PLUMBING SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES

GENERAL ABBREVIATIONS

@	AT	EL	ELEVATION	O2	OXYGEN
1Ø, 3Ø	SINGLE PHASE, THREE PHASE	ELEC	ELECTRICAL	OA	OUTSIDE AIR
		ELEV	ELEVATOR	OB	OFF BOTTOM
A,AMP	AMPERE	EMER	EMERGENCY	OC	ON CENTER
ABV	ABOVE	ENCL	ENCLOSURE	OCC	OCCUPIED / OCCUPANCY
AC	AIR COMPRESSOR	EQ	EQUAL		
AD	ACCESS DOOR	EQUIP	EQUIPMENT	OD	OUTSIDE DIMENSION / DIAMETER
ADR	AREA DRAIN	EQUIV	EQUIVALENT		
AFC	ABOVE FINISHED CEILING	ESC	ESCUTCHEON	OFCI	OWNER-FURNISHED, CONTRACTOR-INSTALLED
		ETC	AND SO FORTH		
AFF	ABOVE FINISHED FLOOR	EW	EYEWASH		
AFG	ABOVE FINISHED GRADE	EWC	ELECTRICAL WATER COOLER	OFOI	OWNER-FURNISHED, OWNER-INSTALLED
AHU	AIR HANDLING UNIT				
ALUM	ALUMINUM	EWH	ELECTRIC WATER HEATER	OPNG	OPENING
AP	ACCESS PANEL			OS	OPEN SITE DRAIN
APPROX	APPROXIMATELY	EWT	ENTERING WATER TEMPERATURE	OT	OFF TOP
AR	ARGON			PART	PARTIAL
AUX	AUXILIARY	EX	EXAMPLE	PC	PLUMBING CONTRACTOR
AV	ACID VENT	EXP	EXPANSION		
AVG	AVERAGE	EXT	EXTERNAL / EXTERIOR	PCW	PROCESS COLD WATER
AVTR	ACID VENT THRU ROOF	°F	DEGREES FAHRENHEIT	PD	PRESSURE DROP
AW	ACID WASTE	FFA	FROM FLOOR ABOVE	PE	PNEUMATIC-ELECTRIC
AWS	ANIMAL WATERING SYSTEM	FFB	FROM FLOOR BELOW	PERF	PERFORATED
		FC	FAIL CLOSED	PH	PHASE
BA	BREATHING AIR	FCO	FLOOR CLEANOUT	PHW	PROCESS HOT WATER
BAS	BUILDING AUTOMATION SYSTEM	FD	FLOOR DRAIN	PHWR	PROCESS HOT WATER RETURN
		FDC	FLOOR DEPARTMENT CONNECTION	PI	PRESSURE INDICATOR
BFC	BELOW FINISH CEILING	FDV	FIRE DEPARTMENT VALVE	PIV	POST INDICATOR VALVE
BHP	BRAKE HORSEPOWER			PLBG	PLUMBING
BLDG	BUILDING	FDVC	FIRE DEPARTMENT VALVE CONNECTION	PNEU	PNEUMATIC
BLW	BELOW			POLY	POLYETHYLENE
BSMT	BASEMENT	FLG	FLANGE	POS	POSITIVE
BMS	BUILDING MANAGEMENT SYSTEM	FLA	FULL LOAD AMPS	PRESS	PRESSURE
		FLEX	FLEXIBLE	PRV	PRESSURE REDUCING VALVE
BOD	BOTTOM OF DUCT	FLR	FLOOR		
BOP	BOTTOM OF PIPE	FO	FAIL OPEN	PSI	POUNDS PER SQUARE INCH
BOS	BOTTOM OF STEEL	FP	FIRE PROTECTION		
BTU	BRITISH THERMAL UNIT	FPM	FEET PER MINUTE	PSIG	POUNDS PER SQUARE INCH GAUGE
BTUH	BRITISH THERMAL UNIT PER HOUR	FPS	FEET PER SECOND		
		FRP	FIBER REINFORCED POLYESTER	PSIA	POUNDS PER SQUARE INCH ABSOLUTE
BV	BALL VALVE	FS	FLOW SWITCH	PV	PLUG VALVE
BWV	BACKWATER VALVE	FT	FEET	PVC	POLYVINYL CHLORIDE
BYP	BYPASS	FTB	FLOOR TO BOTTOM	QTY	QUANTITY
°C	DEGREES CENTIGRADE	FTC	FLOOR TO CENTERLINE	(R)	REMOVE
CA	COMPRESSED AIR	FTT	FLOOR TO TOP	(RE)	RELOCATED EXISTING
CAD	COMPRESSED AIR DRYER	FURN	FURNISH	RAC	RUN ABOVE CEILING
CAF	COMPRESSED AIR FILTER	FUT	FUTURE	RAF	RUN ABOVE FLOOR
CAFM	COMPRESSED AIR FLOW METER	FXC	FLEXIBLE CONNECTION	RATC	RUN AT CEILING
CAP	CAPACITY	G	NATURAL GAS	RBC	RUN BELOW CEILING
CAR	COMPRESSED AIR RECEIVER	GA	GAUGE	RBF	RUN BELOW FLOOR
		GAL	GALLON	RBG	RUN BELOW GRADE
CB	CATCH BASIN	GALV	GALVANIZED	RBJ	RUN BETWEEN JOIST
CBV	CIRCUIT BALANCING VALVE	GC	GENERAL CONTRACTOR	RD	ROOF DRAIN
		GLV	GLOBE VALVE	RDC	REDUCER
CCW	COUNTERCLOCKWISE	GMP	GOOD MANUFACTURING PRACTICE	REC	RECESSED
CFH	CUBIC FEET PER HOUR			RECIRC	RECIRCULATE
CFM	CUBIC FEET PER MINUTE			REL	RELIEF
CGM	COMPRESSED GAS MANIFOLD	GPD	GALLONS PER DAY	REQD	REQUIRED
		GPH	GALLONS PER HOUR	RIC	RUN IN CHASE
CHKV	CHECK VALVE	GPM	GALLONS PER MINUTE	RICW	RUN IN CASEWORK
CI	CAST IRON	GR/LB	GRAINS PER POUND	RIE	RUN IN ENCLOSURE
CIP	CLEAN IN PLACE	GV	GATE VALVE	RIW	RISE IN WALL
CL	CENTERLINE	GWH	GAS WATER HEATER	RLA	RATED LOAD AMPS
CLL	COLUMN LINE	H2	HYDROGEN	RM	ROOM
CLG	CEILING	H2O	WATER	RO	REVERSE OSMOSIS
CLS	CLEAN STEAM	HB	HOSE BIBB	ROD	ROOF OVERFLOW DRAIN
CMU	CONCRETE MASONRY UNIT	HD	HEAD	RPM	REVOLUTIONS PER MINUTE
		HE	HELIUM		
CO	CLEANOUT	HP	HORSEPOWER	S/SHO	SAFETY SHOWER
CO2	CARBON DIOXIDE	HR	HOUR	SS/EW	SAFETY SHOWER/EYEWASH
COL	COLUMN	HS	HOSE STATION		
COMP	COMPRESSOR	HSW	HOT SOFT WATER	SA	SHOCK ABSORBER
CON	CONCENTRIC	HSKPG	HOUSEKEEPING	SCFM	STANDARD CUBIC FEET PER MINUTE
CONC	CONCRETE	HT	HEIGHT		
COND	CONDENSATE	HTR	HEATER	SCH	SCHEDULE
CONN	CONNECT/CONNECTION	HZ	HERTZ	SEC	SECONDARY
CONTN	CONTINUATION	IA	INSTRUMENT AIR	SF	SQUARE FOOT
CONTR	CONTRACTOR	ID	INSIDE DIMENSION / DIAMETER	SH	SHOWER
COORD	COORDINATE			SIP	STERILIZE IN PLACE
CORR	CORRIDOR	IN	INCHES	SK	SINK
CP	CONTROL PANEL	INCL	INCLUDING	SP	SPRINKLER
CPVC	CHLORINATED POLYVINYL CHLORIDE	INFO	INFORMATION	SPEC	SPECIFICATION
		INT	INTERNAL	SQ	SQUARE
CS	CUP SINK	INV	INVERT	SRV	SAFETY RELIEF VALVE
CSW	COLD SOFT WATER	INWC	INCHES OF WATER	SST	STAINLESS STEEL
CTRL	CONTROL		COLUMN	STD	STANDARD
CU	COPPER	IPS	INTERNATIONAL PIPE STANDARD	STL	STEEL
CVS	CONTROL VALVE STATION			STRUCT	STRUCTURAL
		KW	KILOWATTS	SUCT	SUCTION
CW	CLOCKWISE	LAB	LABORATORY	SUP	SUPPLY
DB	DECIBEL	LAV	LAVATORY	SYS	SYSTEM
DCW	DOMESTIC COLD WATER	LB	POUND	TD	TRENCH DRAIN
DEG	DEGREES	LBS/HR	POUNDS PER HOUR (#/HR)	TDH	TOTAL DYNAMIC HEAD
DEPT	DEPARTMENT			TEMP	TEMPERATURE
DET	DETAIL	LIQ	LIQUID	TFA	TO FLOOR ABOVE
DFU	DRAINAGE FIXTURE UNIT	LN2	LIQUID NITROGEN	TI	TEMPERATURE INDICATOR
		LS	LAB SINK		
DHW	DOMESTIC HOT WATER SUPPLY	LVG	LEAVING	TK	TANK
		LWT	LEAVING WATER TEMPERATURE	TOD	TOP OF DUCT
DHWR	DOMESTIC HOT WATER RETURN			TOP	TOP OF PIPE
		MAV	MANUAL AIR VENT	TP	TRAP PRIMER
DI	DUCTILE IRON	MAWP	MAXIMUM ALLOWABLE WORKING PRESSURE	TPW	TEMPERED WATER
DIA	DIAMETER			T&P	TEMPERATURE & PRESSURE RELIEF
DIAG	DIAGRAM	MAX	MAXIMUM		
DIFF	DIFFERENTIAL	MBH	THOUSAND BTU PER HOUR	TYP	TYPICAL
DIR	DEIONIZED WATER RETURN			UNOCC	UNOCCUPIED
		MMBTU	MILLION BRITISH THERMAL UNIT	U.O.N.	UNLESS OTHERWISE NOTED
DIS	DEIONIZED WATER SUPPLY	MC	MECHANICAL CONTRACTOR	UR	URINAL
				V	VOLTS
DISCH	DISCHARGE	MECH	MECHANICAL	VAC	LAB VACUUM
DIV	DIVISION	MFR	MANUFACTURER	VB	VACUUM BREAKER
DW	DOWN IN WALL	MH	MANHOLE	VEL	VELOCITY
DN	DOWN	MIN	MINIMUM	VERT	VERTICAL
DS	DRY STANDPIPE	MISC	MISCELLANEOUS	VFD	VARIABLE FREQUENCY DRIVE
DWG	DRAWING	MR	MOP RECEPTOR		
DWV	DRAINAGE, WASTE, & VENT	MTD	MOUNTED	VIF	VERIFY IN FIELD
		MV	MIXING VALVE	VTR	VENT THRU ROOF
(E)	EXISTING / EXISTING TO REMAIN	N2	NITROGEN	W/	WITH
		NIC	NOT IN CONTRACT	W/O	WITHOUT
(ER)	EXISTING TO BE RELOCATED	NO	NORMALLY OPEN	W	WIDTH
		NOM	NOMINAL	WC	WATER CLOSET
EA	EACH	NPW	NON-POTABLE WATER	WCO	WATER CLEANOUT
EC	ELECTRICAL CONTRACTOR	NUM	NUMBER	WFU	WATER FIXTURE UNIT
ECC	ECCENTRIC	NTS	NOT TO SCALE	WS	WET STANDPIPE
EFF	EFFICIENCY				

