISIONS AND SECTIONS OF THE SPECIFICATIONS.

WHERE PIPE SUPPORT MEMBERS ARE WELDED TO STRUCTURAL BUILDING FRAMING, SCRAPE, BRUSH CLEAN, AND APPLY ONE COAT OF ZINC RICH PRIMER TO WELDING.

**SUPPORT REQUIREMENTS**  
INSTALL ROOF PIPE SUPPORTS TO RESIST WIND MOVEMENT PER MANUFACTURER'S RECOMMENDATIONS. METHOD OF SECURING BASE TO ROOF SHALL BE COMPATIBLE WITH ROOFING MATERIALS.

WHERE BUILDING STRUCTURAL STEEL IS FIREPROOFED, ALL HANGERS, CLAMPS, AUXILIARY STEEL, ETC., WHICH ATTACH TO IT SHALL BE INSTALLED PRIOR TO APPLICATION OF FIREPROOFING. REPAIR ALL FIREPROOFING DAMAGED DURING PIPE INSTALLATION.

SET ALL CONCRETE INSERTS IN PLACE BEFORE POURING CONCRETE.

FURNISH, INSTALL AND PRIME ALL AUXILIARY STRUCTURAL STEEL FOR SUPPORT OF PIPING SYSTEMS THAT ARE NOT SHOWN ON THE DRAWINGS AS BEING BY OTHERS.

INSTALL HANGERS AND SUPPORTS COMPLETE WITH LOCK NUTS, CLAMPS, RODS, BOLTS, COUPLINGS, SWIVELS, INSERTS AND REQUIRED ACCESSORIES.

HANGERS FOR HORIZONTAL PIPING SHALL HAVE ADEQUATE MEANS OF VERTICAL ADJUSTMENT FOR ALIGNMENT.

**PIPE REQUIREMENTS**  
SUPPORT ALL PIPING AND EQUIPMENT, INCLUDING VALVES, STRAINERS, TRAPS AND OTHER SPECIALTIES AND ACCESSORIES TO AVOID OBJECTIONABLE OR EXCESSIVE STRESS, DEFLECTION, SWAYING, SAGGING OR VIBRATION IN THE PIPING OR BUILDING STRUCTURE DURING ERECTION, CLEANING, TESTING AND NORMAL OPERATION OF THE SYSTEMS.

DO NOT, HOWEVER, RESTRAIN PIPING TO CAUSE IT TO SNAKE OR BUCKLE BETWEEN SUPPORTS OR TO PREVENT PROPER MOVEMENT DUE TO EXPANSION AND CONTRACTION.

SUPPORT PIPING AT EQUIPMENT AND VALVES SO THEY CAN BE DISCONNECTED AND REMOVED WITHOUT FURTHER SUPPORTING THE PIPING.

PIPING SHALL NOT INTRODUCE STRAINS OR DISTORTION TO CONNECTED EQUIPMENT.

PARALLEL HORIZONTAL PIPES MAY BE SUPPORTED ON TRAPEZE HANGERS MADE OF STRUCTURAL SHAPES AND HANGER RODS; OTHERWISE, PIPES SHALL BE SUPPORTED WITH INDIVIDUAL HANGERS.

TRAPEZE HANGERS MAY BE USED WHERE DUCTS INTERFERE WITH NORMAL PIPE HANGING.

PROVIDE ADDITIONAL SUPPORTS WHERE PIPE CHANGES DIRECTION, ADJACENT TO FLANGED VALVES AND STRAINERS, AT EQUIPMENT CONNECTIONS AND HEAVY FITTINGS.

PROVIDE AT LEAST ONE HANGER ADJACENT TO EACH JOINT IN GROOVED END STEEL PIPE WITH MECHANICAL COUPLINGS.

PROVIDED THE INSTALLATION COMPLIES WITH ALL LOADING REQUIREMENTS OF TRUSS AND JOIST MANUFACTURERS, THE FOLLOWING PRACTICES ARE ACCEPTABLE:  
1. LOADS OF 100 LBS. OR LESS MAY BE ATTACHED ANYWHERE ALONG THE TOP OR BOTTOM CHORDS OF TRUSSES OR JOISTS WITH A MINIMUM 3' SPACING BETWEEN LOADS.  
2. LOADS GREATER THAN 100 LBS. MUST BE HUNG CONCENTRICALLY AND MAY BE HUNG FROM TOP OR BOTTOM CHORD, PROVIDED ONE OF THE FOLLOWING CONDITIONS IS MET:  
a. THE HANGER IS ATTACHED WITHIN 6" FROM A WEB/CHORD JOINT.  
b. ADDITIONAL L2X2X1/4 WEB REINFORCEMENT IS INSTALLED PER MANUFACTURER'S REQUIREMENTS.  
3. IT IS PROHIBITED TO CANTILEVER A LOAD USING AN ANGLE OR OTHER STRUCTURAL COMPONENT THAT IS ATTACHED TO A TRUSS OR JOIST IN SUCH A FASHION THAT A TORSIONAL FORCE IS APPLIED TO THAT STRUCTURAL MEMBER.  
4. IF CONDITIONS CANNOT BE MET, COORDINATE INSTALLATION WITH TRUSS OR JOIST MANUFACTURER AND CONTACT ARCHITECT/ENGINEER.

DO NOT EXCEED 25 LBS. PER HANGER AND A MINIMUM SPACING OF 2'-0" ON CENTER WHEN ATTACHING TO METAL ROOF DECKING (LIMITATION NOT REQUIRED WITH CONCRETE ON METAL DECK). THIS 25 LBS. LOAD AND 2'-0" SPACING INCLUDE ADJACENT ELECTRICAL AND ARCHITECTURAL ITEMS HANGING FROM DECK. IF THE HANGER RESTRICTIONS CANNOT BE ACHIEVED, SUPPLEMENTAL FRAMING OFF STEEL FRAMING WILL NEED TO BE ADDED.

DO NOT EXCEED THE MANUFACTURER'S RECOMMENDED MAXIMUM LOAD FOR ANY HANGER OR SUPPORT.

SPACING OF HANGERS SHALL NOT EXCEED THE COMPRESSIVE STRENGTH OF THE INSULATION INSERTS, AND IN NO CASE SHALL EXCEED THE FOLLOWING:

PIPE MATERIAL	MAXIMUM SPACING
1-1/4" & UNDER	7'-0"
1-1/2"	9'-0"
2"	10'-0"
2-1/2"	11'-0"
3"	12'-0"
4" & LARGER	12'-0"

STEEL AND FIBERGLASS (STD. WEIGHT OR HEAVIER - LIQUID SERVICE):

PIPE MATERIAL	MAXIMUM SPACING
3/4" & UNDER	5'-0"
1"	6'-0"
1-1/4"	7'-0"
1-1/2"	8'-0"
2"	8'-0"
2-1/2"	9'-0"
3"	10'-0"
4"	12'-0"

STEEL (STD. WEIGHT OR HEAVIER - VAPOR SERVICE):

PIPE MATERIAL	MAXIMUM SPACING
1-1/4" & UNDER	9'-0"
1-1/2"	12'-0"
2" & LARGER	12'-0"

HARD DRAWN COPPER & BRASS (LIQUID SERVICE):

PIPE MATERIAL	MAXIMUM SPACING
3/4" & UNDER	5'-0"
1"	6'-0"
1-1/4"	7'-0"
1-1/2"	8'-0"
2"	8'-0"
2-1/2"	9'-0"
3"	10'-0"
4"	12'-0"

HARD DRAWN COPPER & BRASS (VAPOR SERVICE):

PIPE MATERIAL	MAXIMUM SPACING
3/4" & UNDER	7'-0"
1"	8'-0"
1-1/4"	9'-0"
1-1/2"	10'-0"
2"	11'-0"
2-1/2" & LARGER	12'-0"

FLEXIBLE PLASTIC PIPE, FLEXIBLE HOSE, AND SOFT COPPER TUBING:  
a. CONTINUOUS CHANNEL WITH HANGERS MAXIMUM 8'-0" O.C.  
b. INSTALLATION OF HANGERS SHALL CONFORM TO MSS SP-58 AND THE APPLICABLE PLUMBING CODE.

PROVIDE SEISMIC BRACING FOR PIPING LARGER THAN 2" DIAMETER.

**23 05 93 TESTING, ADJUSTING, AND BALANCING**

**GENERAL**  
TESTING, ADJUSTING, AND BALANCING OF AIR SYSTEMS  
MEASUREMENT OF FINAL OPERATING CONDITION OF HVAC SYSTEMS

**QUALITY ASSURANCE**  
AGENCY SHALL BE A COMPANY SPECIALIZING IN THE ADJUSTING AND BALANCING OF SYSTEMS SPECIFIED IN THIS SECTION WITH MINIMUM THREE YEARS EXPERIENCE. PERFORM WORK UNDER SUPERVISION OF AABC CERTIFIED TEST AND BALANCE ENGINEER, NEBB CERTIFIED TESTING, BALANCING AND ADJUSTING SUPERVISOR, OR SMARTA CERTIFIED AIR AND HYDRONIC BALANCER.

WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE REFERENCES LISTED AT THE START OF THIS SECTION.

**REFERENCES**  
AABC - NATIONAL STANDARDS FOR TOTAL SYSTEM BALANCE, 2002.  
ADC - TEST CODE FOR GRILLES, REGISTERS, AND DIFFUSERS.  
AMCA - PUBLICATION 203-90: FIELD PERFORMANCE MEASUREMENT OF FAN SYSTEMS.  
ASHRAE - 2003 HVAC APPLICATIONS HANDBOOK, CHAPTER 37, TESTING, ADJUSTING AND BALANCING.  
ASHRAE/ANSI - STANDARD 111-1988; PRACTICES FOR MEASUREMENT, TESTING, ADJUSTING AND BALANCING OF BUILDING HVAC&R SYSTEMS.  
SMACNA - HVAC SYSTEMS; TESTING, ADJUSTING AND BALANCING, THIRD EDITION, 2002.

**SUBMITTALS**  
SUBMIT COPIES OF REPORT FORMS, BALANCING PROCEDURES, AND THE NAME AND QUALIFICATIONS OF TESTING AND BALANCING AGENCY FOR APPROVAL WITHIN 30 DAYS AFTER AWARD OF CONTRACT.

SUBMIT CERTIFIED ELECTRONIC COPIES OF TEST REPORTS TO THE ARCHITECT/ENGINEER FOR APPROVAL. INCLUDE INDEX PAGE AND INDEXING TABS.

**REPORT FORMS**  
SUBMIT REPORTS ON AABC OR SMACNA FORMS. USE CUSTOM FORMS APPROVED BY THE ARCHITECT/ENGINEER WHEN NEEDED TO SUPPLY SPECIFIED INFORMATION.

INCLUDE IN THE FINAL REPORT A SCHEMATIC DRAWING SHOWING EACH SYSTEM COMPONENT, INCLUDING BALANCING DEVICES, FOR EACH SYSTEM. EACH DRAWING SHALL BE INCLUDED WITH THE TEST REPORTS REQUIRED FOR THAT SYSTEM. THE SCHEMATIC DRAWINGS SHALL IDENTIFY ALL TESTING POINTS AND CROSS-REFERENCE THESE POINTS TO THE REPORT FORMS AND PROCEDURES.

**WARRANTY/GUARANTEE**  
THE TAB CONTRACTOR SHALL INCLUDE AN EXTENDED WARRANTY OF 90 DAYS AFTER OWNER RECEIPT OF A COMPLETED BALANCING REPORT, DURING WHICH TIME THE OWNER MAY REQUEST A RECHECK OF TERMINALS, OR RESETTING OF ANY OUTLET, COIL, OR DEVICE LISTED IN THE TEST REPORT. THIS WARRANTY SHALL PROVIDE A MINIMUM OF 24 HOURS OF ON-SITE SERVICE TIME. IF IT IS DETERMINED THAT THE NEW TEST RESULTS ARE NOT WITHIN THE DESIGN CRITERIA, THE BALANCER SHALL REBALANCE THE SYSTEM ACCORDING TO DESIGN CRITERIA.

WARRANTY/GUARANTEE MUST MEET AABC NATIONAL PROJECT PERFORMANCE GUARANTEE.

**SCHEDULING**  
COORDINATE SCHEDULE WITH OTHER TRADES. PROVIDE A MINIMUM OF SEVEN DAYS NOTICE TO ALL TRADES AND THE ARCHITECT/ENGINEER PRIOR TO PERFORMING EACH TEST.

**GENERAL REQUIREMENTS**  
ALL PROCEDURES MUST CONFORM TO ONE OF THE PUBLISHED STANDARDS LISTED IN REFERENCES. ALL EQUIPMENT SHALL BE ADJUSTED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. ANY SYSTEM NOT LISTED IN THIS SPECIFICATION BUT INSTALLED UNDER THE CONTRACT DOCUMENTS SHALL BE BALANCED USING A PROCEDURE FROM A PUBLISHED STANDARD LISTED IN REFERENCES.

THE BALANCING CONTRACTOR SHALL INCORPORATE ALL PERTINENT DOCUMENTED CONSTRUCTION CHANGES (E.G. SUBMITTALS/SHOP DRAWINGS, CHANGE ORDERS, RFIS, ASIS, ETC.) AND INCLUDE IN THE BALANCING REPORT.

RECORDED DATA SHALL REPRESENT ACTUAL MEASURED OR OBSERVED CONDITIONS.

CUT INSULATION, DUCTS, PIPES, AND EQUIPMENT CABINETS FOR INSTALLATION OF TEST PROBES TO THE MINIMUM EXTENT NECESSARY TO ALLOW ADEQUATE PERFORMANCE OF PROCEDURES. AFTER TESTING AND BALANCING IS COMPLETE, CLOSE PROBE HOLES AND PATCH INSULATION WITH NEW MATERIALS AS SPECIFIED. RESTORE VAPOR BARRIER AND FINISH AS SPECIFIED.

PERMANENTLY MARK SETTING OF VALVES, DAMPERS, AND OTHER ADJUSTMENT DEVICES ALLOWING FOR SETTINGS TO BE RESTORED. SET AND LOCK MEMORY STOPS.

LEAVE SYSTEMS IN PROPER WORKING ORDER. REPLACING BELT GUARDS, CLOSING ACCESS DOORS, CLOSING DOORS TO ELECTRICAL SWITCH BOXES, PLUGGING TEST HOLES, AND RESTORING THERMOSTATS TO SPECIFIED SETTINGS.

THE BALANCING CONTRACTOR SHALL MEASURE TERMINAL AIR BOX AIR FLOW, AND THE TCC SHALL ADJUST DDC READOUT TO MATCH.

INSTALLATIONS WITH SYSTEMS CONSISTING OF MULTIPLE COMPONENTS SHALL BE BALANCED WITH ALL SYSTEM COMPONENTS OPERATING.

**EXAMINATION**  
BEFORE BEGINNING WORK, VERIFY THAT SYSTEMS ARE COMPLETE AND OPERABLE. ENSURE THE FOLLOWING:  
GENERAL EQUIPMENT REQUIREMENTS:  
A. EQUIPMENT IS SAFE TO OPERATE AND IN NORMAL CONDITION.  
B. EQUIPMENT WITH MOVING PARTS IS PROPERLY LUBRICATED.  
C. TEMPERATURE CONTROL SYSTEMS ARE COMPLETE AND OPERABLE.  
D. PROPER THERMAL OVERLOAD PROTECTION IS IN PLACE FOR ELECTRICAL EQUIPMENT.  
E. DIRECTION OF ROTATION OF ALL FANS AND PUMPS IS CORRECT.  
F. ACCESS DOORS ARE CLOSED AND END CAPS ARE IN PLACE.

DUCT SYSTEM REQUIREMENTS:  
A. ALL FILTERS ARE CLEAN AND IN PLACE. IF REQUIRED, INSTALL TEMPORARY MEDIA.  
B. DUCT SYSTEMS ARE CLEAN AND FREE OF DEBRIS.  
C. FIRE/SMOKE AND MANUAL VOLUME DAMPERS ARE IN PLACE, FUNCTIONAL AND OPEN.  
D. AIR OUTLETS ARE INSTALLED AND CONNECTED.  
E. DUCT SYSTEM LEAKAGE HAS BEEN MINIMIZED.

PIPE SYSTEM REQUIREMENTS:  
A. COIL FINS HAVE BEEN CLEANED AND COMBED.  
B. HYDRONIC SYSTEMS HAVE BEEN CLEANED, FILLED, AND VENTED.  
C. STRAINER SCREENS ARE CLEAN AND IN PLACE.  
D. SHUTOFF, THROTTLING AND BALANCING VALVES ARE OPEN.

REPORT ANY DEFECTS OR DEFICIENCIES TO ARCHITECT/ENGINEER.

PROMPTLY REPORT ITEMS THAT ARE ABNORMAL OR PREVENT PROPER BALANCING.

IF, FOR DESIGN REASONS, SYSTEM CANNOT BE PROPERLY BALANCED, REPORT AS SOON AS OBSERVED.

BEGINNING OF WORK MEANS ACCEPTANCE OF EXISTING CONDITIONS.

**PREPARATION**  
PROVIDE INSTRUMENTS REQUIRED FOR TESTING, ADJUSTING, AND BALANCING OPERATIONS. MAKE INSTRUMENTS AVAILABLE TO THE ARCHITECT/ENGINEER FOR SPOT CHECKS DURING TESTING.