GENERAL SYMBOLS

SECTION TAG	## / AA-### — SECTION NUMBER; DRAWING ON WHICH SECTION IS SHOWN
ROOM TAG	ROOM / ### / DESCR — ROOM NAME; ROOM NUMBER; ADDITIONAL INFO (OPTIONAL)
EQUIPMENT TAG	X / # — DESIGNATION; REFERENCE NUMBER
MATCH LINE	REFER TO SHEET XX-###

EXTENT OF DEMOLITION	
CONNECT TO EXISTING	
DEMOLITION WORK NOTE	#
NEW WORK NOTE	#
PREPURCHASED EQUIPMENT	
CONNECT TO MANUFACTURER'S PREPIPED CONNECTION	
CONTINUATION REFERENCE	#
REVISION & NUMBER	#

LINE ABBREVIATIONS

(E) NAME	EXISTING SERVICE	(R) NAME	EXISTING SERVICE TO BE REMOVED
ADW	ANIMAL DRINKING WATER	NPW	NON-POTABLE WATER
DIS	DEIONIZED WATER SUPPLY	AR	ARGON
DIR	DEIONIZED WATER RETURN	CA	COMPRESSED AIR
DCW	DOMESTIC COLD WATER	CH4	METHANE
DHW	DOMESTIC HOT WATER	CO2	CARBON DIOXIDE
DHWR	DOMESTIC HOT WATER RETURN	HE	HELIUM
TPW	TEMPERED WATER	H2	HYDROGEN
LCW	LAB COLD WATER	G	NATURAL GAS
LHW	LAB HOT WATER	LN2	LIQUID NITROGEN
LHWR	LAB HOT WATER RETURN	N2	GASEOUS NITROGEN
PCW	PROCESS COLD WATER	O2	OXYGEN
PHW	PROCESS HOT WATER	C3H8	PROPANE
PHWR	PROCESS HOT WATER RETURN	VAC	LAB VACUUM
SAN	SANITARY WASTE	SP	SPRINKLER PIPING
V	SANITARY VENT	PW	PROCESS WASTE
GW	GREASE WASTE	PV	PROCESS VENT
GV	GREASE VENT	ST	STORM DRAINAGE
LW	LAB WASTE	ROD	STORM OVERFLOW DRAINAGE
LV	LAB VENT	COND	CONDENSATE DRAINAGE

CODE REFERENCE

1. ALL NEW WORK SHALL BE IN ACCORDANCE WITH THE FOLLOWING ADOPTED CODES AND STANDARDS:
   - BUILDING SUBCODE (NJAC 5:23-3.14)
     - 2015 INTERNATIONAL BUILDING CODE (IBC) NJ EDITION (IBC W/ NJ EDITS FROM 3.14)
     - ANSI/ISEA Z358.1-2009 EMERGENCY EYEWASH & SHOWER EQUIPMENT
   - PLUMBING SUBCODE (NJAC 5:23-3.15)
     - 2015 NATIONAL STANDARD PLUMBING CODE
   - FUEL GAS SUBCODE (NJAC 5:23-3.22)
     - 2015 INTERNATIONAL FUEL GAS CODE
   - ELECTRICAL SUBCODE (NJAC 5:23-3.16)
     - 2014 NATIONAL ELECTRICAL CODE (NFPA 70)

SINGLE LINE PIPING SYMBOLS

NEW PIPE		TRIPLE DUTY VALVE	
DIRECTION OF FLOW		STOP CHECK VALVE	
PIPE SLOPE		FUSIBLE LINK VALVES (QUICK CLOSING & QUICK OPENING)	
FITTINGS (DOWN ELBOW, DOWN TEE, AND UP ELBOW OR TEE)		NEEDLE VALVE	
REDUCERS (CONCENTRIC & ECCENTRIC)		BALANCING VALVES (MANUAL & AUTOMATIC)	
UNIONS (THREADED, FLANGED & BLIND FLANGE)		VACUUM BREAKER & AUTOMATIC VENT VALVE	
END CAP THREADED END CAP WELDED END CAP		DRAIN VALVES (BALL / GATE & HOSE CONN. / THREADED CAP)	
FLEXIBLE CONNECTION		VENT VALVES (BALL & GATE)	
ISOLATION VALVES (IN PLAN, WITH LOCKABLE HANDLE & IN RISE)		TEMPERATURE INDICATORS IN THERMOWELL (DIAL & THERMOMETER TYPES)	
GATE VALVE		PRESSURE INDICATORS (WITHOUT & WITH SYPHON TUBE)	
GLOBE VALVE		PRESSURE INDICATORS IN RISE (WITHOUT & WITH SYPHON TUBE)	
BALL VALVES (NORMAL & CHARACTERIZED)		SOLENOID VALVES (2-WAY & 3-WAY)	
BUTTERFLY VALVE (MANUAL & CONTROL)		ANCHORS (MAIN, INTERMEDIATE, & GUIDE)	
ANGLE VALVES (GATE, GLOBE, & STOP CHECK)		BACKFLOW PREVENTERS	
PRESSURE REDUCING/ REGULATING VALVE		VALVE CONTROL (ELECTRIC/ELECTRONIC, PNEUMATIC, SOLENOID)	
CHECK VALVE		PRESSURE & TEMPERATURE TEST PLUG	
DIAPHRAGM VALVE		STRAINERS (WITHOUT & WITH BLOWDOWN VALVES)	
PLUG VALVE		FILTER	
BACKPRESSURE VALVE		P-TRAP (PLAN & DIAGRAM) U-TRAP (PLAN & DIAGRAM)	
SAFETY RELIEF VALVE & RUPTURE DISC		ORIFICE PLATE	
THERMOSTATIC MIXING VALVE		HEAT TRACING	
AQUASTAT		TRI-CLAMP CONNECTION	
BACKWATER VALVE		SHOCK ABSORBER	SA-'X'
EXPANSION JOINT	EJ	TRANSMITTER (PRESSURE OR TEMPERATURE)	PT/TT
ZERO STATIC VALVE			

PLUMBING SYMBOLS

FLOOR DRAIN	
FLOOR SINK	
ROOF DRAIN/ OVERFLOW DRAIN	RD/ROD
CLEANOUT	CO
WALL CLEANOUT	WCO
FLOOR CLEANOUT	FCO
HOSE BIBB/WALL HYDRANT	
HOSE BIBB/WALL HYDRANT (HOT & COLD)	
SINGLE GAS TURRET	XXX
DOUBLE GAS TURRET	XXX
BACK-TO-BACK GAS TURRET	XXX
QUAD GAS TURRET	XXX

GENERAL PLUMBING NOTES

1. SUBMISSION OF A PROPOSAL SHALL BE CONSTRUED AS EVIDENCE THAT A CAREFUL EXAMINATION OF THE PORTIONS OF THE EXISTING BUILDING, EQUIPMENT, ETC., WHICH AFFECT THIS WORK, AND THE ACCESS TO SUCH SPACES, HAS BEEN MADE AND THAT THE CONTRACTOR IS FAMILIAR WITH THE EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT THE EXECUTION OF THE WORK.
2. UNLESS OTHERWISE NOTED, THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS, FEES, TESTING, AND INSPECTIONS.
3. ALL APPLICABLE CODES, LAWS AND REGULATIONS GOVERNING OR RELATING TO ANY PORTION OF THIS WORK ARE HEREBY INCORPORATED INTO AND MADE A PART OF THESE CONTRACT DOCUMENTS. THEIR PROVISIONS SHALL BE CARRIED OUT BY THE CONTRACTOR WHO SHALL INFORM THE OWNER, PRIOR TO SUBMITTING A PROPOSAL, OF ANY WORK OR MATERIALS WHICH VIOLATE ANY OF THESE LAWS AND REGULATIONS. ANY WORK DONE BY THE CONTRACTOR CAUSING SUCH VIOLATIONS SHALL BE CORRECTED BY THE CONTRACTOR.
4. THE CONTRACTOR SHALL BE RESPONSIBLE, EXCEPT AS OTHERWISE INDICATED OR APPROVED BY THE OWNER, TO PROVIDE LABOR AND MATERIALS TO RESTORE ALL SURFACES REMOVED, DAMAGED OR DISTURBED AS PART OF THE WORK OF THESE CONTRACT DOCUMENTS, TO A CONDITION THAT IS ACCEPTABLE TO THE ARCHITECT AND THE BUILDING OWNER EQUAL TO OR BETTER THAN THAT BEFORE THE WORK BEGAN. THIS SHALL INCLUDE BUT NOT BE LIMITED TO PATCHING, PAINTING, ROOFING, ETC. FOR ALL CUTTING AND PATCHING OF THE EXISTING FLOORS, WALLS AND PARTITIONS IN THE EXISTING BUILDING.
5. ALL WORK SHALL BE PERFORMED IN A CLEAN AND WORKMANLIKE MANNER. CARE SHALL BE EXERCISED TO MINIMIZE ANY INCONVENIENCE OR DISTURBANCE TO OTHER AREAS OF THE BUILDING WHICH ARE TO REMAIN IN OPERATION. ISOLATE WORK AREAS BY MEANS OF TEMPORARY PARTITIONS AND/OR TARPS TO KEEP DUST AND DIRT WITHIN THE CONSTRUCTION AREA. NO TRIPPING HAZARDS SHALL BE PRESENT DURING CONSTRUCTION OR AT COMPLETION OF WORK.
6. KEEP ALL EQUIPMENT AND MATERIALS AND ALL PARTS OF THE BUILDING, EXTERIOR SPACES AND ADJACENT STREETS, SIDEWALKS AND PAVEMENTS FREE FROM MATERIAL AND DEBRIS RESULTING FROM THE EXECUTION OF THIS WORK. EXCESS MATERIALS WILL NOT BE PERMITTED TO ACCUMULATE EITHER ON THE INTERIOR OR THE EXTERIOR OF THE BUILDING. CLEAN THE JOB SITE DAILY AND REMOVE FROM THE PREMISES ANY DIRT AND DEBRIS CAUSED BY THE PERFORMANCE OF THE WORK INCLUDED IN THIS CONTRACT.
7. IF THE CONTRACTOR ENCOUNTERS WHAT APPEARS TO BE A HAZARDOUS OR QUESTIONABLE MATERIAL, THE CONTRACTOR SHALL DISCONTINUE WORK IMMEDIATELY AND CONTACT THE OWNER. PLAN INSTALLATION OF NEW WORK AND CONNECTIONS TO EXISTING WORK TO ENSURE MINIMUM INTERFERENCE WITH REGULAR OPERATION OF EXISTING FACILITIES. SYSTEMS SHALL NOT BE REMOVED, DISCONNECTED, OR SHUT DOWN WITHOUT PRIOR REVIEW WITH THE OWNER AND/OR ENGINEER TO CONFIRM THAT AREAS TO REMAIN IN OPERATION WILL NOT BE AFFECTED. IF ANY AREAS NOT WITHIN THE SCOPE OF WORK ARE AFFECTED BY ANY SHUTDOWN, REMOVAL OR DISCONNECTION, SUFFICIENT ADVANCE NOTICE MUST BE GIVEN TO THE OWNER INDICATING WHICH AREAS WILL BE AFFECTED, WHEN THE PROPOSED SHUTDOWN WILL OCCUR, AND FOR HOW LONG A PERIOD OF TIME.
8. ALL ITEMS TO BE DEMOLISHED OR REMOVED SHALL BE DISPOSED OF AS PER THE OWNER'S INSTRUCTIONS, UNLESS INDICATED OTHERWISE. ALL ITEMS WHICH ARE NOT TO BE STORED ON SITE BY OWNER SHALL BE REMOVED FROM THE BUILDING IMMEDIATELY.
9. THIS CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS PRIOR TO PROCEEDING WITH ANY WORK. WHERE DISCREPANCIES OCCUR BETWEEN THESE DOCUMENTS AND EXISTING CONDITIONS, THE DISCREPANCY SHALL BE REPORTED TO THE OWNER AND/OR ENGINEER FOR EXPEDITING AND RESOLUTION.
10. USE OF THE OWNER'S ELEVATORS AND BUILDING CORRIDORS FOR HANDLING OF NEW AND REMOVED MATERIALS AND EQUIPMENT SHALL BE AT THE DIRECTION OF THE OWNER AND SHALL BE COORDINATED WITH OWNER'S OPERATIONS.
11. INVESTIGATE EACH SPACE THROUGH WHICH EQUIPMENT MUST BE MOVED. WHERE NECESSARY, EQUIPMENT SHALL BE SHIPPED FROM THE MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH AVAILABLE RESTRICTIVE SPACES. ASCERTAIN FROM BUILDING OWNER AND TENANT AT WHAT TIMES OF THE DAY EQUIPMENT MAY BE MOVED THROUGH ALL AREAS.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFEKEEPING OF HIS OWN PROPERTY ON THE JOB SITE. OWNER ASSUMES NO RESPONSIBILITY FOR PROTECTION OF PROPERTIES AGAINST FIRE, THEFT, AND ENVIRONMENTAL CONDITIONS.
13. SEAL ALL OPENINGS AROUND ALL SYSTEM DISTRIBUTION (PIPING, DUCTWORK, CONDUIT, ETC.) THROUGH PARTITIONS, WALLS, AND FLOORS WITH APPROVED FIRESTOPPING MATERIAL.
14. FURNISH SHOP DRAWINGS FOR ALL EQUIPMENT AND MATERIALS BEING PROVIDED. SUBMIT TO OWNER AND ENGINEER FOR APPROVAL PRIOR TO FABRICATION, PURCHASE AND/OR INSTALLATION.
15. WHERE USED, THE TERM "PROVIDE" SHALL MEAN "FURNISH AND INSTALL."
16. THIS CONTRACTOR SHALL COORDINATE HIS WORK WITH ALL OTHER TRADES PRIOR TO FABRICATION, PURCHASE AND/OR INSTALLATION OF ALL WORK.
17. ALL SYSTEMS DISTRIBUTION (PIPING, DUCTWORK, CONDUIT, ETC.) IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL OFFSETS, DROPS, AND RISES OF RUNS. THE CONTRACTOR SHALL ALLOW IN HIS PRICE FOR ROUTING TO AVOID OBSTRUCTIONS.
18. PROVIDE ALL NECESSARY FLASHING AND COUNTER FLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THIS BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF SYSTEM DISTRIBUTION (PIPING, DUCTWORK, CONDUIT, ETC.) AND EQUIPMENT.
19. SUPPORT NEW PIPING FROM BUILDING STRUCTURE AND OR FRAMING IN AN APPROVED MANNER. WHERE OVERHEAD CONSTRUCTION DOES NOT PERMIT FASTENING OF SUPPORTS FOR EQUIPMENT, PROVIDE ADDITIONAL FRAMING. COMPLY WITH ALL LOCAL AND STATE CODES FOR SEISMIC ISOLATION. THE DRAWINGS DO NOT SHOW ALL SEISMIC ISOLATION POINTS, THEREFORE ALLOW FOR SEISMIC ISOLATION IN ACCORDANCE WITH THE AUTHORITY HAVING JURISDICTION.
20. EXISTING MATERIALS THAT ARE REMOVED SHALL NOT BE REUSED IN NEW SYSTEMS, EXCEPT WHERE INDICATED AS BEING RELOCATED.
21. INSTALL WORK SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS FROM DRAWINGS MAY BE MADE TO ACCOMPLISH THIS, BUT CHANGES WHICH INVOLVE ADDITIONAL COST TO THE OWNER SHALL NOT BE MADE WITHOUT APPROVAL.
22. IF A DISCREPANCY ARISES BETWEEN CONTRACT DOCUMENTS, CONTACT THE ARCHITECT/ENGINEER FOR RESOLUTION BEFORE PROCEEDING.
23. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK WILL BE NECESSARY FOR THE PERFORMANCE OF THE GENERAL WORK. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALL CHANGES IN MAKING UP THE WORK PROPOSAL. PRIOR TO CONSTRUCTION, DETERMINE EXACT ELEVATION, SIZE, AND LOCATION OF ALL EXISTING UTILITIES WHERE CONNECTIONS ARE TO BE MADE OR INTERSECTIONS OCCUR.
24. REMOVE AND REINSTALL EXISTING LAY-IN TYPE CEILINGS AS REQUIRED TO PERFORM THE WORK UNDER THE CONTRACT DOCUMENTS AND BE RESPONSIBLE FOR DAMAGE THAT MAY OCCUR TO CEILINGS AS A RESULT OF REMOVAL AND REPLACEMENT OF SAME. DAMAGED CEILING TILES, INCLUDING TILES WITH HOLES OR OPENINGS LEFT AS A RESULT OF DEMOLITION SHALL BE REPLACED. REMOVE ONLY THOSE CEILING TILES REQUIRED TO GAIN ACCESS TO AFFECTED SYSTEMS AND STORE IN PROTECTED AREA WHERE DESIGNATED BY THE OWNER. REINSTALL UPON COMPLETION OF THE WORK.
25. CONTRACTOR SHALL KEEP A CURRENT RECORD OF ALL DEVIATIONS FROM THE SPECIFICATIONS AND DRAWINGS. THE CONTRACTOR SHALL SUBMIT CORRECTED AS-BUILT DRAWINGS TO OWNER AND ENGINEER AT PROJECT COMPLETION.
26. CONTRACTOR SHALL FURNISH A WRITTEN GUARANTEE TO REPLACE OR REPAIR PROMPTLY AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN A PERIOD OF ONE (1) YEAR FROM THE DATE OF ACTUAL USE OF THE EQUIPMENT OR TURNOVER TO OWNER, WHICHEVER DATE IS EARLIER. THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. WHERE DEFECTS OCCUR, ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED IN REPAIRING AND REPLACING WORK OF THE OTHER TRADES AFFECTED BY DEFECTS.
27. SUCCESSFULLY PRESSURE TEST ALL NEW OR REROUTED PIPING SYSTEMS. REPAIR AND RETEST AS REQUIRED UNTIL SYSTEMS PROVE TIGHT.
28. PROVIDE ALL NECESSARY TEMPORARY OR PERMANENT CAPS OR PLUGS FOR PIPING. DO NOT LEAVE PIPING OPEN-ENDED.
29. ALL INSPECTIONS AND TESTING SHALL BE WITNESSED BY A TOWN OFFICIAL AND ALLERGAN.