INSTRUMENTS SHALL BE CALIBRATED WITHIN SIX MONTHS OF TESTING PERFORMED FOR PROJECT, OR MORE RECENTLY IF RECOMMENDED BY THE INSTRUMENT MANUFACTURER.  
INSTALLATION TOLERANCES  
± 10% OF SCHEDULED VALUES:  
1. ADJUST AIR INLETS AND OUTLETS TO ± 10% OF SCHEDULED VALUES.  
2. ADJUST PIPING SYSTEMS TO ± 10% OF DESIGN VALUES.  
± 5% OF SCHEDULED VALUES:  
1. ADJUST SUPPLY AND EXHAUST AIR-HANDLING SYSTEMS FOR SPACE PRESSURIZATION TO ± 5% OF SCHEDULED VALUES, AND TO PROVIDE PROPER PRESSURIZATION.  
+ 5% OF SCHEDULED VALUES:  
1. ADJUST OUTDOOR AIR INTAKES TO WITHIN + 5% OF SCHEDULED VALUES.  
2. ADJUST EXHAUST AIR THROUGH ENERGY RECOVERY EQUIPMENT TO WITHIN +5% OF SCHEDULED VALUES.

ADJUST SUPPLY, RETURN, AND EXHAUST AIR-HANDLING SYSTEMS TO +10% / -5% OF SCHEDULED VALUES.

**ADJUSTING**  
AFTER ADJUSTMENT, TAKE MEASUREMENTS TO VERIFY BALANCE HAS NOT BEEN DISRUPTED OR THAT DISRUPTION HAS BEEN RECTIFIED.

ONCE BALANCING OF SYSTEMS IS COMPLETE, AT LEAST ONE DAMPER OR VALVE MUST BE 100% OPEN.

AFTER TESTING, ADJUSTING AND BALANCING ARE COMPLETE, OPERATE EACH SYSTEM AND RANDOMLY CHECK MEASUREMENTS TO VERIFY SYSTEM IS OPERATING AS REPORTED IN THE REPORT. DOCUMENT ANY DISCREPANCIES.

CONTRACTOR RESPONSIBLE FOR EACH MOTOR SHALL ALSO BE RESPONSIBLE FOR REPLACEMENT SREAVES. COORDINATE WITH CONTRACTOR.

CONTRACTOR RESPONSIBLE FOR PUMP SHALL TRIM IMPELLER TO FINAL DUTY POINT AS INSTRUCTED BY THIS CONTRACTOR ON ALL PUMPS NOT DRIVEN BY A VFD. COORDINATE WITH CONTRACTOR.

**SUBMISSION OF REPORTS**  
FILL IN TEST RESULTS ON APPROPRIATE FORMS.

**SYSTEMS TO BE TESTED, ADJUSTED AND BALANCED**  
a. CONSTANT AIR VOLUME BOXES  
b. AIR INLETS/OUTLETS  
c. EXHAUST HOOD  
d. STEAM PIPING  
e. CONDENSATE PIPING

**VERIFICATION OF EXISTING SYSTEMS**  
PERFORM A PRE-BALANCE OF SYSTEMS SERVING THE AREA OF CONSTRUCTION PRIOR TO THE START OF ANY OTHER WORK. DO NOT MAKE ADJUSTMENTS TO THE SYSTEMS. IF THE SYSTEMS ARE NOT OPERATING AT MAXIMUM CAPACITY, TEMPORARILY DRIVE SYSTEM TO MAXIMUM AND TAKE READINGS FOR THE SYSTEM. RETURN THE SYSTEM TO ITS ORIGINAL STATE WHEN MEASUREMENTS ARE COMPLETE.

SYSTEMS TO BE PRE-BALANCED ARE AS FOLLOWS:  
a. CONSTANT AIR VOLUME BOXES  
b. AIR INLETS/OUTLETS  
c. EXHAUST HOOD  
d. STEAM PIPING  
e. CONDENSATE PIPING

REFER TO NEW WORK SYSTEM/EQUIPMENT BALANCING CRITERIA WITHIN THIS SPECIFICATION FOR BALANCING DATA TO OBTAIN AS PART OF PRE-BALANCING.

REPORT FINDINGS TO ARCHITECT/ENGINEER ON STANDARD FORMS. PROVIDE ONE ELECTRONIC COPY OF THE REPORT.

**GENERAL REQUIREMENTS**  
TITLE PAGE:  
1. PROJECT NAME.  
2. PROJECT LOCATION.  
3. PROJECT ARCHITECT.  
4. PROJECT ENGINEER (IMEG CORP.).  
5. PROJECT GENERAL CONTRACTOR.  
6. TAB COMPANY NAME, ADDRESS, PHONE NUMBER.  
7. TAB SUPERVISOR'S NAME AND CERTIFICATION NUMBER.  
8. TAB SUPERVISOR'S SIGNATURE AND DATE.  
9. REPORT DATE.

REPORT INDEX.

GENERAL INFORMATION:  
1. TEST CONDITIONS.  
2. NOMECLATURE USED THROUGHOUT REPORT.  
3. NOTABLE SYSTEM CHARACTERISTICS/DISCREPANCIES FROM DESIGN.  
4. TEST STANDARDS FOLLOWED.  
5. ANY DEFICIENCIES NOTED.  
6. QUALITY ASSURANCE STATEMENT.

INSTRUMENT LIST:  
1. INSTRUMENT.  
2. MANUFACTURER, MODEL, AND SERIAL NUMBER.  
3. RANGE.  
4. CALIBRATION DATE.

**23 07 13 DUCTWORK INSULATION**

**SECTION INCLUDES**  
DUCTWORK INSULATION FOR SUPPLY AIR

**QUALITY ASSURANCE**  
APPLICATOR: COMPANY SPECIALIZING IN DUCTWORK INSULATION APPLICATION WITH FIVE YEARS MINIMUM EXPERIENCE.

MATERIALS: UL LISTED IN CATEGORY HNKT; FLAME SPREAD/SMOKE DEVELOPED RATING OF 25/50 IN ACCORDANCE WITH ASTM E84, NFPA 255, OR UL 723.

ADHESIVES: UL LISTED, MEETING NFPA 90A/90B REQUIREMENTS.

**INSULATION MATERIALS**  
TYPE A: FLEXIBLE FIBERGLASS - OUTSIDE WRAP; ANSI/ASTM C553; COMMERCIAL GRADE; 0.28 MAXIMUM 'K' VALUE AT 75F; FOIL SCRIM KRAFT FACING, 1.0 LB./CU. FT. DENSITY.

**GENERAL INSTALLATION REQUIREMENTS**  
INSTALL MATERIALS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, CODES, AND INDUSTRY STANDARDS.  
INSTALL MATERIALS AFTER DUCTWORK HAS BEEN TESTED.  
CLEAN SURFACES FOR ADHESIVES.  
PROVIDE INSULATION WITH VAPOR BARRIER WHEN AIR CONVEYED MAY BE BELOW AMBIENT TEMPERATURE.

**EXTERIOR DUCT WRAP - FLEXIBLE, TYPE A INSTALLATION**  
APPLY WITH EDGES TIGHTLY BUTTED.  
CUT SLIGHTLY LONGER THAN PERIMETER OF DUCT TO INSURE FULL THICKNESS AT CORNERS. DO NOT WRAP EXCESSIVELY TIGHT.  
SEAL JOINTS WITH ADHESIVE BACKED TAPE.  
APPLY SO INSULATION CONFORMS UNIFORMLY AND FIRMLY TO DUCT.  
PROVIDE HIGH-DENSITY INSULATION INSERTS AT TRAPEZE DUCT HANGERS AND STRAPS TO PREVENT CRUSHING OF INSULATION. MAINTAIN CONTINUOUS VAPOR BARRIER THROUGH THE HANGER.  
TAPE ALL JOINTS WITH ROVAL TAPES #RT 350 (216-439-7229), VENTURE TAPE 1525CW, OR COMPAC TYPE FSK. NO SUBSTITUTIONS WILL BE ACCEPTED WITHOUT WRITTEN PERMISSION FROM THE ARCHITECT/ENGINEER.  
PRESS TAPE TIGHTLY TO THE DUCT COVERING WITH A SQUEEGEE FOR A TIGHT CONTINUOUS SEAL. FISH MOUTHS AND LOOSE TAPE EDGES ARE NOT ACCEPTABLE.  
STAPLES MAY BE USED, BUT MUST BE COVERED WITH TAPE.  
VAPOR BARRIER MUST BE CONTINUOUS.  
MECHANICALLY FASTEN ON 12" CENTERS AT BOTTOM OF DUCTS OVER 24" WIDE AND ON ALL SIDES OF VERTICAL DUCTS.

**23 09 19 HVAC PIPING INSULATION**

**SECTION INCLUDES**  
PIPING INSULATION  
INSULATION JACKETS

**QUALITY ASSURANCE**  
APPLICATOR: COMPANY SPECIALIZING IN PIPING INSULATION APPLICATION WITH FIVE YEARS MINIMUM EXPERIENCE.  
MATERIALS: FLAME SPREAD/SMOKE DEVELOPED RATING OF 25/50 IN ACCORDANCE WITH ASTM E84, NFPA 255, OR UL 723 (WHERE REQUIRED).

**INSULATION MATERIALS**  
TYPE A: GLASS FIBER; ANSI/ASTM C547; 0.24 MAXIMUM 'K' VALUE AT 75F; NON-COMBUSTIBLE. ALL PURPOSE, WHITE KRAFT JACKET BONDED TO ALUMINUM FOIL AND REINFORCED WITH FIBERGLASS YARN, 25/50 FLAME SPREAD/SMOKE DEVELOPED RATING WHEN TESTED IN ACCORDANCE WITH ASTM E84 (UL 723).

**VAPOR BARRIER JACKETS**  
KRAFT REINFORCED FOIL VAPOR BARRIER WITH SELF-SEALING ADHESIVE JOINTS. BEACH PUNCTURE RESISTANCE RATIO OF AT LEAST 50 UNITS. TENSILE STRENGTH: 35 PSI MINIMUM. SINGLE, SELF-SEAL ACRYLIC ADHESIVE ON LONGITUDINAL JACKET LAPS AND BUTT STRIPS.

**JACKET COVERINGS**  
PLASTIC JACKETS AND FITTING COVERS: HIGH IMPACT, GLOSSY WHITE, 0.020" OR 0.030" THICK, SELF-EXTINGUISHING PLASTIC, SUITABLE FOR USE INDOORS OR OUTDOORS WITH ULTRAVIOLET INHIBITORS. SUITABLE FOR -40°F TO 150°F. 25/50 MAXIMUM FLAME SPREAD/SMOKE DEVELOPED.

**PREPARATION**  
INSTALL INSULATION AFTER PIPING HAS BEEN TESTED. PIPE SHALL BE CLEAN, DRY AND FREE OF RUST BEFORE APPLYING INSULATION.

**GENERAL INSTALLATION REQUIREMENTS**  
INSTALL MATERIALS PER MANUFACTURER'S INSTRUCTIONS, BUILDING CODES AND INDUSTRY STANDARDS.  
CONTINUE INSULATION WITH VAPOR BARRIER THROUGH PENETRATIONS. THIS APPLIES TO ALL INSULATED PIPING. MAINTAIN FIRE RATING OF ALL PENETRATIONS.  
NEATLY FINISH INSULATION AT SUPPORTS, PROTRUSIONS, AND INTERRUPTIONS.  
ON ALL INSULATED PIPING, PROVIDE AT EACH SUPPORT AN INSERT OF SAME THICKNESS AND CONTOUR AS ADJOINING INSULATION, BETWEEN THE PIPE AND INSULATION JACKET, TO PREVENT INSULATION FROM SAGGING AND CRUSHING. THE INSERT SHALL BE SUITABLE FOR PLANNED TEMPERATURES, BE SUITABLE FOR USE WITH SPECIFIC PIPE MATERIAL, AND SHALL BE A 180 CYLINDRICAL SEGMENT THE SAME LENGTH AS METAL SHIELDS. INSERTS SHALL BE A CELLULAR GLASS (FOR ALL TEMPERATURE RANGES) OR MOLDED HYDROUS CALCIUM SILICATE (FOR PIPE WITH OPERATING TEMPERATURES ABOVE 70F, WITH A MINIMUM COMPRESSIVE STRENGTH OF 50 PSI. POLYISOCYANURATE INSULATION WITH A MINIMUM COMPRESSIVE STRENGTH OF 24 PSI IS ACCEPTABLE FOR PIPE SIZES 3" AND BELOW, MINIMUM 60 PSI FOR PIPE SIZES 4", AND OPERATE BELOW 300°F. FACTORY FABRICATED INSERTS MAY BE USED, RECTANGULAR BLOCKS, PLUGS, OR WOOD MATERIAL ARE NOT ACCEPTABLE. TEMPORARY WOOD BLOCKING MAY BE USED BY THE PIPING CONTRACTOR FOR PROPER HEIGHT; HOWEVER, THESE MUST BE REMOVED AND REPLACED WITH PROPER INSERTS BY THE INSULATION CONTRACTOR.

INSTALL METAL SHIELDS BETWEEN ALL HANGERS OR SUPPORTS AND THE PIPE INSULATION. SHIELDS SHALL BE GALVANIZED SHEET METAL, HALF-ROUND WITH FLARED EDGES. ADHERE SHIELDS TO INSULATION. ON COLD PIPING, SEAL THE SHIELDS VAPOR-TIGHT TO THE INSULATION AS REQUIRED TO MAINTAIN THE VAPOR BARRIER, OR ADD SEPARATE VAPOR BARRIER JACKET.

SHIELDS SHALL BE AT LEAST THE FOLLOWING LENGTHS AND GAUGES:  
PIPE SIZE: SHIELD SIZE:  
1/2" TO 3" PIPE 12" LONG X 18 GAUGE

ALL PIPING AND INSULATION THAT DOES NOT MEET 25/50 THAT IS LOCATED IN AN AIR PLENUM SHALL HAVE WRITTEN APPROVAL FROM THE AUTHORITY HAVING JURISDICTION AND THE LOCAL FIRE DEPARTMENT FOR AUTHORIZATION AND MATERIALS APPROVAL. IF APPROVAL HAS BEEN ALLOWED, THE NON-RATED MATERIAL SHALL BE WRAPPED WITH A PRODUCT THAT HAS PASSED ASTM E84 AND/OR NFPA 255 TESTING WITH A RATING OF 25/50 OR BELOW.

**INSULATED PIPING OPERATING BELOW 60°F**  
INSULATE FITTINGS, VALVES, UNIONS, FLANGES, STRAINERS, FLEXIBLE CONNECTIONS, FLEXIBLE HOSES, AND EXPANSION JOINTS. SEAL ALL PENETRATIONS OF VAPOR BARRIER.

ALL BALANCE VALVES WITH FLUID OPERATING BELOW 60°F SHALL BE INSULATED WITH A REMOVABLE PLUG WRAPPED WITH VAPOR BARRIER TAPE TO ALLOW READING AND ADJUSTING OF THE VALVE.

**INSULATED PIPING OPERATING BETWEEN 60°F AND 140°F**  
DO NOT INSULATE FLANGES AND UNIONS, BUT BEVEL AND SEAL ENDS OF INSULATION AT SUCH LOCATIONS. INSULATE ALL FITTINGS, VALVES AND STRAINERS.

**INSULATED PIPING OPERATING ABOVE 140°F**  
INSULATE FITTINGS, VALVES, FLANGES, AND STRAINERS.

ALL BALANCE VALVES WITH FLUID OPERATING ABOVE 140°F SHALL BE INSULATED AND AN OPENING SHALL BE LEFT IN THE INSULATION TO ALLOW FOR READING AND ADJUSTING THE VALVE.

**EXPOSED PIPING**  
LOCATE AND COVER SEAMS IN LEAST VISIBLE LOCATIONS.

PROJECT TITLE  
**STERILIZATION SYSTEM INSTALLATION FOR THE ARROWHEAD REGIONAL MEDICAL CENTER**  
400 N. PEPPER AVE.  
COLTON, CA, 92324  
WBSE #: 10.10.1142  
CIP #: 21-154  
CAF# #: COL003

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Office of Statewide Health Planning and Development  
**HCAI # S222347-36-00**

REVIEWED IN ACCORDANCE WITH THE REQUIREMENTS OF T24, CCR

APPROVED

Department of Health Care Access & Information  
Office of Statewide Hospital Planning & Development  
1/4/2024, 9:00:12 AM  
S222347-36-00  
Allen Cheng

**REFERENCE PLAN**

PROJECT AREA

GRD FLOOR

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**SPECIFICATIONS**

DRAWING TITLE

DATE

**12/28/2022**

**REVISIONS**

NO.	DESCRIPTION	DATE
1	HCAI COMMENTS 2/13/2023	

PROJECT NUMBER  
**3021022**

DRAWING NUMBER  
**MO.4**

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REFERENCE SCALE IN INCHES  
0 1 2 3

ARMC SPD Sterilization Washer Replacement

5/10/2023 6:42:56 PM

WHERE EXPOSED INSULATED PIPING EXTENDS ABOVE THE FLOOR, PROVIDE A SHEET METAL GUARD AROUND THE INSULATION EXTENDING 12" ABOVE THE FLOOR. GUARD SHALL BE 0.016" CYLINDRICAL SMOOTH OR STUCCO ALUMINUM AND SHALL FIT TIGHTLY TO THE INSULATION.

INSULATION INSTALLATION

TYPE A INSULATION:

- 1. ALL SERVICE JACKETS: SEAL ALL LONGITUDINAL JOINTS WITH SELF-SEAL LAPs USING A SINGLE PRESSURE SENSITIVE ADHESIVE SYSTEM. DO NOT STAPLE.
2. INSULATION WITHOUT SELF-SEAL LAP MAY BE USED IF INSTALLED WITH BENJAMIN FOSTER 85-20 OR EQUIVALENT CHICAGO MASTIC, 3M OR CHILDERS LAP ADHESIVE.
3. APPLY INSULATION WITH LAPS ON TOP OF PIPE.
4. FITTINGS, VALVE BODIES AND FLANGES: FOR 4" AND SMALLER PIPES, INSULATE WITH 1 LB.DENSITY INSULATION WRAPPED UNDER COMPRESSION TO A THICKNESS EQUAL TO THE ADJACENT PIPE INSULATION. FOR PIPES OVER 4", USE MITERED SEGMENTS OF PIPE INSULATION. FINISH WITH PREFORMED PLASTIC FITTING COVERS. SECURE FITTING COVERS WITH PRESSURE SENSITIVE TAPE AT EACH END. OVERLAP TAPE AT LEAST 2" ON ITSELF. FOR PIPES OPERATING BELOW 60F, SEAL FITTING COVERS WITH VAPOR RETARDER MASTIC IN ADDITION TO TAPE.

INSULATION SCHEDULE

PIPING SYSTEM:

MEDIUM PRESSURE STEAM AND CONDENSATE RETURN PIPING AND STEAM VENT, ABOVE GROUND - (15 - 60 PSIG):

INSULATION TYPE/THICKNESS:
(PIPE SIZE >1-1/2") R243"
(PIPE SIZE >1-1/2") R354.5"

- A. STEEL PIPE: SEAMLESS WELDED BLACK STEEL PIPE ASTM A53, SCHEDULE 40 STEAM, AND SEAMLESS WELDED BLACK STEEL PIPE ASTM A53, SCHEDULE 80 CONDENSATE RETURN.

- 1. FITTINGS: ASTM A234 FORGED STEEL WELDING TYPE, CLASS 150.
2. JOINTS: WELDED.

EQUIPMENT DRAINS AND OVERFLOWS:

INSULATION TYPE/THICKNESS:
(PIPE SIZE >1-1/2") R111-1/2"

- A. STEEL PIPE: ASTM A53 40, GALVANIZED.
1. FITTINGS: ASME B16.3, MALLEABLE IRON OR ASME B16.4, CAST IRON.
2. JOINTS: THREADED FOR PIPE 2 INCH AND SMALLER, FLANGED FOR PIPE 2-1/2 INCHES AND LARGER.

23 22 00 STEAM AND STEAM CONDENSATE PIPING

SECTION INCLUDES

PIPE AND PIPE FITTINGS. VALVES. STEAM PIPING SYSTEM, CONDENSATE PIPING SYSTEM.

QUALITY ASSURANCE

VALVES: MANUFACTURER'S NAME AND PRESSURE RATING MARKED ON VALVE BODY. REMANUFACTURED VALVES ARE NOT ACCEPTABLE.

WELDERS CERTIFICATION: IN ACCORDANCE WITH ANSI/ASME SEC 9 OR ANSI/AWS D1.1.

DELIVERY, STORAGE AND HANDLING

STORE AND PROTECT PIPING TO PREVENT CORROSION AND ENTRANCE OF FOREIGN MATTER.

DELIVER AND STORE VALVES IN SHIPPING CONTAINERS WITH LABELING IN PLACE.

REGULATORY REQUIREMENTS

- CONFORM TO ANSI/ASME B31.9 FOR THE FOLLOWING PIPE SYSTEMS:
1. BOILER EXTERNAL PIPE SYSTEMS THAT OPERATE UP TO 15 PSI.
2. NON-BOILER EXTERNAL PIPE SYSTEMS THAT OPERATE UP TO 150 PSI.

REFER TO ANSI/ASME B31.1 AND ANSI/ASME B31.9 FOR "BOILER EXTERNAL PIPING" AND "NON-BOILER EXTERNAL PIPING" DEFINITIONS.

COORDINATION DRAWINGS

REFERENCE COORDINATION DRAWINGS ARTICLE IN SECTION 23 05 00 FOR REQUIRED STEAM AND STEAM CONDENSATE PIPING SYSTEMS. ELECTRONIC CAD DRAWINGS TO BE PROVIDED TO COORDINATING CONTRACTOR FOR INCLUSION INTO COMPOSITE COORDINATION DRAWINGS.

PRODUCTS

STEEL PIPING (0 TO 125 PSIG)

STEEL PIPE: 0-125PSIG, STANDARD WEIGHT; WELDED JOINTS; DESIGN PRESSURE: 125 PSIG, MAXIMUM DESIGN TEMPERATURE: 353°F. PIPE: STANDARD WEIGHT BLACK STEEL, WELDED, ASTM A53. JOINTS: WELDED. FITTINGS: 125 PSI S - 175 PSI, WOG, CAST IRON, ASTM A126, ANSI B16.4. UNIONS: 250 PSI S - 500 PSI, WOG, BLACK MALLEABLE IRON, GROUND JOINT WITH BRASS SEAT.

VALVES

GATE VALVES: GA-1: (0 TO 125 PSIG) 2" AND UNDER, 125 PSI S @ 353°F (178°C), 300 PSI WOG @ 150°F, SCREWED, BRONZE, RISING STEM, SCREWED BONNET, CRANE #431, HAMMOND #B641, STOCKHAM #B122, WALWORTH #56, MILWAUKEE #1150, WATTS #B-3210, NIBCO #T-131.

ALL BOILER SHUTOFF VALVES SHALL POSSESS AN ADJUSTABLE PACKING OR GLAND AROUND THE STEM. ALL SHUTOFF VALVES ON BOILERS THAT MAY BE CONSIDERED AS A CONFINED SPACE SHALL BE LOCKABLE AND TAGGABLE. ALL BOILER SHUTOFF VALVES SHALL COMPLY FULLY WITH APPLICABLE SECTIONS OF THE ASME BOILER CODE

GLOBE VALVES (0 TO 125 PSIG):

GL-1: (0 TO 125 PSIG) 2" AND UNDER, 125 PSI SATURATED STEAM, 300 PSI WOG, SCREWED, BRONZE, CRANE #T7E, STOCKHAM #B22T, WALWORTH #3095, MILWAUKEE #590, HAMMOND #B413, WATTS #B-4010-T, NIBCO T-235-Y.

CHECK VALVES:

CK-1: (0 TO 125 PSIG) 2" AND UNDER, 125 PSI S @ 353°F, 200 PSI WOG @ 150°F, SCREWED, BRONZE, HORIZONTAL SWING, INLET PIPING, HANGERS, AND ACCESSORIES (IN PREPARATION TO BE PAINTED). WATTS #77S, NIBCO T-751. BRONZE BODY STRAINER 125# MAY BE USED AS CONTRACTOR OPTION.

STRAINER:

ST-1: (0 TO 125 PSIG) CAST IRON BODY, SCREWED ENDS, SCREWED COVER, 250# STEAM @ 406°F, 400# WOG @ 150°F, ARMSTRONG #CA1SC, METRAFLEX #TS, MUELLER STEAM SPECIALTY CO. #11M, SARCO #IT, WATTS #77S, NIBCO T-751. BRONZE BODY STRAINER 125# MAY BE USED AS CONTRACTOR OPTION.

UNLESS OTHERWISE INDICATED, STRAINERS SHALL HAVE STAINLESS STEEL SCREENS WITH PERFORATIONS AS FOLLOWS: 1. STEAM ALL SIZES: 1/32" 2. CONDENSATE ALL SIZES: 3/64"

FURNISH PIPE NIPPLE WITH GATE VALVE AND THREADED CAP TO BLOW DOWN ALL STRAINER SCREENS.

EXECUTION

PREPARATION: REAM PIPE AND TUBE ENDS, REMOVE BURRS, BEVEL PLAIN END FERROUS PIPE. REMOVE SCALE AND DIRT ON INSIDE AND OUTSIDE BEFORE ASSEMBLY. REMOVE ALL SCALE, RUST, DIRT, OILS, STICKERS AND THOROUGHLY CLEAN EXTERIOR OF ALL BARE METAL EXPOSURE. PIPING, HANGERS, AND ACCESSORIES (IN PREPARATION TO BE PAINTED). MAKE CONNECTIONS TO EQUIPMENT WITH FLANGES OR UNIONS. AFTER COMPLETION, FILL, CLEAN, AND TREAT SYSTEMS.

PIPING SCHEDULE

STEAM (0-125PSIG):

- 1. STEEL PIPE: 0-125 PSIG; STANDARD WEIGHT; WELDED JOINTS: 2" AND UNDER
2. SHUTOFF VALVES: GA-1
3. THROTTLING: GL-1
4. CHECK VALVES: CK-1
5. STRAINERS: ST-1

CONDENSATE PIPING (0-125PSIG):

- 1. STEEL PIPE: 0-125 PSIG; EXTRA STRONG; WELDED JOINTS: 2" AND UNDER
2. SHUTOFF VALVES: GA-1
3. THROTTLING: GL-1
4. CHECK VALVES: CK-1
5. STRAINERS: ST-1

BOILER FEEDWATER (0-125PSIG)

- 1. COPPER PIPE: 0 TO 125 PSIG; TYPE K; SOLDER JOINT: 2" AND UNDER
2. SHUTOFF VALVES: GA-1
3. THROTTLING: GL-1
4. CHECK VALVES: CK-1
5. STRAINERS: ST-1

TESTING PIPING

COMPLETE ALL TESTING OF PIPES UNDERGROUND, OR IN CHASES AND WALLS, BEFORE PIPING IS CONSIDERED. COMPLETE ALL TESTING BEFORE INSULATION IS APPLIED, OR IF INSULATION IS APPLIED BEFORE THE PIPE IS TESTED AND A LEAK DEVELOPS WHICH RUINS THE INSULATION, THE PIPE INSTALLING CONTRACTOR SHALL ARRANGE AND PAY FOR REPLACING THE DAMAGED INSULATION. TEST PIPING WITH WATER AT 150% OF THE MAXIMUM OPERATING PRESSURE. HOLD PRESSURE FOR AT LEAST TWO HOURS. TEST TO BE WITNESSED BY THE ARCHITECT/ENGINEER OR THEIR REPRESENTATIVE, IF REQUESTED BY THE ARCHITECT/ENGINEER.

CLEANING PIPING

ASSEMBLY: 1. PRIOR TO ASSEMBLY OF PIPE AND PIPING COMPONENTS, ALL LOOSE DIRT, SCALE, OIL AND OTHER FOREIGN MATTER ON INTERNAL OR EXTERNAL SURFACES SHALL BE REMOVED BY MEANS CONSISTENT WITH GOOD PIPING PRACTICE SUBJECT TO THE APPROVAL OF THE ARCHITECT/ENGINEER'S REPRESENTATIVE. CHIPS AND BURRS FROM MACHINERY OR THREAD CUTTING OPERATION SHALL BE BLOWN OUT OF PIPE BEFORE ASSEMBLY. CUTTING OIL SHALL BE WIPED FROM INTERNAL AND EXTERNAL SURFACES. 2. DURING FABRICATION AND ASSEMBLY, REMOVE SLAG AND WELD SPATTER FROM BOTH INTERNAL AND EXTERNAL PIPE JOINTS BY PEENING, CHIPPING AND WIRE BRUSHING. 3. NOTIFY THE ARCHITECT/ENGINEER'S REPRESENTATIVE PRIOR TO STARTING ANY POST ERECTION CLEANING OPERATION IN SUFFICIENT TIME TO ALLOW WITNESSING THE OPERATION, CONSULT WITH AND OBTAIN APPROVAL FROM THE ARCHITECT/ENGINEER'S REPRESENTATIVE REGARDING SPECIFIC PROCEDURES AND SCHEDULING. ARRANGE FOR PROPER DISPOSAL OF CLEANING AND FLUSHING FLUIDS. 4. WHEN THE SYSTEM IS STARTED UP FOR THE FIRST TIME, DISCHARGE THE CONDENSATE TO DRAIN PER THE BOILER MANUFACTURER'S RECOMMENDATIONS OR FOR 24 HOURS, WHICHEVER IS MORE RESTRICTIVE. ADD DOMESTIC COLD WATER TO THE DRAIN AT A SUFFICIENT RATE TO REDUCE THE CONDENSATE TEMPERATURE TO A MAXIMUM OF 140°F.

INSTALLATION

GENERAL INSTALLATION REQUIREMENTS: 1. ROUTE PIPING IN ORDERLY MANNER, PLUMB AND PARALLEL TO BUILDING STRUCTURE, AND MAINTAIN GRADIENT. 2. INSTALL PIPING TO CONSERVE BUILDING SPACE AND NOT INTERFERE WITH USE OF SPACE, OTHER WORK, OR EQUIPMENT. 3. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE, JOINTS, OR CONNECTED EQUIPMENT. 4. SLOPE STEAM PIPING 0.25" IN 10 FEET IN DIRECTION OF FLOW. USE ECCENTRIC REDUCERS TO MAINTAIN BOTTOM OF PIPE LEVEL. 5. SLOPE STEAM CONDENSATE PIPING 0.5" IN 10 FEET. 6. WHERE PIPE SUPPORTS ARE WELDED TO STRUCTURAL BUILDING FRAMING, SCRAPE, BRUSH CLEAN, AND APPLY ZINC RICH PRIMER TO WELDS.

VALVES/FITTINGS AND ACCESSORIES:

- 1. PROVIDE CLEARANCE FOR INSTALLATION OF INSULATION AND ACCESS TO VALVES AND FITTINGS.
2. PROVIDE ACCESS DOORS WHERE VALVES AND FITTINGS ARE NOT EXPOSED.
3. PROVIDE DRIP TRAP ASSEMBLY AT LOW POINTS AND BEFORE CONTROL VALVES AND PRESSURE REDUCING VALVES.
4. PROVIDE LOOP VENTS OVER TRAPPED SECTIONS.
5. PREPARE PIPE, FITTINGS, SUPPORTS, AND ACCESSORIES FOR FINISH PAINTING.
6. PROVIDE DRIP LEGS AS SHOWN ON THE DRAWINGS, AT LOW POINTS, TRAPS, AND THE BASE OF ALL RISERS IN STEAM, AND CONDENSATE PIPES, UNLESS OTHERWISE SHOWN, DRIP LEGS SHALL BE FULL PIPE SIZE ON PIPES THROUGH 4" AND AT LEAST 4", BUT NOT LESS THAN HALF LINE SIZE OVER 4". DRIP LEGS SHALL BE 1/2" MINIMUM LENGTH, WITH A REDUCER AND A 3/4" SHUTOFF VALVE.
7. INSTALL VALVES WITH STEMS UPRIGHT OR HORIZONTAL, NOT INVERTED.
8. PROVIDE SHUTOFF VALVES IN SUPPLY AND RETURN TO ALL EQUIPMENT.
9. INSTALL STRAINERS IN STEAM PIPING WITH THE "WYE" OF THE STRAINER TO THE SIDE OF THE PIPE IN THE HORIZONTAL PLANE TO AVOID POOLING OF CONDENSATE.

PIPE ERECTION AND LAYING

CAREFULLY INSPECT ALL PIPE, FITTINGS, VALVES, EQUIPMENT AND ACCESSORIES BEFORE INSTALLATION. ANY ITEMS THAT ARE UNSUITABLE, CRACKED OR OTHERWISE DEFECTIVE SHALL BE REJECTED AND REMOVED FROM THE JOB IMMEDIATELY.

ALL PIPE, FITTINGS, VALVES, EQUIPMENT AND ACCESSORIES SHALL HAVE FACTORY APPLIED IDENTIFICATION SUFFICIENT TO DETERMINE CONFORMANCE WITH SPECIFIED REQUIREMENTS.

EXERCISE CARE AT EVERY STAGE OF STORAGE, HANDLING, LAYING AND ERECTING TO PREVENT ENTRY OF FOREIGN MATTER INTO PIPING, FITTINGS, VALVES, EQUIPMENT AND ACCESSORIES. DO NOT ERECT OR INSTALL ANY ITEM THAT IS NOT CLEAN.

DURING CONSTRUCTION, UNTIL SYSTEM IS FULLY OPERATIONAL, KEEP ALL OPENINGS IN PIPING AND EQUIPMENT CLOSED EXCEPT WHEN ACTUAL WORK IS BEING PERFORMED ON THAT ITEM OF SYSTEM. USE PLUGS, CAPS, BLIND FLANGES OR OTHER ITEMS DESIGNED FOR THIS PURPOSE.

RUN PIPE STRAIGHT AND TRUE, PARALLEL TO BUILDING LINES WITH MINIMUM USE OF OFFSETS AND COUPLINGS. PROVIDE ONLY OFFSETS REQUIRED FOR NEEDED HEADROOM OR CLEARANCE AND TO PROVIDE NEEDED FLEXIBILITY IN PIPING.

CHANGE DIRECTION OF PIPES ONLY WITH FITTINGS OR PIPE BENDS. CHANGE SIZE ONLY WITH FITTINGS, DO NOT USE MITER FITTINGS, FACE OR FLUSH BUSHINGS, OR STREET ELBOWS. ALL FITTINGS SHALL BE LONG RADIUS TYPE, UNLESS OTHERWISE NOTED.