DRAWING NOMENCLATURE

FIELD NO.	1		2	3	4
DRAWING NO.	A	D*	-	#	#	#

FIELD 1	
G	GENERAL
C	CIVIL
S	STRUCTURAL
A	ARCHITECTURAL
F	FIRE PROTECTION
P	PLUMBING
Z	PROCESS
M	MECHANICAL
E	ELECTRICAL
*A "D" AFTER THE DISCIPLINE DESIGNATOR DENOTES A DEMOLITION DRAWING.	

FIELD 2	
0	GENERAL
1	PLANS
2	PLANS
3	PLANS
4	PLANS
5	ENLARGED PLANS / SECTIONS / 3D
6	DIAGRAMS
7	DETAILS
8	SCHEDULES
9	SPECIFICATIONS
NOTE: PLAN TYPES FOR SERIES 1-4 ARE PROJECT- AND DISCIPLINE-SPECIFIC.	

FIELD 3
ONE ALPHANUMERIC VALUE TYPICALLY REPRESENTING THE FLOOR OR LEVEL.

FIELD 4
ONE NUMERIC VALUE REPRESENTING THE SHEET SEQUENCE NUMBER, STARTING WITH "1".

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INTEGRA

REGENERATIVE CENTER OF EXCELLENCE - B104

Seal:

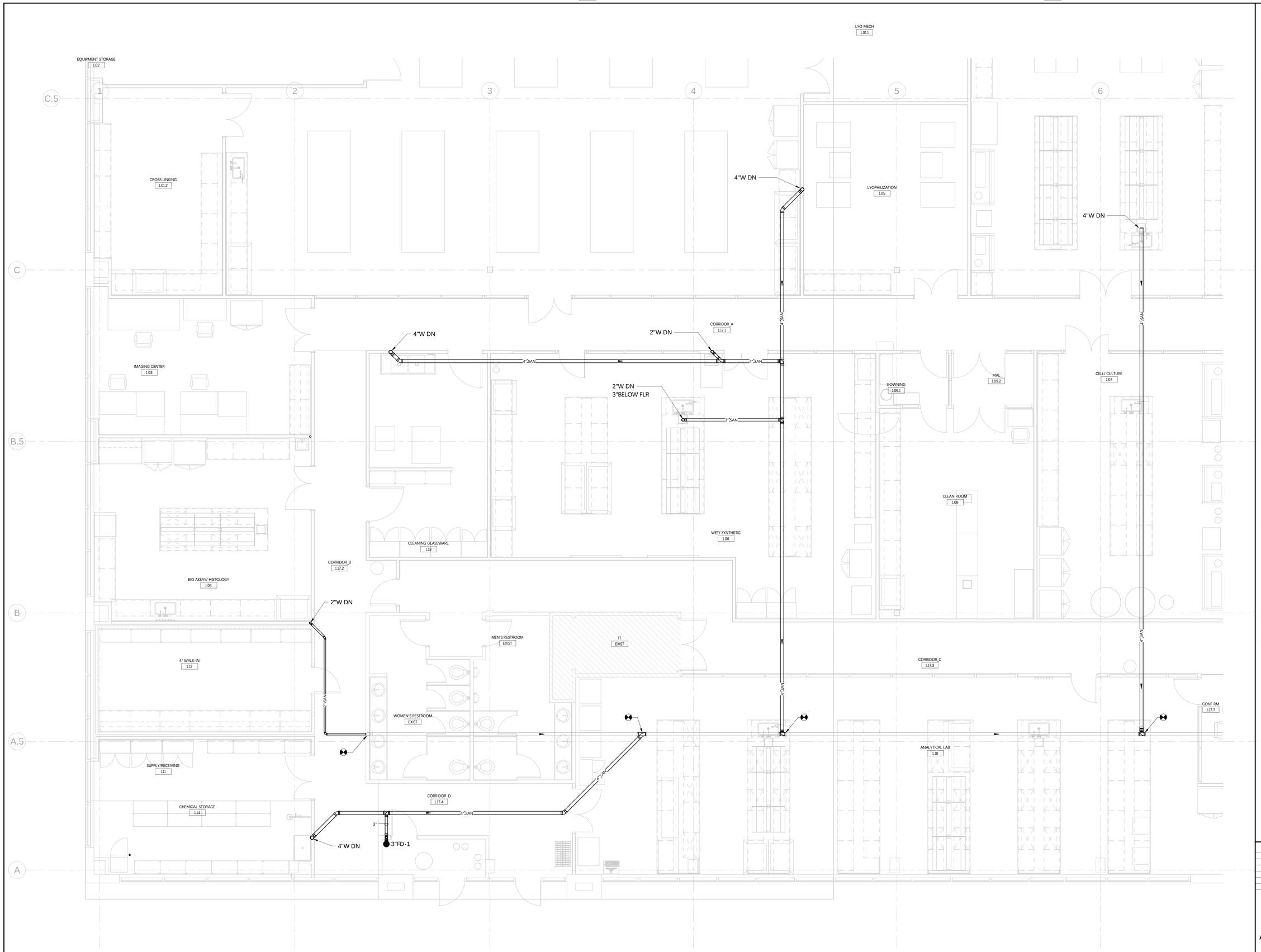
Revision Schedule		
A	2019-03-19	PRICING SET