PROVIDE FLANGES OR UNIONS AT ALL CONNECTIONS TO EQUIPMENT, TRAPS AND VALVES TO FACILITATE DISMANTLING.

ARRANGE PIPING AND CONNECTIONS SO EQUIPMENT SERVED MAY BE SERVICED OR TOTALLY REMOVED WITHOUT DISTURBING PIPING BEYOND FINAL CONNECTIONS AND ASSOCIATED SHUTOFF VALVES.

USE FULL AND DOUBLE LENGTHS OF PIPE WHEREVER POSSIBLE.

UNLESS OTHERWISE INDICATED, INSTALL ALL INLET AND OUTLET PIPING, INCLUDING SHUTOFF VALVES AND STRAINERS, TO COILS, PUMPS AND OTHER EQUIPMENT AT LINE SIZE WITH REDUCTION IN SIZE MADE ONLY AT CONTROL VALVE, PUMP, OR TRAP.

CUT ALL PIPE TO EXACT MEASUREMENT AND INSTALL WITHOUT SPRINGING OR FORCING.

AVOID CREATING, EVEN TEMPORARILY, UNDUE LOADS, FORCES OR STRAINS ON VALVES, EQUIPMENT OR BUILDING ELEMENTS WITH PIPING CONNECTIONS OR SUPPORTS.

UNLESS OTHERWISE INDICATED, BRANCH TAKEOFFS SHALL BE FROM TOP OF MAINS OR HEADERS AT EITHER A 45° OR 90° ANGLE FROM THE HORIZONTAL PLANE FOR STEAM PIPES.

BRANCH TAKEOFFS SHALL BE FROM THE TOP, SIDE (IF BRANCH IS TWO SIZES SMALLER THAN MAIN), OR ANY ANGLE FROM THE HORIZONTAL PLANE TO THE TOP OF PIPING FOR LIQUIDS.

BRANCH CONNECTIONS MAKE BRANCH CONNECTIONS WITH STANDARD TEE OR CROSS FITTINGS OF THE TYPE REQUIRED FOR THE SERVICE UNLESS OTHERWISE INDICATED.

REDUCERS ARE GENERALLY NOT SHOWN WHERE PIPE SIZES CHANGE AT TEE, THE TEE SHALL BE THE SIZE OF THE LARGEST PIPE SHOWN CONNECTING TO IT.

BRANCH CONNECTIONS FROM MAINS MAY BE CUT INTO BLACK STEEL PIPE USING FORGED WELD-ON FITTINGS: 1. STEAM. 2. CONDENSATE. 3. BOILER FEEDWATER.

USE OF FORGED WELD-ON FITTINGS IS FURTHER LIMITED AS FOLLOWS:

- 1. MUST HAVE AT LEAST SAME PRESSURE RATING AS THE MAIN.
2. HEADER OR MAIN MUST BE 2-1/2" (65 MM) OR OVER.
3. BRANCH PIPE IS AT LEAST TWO SIZES UNDER MAIN SIZE.

23 22 00 STEAM AND STEAM CONDENSATE SPECIALTIES

SECTION INCLUDES

STEAM TRAPS CONDENSATE RETURN UNITS

QUALITY ASSURANCE

MANUFACTURER: FOR EACH PRODUCT SPECIFIED, PROVIDE COMPONENTS BY SAME MANUFACTURER THROUGHOUT. TRAPS: REMANUFACTURED TRAPS ARE NOT ACCEPTABLE.

SUBMITTALS

SUBMIT PRODUCT DATA UNDER PROVISIONS OF SECTION 23 05 00. INCLUDE PRODUCT DESCRIPTION, MODEL, DIMENSIONS, COMPONENT SIZES, ROUGH-IN REQUIREMENTS, SERVICE SIZES, AND FINISHES.

SUBMIT ELECTRICAL POWER/CONTROLS WIRING DIAGRAMS AND PRODUCT DATA INDICATING GENERAL ASSEMBLY, COMPONENTS, SAFETY CONTROLS, AND SERVICE CONNECTIONS. SUBMIT MANUFACTURER'S INSTALLATION INSTRUCTIONS.

SUBMIT OPERATION AND MAINTENANCE DATA

PRODUCTS

STEAM TRAPS:

CONSTRUCTION: STAINLESS STEEL BODY, DISK, AND CAP. RATING: 300 PSIG WSP. FEATURES: STAINLESS STEEL INSULATING CAP, 1/4 INCH STEEL DLOW DOWN VALVE, INTEGRAL STRAINER.

MANUFACTURERS: (0-125 PSIG):

- 1. SPIRAX/SACRO CO., INC. TYPE TD52 THERMODYNAMIC STEAM TRAP
2. ARMSTRONG
3. HOFFMAN

EXECUTION

INSTALLATION AND APPLICATION

GENERAL INSTALLATION REQUIREMENTS: INSTALL SPECIALTIES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. SIZE TRAPS TO HANDLE MINIMUM OF TWO AND ONE-HALF TIMES MAXIMUM CONDENSATE LOAD OF APPARATUS SERVED, UNLESS NOTED OTHERWISE. ALL TRAPS SHALL BE MINIMUM 3/4" SIZE. INSTALL TRAPS WITH UNIONS OR FLANGES AT BOTH ENDS. PROVIDE SHUTOFF VALVE AND STRAINER AT INLET, AND CHECK VALVE AND SHUTOFF VALVE AT DISCHARGE OF TRAPS. PROVIDE MINIMUM 14" LONG DIRT POCKET OF SAME SIZE AS APPARATUS RETURN CONNECTION BETWEEN APPARATUS AND TRAP, UNLESS NOTED OTHERWISE ON DRAWINGS. REMOVE THERMOSTATIC ELEMENTS FROM TRAPS DURING TEMPORARY AND TRIAL USAGE, AND UNTIL SYSTEM HAS BEEN OPERATED AND DIRT POCKETS CLEANED OF SEDIMENT AND SCALE.

23 31 00 DUCTWORK

SECTION INCLUDES

GALVANIZED DUCTWORK STAINLESS STEEL DUCTWORK DUCTWORK REINFORCEMENT DUCTWORK SEALANTS RECTANGULAR DUCTWORK - SINGLE WALL ROUND AND FLAT OVAL DUCTWORK - SINGLE WALL FLEXIBLE DUCT STERILIZER EXHAUST DUCT LEAKAGE TESTING DUCTWORK PENETRATIONS DUCT CLEANING

DEFINITIONS

DUCT SIZES SHOWN ON DRAWINGS ARE INSIDE CLEAR DIMENSIONS. MAINTAIN CLEAR DIMENSIONS INSIDE ANY LINING.

TRANSITIONS ARE GENERALLY NOT SHOWN IN SINGLE-LINE DUCTWORK, WHERE SIZES CHANGE AT A DIVIDED FLOW FITTING, THE LARGER SIZE SHALL CONTINUE THROUGH THE FITTING.

GALVANIZED DUCTWORK

DUCT AND REINFORCEMENT MATERIALS SHALL CONFORM TO ASTM A653 AND A924.

INTERIOR DUCTWORK AND REINFORCEMENTS: G60 GALVANIZED (0.60 OUNCES PER SQUARE FOOT TOTAL ZINC COATING FOR TWO SIDES PER ASTM A90) UNLESS NOTED OTHERWISE.

EXTERIOR DUCTWORK: G90 GALVANIZED (0.90 OUNCES PER SQUARE FOOT TOTAL ZINC COATING FOR TWO SIDES PER ASTM A90) UNLESS NOTED OTHERWISE. G60 IS NOT ACCEPTABLE FOR EXTERIOR USE.

DUCTWORK REINFORCEMENT SHALL BE OF GALVANIZED STEEL.

DUCTWORK SUPPORTS SHALL BE OF GALVANIZED OR PAINTED STEEL. SLIP CABLE HANGERS ARE ACCEPTABLE. ACCEPTABLE MANUFACTURERS ARE GRIPPLE, DUCTMATE, DURO DYNE, OR ARCHITECT/ENGINEER APPROVED.

ALL FASTENERS SHALL BE GALVANIZED OR CADMIUM PLATED.

STAINLESS STEEL DUCTWORK

DUCTWORK SHALL BE TYPE 316L STAINLESS STEEL, 18 GAUGE MINIMUM. EXPOSED DUCTWORK SHALL HAVE A #3 FINISH. CONCEALED DUCTWORK MAY HAVE MILLED FINISH.

DUCTWORK REINFORCEMENT SHALL BE OF STAINLESS STEEL.

DUCTWORK SUPPORTS SHALL BE OF STAINLESS STEEL. SLIP CABLE HANGERS ARE ACCEPTABLE. ACCEPTABLE MANUFACTURERS ARE GRIPPLE, DUCTMATE, DURO DYNE, OR ARCHITECT/ENGINEER APPROVED.

ALL FASTENERS SHALL BE CADMIUM PLATED OR STAINLESS STEEL.

DUCTWORK REINFORCEMENT

ALL REINFORCEMENT SHALL BE EXTERNAL TO THE DUCT EXCEPT THAT TIE RODS MAY BE USED WITH THE FOLLOWING LIMITATIONS.

DUCTS MUST BE OVER 18" WIDE.

DUCT DIMENSIONS MUST BE INCREASED 2" IN ONE DIMENSION (H OR W) FOR EACH ROW OF TIE RODS INSTALLED.

TIE RODS MUST NOT EXCEED 1/2" DIAMETER.

MANUFACTURER OF TIE ROD SYSTEM MUST CERTIFY PRESSURE CLASSIFICATIONS OF VARIOUS ARRANGEMENTS, AND THIS MUST BE IN THE SHOP DRAWINGS.

DUCTWORK SEALANTS

ONE PART JOINT SEALERS SHALL BE WATER-BASED MASTIC SYSTEMS THAT MEET THE FOLLOWING REQUIREMENTS: MAXIMUM 48-HOUR CURE TIME, SERVICE TEMPERATURE OF -20°F TO +175°F, RESISTANT TO MOLD, MILDEW AND WATER, FLAME SPREAD RATING BELOW 25 AND SMOKE-DEVELOPED RATING BELOW 50 WHEN TESTED IN ACCORDANCE WITH ASTM E84. SUITABLE FOR ALL SMACNA SEAL CLASSES AND PRESSURE CLASSES. MASTIC USED TO SEAL FLEXIBLE DUCTWORK SHALL BE MARKED UL 181B-M. JOINT SEALERS FOR USE ON EXTERIOR WEATHER EXPOSED DUCTWORK SHALL BE RATED FOR -30°F TO +175°F AND 2000 HOUR MINIMUM UV RESISTANCE PER ASTM G-53.

ADHESIVES AND SEALANTS: ALL SEALERS, ADHESIVES, AND SEALANTS SHALL COMPLY WITH THE LOW EMITTING MATERIAL LIMITS OF THE FOLLOWING STANDARDS. [SPECIFIER: REMOVE PARAGRAPH AND SUBPARAGRAPHS FOR CODE MINIMUM.]

- 1. CDPH STANDARD METHOD V1.1-2010 - STANDARD METHOD FOR THE TESTING AND EVALUATION OF VOLATILE ORGANIC CHEMICAL EMISSIONS VOC FROM INDOOR SOURCES USING ENVIRONMENTAL CHAMBERS VERSION 1.1.
2. SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT RULE 116B - ADHESIVE AND SEALANT APPLICATIONS. ALL ADHESIVES AND SEALANTS WET-APPLIED ON SITE SHALL COMPLY WITH THE APPLICABLE CHEMICAL CONTENT REQUIREMENTS OF SCAQMD RULE 116B.

RECTANGULAR DUCT - SINGLE WALL

ALL DUCTWORK GAUGES AND REINFORCEMENTS SHALL BE AS LISTED IN SMACNA DUCT CONSTRUCTION STANDARDS CHAPTER 2, WHERE NECESSARY TO FIT IN CONFINED SPACES, FURNISH HEAVIEST DUCT GAUGE AND LEAST SPACE CONSUMING REINFORCEMENT.

TRANSITIONS SHALL NOT EXCEED THE ANGLES IN FIGURE 4-7.

EXCEPTIONS AND MODIFICATIONS TO THE 2005 HVAC DUCT CONSTRUCTION STANDARDS ARE:

- 1. ALL DUCTS SHALL BE CROSS-BROKEN OR BEADED.
2. TURNING VANS SHALL BE USED IN ALL 90° MITERED ELBOWS, UNLESS CLEARLY NOTED OTHERWISE ON THE DRAWINGS. VANS SHALL BE AS FOLLOWS:

- a. TYPE 1: 1) DESCRIPTION: SINGLE WALL TYPE WITH 22-GAUGE (0.029") OR HEAVIER VANS, 3-1/4" BLADE SPACING, AND 4" TO 4-1/2" RADIUS. VANS HEMMED IF RECOMMENDED BY RUNNER MANUFACTURER. RUNNERS SHALL HAVE EXTRA LONG LOCKING TABS. C-VALUE INDEPENDENTLY TESTED AT BELOW 0.26. EZ RAIL IF BY SHEET METAL CONNECTORS OR EQUAL.
2) USAGE: LIMITED TO 3,000 FPM AND VANE LENGTHS 36" AND UNDER.

- b. TURNING VANS SHALL OPERATE QUIETLY. REPAIR OR REPLACE VANS THAT RATTLE OR FLUTTER.
c. RUNNERS MUST BE INSTALLED AT A 45° ANGLE. ELBOWS WITH DIFFERENT SIZE INLET AND OUTLET MUST BE RADIUS TYPE.
d. OMITTING EVERY OTHER VANE IS PROHIBITED.

3. WHERE SMOOTH RADIUS RECTANGULAR ELBOWS ARE SHOWN, THEY SHALL BE CONSTRUCTED PER SMACNA FIGURE 4-2. TYPE RE1 SHALL BE CONSTRUCTED WITH A CENTERLINE DUCT RADIUS RW OF 1.0. WHERE SHOWN ON DRAWINGS, TYPE RE3 ELBOWS WITH 3 VANS SHALL BE USED WITH CENTERLINE DUCT RADIUS RW OF 0.6 (SMACNA RW=0.1). RE1 OR RE3 ELBOWS MAY BE USED WHERE MITERED ELBOWS ARE SHOWN IF SPACE PERMITS. MITERED ELBOWS (WITH OR WITHOUT TURNING VANES) MAY NOT BE SUBSTITUTED FOR RADIUS ELBOWS. DO NOT MAKE BRANCH TAKEOFFS WITHIN 4 DUCT DIAMETERS ON THE SIDE OF THE DUCT DOWNSTREAM FROM THE INSIDE RADIUS OF RADIUS ELBOWS.

4. RECTANGULAR BRANCH AND TEE CONNECTIONS IN DUCTS OVER 1" PRESSURE CLASS SHALL BE 45° ENTRY TYPE PER FIGS. 4-5 AND 4-6. RECTANGULAR STRAIGHT TAPS ARE NOT ACCEPTABLE ABOVE 1" PRESSURE CLASS.

5. BELLMOUTH FITTINGS SHOWN ON RETURN DUCT INLETS SHALL EXPAND AT A 60-DEGREE TOTAL ANGLE HORIZONTALLY AND VERTICALLY (SPACE PERMITTING) AND HAVE LENGTH OF AT LEAST 25% OF THE SMALLEST DUCT DIMENSION.

6. ROUND TAPS OFF RECTANGULAR UNLINED DUCTS SHALL BE FLANGED CONICAL OR BELLMOUTH TYPE (EQUAL TO BUCKLEY BELLMOUTH OR SHEET METAL CONNECTORS E-Z TAP), OR 45° RECTANGULAR WITH TRANSITION TO ROUND (EQUVAL TO SHEET METAL CONNECTORS INC. HIGH EFFICIENCY TAKEOFF). STRAIGHT TAPS ARE ACCEPTABLE IF PRESSURE CLASS IS 1" OR LESS. ROUND DUCT IS 12" DIAMETER OR LESS, AND THE TAP IS NOT LOCATED BETWEEN FANS AND TAB DEVICES.

7. DUCT OFFSETS SHALL BE CONSTRUCTED AS SHOWN ON DRAWINGS. ADDITIONAL OFFSETS REQUIRED IN THE FIELD SHALL BE FORMED OF MITERED ELBOWS WITHOUT TURNING VANES FOR OFFSETS UP TO 30" MAXIMUM ANGLE IN ACCORDANCE WITH SMACNA OFFSET TYPE 2, OFFSETS OF GREATER THAN 30" ANGLE SHALL BE FORMED OF RADIUS ELBOWS WITH CENTERLINE RADIUS RW=1.0 OR GREATER. SMACNA TYPE 1 OFFSETS ARE NOT PERMITTED.

8. ALL LINED DUCT SHALL UTILIZE DOVETAIL JOINTS WHERE ROUND OR CONICAL TAPS OCCUR. THE DOVETAIL JOINTS SHALL EXTEND PAST THE LINER BEFORE BEING FOLDED OVER.

9. CUSHION HEADS ARE ACCEPTABLE ONLY DOWNSTREAM OF TAB DEVICES IN DUCTS UP TO ± 2" PRESSURE CLASS, AND MUST BE LESS THAN 6" IN LENGTH.