KEY TO SYMBOLS AND ABBREVIATIONS

P-001

DATE: 2019.01.22 PROJ. #: 19001A

NOT FOR CONSTRUCTION



1 PLUMBING PLAN - NEW WORK - FIRST FLOOR
1/4" = 1'-0"

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REGENERATIVE CENTER OF EXCELLENCE - B104

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Revision Schedule

A	2019-03-19	PRICING SET

PLUMBING UNDERGROUND NEW WORK PLAN

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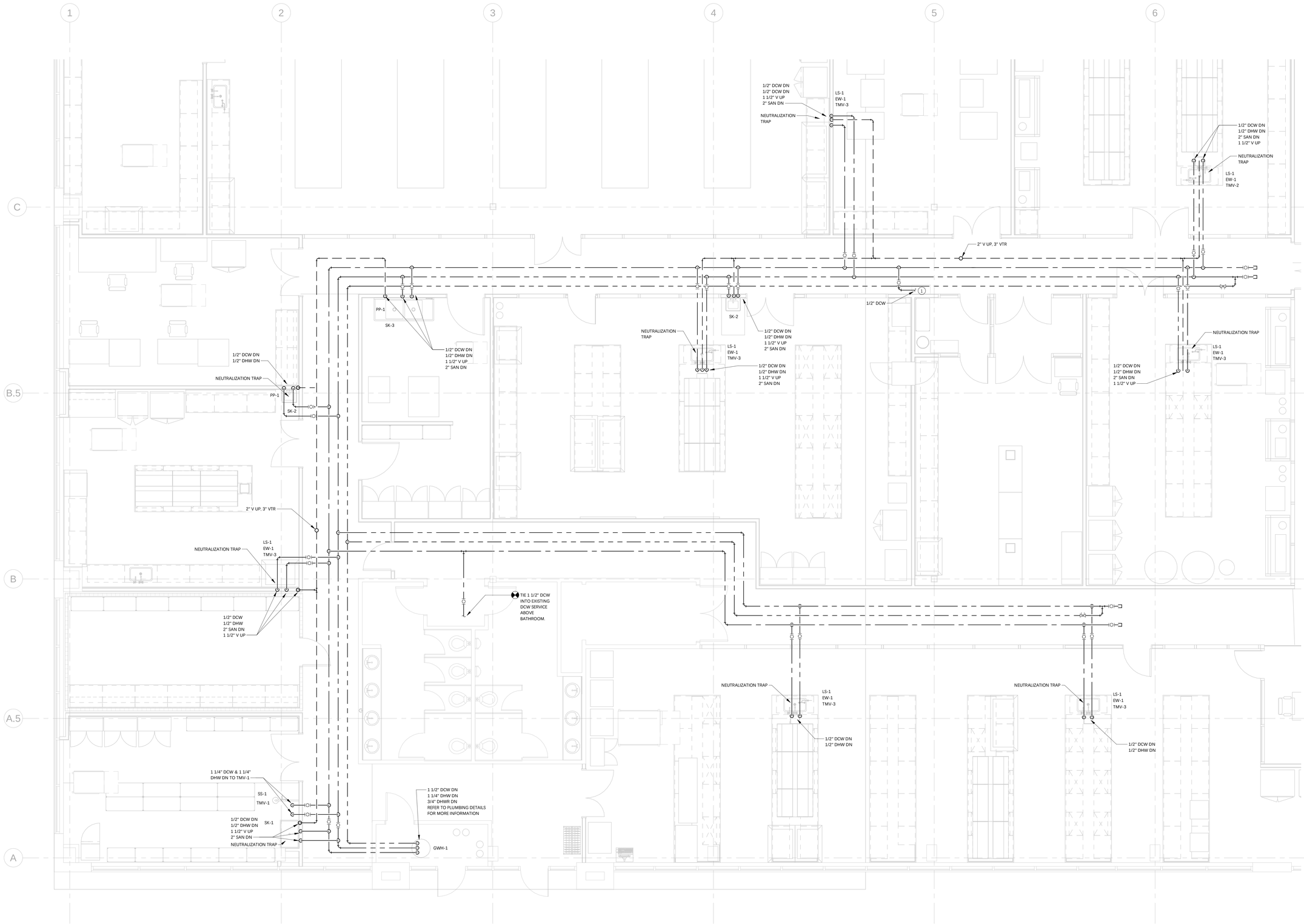

1 NEW WORK - FIRST FLOOR

1/4" = 1'-0"

NEW WORK SHEET NOTES:

(1) 1/2" DCW TO HSG-1, SEE M-111 FOR LOCATION.

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A	2019-03-19	PRICING SET

PLUMBING FIRST FLOOR NEW WORK PLAN

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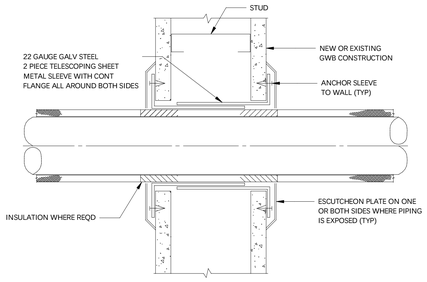
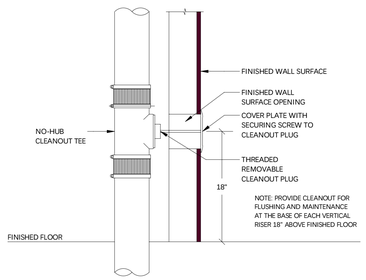


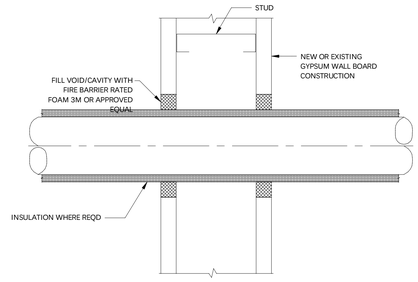
6 DETAIL - PIPE SLEEVE (GWB)

NOT TO SCALE



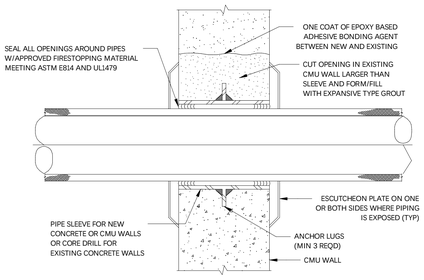
13 DETAIL - CONCEALED DRAIN STACK CLEANOUT

NOT TO SCALE



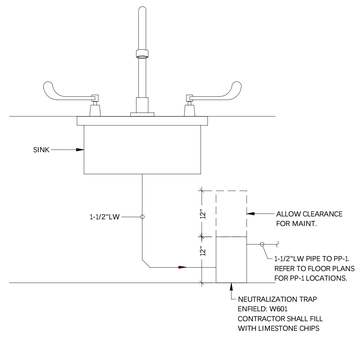
3 DETAIL - PIPE PENETRATION 1 HOUR FIRE RATED (GWB)