10. SLIDE-ON FLANGED TRANSVERSE JOINT SYSTEMS ARE ACCEPTABLE PROVIDED THEY ARE A MANUFACTURED PRODUCT THAT HAS BEEN TESTED FOR CONFORMANCE WITH CHAPTER 2 OF THE SMACNA HVAC DUCT CONSTRUCTION STANDARDS FOR SHEET AND JOINT DEFLECTION AT THE SPECIFIED PRESSURE CLASS.

a. APPLY SEALANT TO ALL INSIDE CORNERS. HOLES AT CORNERS ARE NOT ACCEPTABLE.
b. ACCEPTABLE MANUFACTURERS: DUCTMATE INDUSTRIES - 259/345, NEXUS, MEZ, OR WDCI. OTHER MANUFACTURERS MUST SUBMIT TEST DATA AND FABRICATION STANDARDS AND RECEIVE ARCHITECT/ENGINEER'S APPROVAL BEFORE ANY FABRICATION BEGINS.

11. FORMED-ON FLANGED TRANSVERSE JOINT SYSTEMS ARE ACCEPTABLE PROVIDED THEY ARE A MANUFACTURED PRODUCT THAT HAS BEEN TESTED FOR CONFORMANCE WITH CHAPTER 2 OF THE SMACNA HVAC DUCT CONSTRUCTION STANDARDS FOR SHEET AND JOINT DEFLECTION AT THE SPECIFIED PRESSURE CLASS.

a. APPLY SEALANT TO ALL INSIDE CORNERS. HOLES AT CORNERS ARE NOT ACCEPTABLE.
b. FLANGES SHALL BE 24-GAUGE MINIMUM (NOT 26 GAUGE).
c. ACCEPTABLE MANUFACTURERS: LOCKFORMER TDC, UNITED MCGILL, OR SHEET METAL CONNECTORS. OTHER MANUFACTURERS MUST SUBMIT TEST DATA AND FABRICATION STANDARDS AND RECEIVE ARCHITECT/ENGINEER'S APPROVAL BEFORE ANY FABRICATION BEGINS.

ROUND AND FLAT OVAL DUCTWORK - SINGLE WALL

CONFORM TO APPLICABLE PORTIONS OF RECTANGULAR DUCT SECTION. ROUND OR FLAT OVAL DUCTWORK MAY BE SUBSTITUTED FOR RECTANGULAR DUCTWORK WHERE APPROVED BY THE ARCHITECT/ENGINEER. THE SPIRAL SEAM DUCTWORK SHALL MEET THE STANDARDS SET FORTH IN THIS SPECIFICATION, THE DUCTWORK SHALL MEET OR EXCEED THE SPECIFIED CROSS-SECTIONAL AREA AND INSULATION REQUIREMENTS. THE SUBSTITUTION SHALL BE COORDINATED WITH ALL OTHER TRADES PRIOR TO INSTALLATION.

SNAP LOCK SEAMS ARE NOT PERMITTED.

FLAT OVAL DUCT IN NEGATIVE PRESSURE APPLICATIONS SHALL HAVE FLAT SIDES REINFORCED AS REQUIRED FOR RECTANGULAR DUCTS OF THE SAME GAUGE WITH DIMENSIONS EQUAL TO THE FLAT SPAN OF THE OVAL DUCT.

90 ELBOWS SHALL BE SMOOTH RADIUS OR HAVE A MINIMUM OF FIVE

WITH WIDTH AND DEPTH EQUAL TO THE ELECTRICAL EQUIPMENT UNLESS INTENDED TO SERVE THESE ROOMS. DO NOT INSTALL ANY DUCTWORK OR EQUIPMENT IN ELECTRICAL ROOMS, TRANSFORMER ROOMS, ELECTRICAL CLOSETS, TELEPHONE ROOMS OR ELEVATOR MACHINE ROOMS.

DURING CONSTRUCTION PROVIDE TEMPORARY CLOSURES OF METAL OR TAPED POLYETHYLENE ON OPEN DUCTS TO PREVENT DUST FROM ENTERING DUCTWORK. SUPPLY DUCTWORK SHALL BE FREE OF CONSTRUCTION DEBRIS, AND SHALL COMPLY WITH LEVEL "B" OF THE SMACNA DUCT CLEANLINESS FOR NEW CONSTRUCTION GUIDELINES.

REPAIR ALL DUCT INSULATION AND LINER TEARS.

INSTALL MANUAL VOLUME DAMPERS IN BRANCH SUPPLY DUCTS SO ALL OUTLETS CAN BE ADJUSTED. DO NOT INSTALL DAMPERS AT AIR TERMINAL DEVICE OR IN OUTLETS, UNLESS SPECIFICALLY SHOWN.

INSULATE TERMINAL AIR BOX REHEAT COILS. SEAL INSULATION TIGHT TO FORM A TIGHT VAPOR BARRIER.

INSTALL FLEXIBLE DUCT IN ACCORDANCE WITH THE ADC FLEXIBLE DUCT PERFORMANCE AND INSTALLATION STANDARDS.

INSTALL ALL EXTERIOR DUCTWORK PER SMACNA FIG. 6-3. WHERE DRAWINGS DO NOT INDICATE OTHERWISE, DUCTWORK SEAMS AND JOINTS SHALL BE SEALED WATERTIGHT AND PITCHED TO SHED WATER.

SUPPORT ALL DUCT SYSTEMS IN ACCORDANCE WITH THE SMACNA HVAC DUCT CONSTRUCTION STANDARDS: METAL AND FLEXIBLE AND THE SMACNA SEISMIC RESTRAINT MANUAL: GUIDELINES FOR MECHANICAL SYSTEMS, WHERE APPLICABLE.

ADHESIVES, SEALANTS, TAPES, VAPOR RETARDERS, FILMS, AND OTHER SUPPLEMENTARY MATERIALS ADDED TO DUCTS, PLENUMS, HOUSING PANELS, SILENCERS, ETC. SHALL HAVE FLAME SPREAD/SMOKE DEVELOPED RATINGS OF UNDER 25/50 PER ASTM E84, NFPA 255, OR UL 723.

**DUCTWORK SEALING**  
OPENINGS, SUCH AS ROTATING SHAFTS, SHALL BE SEALED WITH BUSHINGS OR SIMILAR.

PRESSURE SENSITIVE TAPE SHALL NOT BE USED AS THE PRIMARY SEALANT UNLESS IT HAS BEEN CERTIFIED TO COMPLY WITH UL-181A OR UL-181B BY AN INDEPENDENT TESTING LABORATORY AND THE TAPE IS USED IN ACCORDANCE WITH THAT CERTIFICATION.

ALL CONNECTIONS SHALL BE SEALED INCLUDING, BUT NOT LIMITED TO, TAPS, OTHER BRANCH CONNECTIONS, ACCESS DOORS, ACCESS PANELS, AND DUCT CONNECTIONS TO EQUIPMENT. SEALING THAT WOULD VOID PRODUCT LISTINGS IS NOT REQUIRED. SPIRAL LOCK SEAMS NEED NOT BE SEALED.

MASTIC-BASED DUCT SEALANTS SHALL BE APPLIED TO JOINTS AND SEAMS IN MINIMUM 3 INCH WIDE BY 20 MIL THICK BANDS USING BRUSH, PUTTY KNIFE, TROWEL, OR SPRAY, UNLESS MANUFACTURER'S DATA SHEET SPECIFIES OTHER APPLICATION METHODS OR REQUIREMENTS.

FOR SEAL CLASS A DUCTS, ALL TRANSVERSE JOINTS, LONGITUDINAL SEAMS, AND DUCT WALL PENETRATIONS SHALL BE SEALED. JOINTS ARE INCLUSIVE OF, BUT NOT LIMITED TO, GIRTH JOINTS, BRANCH AND SUB-BRANCH INTERSECTIONS, DUCT COLLAR TAP-INS, FITTING SUBSECTIONS, LOUVER AND AIR TERMINAL CONNECTIONS TO DUCTS, ACCESS DOOR AND ACCESS PANEL FRAMES AND JAMBS, DUCT, PLENUM, AND CASING ABUTMENTS TO BUILDING STRUCTURES.

DOUBLE-WALL DUCTWORK: INSTALL INSULATION END FITTINGS AT ALL TRANSITIONS FROM DOUBLE TO SINGLE-WALL CONSTRUCTION.

**TESTING**  
DUCT  $\geq$  2" WG OR LESS (POSITIVE OR NEGATIVE):  
SYSTEMS SHALL NOT LEAK MORE THAN SHOWN IN TABLE 4-1 OF SMACNA HVAC AIR DUCT LEAKAGE TEST MANUAL FOR SEAL CLASS A.

LEAK TESTING OF THESE SYSTEMS IS NOT NORMALLY REQUIRED FOR INTERIOR DUCTWORK. HOWEVER, LEAK TESTS WILL BE REQUIRED IF, IN THE OPINION OF THE ARCHITECT/ENGINEER, THE LEAKAGE APPEARS EXCESSIVE. ALL EXTERIOR DUCTWORK SHALL BE TESTED. IF DUCT HAS OUTSIDE WRAP, TESTING SHALL BE DONE BEFORE IT IS APPLIED.

LEAK TEST SHALL BE AT THE CONTRACTOR'S EXPENSE AND SHALL REQUIRE CAPPING AND SEALING ALL OPENINGS.

SEAL DUCTS TO BRING THE AIR LEAKAGE INTO COMPLIANCE.

CONTRACTOR SHALL NOTIFY THE ARCHITECT/ENGINEER FIVE BUSINESS DAYS PRIOR TO PRESSURIZING DUCTWORK FOR TESTING.

**DUCTWORK PENETRATIONS**  
ALL DUCT PENETRATIONS OF FIREWALLS SHALL HAVE FIRE OR FIRE/SMOKE DAMPERS WHERE REQUIRED BY CODE.

DAMPERS SHALL BE COMPATIBLE WITH FIRE RATING OF WALL ASSEMBLY. VERIFY ACTUAL RATING OF ANY WALL BEING PENETRATED WITH ARCHITECT/ENGINEER.

SEAL ALL DUCT PENETRATIONS OF WALLS THAT ARE NOT FIRE RATED BY CAULKING OR PACKING WITH FIBERGLASS. INSTALL GALVANIZED STEEL (UNLESS OTHERWISE INDICATED) TRIM STRIP TO COVER VACANT SPACE AND RAW CONSTRUCTION EDGES OF ALL RECTANGULAR OPENINGS IN FINISHED ROOMS.

**23 33 00 DUCTWORK ACCESSORIES**

**SECTION INCLUDES**  
MANUAL VOLUME DAMPERS  
DUCT ACCESS DOORS  
DUCT TEST HOLES

**REFERENCES**  
ASTM E477-08A - STANDARD TEST METHOD FOR MEASURING ACOUSTICAL AND AIRFLOW PERFORMANCE OF DUCT LINER MATERIALS AND PREFABRICATED SILENCERS.  
ASTM E2336-04 - STANDARD TEST METHODS FOR FIRE RESISTIVE GREASE DUCT ENCLOSURE SYSTEMS.  
NFPA 90A - INSTALLATION OF AIR-CONDITIONING AND VENTILATING SYSTEMS.  
SMACNA - HVAC DUCT CONSTRUCTION STANDARDS - THIRD EDITION - 2005.  
UL 33 - HEAT RESPONSIVE LINKS FOR FIRE PROTECTION SERVICE.  
UL 555 - FIRE DAMPERS AND CEILING DAMPERS.  
UL 555C - CEILING DAMPERS.  
UL 555S - LEAKAGE RATED DAMPERS FOR USE IN SMOKE CONTROL SYSTEMS.

**SUBMITTALS**  
SUBMIT SHOP DRAWINGS UNDER PROVISIONS OF SECTION 23 05 00.  
SUBMIT MANUFACTURER'S INSTALLATION INSTRUCTIONS.

**MANUAL VOLUME DAMPERS**  
FABRICATE IN ACCORDANCE WITH SMACNA DUCT CONSTRUCTION STANDARDS, AND AS INDICATED.  
FABRICATE SINGLE BLADE DAMPERS FOR DUCT SIZES TO 9-1/2 X 30 INCHES.  
FABRICATE MULTI\_BLADE DAMPER OF OPPOSED BLADE PATTERN WITH MAXIMUM BLADE SIZES 12" X 72".  
ASSEMBLE CENTER AND EDGE CRIMPED BLADES IN PRIME COATED OR GALVANIZED CHANNEL FRAME WITH SUITABLE HARDWARE.  
EXCEPT IN ROUND DUCTWORK 12 INCHES AND SMALLER, PROVIDE END BEARINGS. ON MULTIPLE BLADE DAMPERS, PROVIDE MOLDED SYNTHETIC OR OIL-IMPREGNATED NYLON OR SINTERED BRONZE BEARINGS.  
PROVIDE LOCKING QUADRANT REGULATORS ON SINGLE AND MULTI-BLADE DAMPERS.  
ON INSULATED DUCTS, MOUNT QUADRANT REGULATORS ON STAND-OFF MOUNTING BRACKETS, BASES, OR ADAPTERS.  
IF BLADES ARE IN OPEN POSITION AND EXTEND INTO THE MAIN DUCT, MOUNT DAMPER SO BLADES ARE PARALLEL TO AIRFLOW.

**DUCT ACCESS DOORS**  
FABRICATE PER FIG. 7-2 AND 7-3 OF THE SMACNA HVAC DUCT CONSTRUCTION STANDARDS AND AS INDICATED.  
REVIEW LOCATIONS PRIOR TO FABRICATION. INSTALL ACCESS DOORS AT FIRE DAMPERS, SMOKE DAMPERS, MOTORIZED DAMPERS, FAN BEARINGS, FILTERS, AUTOMATIC CONTROLS, HUMIDIFIERS, LOUVERS, DUCT COILS AND OTHER EQUIPMENT REQUIRING SERVICE INSIDE THE DUCT.  
CONSTRUCTION SHALL BE SUITABLE FOR THE PRESSURE CLASS OF THE DUCT. FABRICATE RIGID, AIRTIGHT, AND CLOSE-FITTING DOORS OF MATERIALS IDENTICAL TO ADJACENT DUCTWORK WITH SEALING GASKETS BUTT OR PIANO HINGES, AND QUICK FASTENING LOCKING DEVICES. FOR INSULATED DUCTWORK, INSTALL MINIMUM ONE INCH (25 MM) THICK INSULATION WITH SHEET METAL COVER.  
ACCESS DOORS WITH SHEET METAL SCREW FASTENERS ARE NOT ACCEPTABLE.  
MINIMUM SIZE FOR ACCESS DOORS SHALL BE 24" (600 MM) X 16" (400 MM) OR FULL DUCT SIZE, WHICHEVER IS LESS.  
PROVIDE DUCT ACCESS DOOR IN ALL HORIZONTAL RETURN DUCTWORK AT 20 FOOT (6 M) INTERVALS PER NFPA 90A.

**DUCT TEST HOLES**  
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.

**INSTALLATION**  
INSTALL ACCESSORIES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.  
WHERE DUCT ACCESS DOORS ARE LOCATED ABOVE INACCESSIBLE CEILINGS, PROVIDE CEILING ACCESS DOORS. COORDINATE LOCATION WITH THE ARCHITECT/ENGINEER.  
COORDINATE AND INSTALL ACCESS DOORS PROVIDED BY OTHERS.  
PROVIDE ACCESS DOORS FOR ALL EQUIPMENT REQUIRING MAINTENANCE OR ADJUSTMENT ABOVE AN INACCESSIBLE CEILING. MINIMUM SIZE SHALL BE 24" X 24".  
PROVIDE DUCT TEST HOLES WHERE INDICATED AND AS REQUIRED FOR TESTING AND BALANCING PURPOSES.  
**MANUAL VOLUME DAMPER:**  
PROVIDE MANUAL VOLUME DAMPERS AT POINTS ON LOW PRESSURE SUPPLY, RETURN, AND EXHAUST SYSTEMS WHERE BRANCHES ARE TAKEN FROM LARGER DUCTS WHERE INDICATED ON DRAWINGS AND AS REQUIRED FOR AIR BALANCING. USE SPLITTER DAMPERS NOT ACCEPTABLE.  
PROVIDE CEILING ACCESS DOORS FOR MANUAL VOLUME DAMPERS. WHEN MANUAL VOLUME DAMPERS ARE LOCATED ABOVE AN INACCESSIBLE CEILING AND AN ACCESS DOOR CANNOT BE INSTALLED, PROVIDE A REMOTE CONTROLLED VOLUME CONTROL DEVICE FOR OPERATION OF THE DAMPER. COORDINATE LOCATION WITH THE ARCHITECT/ENGINEER.

**23 37 00 AIR INLETS AND OUTLETS**

**SECTION INCLUDES**  
CONDENSATE EXHAUST HOOD  
GRILLES AND REGISTERS

**QUALITY ASSURANCE**  
TEST AND RATE PERFORMANCE OF AIR INLETS AND OUTLETS PER ASHRAE 70.  
TEST AND RATE PERFORMANCE OF LOUVERS PER AMCA 500L-99.

ALL AIR HANDLING AND DISTRIBUTION EQUIPMENT MOUNTED OUTDOORS SHALL BE DESIGNED TO PREVENT RAIN INTRUSION INTO THE AIRSTREAM WHEN TESTED AT DESIGN AIRFLOW AND WITH NO AIRFLOW, USING THE RAIN TEST APPARATUS DESCRIBED IN SECTION 58 OF UL 1995.