NOT TO SCALE



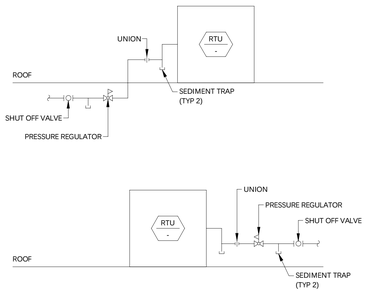
4 DETAIL - PIPE SLEEVE (ABOVE GRADE)

NOT TO SCALE



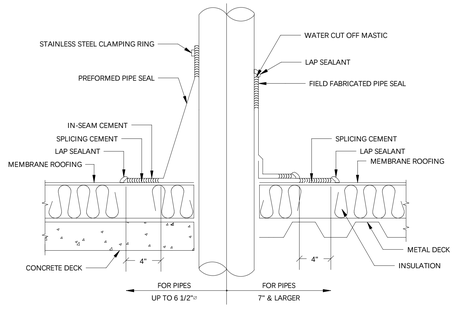
11 DETAIL - UNDERCOUTNER NEUTRALIZATION SYSTEM

NOT TO SCALE



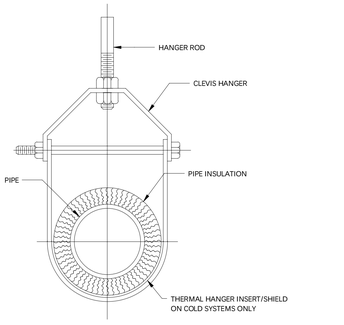
14 DETAIL - NATURAL GAS EQUIPMENT CONNECTION

NOT TO SCALE



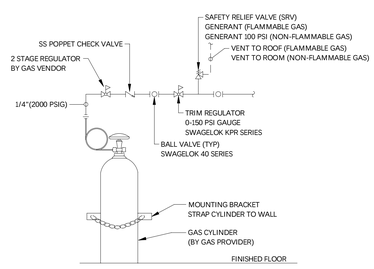
8 DETAIL - PIPE THROUGH ROOF PENETRATION

NOT TO SCALE



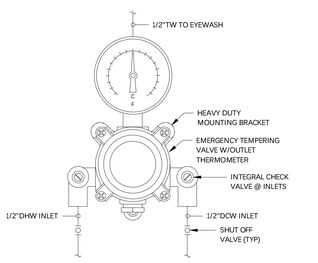
12 DETAIL - CLEVIS HANGER

NOT TO SCALE



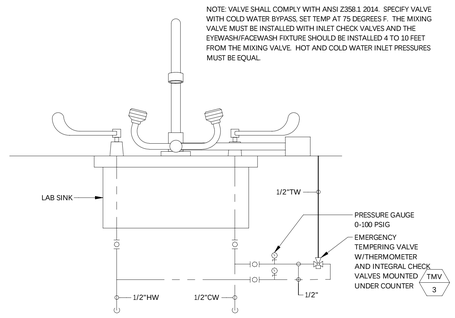
TYP. DETAIL - SINGLE CYLINDER GAS DELIVERY SYSTEM

NOT TO SCALE



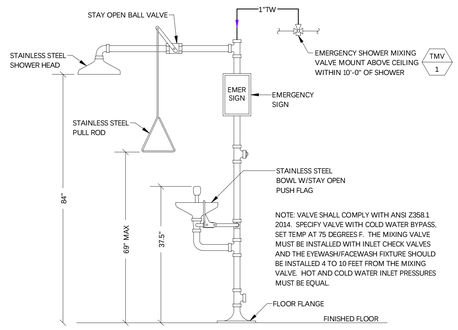
TYP. DETAIL - EMERGENCY EYEWASH MIXING VALVE (TMV-3)

NOT TO SCALE



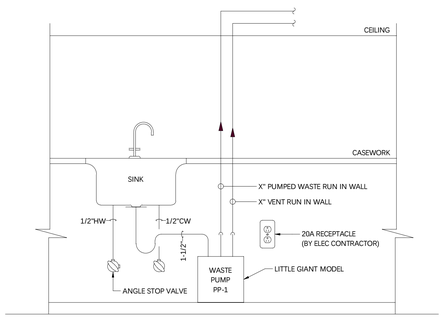
TYP. DETAIL - DECK MOUNTED EYEWASH & TMV (EW-1)

NOT TO SCALE



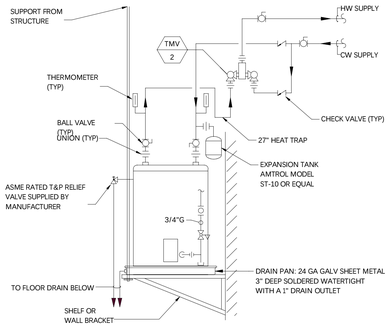
TYP. DETAIL - SAFETY SHOWER/EYEWASH W/MIXING VALVE

NOT TO SCALE



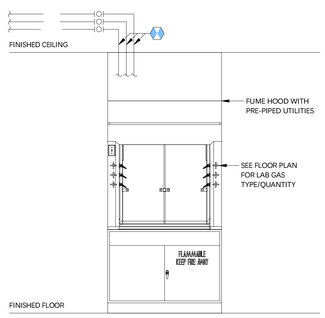
TYP. DETAIL - DRAIN PUMP UNDER SINK

NOT TO SCALE



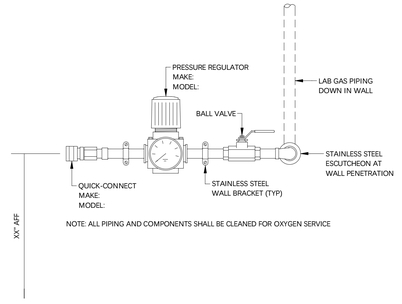
TYP. DETAIL - GAS WATER HEATER WALL MOUNTED

NOT TO SCALE



TYP. DETAIL - FUME HOOD EQUIPMENT CONNECTION

NOT TO SCALE



TYP. DETAIL - COMPRESSED AIR POINT OF USE RUO SPACES

NOT TO SCALE

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REGENERATIVE CENTER OF EXCELLENCE - B104

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Revision Schedule

A	2019-03-19	PRICING SET

PLUMBING DETAILS

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EQUIPMENT CONNECTION SCHEDULE

EQUIPMENT	DESCRIPTION	LOCATION	MANUFACTURER	MODEL	COLD WATER			HOT WATER			DI WATER			DRAIN		CARBON DIOXIDE			COMPRESSED AIR			NITROGEN			OUTLET TEPID WATER			VACUUM			NOTES
					PRESS (PSIG)	FLOW (GPM)	SIZE (IN)	PRESS (PSIG)	FLOW (GPM)	SIZE (IN)	PRESS (PSIG)	FLOW (GPM)	SIZE (IN)	FLOW (GPM)	SIZE (IN)	PRESS (PSIG)	FLOW (SCFM)	SIZE (IN)	PRESS (PSIG)	FLOW (SCFM)	SIZE (IN)	PRESS (PSIG)	FLOW (SCFM)	SIZE (IN)	PRESS (PSIG)	FLOW (SCFM)	SIZE (IN)	PRESS ("WC)	FLOW (SCFM)	SIZE (IN)	
TMV-1	THERMOSTATIC MIXING VAVLE	XXX	LEONARD VALVE CO.	XXX	50	12	3/4"	50	12	3/4"															45	_	1"				PROVIDE INLET AND OUTLET THERMOMETERS AND SHUT-OFF VALVES. SET VALVE FOR 77 DEG F OUTLET TEMP. SIZE VALVE FOR 5 PSI DROP @ 11 GPM FLOW
TMV-2	THERMOSTATIC MIXING VAVLE	XXX	LEONARD VALVE CO.	G3800LF	50	12	1.25"	50	8	1.25"															45	_	1"				
TMV-3	THERMOSTATIC MIXING VAVLE	XXX	GUARDIAN	G3600LF	50	2	3/4"	50	2	3/4"															45	_	3/4"				
PP-1	UNDERCOUNTER LAB SINK WASTE PUMP	XXX	LITLE GIANT	WRS-6							XX	XX	XX																		PROVIDE SHUT-OFF VALVE AND CHECK VALVE IN RISE. LOCATE PIPING NOT TO EXCEED 15 FEET FROM FINISH FLOOR.
PP-2	HOT WATER RETURN PUMP	XXX	TACO PUMP CO	0012-MSF1-IFC				55	2	3/4"																					TACO MODEL SHALL BE FLANGED INLET AND OUTLET WITH STAINLESS STEEL CASING. 2 GPM @ 15 FT HEAD WITH INTEGRAL CHECK VALVES. RATED FOR 1/6 HP AND 3250 RPM. ELECTRICAL POWER RATING 115/1/60
F-3 & 4	CLEAN COMPRESSED AIR STERILE FILTER	SUPPORT G136	DONALDSON ULTRAFILTER	HOUSING MODEL # PG-EG-0144 (1C076245-63) ELEMENT MODEL # PF-PT UF 20/30 (1C230182-82, 0.2 MICRON)										0.5	PHARMA VALVE OUTLET	75	40	2" INLET / 2" OUTLET CLEAN PRESSURE DROP = 1 PSIG													FILTERS SHALL HAVE INLET AND OUTLET SANITARY TRI-CLOVER ENDS. FINISH TO ELECTROPOLISHED R32. VENT IS SUPPLIED WITH PHARMA PLU. LOW DIFFERENTIAL PRESSURE OF 0.50 PSIG. MAX. PRESSURE RATED FOR 232 PSIG @ 392 DEG F. FILTER ELEMENT MEMBRANE PTFE UPSTREAM / DOWNSTREAM SUPPORT POLYPROPYLENE, O-RINGS EPDM. FILTER ELEMENT RATED FOR 0.20 MICRON. OVERALL FILTER HOUSING DIMENSION = 32.50" x 5" DIAM. PROVIDE SUPPORT WALL SYSTEM.