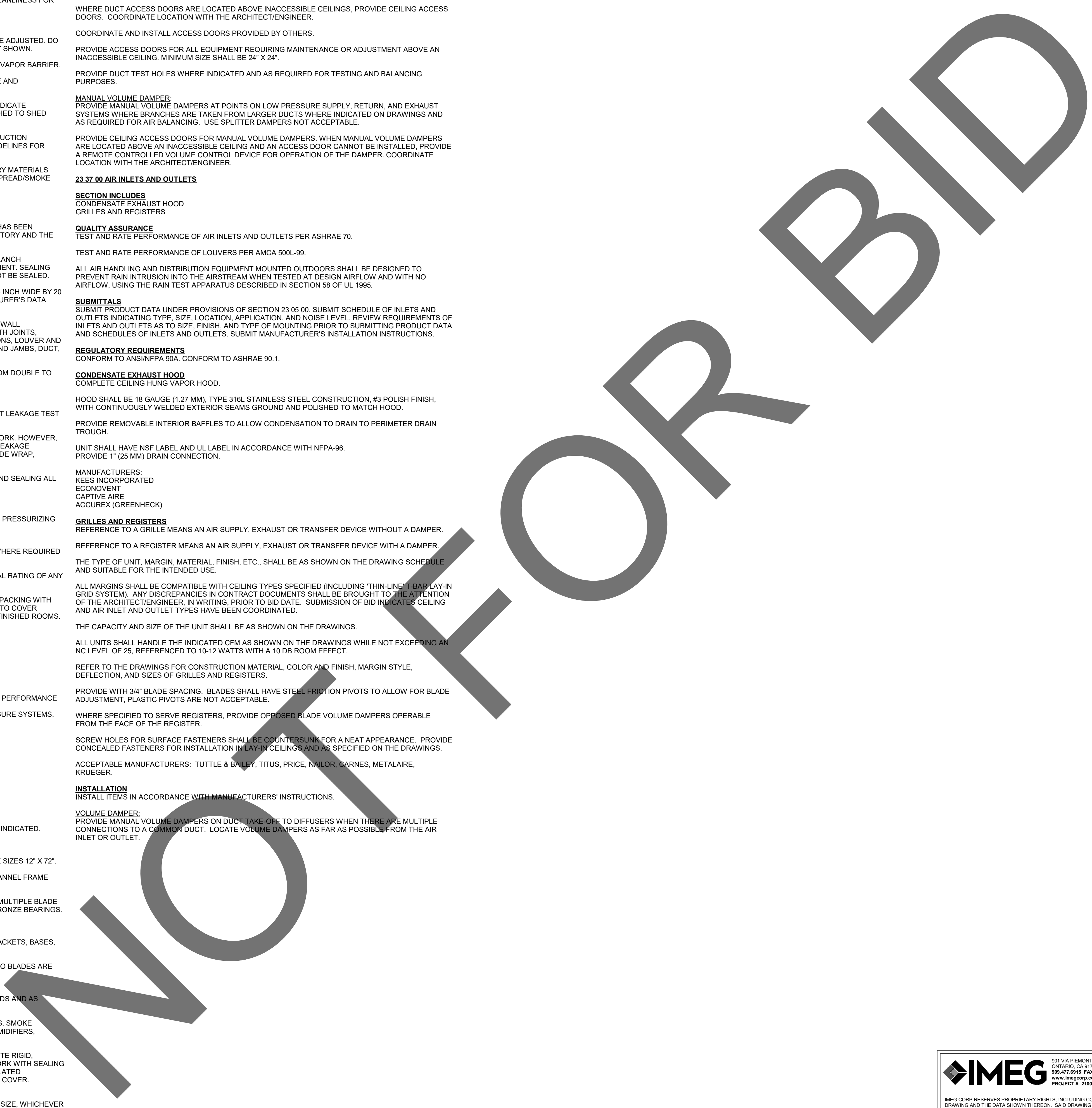
**SUBMITTALS**  
SUBMIT PRODUCT DATA UNDER PROVISIONS OF SECTION 23 05 00. SUBMIT SCHEDULE OF INLETS AND OUTLETS INDICATING TYPE, SIZE, LOCATION, APPLICATION, AND NOISE LEVEL. REVIEW REQUIREMENTS OF INLETS AND OUTLETS AS TO SIZE, FINISH, AND TYPE OF MOUNTING PRIOR TO SUBMITTING PRODUCT DATA AND SCHEDULES OF INLETS AND OUTLETS. SUBMIT MANUFACTURER'S INSTALLATION INSTRUCTIONS.

**REGULATORY REQUIREMENTS**  
CONFORM TO ANSINFFA 90A. CONFORM TO ASHRAE 90.1.

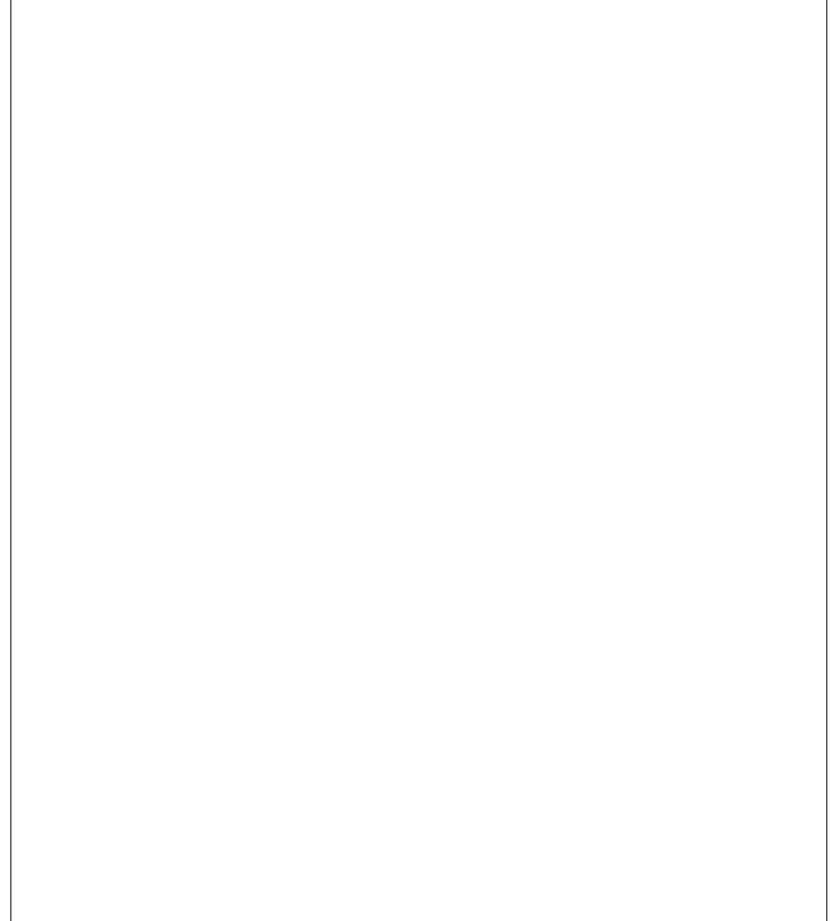
**CONDENSATE EXHAUST HOOD**  
COMPLETE CEILING HUNG VAPOR HOOD.  
HOOD SHALL BE 18 GAUGE (1.27 MM), TYPE 316L STAINLESS STEEL CONSTRUCTION, #3 POLISH FINISH, WITH CONTINUOUSLY WELDED EXTERIOR SEAMS GROUND AND POLISHED TO MATCH HOOD.  
PROVIDE REMOVABLE INTERIOR BAFFLES TO ALLOW CONDENSATION TO DRAIN TO PERIMETER DRAIN TROUGH.  
UNIT SHALL HAVE NSF LABEL AND UL LABEL IN ACCORDANCE WITH NFPA-96.  
PROVIDE 1" (25 MM) DRAIN CONNECTION.  
MANUFACTURERS:  
KEES INCORPORATED  
ECONOVENT  
CAPTIVE AIRE  
ACCUREX (GREENHECK)

**GRILLES AND REGISTERS**  
REFERENCE TO A GRILLE MEANS AN AIR SUPPLY, EXHAUST OR TRANSFER DEVICE WITHOUT A DAMPER. REFERENCE TO A REGISTER MEANS AN AIR SUPPLY, EXHAUST OR TRANSFER DEVICE WITH A DAMPER.  
THE TYPE OF UNIT, MARGIN, MATERIAL, FINISH, ETC., SHALL BE AS SHOWN ON THE DRAWING SCHEDULE AND SUITABLE FOR THE INTENDED USE.  
ALL MARGINS SHALL BE COMPATIBLE WITH CEILING TYPES SPECIFIED (INCLUDING THIN-LINE IT-BAR LAY-IN GRID SYSTEM). ANY DISCREPANCIES IN CONTRACT DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER, IN WRITING, PRIOR TO BID DATE. SUBMISSION OF BID INDICATES CEILING AND AIR INLET AND OUTLET TYPES HAVE BEEN COORDINATED.  
THE CAPACITY AND SIZE OF THE UNIT SHALL BE AS SHOWN ON THE DRAWINGS.  
ALL UNITS SHALL HANDLE THE INDICATED CFM AS SHOWN ON THE DRAWINGS WHILE NOT EXCEEDING AN NC LEVEL OF 25, REFERENCED TO 10-12 WATTS WITH A 10 DB ROOM EFFECT.  
REFER TO THE DRAWINGS FOR CONSTRUCTION MATERIAL, COLOR AND FINISH, MARGIN STYLE, DEFLECTION, AND SIZES OF GRILLES AND REGISTERS.  
PROVIDE WITH 3/4" BLADE SPACING. BLADES SHALL HAVE STEEL FRICTION PIVOTS TO ALLOW FOR BLADE ADJUSTMENT, PLASTIC PIVOTS ARE NOT ACCEPTABLE.  
WHERE SPECIFIED TO SERVE REGISTERS, PROVIDE OPPOSED BLADE VOLUME DAMPERS OPERABLE FROM THE FACE OF THE REGISTER.  
SCREW HOLES FOR SURFACE FASTENERS SHALL BE COUNTERSUNK FOR A NEAT APPEARANCE. PROVIDE CONCEALED FASTENERS FOR INSTALLATION IN LAY-IN CEILINGS AND AS SPECIFIED ON THE DRAWINGS.  
ACCEPTABLE MANUFACTURERS: TUTTLE & BAILEY, TITUS, PRICE, NAILOR, CARNES, METALAIRE, KRUEGER.

**INSTALLATION**  
INSTALL ITEMS IN ACCORDANCE WITH MANUFACTURERS' INSTRUCTIONS.  
**VOLUME DAMPER:**  
PROVIDE MANUAL VOLUME DAMPERS ON DUCT TAKE-OFF TO DIFFUSERS WHEN THERE ARE MULTIPLE CONNECTIONS TO A COMMON DUCT. LOCATE VOLUME DAMPERS AS FAR AS POSSIBLE FROM THE AIR INLET OR OUTLET.



PROJECT TITLE  
**STERILIZATION SYSTEM  
INSTALLATION  
FOR THE  
ARROWHEAD REGIONAL  
MEDICAL CENTER**  
400 N. PEPPER AVE.  
COLTON, CA. 92324  
WBSE #: 10.10.1142  
CIP #: 21-154  
CAF# #: COL003



Office of Statewide Health Planning and Development  
**HCAI # S222347-36-00**

**REFERENCE PLAN**

PROJECT AREA

GRD FLOOR

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**SPECIFICATIONS**

DATE: **12/28/2022**

REVISIONS

HCAI COMMENTS 2/13/2023

**marks architects**

73121 fred waring drive suite 200 palm deserf, ca 92260 760-327-6800

PROJECT NUMBER: **3021022**

REGISTERED ARCHITECT  
DAVID WILLIAM CLARKE  
C-21219  
30-23  
EXPIRES DATE

PROJECT NUMBER: **3021022**

DRAWING NUMBER: **M0.6**

**IMEG**

901 VIA PIEMONTE, SUITE 400  
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PROJECT # 21007609.00

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REFERENCE SCALE IN INCHES  
0 1 2 3

REGISTERED PROFESSIONAL ENGINEER  
MANSURU P. SHARMA  
No. M25602  
Exp. 9/30/24  
MECHANICAL  
STATE OF CALIFORNIA

ARMC SPD Sterilization Washer Replacement

21007609.00 5/10/2023 6:42:56 PM

**HANGER ROD  
 DIAMETER = 1/2"**

**PIPING/CONDUIT TRANSVERSE  
 SEISMIC SOLID BRACING SYSTEM  
 3"Ø PIPE/CONDUIT MAX**

**KIT OPTIONS  
 S122T  
 SH412T  
 SH420T**

REF. M PAGES FOR CONNECTION DETAILS  
 3/8" Ø ASTM A36 ATR, TYP  
 MASON IND. N.Y. UCC ROD STIFFENER CLAMP  
 TORQUE TO 10 FT-LBS, TYP  
 1 1/2" x 1 1/2" x 12GA SINGLE STRUT, ROD STIFFENER, WHERE REQ'D  
 1/2" Ø NUT (T&B SNUG TIGHT)  
 MW-WPL LUG AS SHOWN OR PIPE CLAMP OPTIONS 5, 6, 7  
 BOTH SIDES OF PIPE HANGER LUG, TYP  
 3"Ø PIPE/CONDUIT MAX  
 INSULATION WHERE REQ'D

REF. N PAGES FOR BRACKET CONNECTION DETAILS  
 MASON IND. N.Y. UCC ROD STIFFENER CLAMP  
 TORQUE TO 10 FT-LBS, TYP  
 1 1/2" x 1 1/2" x 12GA SINGLE STRUT, ROD STIFFENER, WHERE REQ'D  
 REFER TO TABLE FOR ALLOWABLE BRACE ANGLE RANGE

BRACE MEMBER 1, SEE VIEW A-A  
 (1) MW-SSN-1/2 WITH MW-BON-1/2 TORQUED UNTIL NUT BREAKS OFF (REF. PAGE X4.0)<sup>3</sup>  
 MASON IND. N.Y. SHB-1/2 AS SHOWN OR SSB5-12 OPTION 1<sup>4</sup>

MAX ALLOWABLE FORCE PER SEISMIC BRACE ASSEMBLY, Fp

BRACE ANGLE RANGE	WPL	SPC (STL) <sup>1</sup>	SPC (CI) <sup>2</sup>
30° - 45°	350 LBS	460 LBS	220 LBS
46° - 60°	350 LBS	410 LBS	220 LBS

\* STL = STEEL PIPING  
 \* CI = CAST IRON PIPING

NOTES:  
 1. REF. SECTION A10 OR A20 FOR GENERAL NOTES.  
 2. PROVIDE ROD STIFFENING ONLY WHERE SEISMIC BRACKETS ARE ATTACHED TO THE ROD AND ROD LENGTH (L) EXCEEDS 31". REF. APPROPRIATE M10 PAGES FOR DETAIL.  
 3. PROVIDE (1) 1/2" DIA. CONNECTION IN CENTER HOLE WHEN STRUT BRACE IS INSTALLED INSIDE THE BRACKET AND (2) 1/2" DIA. CONNECTIONS IN (2) OUTER HOLES WHEN THE BRACE IS INSTALLED OUTSIDE OF THE BRACKET. REF. X2.3 FOR CONNECTION DETAILS.  
 4. FOR PIPE/CONDUIT SIZES UP TO 3"Ø MAX, USE RESPECTIVE MW-SSP SIZE (REF. X8.3-X8.3.1) OR USE MW-WPL-50 (REF. X8.4).  
 5. REF. SECTION A15 OR A25 FOR ALTERNATE ARRANGEMENTS OF SEISMIC BRACES.  
 6. REF. PAGE A19.0 OR A28.0 FOR PIPE/CONDUIT CLAMP OPTION.

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PAGE **C1.20**

**HANGER ATTACHMENT  
 TO CONCRETE FILLED METAL DECK  
 WITH (1) HILTI KB-T22 CONCRETE ANCHOR**

2 1/2" MIN FOR 3/8" Ø  
 3 1/4" MIN FOR 1/2" Ø

MIN 20 GA STEEL DECK WITH MIN 3000 FSI NWC OR SLWC  
 HILTI KB-T22 CONCRETE ANCHOR, TYP  
 REGULAR OR REDUCING ROD COUPLER, TYP  
 ATR HANGER, TYP

MIN FLUTE WIDTH FOR INCH  
 3 1/4" 1 5/8"  
 4 1/2" 1"

HILTI KB-T22 CONCRETE ANCHOR (ICC ESR-4266)  
 SPECIAL INSPECTION REQ'D

HANGER ATTACHMENT TYPE	ALLOWABLE VERTICAL LOAD Ta LBS	MIN ATR HANGER DIA. INCH	MIN EFF. DIA. INCH	MIN HOLE DEPTH INCH	MIN SPACING Smin INCH	MIN END DIST. Cmin INCH	TORQUE REQ'D FT-LBS
38A TO 38J	980	3/8	3/8	2 1/2	3 1/4	3 3/4	30
38A TO 38L	1340	1/2	1/2	2 1/2	3 1/4	3 3/4	50
50A TO 50L	1340	3/4	3/4	2 1/2	3 1/4	3 3/4	50
63A TO 63L	1340	1/2	1/2	2 1/2	3 1/4	3 3/4	50
38A TO 38L	1370	3/8	3/8	3 1/4	4 1/4	4 1/4	50
63A TO 63L	1370	3/8	3/8	3 1/4	4 1/4	4 1/4	50
50A TO 50M	1610	1/2	1/2	3 1/4	4 1/4	4 1/4	40
63A TO 63M	1610	3/4	3/4	2 1/4	3 3/4	3 3/4	40
75A TO 75M	1610	3/4	3/4	2 1/4	3 3/4	3 3/4	40
50A TO 50M	1800	1/2	1/2	3 1/4	4 1/4	4 1/4	40
63A TO 63M	1800	3/4	3/4	4	4 1/4	4 1/4	40
75A TO 75M	1800	3/4	3/4	4	4 1/4	4 1/4	40
63A TO 63L	1530	3/4	3/4	3 1/4	4 1/4	4 1/4	110
75A TO 75L	1530	3/4	3/4	3 1/4	4 1/4	4 1/4	110
88A TO 88L	1530	3/4	3/4	3 1/4	4 1/4	4 1/4	110

MAX OF: 3" Hef OR 1.5" FLUTE WIDTH

SEE DETAIL M9.00 FOR SECTION NOTES  
 \*ALLOWABLE LOADS HAVE BEEN INCREASED BY A FACTOR OF 1.2 FOR LOAD COMBINATIONS INCLUDING OVERSTRENGTH, D<sub>p</sub>, PER ASCE 7-10 SEC. 12.4.3.3.