NOTES:
1.

GAS WATER HEATER SCHEDULE

TAG	SYSTEM/LOCATION	STORAGE (GAL)	ASME (Y/N)	INCOMING TEMP (F)	LEAVING TEMP (F)	RECOVERY (GPH)	RISE (F)	GAS LOAD (CFH)	GAS PRESSURE (PSIG)	BASIS OF DESIGN		NOTES
										MANUFACTURER	MODEL	
GWH-1	DOMESTIC HOT WATER - ABOVE CEILING MOUNTING	55	N	40	120	76	100	78	7"WC	BRADFORD WHITE	LG255H783N	HOT WATER HEATER SHALL BE MOUNTED ABOVE THE CEILING AND SUPPORTED FROM BOTH ONE WALL AND STRUCTURE ABOVE. PROVIDE VACUUM RELIEF VALVE AND T&P RELIEF VALVE PIPED TO FLOOR DRAIN.

NOTES:
1.

DRAIN SCHEDULE

TAG	SYSTEM	GRATE	TRAP PRIMER [Y/N]	BODY MATERIAL	TOP & RIM MATERIAL	ROUND/SQUARE	BASIS OF DESIGN		NOTES
							MANUFACTURER	MODEL	
FCO-1	SANITARY/LAB	N/A	N	CAST IRON	NICKEL BRONZE	6" ROUND	JAY R. SMITH	4021S	
FCO-2	PROCESS	N/A	N	CAST IRON	316 S.S.	6" ROUND	JAY R. SMITH	4021S-CF8M	
FD-1	PROCESS	FULL	Y	CAST IRON	NICKEL BRONZE	8"ROUND	JAY R. SMITH	2110	1, 2
WCO	SANITARY/LAB	N/A	N	BRONZE	STAINLESS STEEL	ROUND	JAY R. SMITH	9776T	

NOTES:
1. WITH ACID RESISTANT COATING
2. TYPICAL FOR ALL CLEAN ROOM SPACES IN GMP AREA INCLUSIVE TO AUTOCLAVE FLOOR DRAIN RECEPTORS, PROVIDE SOLID GASKETED TOP CONSTRUCTED FROM 316 STAINLESS STEEL WITH WELDDED 2"VENT TO SOLID TOP EXTENDING 12" HIGH AND TERMINATING WITH TRI-CLOVER CONNECTION BLIND END, CAPPED FOR FUTURE. THE REMAINING DRAIN PORTS SHALL BE COORDINATED WITH OWNER, OWNERS REPRESENTATIVE AND AUTOCLAVE MFGR.

PLUMBING PIPING INSULATION SCHEDULE

COLD SYSTEMS : DOMESTIC/LAB COLD WATER, SOFT WATER, BRINE (1)

FLUID TEMP RANGE F	INSULATION TYPE	INSULATION THICKNESS (IN) FOR PIPE SIZES				FIELD APPLIED JACKETS			
						INDOOR		OUTDOOR	
		<1	1 to <1.5	1.5 to <4	4 to <8	EXPOSED	CONCEALED	EXPOSED	CONCEALED
40-60	A	0.5	0.5	1.0	1.0	(2) (3)	-	AL	-
	E	0.5	0.5	1.0	1.0	(2) (3)	-	AL	-

HOT SYSTEMS : DOMESTIC/LAB HOT WATER SUPPLY & RETURN (1)

FLUID TEMP RANGE F	INSULATION TYPE	INSULATION THICKNESS (IN) FOR PIPE SIZES				FIELD APPLIED JACKETS			
						INDOOR		OUTDOOR	
		<1	1 to <1.5	1.5 to <4	4 to <8	EXPOSED	CONCEALED	EXPOSED	CONCEALED
105-140	A	1.0	1.0	1.5	1.5	(2) (3)	-	AL	-
	E	1.0	1.0	1.5	1.5	(2) (3)	-	AL	-

TEMPERED SYSTEMS : TEMPERED WATER

FLUID TEMP RANGE F	INSULATION TYPE	INSULATION THICKNESS (IN) FOR PIPE SIZES				FIELD APPLIED JACKETS			
						INDOOR		OUTDOOR	
		<1	1 to <1.5	1.5 to <4	4 to <8	EXPOSED	CONCEALED	EXPOSED	CONCEALED
60-100	A	0.5	0.5	0.5	0.5	(2) (3)	-	AL	-
	E	0.5	0.5	0.5	0.5	(2) (3)	-	AL	-

DRAIANGE SYSTEMS : SANITARY, STORM, AND CONDENSATE DRAIN

FLUID TEMP RANGE F	INSULATION TYPE	INSULATION THICKNESS (IN) FOR PIPE SIZES				FIELD APPLIED JACKETS			
						INDOOR		OUTDOOR	
		<1	1 to <1.5	1.5 to <4	4 to <8	EXPOSED	CONCEALED	EXPOSED	CONCEALED
60-100	A	1.0	1.0	1.0	1.0	(2) (3)	-	AL	-
	E	1.0	1.0	1.0	1.0	(2) (3)	-	AL	-

NOTES:

1.	TYPE AND THICKNESS SHOWN FOR INDOOR APPLICATIONS. INCREASE LISTED THICKNESS BY 0.5 INCHES FOR OUTDOOR APPLICATIONS OR WHERE EXPOSED TO AMBIENT CONDITIONS FOR CONDENSATION CONTROL. VALUES BASED ON ASHRAE 90.1 TABLES 6.8.3-1 AND 6.8.3-2 MINIMUM PIPING INSULATION THICKNESS.
2.	ALL EXPOSED PIPING IN PROCESSING, GMP, OR ANY WET AREAS SUCH AS KITCHENS, WET PRODUCTION ROOMS, WASH AREAS, AND DISHWASH AREAS SHALL HAVE A PVC JACKET.
3.	PROVIDE ALUMINUM JACKET IN HIGH ABUSE AREAS SUBJECT TO DAMAGE SUCH AS SHIPPING AND RECEIVING,WAREHOUSE OR LOADING AREAS.