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PAGE **M2.130**

**HANGER ROD  
 DIAMETER = 1/2"**

**PIPING/CONDUIT ALL-DIRECTIONAL  
 SEISMIC SOLID BRACING SYSTEM  
 3"Ø PIPE/CONDUIT MAX**

**KIT OPTIONS  
 S12A  
 S120A  
 SH412A  
 SH420A**

REF. M PAGES FOR CONNECTION DETAILS  
 3/8" Ø ASTM A36 ATR, TYP  
 MASON IND. N.Y. UCC ROD STIFFENER CLAMP  
 TORQUE TO 10 FT-LBS, TYP  
 1 1/2" x 1 1/2" x 12GA SINGLE STRUT, ROD STIFFENER, WHERE REQ'D  
 1/2" Ø NUT (T&B SNUG TIGHT)  
 MW-WPL LUG AS SHOWN OR PIPE CLAMP OPTIONS 5, 6, 7  
 BOTH SIDES OF PIPE HANGER LUG, TYP  
 3"Ø PIPE/CONDUIT MAX  
 INSULATION WHERE REQ'D

REF. N PAGES FOR BRACKET CONNECTION DETAILS  
 MASON IND. N.Y. UCC ROD STIFFENER CLAMP  
 TORQUE TO 10 FT-LBS, TYP  
 1 1/2" x 1 1/2" x 12GA SINGLE STRUT, ROD STIFFENER, WHERE REQ'D  
 REFER TO TABLE FOR ALLOWABLE BRACE ANGLE RANGE

BRACE MEMBER 1, SEE VIEW A-A  
 (1) MW-SSN-1/2 WITH MW-BON-1/2 TORQUED UNTIL NUT BREAKS OFF (REF. PAGE X4.0)<sup>3</sup>  
 MASON IND. N.Y. SHB-1/2 AS SHOWN OR SSB5-12 OPTION 1<sup>4</sup>  
 (1) MW-SSN-1/2 WITH MW-BON-1/2 TORQUED UNTIL NUT BREAKS OFF (REF. PAGE X4.0)<sup>3</sup>

MAX ALLOWABLE FORCE PER SEISMIC BRACE ASSEMBLY, Fp

BRACE ANGLE RANGE	WPL	SPC (STL) <sup>1</sup>	SPC (CI) <sup>2</sup>
30° - 45°	350 LBS	500 LBS	220 LBS
46° - 60°	350 LBS	290 LBS	220 LBS

\* STL = STEEL PIPING  
 \* CI = CAST IRON PIPING

NOTES:  
 1. REF. SECTION A10 OR A20 FOR GENERAL NOTES.  
 2. PROVIDE ROD STIFFENING ONLY WHERE SEISMIC BRACKETS ARE ATTACHED TO THE ROD AND ROD LENGTH (L) EXCEEDS 20". REF. APPROPRIATE M10 PAGES FOR DETAIL.  
 3. PROVIDE (1) 1/2" DIA. CONNECTION IN CENTER HOLE WHEN STRUT BRACE IS INSTALLED INSIDE THE BRACKET AND (2) 1/2" DIA. CONNECTIONS IN (2) OUTER HOLES WHEN THE BRACE IS INSTALLED OUTSIDE OF THE BRACKET. REF. X2.3 FOR CONNECTION DETAILS.  
 4. MW-KY-50 MUST BE USED ON TOP OF BOTTOM SHB WHEN STACKING (2) SHB ON THE SAME ROD, REF. X2.4.  
 5. FOR PIPE/CONDUIT SIZES UP TO 3"Ø MAX, USE RESPECTIVE MW-SSP SIZE (REF. X8.3-X8.3.1) OR USE MW-WPL-50 (REF. X8.4).  
 6. REF. SECTION A15 OR A25 FOR ALTERNATE ARRANGEMENTS OF SEISMIC BRACES.  
 7. REF. PAGE A19.0 OR A28.0 FOR PIPE/CONDUIT CLAMP OPTION.

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PAGE **C1.22**

**HANGER ROD  
 DIAMETER = 1/2"**

**PIPING/CONDUIT ALL-DIRECTIONAL  
 SEISMIC SOLID BRACING SYSTEM  
 5"Ø PIPE/CONDUIT MAX**

**KIT OPTIONS  
 S20A  
 S2012A  
 SH512A  
 SH520A**

REF. M PAGES FOR CONNECTION DETAILS  
 3/8" Ø ASTM A36 ATR, TYP  
 MASON IND. N.Y. UCC ROD STIFFENER CLAMP  
 TORQUE TO 10 FT-LBS, TYP  
 1 1/2" x 1 1/2" x 12GA SINGLE STRUT, ROD STIFFENER, WHERE REQ'D  
 1/2" Ø NUT (T&B SNUG TIGHT)  
 MW-WPL LUG AS SHOWN OR PIPE CLAMP OPTIONS 5, 6, 7  
 BOTH SIDES OF PIPE HANGER LUG, TYP  
 5"Ø PIPE/CONDUIT MAX  
 INSULATION WHERE REQ'D

REF. N PAGES FOR BRACKET CONNECTION DETAILS  
 MASON IND. N.Y. UCC ROD STIFFENER CLAMP  
 TORQUE TO 10 FT-LBS, TYP  
 1 1/2" x 1 1/2" x 12GA SINGLE STRUT, ROD STIFFENER, WHERE REQ'D  
 REFER TO TABLE FOR ALLOWABLE BRACE ANGLE RANGE

BRACE MEMBER 1, SEE VIEW A-A  
 (1) MW-SSN-1/2 WITH MW-BON-1/2 TORQUED UNTIL NUT BREAKS OFF (REF. PAGE X4.0)<sup>3</sup>  
 MASON IND. N.Y. SHB-1/2 AS SHOWN OR SSB5-20 OPTION 1<sup>4</sup>

MAX ALLOWABLE FORCE PER SEISMIC BRACE ASSEMBLY, Fp

BRACE ANGLE RANGE	WPL	SPC (STL) <sup>1</sup>	SPC (CI) <sup>2</sup>
30° - 45°	580 LBS	590 LBS	300 LBS
46° - 60°	410 LBS	420 LBS	270 LBS

\* STL = STEEL PIPING  
 \* CI = CAST IRON PIPING

NOTES:  
 1. REF. SECTION A10 OR A20 FOR GENERAL NOTES.  
 2. PROVIDE ROD STIFFENING ONLY WHERE SEISMIC BRACKETS ARE ATTACHED TO THE ROD AND ROD LENGTH (L) EXCEEDS 31". REF. APPROPRIATE M10 PAGES FOR DETAIL.  
 3. PROVIDE (1) 1/2" DIA. CONNECTION IN CENTER HOLE WHEN STRUT BRACE IS INSTALLED INSIDE THE BRACKET AND (2) 1/2" DIA. CONNECTIONS IN (2) OUTER HOLES WHEN THE BRACE IS INSTALLED OUTSIDE OF THE BRACKET. REF. X2.3 FOR CONNECTION DETAILS.  
 4. MW-KY-63 MUST BE USED ON TOP OF BOTTOM SHB WHEN STACKING (2) SHB ON THE SAME ROD, REF. X2.4.  
 5. FOR PIPE/CONDUIT SIZES UP TO 5"Ø MAX, USE RESPECTIVE MW-SSP SIZE (REF. X8.3-X8.3.1) OR USE MW-WPL-63 (REF. X8.4).  
 6. REF. SECTION A15 OR A25 FOR ALTERNATE ARRANGEMENTS OF SEISMIC BRACES.  
 7. REF. PAGE A19.0 OR A28.0 FOR PIPE/CONDUIT CLAMP OPTION.

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PAGE **C1.34**

**HANGER ATTACHMENT  
 TO CONCRETE FILLED METAL DECK  
 WITH (1) HILTI KB-T22 CONCRETE ANCHOR**

2 1/2" MIN FOR 3/8" Ø  
 3 1/4" MIN FOR 1/2" Ø

MIN 20 GA STEEL DECK WITH MIN 3000 FSI NWC OR SLWC  
 HILTI KB-T22 CONCRETE ANCHOR, TYP  
 REGULAR OR REDUCING ROD COUPLER, TYP  
 ATR HANGER, TYP

MIN FLUTE WIDTH FOR INCH  
 3 1/4" 1 5/8"  
 4 1/2" 1"

HILTI KB-T22 CONCRETE ANCHOR (ICC ESR-4266)  
 SPECIAL INSPECTION REQ'D

HANGER ATTACHMENT TYPE	ALLOWABLE VERTICAL LOAD Ta LBS	MIN ATR HANGER DIA. INCH	MIN EFF. DIA. INCH	MIN HOLE DEPTH INCH	MIN SPACING Smin INCH	MIN END DIST. Cmin INCH	TORQUE REQ'D FT-LBS
38A TO 38J	980	3/8	3/8	2 1/2	3 1/4	3 3/4	30
38A TO 38L	1340	1/2	1/2	2 1/2	3 1/4	3 3/4	50
50A TO 50L	1340	3/4	3/4	2 1/2	3 1/4	3 3/4	50
63A TO 63L	1340	1/2	1/2	2 1/2	3 1/4	3 3/4	50
38A TO 38L	1370	3/8	3/8	3 1/4	4 1/4	4 1/4	50
63A TO 63L	1370	3/8	3/8	3 1/4	4 1/4	4 1/4	50
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63A TO 63M	1610	3/4	3/4	2 1/4	3 3/4	3 3/4	40
75A TO 75M	1610	3/4	3/4	2 1/4	3 3/4	3 3/4	40
50A TO 50M	1800	1/2	1/2	3 1/4	4 1/4	4 1/4	40
63A TO 63M	1800	3/4	3/4	4	4 1/4	4 1/4	40
75A TO 75M	1800	3/4	3/4	4	4 1/4	4 1/4	40
63A TO 63L	1530	3/4	3/4	3 1/4	4 1/4	4 1/4	110
75A TO 75L	1530	3/4	3/4	3 1/4	4 1/4	4 1/4	110
88A TO 88L	1530	3/4	3/4	3 1/4	4 1/4	4 1/4	110

MAX OF: 3" Hef OR 1.5" FLUTE WIDTH

SEE DETAIL M9.00 FOR SECTION NOTES  
 \*ALLOWABLE LOADS HAVE BEEN INCREASED BY A FACTOR OF 1.2 FOR LOAD COMBINATIONS INCLUDING OVERSTRENGTH, D<sub>p</sub>, PER ASCE 7-10 SEC. 12.4.3.3.

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Jeff "Jeff" Zhang, SE  
 California SE No. 55270

PAGE **M2.130**

**ATR HANGER ATTACHMENT  
 TO STEEL BEAM  
 WITH WELDED BEAM ATTACHMENT**

STRUCTURAL BEAM

STRUCTURAL BEAM

BOTH SIDES OF LUG W/ AUTOMATIC MACHINE WELDING, SEE NOTE 3

MW-WPL WELD BEAM ATTACHMENT (REF. X8.4)  
 MW-WPL MAY BE NOTATED TO ANY ANGLE IN PLAN

REG. NUT TOP AND BOTTOM (SNUG TIGHT)  
 3/4" TO 1" DIA. ATR HANGER

NELSON HBL STUD, WELD BEAM ATTACHMENT

REGULAR OR REDUCING ROD COUPLER  
 3/4" TO 1" DIA. ATR HANGER

NOTE: ALL WELDS TO BE MINIMUM 70xw ELECTRODE WELDS

DETAIL A

HANGER ATTACHMENT TYPE	DETAIL A MW-WPL LUG SIZE INCH	DETAIL B W. WELD NELSON HBL STUD DIA. INCH	ALLOWABLE VERTICAL LOAD LBS	ATR HANGER DIA. INCH
38A TO 38H	MW-WPL-38	3/8	720	3/8
50A TO 50L	MW-WPL-50	1/2	1320	1/2
63A TO 63P	MW-WPL-63	3/8	2880	3/8
75A TO 75Q	MW-WPL-75	3/4	4800	3/4
75A TO 75S	MW-WPL-75A	3/8	8000	3/4
88A TO 88R	MW-WPL-88	3/4	6900	1
100A TO 100S	MW-WPL-100	3/4	8660	1 1/4
125A TO 125T	MW-WPL-125	3/4	N/A	1 1/2

1. SEE DETAIL M9.00 FOR SECTION NOTES  
 2. WELDED ATTACHMENT TO STEEL BEAM SHALL NOT BE PLACED WITHIN THE PROTECTED ZONE AS DEFINED IN AISC 341.  
 3. AUTOMATIC MACHINE WELDING OF NELSON HBL STUD SHALL COMPLY WITH AWS D1.1, SECTION 6: STUD WELDING.  
 4. NELSON HBL STUD TO BE MINIMUM 61KSI TENSILE STRENGTH MILD STEEL CONFORMING TO ASTM A106.

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PAGE **M3.12**

**REFERENCE PLAN**

PROJECT AREA

GRD FLOOR

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REVIEWED IN ACCORDANCE WITH THE REQUIREMENTS OF T24, CCR

**APPROVED**

Department of Health Care Access & Information  
 Office of Statewide Hospital Planning & Development  
 1/4/2024, 9:00:12 AM  
 S222347-36-00  
 Allen Cheng

**DETAILS**

DATE **12/28/2022**

REVISIONS

HCAI COMMENTS 2/13/2023

PROJECT NUMBER **3021022**

DRAWING NUMBER **M3.2**

**marks architects**

73121 fred waring drive suite 200 palm desert, ca 92260 760-327-6800

REGISTERED PROFESSIONAL ENGINEER  
 No. M25602  
 Exp. 9/30/24  
 MECHANICAL  
 STATE OF CALIFORNIA

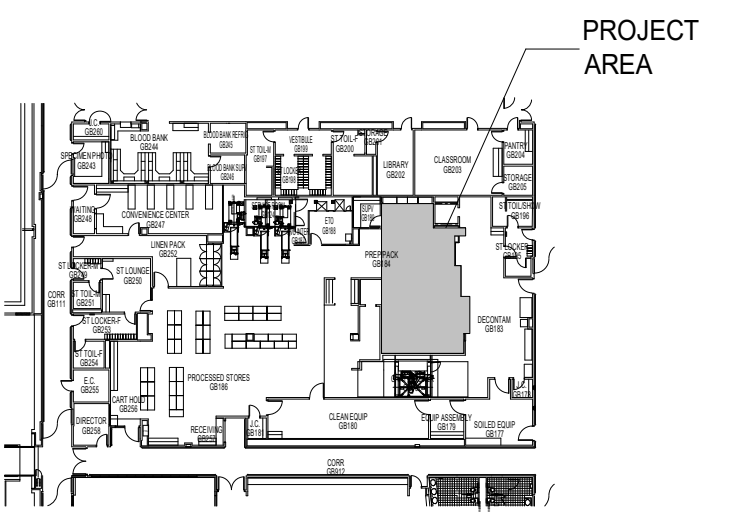
PROJECT # 21007609.00

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**REFERENCE PLAN**



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 architects**

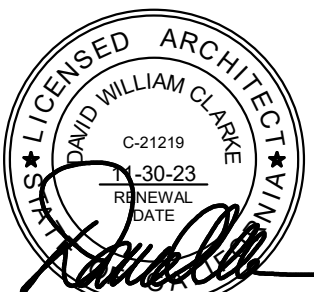
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 suite 200  
 palm desert, ca 92260  
 760-327-6800

**DETAILS**

DATE: 12/28/2022

REVISIONS

1	HCAI COMMENTS 2/13/2023
---	-------------------------



PROJECT NUMBER  
**3021022**

DRAWING NUMBER  
**M3.3**

### SSBS / SHB ALTERNATE CONNECTIONS

**SSBS (1) BOLT ATTACHMENT TO STRUT**

OPEN SIDE OF SINGLE OR DOUBLE STRUT MEMBER, TYP. (REF X2.1)

1" MIN.

STANDARD WASHER, TYP.

(1) 1/2" BOLT (ASTM A307) AND STRUT NUT IN CENTER HOLE. TORQUE TO 50 FT-LBS OR USE 90 FT-LBS MIN. BREAK-OFF NUT.

**SHB (1) BOLT ATTACHMENT TO STRUT**

OPEN SIDE OF SINGLE OR DOUBLE STRUT MEMBER, TYP. (REF X2.1)

1" MIN.

STANDARD WASHER, TYP.

(2) 1/2" BOLTS (ASTM A307) AND STRUT NUTS IN (2) OUTSIDE HOLES. TORQUE TO 50 FT-LBS OR USE 90 FT-LBS MIN. BREAK-OFF NUT.

**SSBS (2) BOLT ATTACHMENT TO STRUT**

OPEN SIDE OF SINGLE OR DOUBLE STRUT MEMBER, TYP. (REF X2.2)

3/4" MIN.

STANDARD WASHER, TYP.

(2) 3/8" BOLTS (ASTM A307) AND STRUT NUTS IN (2) OUTSIDE HOLES. TORQUE TO 50 FT-LBS OR USE 90 FT-LBS MIN. BREAK-OFF NUT.

**SHB (2) BOLT ATTACHMENT TO STRUT**

OPEN SIDE OF SINGLE OR DOUBLE STRUT MEMBER, TYP. (REF X2.1)

3/4" MIN.

STANDARD WASHER, TYP.

(2) 1/2" BOLTS (ASTM A307) AND STRUT NUTS IN (2) OUTSIDE HOLES. SNUG TIGHT.

**SSBS (2) BOLT ATTACHMENT TO STEEL ANGLE**

STEEL ANGLE MEMBER (REF X2.2)

1/2" MIN.

STANDARD WASHER, TYP.

(2) 1/2" BOLTS (ASTM A307) AND NUTS IN (2) OUTSIDE HOLES. SNUG TIGHT.

**SHB (2) BOLT ATTACHMENT TO STEEL ANGLE**

STEEL ANGLE MEMBER (REF X2.1)

1/2" MIN.

STANDARD WASHER, TYP.

(2) 1/2" BOLTS (ASTM A307) AND NUTS IN (2) OUTSIDE HOLES. SNUG TIGHT.

NOTES:  
 1. MW-SSB AND MW-SOB MAY BE SUBSTITUTED FOR 1/2" BOLT AND STRUT NUT DETAIL ABOVE. (REF PAGE X4.9)  
 2. FOR INSTALLATION TO CLOSED SIDE OF STRUT MEMBER, USE 3/8" BOLT (ASTM A307) AND NUTS.

### MASON IND. N.Y. SHB - SEISMIC HOOK BRACE

**TESTED**

FINISH: ALL PARTS ARE ZINC ELECTROPLATED

REFER TO D11.10 - D11.13 FOR CONNECTION TO SUSPENDED COMPONENT

COUNTERBORED NUT RESTRAINT HOLE (CH)

LONGITUDINAL BRACING

STRAUT ATTACHMENT NUT WITH STAMPED TEETH AT OPEN FACE OF STRUT

STANDARD WASHER, TYP.

NUT IS LOCKED IN COUNTERBORE

STRAUT NUT DIMENSIONS<sup>2</sup> MUST HAVE STAMPED TEETH TO ACHIEVE THESE VALUES

**BRACE MEMBER AXIAL RATING (ASD) (LBS)**

AXIAL MEMBER	MAX. LENGTH (FT)
1 1/2" x 1 1/2" x 1/8" SINGLE STRUT	1600 850 415
1 1/2" x 1 1/2" x 1/8" DOUBLE STRUT	3950 2200 1200
L3x3x1/4	5790 1970 920
L3x3x1/2	14400 6200 3000

NOTE: STRUT MUST BE ASTM A1018 OR 33 COLD ROLLED MILD STEEL. SCOTCH FINISH OR SOLID (REF X7.1 & X7.2). DOUBLE STRUT MUST BE MINIMUM 2" LONG. ANGLE MUST BE AS STEEL.

**TYPE SHB DIMENSIONS & RATINGS (ASD)**

SIZE	ROD DIA. (IN)	COUNTERBORED HOLE DIA. (CH) x DEPTH (D)	LATERAL LOAD RATINGS <sup>1</sup>							
			30° - 45°	45° - 60°	60° - 75°	75° - 90°	90°	45° - 60°		
MW-30	3/8	10	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
MW-40	1/2	12	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
MW-50	5/8	14	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
MW-60	3/4	16	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
MW-75	7/8	18	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
MW-90	1	20	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5
MW-100	1 1/8	22	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0
MW-120	1 1/4	24	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5

NOTE: STRUT MUST BE ASTM A1018 OR 33 COLD ROLLED MILD STEEL. SCOTCH FINISH OR SOLID (REF X7.1 & X7.2). DOUBLE STRUT MUST BE MINIMUM 2" LONG. ANGLE MUST BE AS STEEL.

**BRACE ANGLE MEASURED FROM HORIZONTAL**

3. BRACE ANGLE MEASURED FROM HORIZONTAL. WITH BREAK-OFF NUT (MINIMUM OPTICAL STRAIN GAGE) AND HEX BOLT.

4. ATTACHMENT TO STEEL OR OTHER SUBSTRATE IN CONCRETE. WOOD MAY GOVERN THE DESIGN OF THE OVERALL BRACE ASSEMBLY AND SHALL BE EVALUATED ON A PROJECT BY PROJECT BASIS PER ATTACHMENT LOAD RATINGS IN SECTION 9.

**DESIGN LOADS (ASD)**

STEEL PIPE/RIGID STEEL CONDUIT	NO. PIPE SIZE (IN)	D (IN)	STRAP GA.	BOLT TORQUE (FT-LB)	MAX. LOAD 1 (LBS)	MAX. LOAD 2 (LBS)	MAX. LOAD 3 (LBS)
SSC-13	1 1/2	1.66	14	1/2	6	1470	130
SSC-15	1 3/8	1.5	12	3/4	11	1600	160
SSC-20	2	2.375	12	1 1/2	11	2050	250
SSC-25	2 1/2	2.875	12	1 1/2	11	2430	320
SSC-30	3	3.5	12	1 1/2	11	2820	390
SSC-40	4	4.5	11	3/4	20	3290	500
SSC-50	5	5.563	11	3/4	20	3740	590
SSC-60	6	6.625	10	3/4	20	2840	350
SSC-80	8	8.625	10	3/4	20	2840	350
SSC-100	10	10.75	10	3/4	20	2840	340
SSC-120	12	12.75	10	3/4	20	2840	330

EMT AND IMC CONDUIT

DESIGN LOADS (ASD)	NO. PIPE SIZE (IN)	D (IN)	STRAP GA.	BOLT TORQUE (FT-LB)	MAX. LOAD 1 (LBS)	MAX. LOAD 2 (LBS)	MAX. LOAD 3 (LBS)
SSCE-13	1 1/2	1.51	14	1/2	6	2000	140
SSCE-15	1 3/8	1.74	12	3/4	11	2240	180
SSCE-20	2	2.187	12	1 1/2	11	2730	240
SSCE-25	2 1/2	2.875	12	1 1/2	11	2880	240
SSCE-30	3	3.5	12	1 1/2	11	3020	230
SSCE-40	4	4.5	11	3/4	20	3150	280

NOTES:  
 1. STEEL PIPE SHALL BE MINIMUM SCHEDULE 10. RIGID STEEL CONDUIT SHALL BE MANUFACTURED TO UL6 AND ANSI C83.  
 2. FOR RPP/RC CONDUIT SUSPENDED FROM STRUT, REFER TO PAGE X8.1 FOR COMBINED MAX TENSION AND LATERAL LOADS.  
 3. LOAD 2 AND LOAD 3 MAY BE ROTATED UP TO 15° MAX FROM THE REFERENCED LOAD DIRECTION IN PLAN.

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PAGE  
**X2.1**

### MASON IND. N.Y. SSBS - SEISMIC SOLID BRACE

**FM APPROVED**

FINISH: ALL PARTS ARE ZINC ELECTROPLATED

MIN. (1) REQUIRED PER SSBS AS ILLUSTRATED. TORQUE BOLTS TO 50 FT-LBS (60 N.m) (REFER TO PAGE X2.3 FOR ATTACHMENT DETAILS). FOR STEEL ANGLE, 2 BOLTS WITH STANDARD NUTS ARE REQUIRED. HOLES IN ANGLE TO BE 1/4" DIAMETER.

STANDARD WASHER, TYP.

STRUT SHOWN MAY BE STEEL ANGLE DRILLED TO SUIT (ASTM A36, Fy = 36 KSI)

ATTACHMENT NUT WITH STAMPED TEETH AT OPEN FACE OF STRUT

PRODUCT IDENTIFICATION

NOTE: NOT TO BE USED AS A HANGER FOR EQUIPMENT, DUCTWORK OR PIPING. TO BE USED AS A SEISMIC RESTRAINT ONLY.

**BRACE MEMBER AXIAL RATING (ASD) (LBS)**

AXIAL MEMBER	MAX. LENGTH (FT)
1 1/2" x 1 1/2" x 1/8" SINGLE STRUT	1600 850 415
1 1/2" x 1 1/2" x 1/8" DOUBLE STRUT	3950 2200 1200
L3x3x1/4	5790 1970 920
L3x3x1/2	14400 6200 3000

NOTE: STRUT MUST BE ASTM A1018 OR 33 COLD ROLLED MILD STEEL. SCOTCH FINISH OR SOLID (REF X7.1 & X7.2). DOUBLE STRUT MUST BE MINIMUM 2" LONG. ANGLE MUST BE AS STEEL.

**TYPE SSBS DIMENSIONS & RATINGS (ASD)**

SIZE	A (IN)	ROD DIA. (IN)	LATERAL LOAD RATINGS <sup>1</sup>						
			30° - 45°	45° - 60°	60° - 75°	75° - 90°	90°	45° - 60°	
SSBS-12	13	3/8	1.5	2.0	2.5	3.0	3.5	4.0	4.5
SSBS-15	15	3/8	2.0	2.5	3.0	3.5	4.0	4.5	5.0
SSBS-20	20	1/2	2.5	3.0	3.5	4.0	4.5	5.0	5.5
SSBS-25	25	5/8	3.0	3.5	4.0	4.5	5.0	5.5	6.0
SSBS-30	30	3/4	3.5	4.0	4.5	5.0	5.5	6.0	6.5
SSBS-36	36	7/8	4.0	4.5	5.0	5.5	6.0	6.5	7.0
SSBS-42	42	1	4.5	5.0	5.5	6.0	6.5	7.0	7.5
SSBS-48	48	1 1/8	5.0	5.5	6.0	6.5	7.0	7.5	8.0
SSBS-54	54	1 1/4	5.5	6.0	6.5	7.0	7.5	8.0	8.5
SSBS-60	60	1 1/2	6.0	6.5	7.0	7.5	8.0	8.5	9.0

NOTE: BRACE ANGLE MEASURED FROM HORIZONTAL.  
 2. REFER TO PAGE X4.9 FOR STRUT NUT WITH STAMPED TEETH WITH BREAK-OFF NUT (MINIMUM OPTICAL STRAIN GAGE) AND HEX BOLT.  
 3. ATTACHMENT TO STEEL OR OTHER SUBSTRATE IN CONCRETE. WOOD MAY GOVERN THE DESIGN OF THE OVERALL BRACE ASSEMBLY AND SHALL BE EVALUATED ON A PROJECT BY PROJECT BASIS PER ATTACHMENT LOAD RATINGS IN SECTION 9.

**STRUT NUT DIMENSIONS<sup>2</sup>**

STRUT ATTACHMENT NUT (ASTM A36) MUST HAVE STAMPED TEETH TO ACHIEVE THESE VALUES.

NOTE: STRUT MUST BE ASTM A1018 OR 33 COLD ROLLED MILD STEEL. SCOTCH FINISH OR SOLID (REF X7.1 & X7.2). DOUBLE STRUT MUST BE MINIMUM 2" LONG. ANGLE MUST BE AS STEEL.

**DESIGN LOADS (ASD)**

EMT AND IMC CONDUIT	DESIGN LOADS (ASD)	NO. PIPE SIZE (IN)	D (IN)	STRAP GA.	BOLT TORQUE (FT-LB)	MAX. LOAD 1 (LBS)	MAX. LOAD 2 (LBS)	MAX. LOAD 3 (LBS)
SSCS-13	1 1/2	1.51	14	1/2	6	2000	140	210
SSCS-15	1 3/8	1.74	12	3/4	11	2240	180	290
SSCS-20	2	2.187	12	1 1/2	11	2730	240	350
SSCS-25	2 1/2	2.875	12	1 1/2	11	2880	240	360
SSCS-30	3	3.5	12	1 1/2	11	3020	230	380
SSCS-40	4	4.5	11	3/4	20	3150	280	430

NOTES:  
 1. RATING ARE FOR (1) ATTACHMENT ONLY. CONDITIONS WITH MULTIPLE ATTACHMENTS WERE NOT TESTED. COMBINED TENSION AND SHEAR LOADS SHALL BE CHECKED FOR UNIT, T<sub>1</sub> + V<sub>1</sub>V<sub>2</sub> + V<sub>2</sub>V<sub>3</sub> ≤ 1.0  
 2. ONLY (1) MW-SSB-12 SHALL OCCUR WITH SPAN 8 AND ANY ADJACENT MW-SSB-12 SHALL BE A MINIMUM OF 4' AWAY.  
 3. FOR SHEAR LOADS APPLIED AT AN ANGLE UP TO 45°, THE 3" MIN. EDGE DISTANCE IS REQUIRED.

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PAGE  
**X2.0**

### MASON WEST MW-SSC AND MW-SSCE

**DESIGN LOADS (ASD)**

STEEL PIPE/RIGID STEEL CONDUIT	NO. PIPE SIZE (IN)	D (IN)	STRAP GA.	BOLT TORQUE (FT-LB)	MAX. LOAD 1 (LBS)	MAX. LOAD 2 (LBS)	MAX. LOAD 3 (LBS)
SSC-13	1 1/2	1.66	14	1/2	6	1470	130
SSC-15	1 3/8	1.5	12	3/4	11	1600	160
SSC-20	2	2.375	12	1 1/2	11	2050	250
SSC-25	2 1/2	2.875	12	1 1/2	11	2430	320
SSC-30	3	3.5	12	1 1/2	11	2820	390
SSC-40	4	4.5	11	3/4	20	3290	500
SSC-50	5	5.563	11	3/4	20	3740	590
SSC-60	6	6.625	10	3/4	20	2840	350
SSC-80	8	8.625	10	3/4	20	2840	340
SSC-100	10	10.75	10	3/4	20	2840	340
SSC-120	12	12.75	10	3/4	20	2840	330

EMT AND IMC CONDUIT

DESIGN LOADS (ASD)	NO. PIPE SIZE (IN)	D (IN)	STRAP GA.	BOLT TORQUE (FT-LB)	MAX. LOAD 1 (LBS)	MAX. LOAD 2 (LBS)	MAX. LOAD 3 (LBS)
SSCE-13	1 1/2	1.51	14	1/2	6	2000	140
SSCE-15	1 3/8	1.74	12	3/4	11	2240	180
SSCE-20	2	2.187	12	1 1/2	11	2730	240
SSCE-25	2 1/2	2.875	12	1 1/2	11	2880	240
SSCE-30	3	3.5	12	1 1/2	11	3020	230
SSCE-40	4	4.5	11	3/4	20	3150	280

NOTES:  
 1. STEEL PIPE SHALL BE MINIMUM SCHEDULE 10. RIGID STEEL CONDUIT SHALL BE MANUFACTURED TO UL6 AND ANSI C83.  
 2. FOR RPP/RC CONDUIT SUSPENDED FROM STRUT, REFER TO PAGE X8.1 FOR COMBINED MAX TENSION AND LATERAL LOADS.  
 3. LOAD 2 AND LOAD 3 MAY BE ROTATED UP TO 15° MAX FROM THE REFERENCED LOAD DIRECTION IN PLAN.

**DESIGN LOADS (ASD)**

EMT AND IMC CONDUIT	DESIGN LOADS (ASD)	NO. PIPE SIZE (IN)	D (IN)	STRAP GA.	BOLT TORQUE (FT-LB)	MAX. LOAD 1 (LBS)	MAX. LOAD 2 (LBS)	MAX. LOAD 3 (LBS)
SSCE-13	1 1/2	1.51	14	1/2	6	2000	140	210
SSCE-15	1 3/8	1.74	12	3/4	11	2240	180	290
SSCE-20	2	2.187	12	1 1/2	11	2730	240	350
SSCE-25	2 1/2	2.875	12	1 1/2	11	2880	240	360
SSCE-30	3	3.5	12	1 1/2	11	3020	230	380
SSCE-40	4	4.5	11	3/4	20	3150	280	430

NOTES:  
 1. STEEL PIPE SHALL BE MINIMUM SCHEDULE 10. RIGID STEEL CONDUIT SHALL BE MANUFACTURED TO UL6 AND ANSI C83.  
 2. FOR RPP/RC CONDUIT SUSPENDED FROM STRUT, REFER TO PAGE X8.1 FOR COMBINED MAX TENSION AND LATERAL LOADS.  
 3. LOAD 2 AND LOAD 3 MAY BE ROTATED UP TO 15° MAX FROM THE REFERENCED LOAD DIRECTION IN PLAN.

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PAGE  
**X2.3**

### MASON WEST MW-SSC AND MW-SSCE

**DESIGN LOADS (ASD)**

STEEL PIPE/RIGID STEEL CONDUIT	NO. PIPE SIZE (IN)	D (IN)	STRAP GA.	BOLT TORQUE (FT-LB)	MAX. LOAD 1 (LBS)	MAX. LOAD 2 (LBS)	MAX. LOAD 3 (LBS)
SSC-13	1 1/2	1.66	14	1/2	6	1470	130
SSC-15	1 3/8	1.5	12	3/4	11	1600	160
SSC-20	2	2.375					