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PLUMBING SCHEDULES

NOT FOR CONSTRUCTION

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DATE: 2019.01.22 PROJ. #: 19001A

220000 PLUMBING GENERAL CONDITIONS

1. BASIC REQUIREMENTS
1.1. CONTRACTOR SHALL PROVIDE A COMPLETE AND OPERATIONAL BUILDING HVAC AND PIPING SYSTEM AS INDICATED ON THE PLANS AND SPECIFICATIONS.
1.2. ALL MATERIAL AND EQUIPMENT SHALL BE LISTED, LABELED OR CERTIFIED BY UNDERWRITERS LABORATORIES, INC., WHERE SUCH STANDARDS HAVE BEEN ESTABLISHED.
1.3. ALL EQUIPMENT AND MATERIALS SHALL BE NEW.
1.4. PRESSURE VESSELS AND SAFETY DEVICES SHALL BE LISTED AND CERTIFIED IN ACCORDANCE WITH THE ASME TEST CODE.
1.5. UNLESS MORE STRINGENT PROVISIONS ARE SHOWN OR SPECIFIED, THE WORK SHALL COMPLY WITH APPLICABLE STANDARDS OF THE FOLLOWING.
1.5.1. AMERICAN NATIONAL STANDARD INSTITUTE (ANSI).
1.5.2. AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME).
1.5.3. ASHRAE
1.5.4. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
1.5.5. NATIONAL ELECTRICAL CODE (NEC), INCLUDING AMENDMENTS BY LOCAL AUTHORITY HAVING JURISDICTION.
1.5.6. UNDERWRITER'S LABORATORIES, INC. (UL).
1.6. SUBJECT TO ACCEPTANCE BY ENGINEER AND WITHOUT EXTRA COST, MAKE MODIFICATIONS IN THE LAYOUT AS REQUIRED TO PREVENT CONFLICT WITH WORK OF OTHER TRADES OR FOR THE PROPER EXECUTION OF THE WORK.
1.7. WHERE NOTED ON PLANS, CONCEAL MECHANICAL CONSTRUCTION RUNNING THROUGH FINISHED SPACES WITHIN THE WALLS OR IN CHASES. ALL WORK SHALL BE ABOVE CEILINGS UNLESS INDICATED OTHERWISE.
1.8. COOPERATE WITH OTHER TRADES AND FURNISH IN WRITING, INFORMATION NECESSARY TO PERMIT THE WORK OF OTHER TRADES TO BE INSTALLED AND WITH LEAST POSSIBLE INTERFERENCES OR DELAY.
1.9. WHERE PHYSICAL INTERFERENCES CANNOT BE RESOLVED READILY, PREPARE COMPOSITE DRAWINGS AT A SCALE OF NOT LESS THAN 1/4 INCH = 1'-0", CLEARLY SHOWING THE WORK OF THIS DIVISION IN RELATION TO THE WORK OF OTHER TRADES. OBTAIN WRITTEN ACCEPTANCE BY ENGINEER OF PROPOSED CHANGES AND DISTRIBUTE DRAWINGS TO OTHER TRADES AFFECTED. CORRECT INSTALLED WORK IN CONFLICT WITH WORK OF OTHER TRADES AT NO ADDITIONAL COST.
1.10. DO NOT INSTALL ANY PIPING OR FITTINGS OVER THE TOP OF, OR WITHIN A DISTANCE OF SIX FEET (6') MEASURED HORIZONTALLY FROM ALL SWITCHBOARDS, PANELBOARDS, METERING ASSEMBLIES, BUS DUCTS AND ASSOCIATED EQUIPMENT. WHERE DEVIATION FROM THESE REQUIREMENTS IS NECESSARY AND PIPING PASSES OVER SUCH EQUIPMENT, OBTAIN ENGINEER APPROVAL TO PROVIDE WATERTIGHT SHEET METAL TROUGH AROUND AND UNDER PIPING TO COMPLETELY CONTAIN WATER LEAKAGE. PROVIDE DRAIN PROVISIONS IN TROUGHS AND PIPE TO NEAREST FLOOR DRAIN.
1.11. MATERIALS AND WORKMANSHIP, UNLESS OTHERWISE NOTED, SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS. THE WORK IN THE BUILDING SHALL BE DONE IN A MANNER SATISFACTORY TO THE OWNER.
1.12. COMPLY WITH ALL LOCAL AND STATE CODES FOR SEISMIC ISOLATION. THE DRAWINGS DO NOT SHOW ALL SEISMIC ISOLATION POINTS, THEREFORE ALLOW FOR SEISMIC ISOLATION IN ACCORDANCE WITH THE AUTHORITY HAVING JURISDICTION.
1.13. SERVICE PIPING AND VALVES SHALL BE LOCATED FOR EASY ACCESS TO VALVES AND ASSOCIATED FITTINGS.
1.14. CONTRACTOR SHALL FOLLOW OWNER PROCEDURES TO OBTAIN UTILITY SHUTDOWNS BEFORE, DURING AND AFTER ANY HOT WORK. THIS INCLUDES PROVIDING A DEDICATED FIRE WATCH FOR AT LEAST 1 HOUR AFTER COMPLETING ANY HOT WORK.
1.15. REFER TO DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS AND DIVISION 01 GENERAL REQUIREMENTS AS PROVIDED BY THE OWNER AND/OR CONSTRUCTION MANAGER.

2. SCOPE OF WORK
2.1. THE WORK UNDER CONTRACT INCLUDES ALL LABOR, MATERIALS, AND APPLIANCES NECESSARY FOR THE FURNISHING, INSTALLATION AND TESTING, COMPLETE AND READY FOR SAFE OPERATION OF THE SYSTEMS. WORK SHALL BE INSTALLED IN A NEAT, WORKMANLIKE MANNER. INCLUDE ALL COSTS FOR PERMITS, LICENSES AND CERTIFICATE FILING AND INSPECTIONS REQUIRED BY AUTHORITIES HAVING JURISDICTION.

3. COMMISSIONING SUPPORT
3.1. EACH CONTRACTOR SHALL PROVIDE THE REQUIRED KNOWLEDGABLE PERSONNEL AND EQUIPMENT TO ASSIST IN THE COMMISSIONING OF THE SYSTEMS WITHIN THEIR SCOPE OF WORK.
3.2. THE CONTRACTOR SHALL PROVIDE THE CONSTRUCTION SCHEDULE TO THE COMMISSIONING AGENT FOR REVIEW AND APPROVAL DURING THE CONSTRUCTION PROCESS. THE SCHEDULE SHALL INCLUDE THE COMMISSIONING RELATED ACTIVITIES. THE CONSTRUCTION SCHEDULE SHALL BE UPDATED AND MAINTAINED BY THE CONTRACTOR BASED ON INPUT FROM THE COMMISSIONING AGENT.
3.3. THE CONTRACTOR SHALL INCLUDE THE COMMISSIONING AGENT IN ALL REQUESTS FOR INFORMATION AND RESPONSES TO THE REQUEST FOR INFORMATION.
3.4. CONTRACTORS SHALL BE RESPONSIBLE FOR OPERATION OF SYSTEMS AND EQUIPMENT DURING THE COMMISSIONING PROCESS. THE CONTRACTOR SHALL DEMONSTRATE THAT THE SYSTEMS AND EQUIPMENT ARE INSTALLED AND FUNCTIONING ACCORDING TO THE APPROVED SUBMITTALS, SHOP DRAWINGS, AND INSTALLATION MANUALS.
3.5. EACH CONTRACTOR SHALL PROVIDE THE TEST DATA, REPORTS, COMPLETED INSTALLATION VERIFICATIONS, AND INSTALLATION MANUALS AS REQUESTED BY THE COMMISSIONING AGENT. THE CONTRACTOR MAY UTILIZE HAND WRITTEN AND DRAFT DOCUMENTS IN ORDER TO PROVIDE THE REQUESTED DATA IN A TIMELY MANNER. TYPED FINAL REPORTS SHALL BE ISSUED TO THE COMMISSIONING AGENT WHEN COMPLETED.
3.6. THE CONTACTOR SHALL NOTIFY THE COMMISSIONING AGENT OF ANY ITEMS THAT MAY IMPACT THE COMMISSIONING PROCESS AND WILL NOTIFY THE COMMISSIONING AGENT OF THE RESOLUTION OF THOSE ITEMS.
3.7. THE CONTRACTOR SHALL NOTIFY THE COMMISSIONING AGENT OF SYSTEM SUBSTANTIAL COMPLETION AND PROVIDE START-UP DATES TWO WEEKS IN ADVANCE OF ANY SYSTEM ENERGIZATION OR START-UP. PROVIDE VENDOR START-UP FORMS TWO WEEKS IN ADVANCE OF START-UP AND FULLY COMPLETED FORMS UPON COMPLETION OF START-UP.
3.8. CONSTRUCTION TURN-OVER PACKAGES, INCLUDING AS BUILT DRAWINGS AND TEST REPORTS SHALL BE GENERATED BY THE CONTRACTORS AND ISSUED TO THE COMMISSIONING AGENT FOR REVIEW.
3.9. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION REQUIRED TO CONFIRM THAT THE INSTALLED SYSTEMS AND EQUIPMENT IS FULLY OPERATIONAL. COMPLETED LOOP CHECKS, POINT-TO-POINT, SET-POINT VERIFICATION, AND CALIBRATION DOCUMENTS SHALL BE PROVIDED WHERE SPECIFIED.

4. SUBMITTALS
4.1. SUBMIT A SCHEDULE OF SUBMITTALS, ARRANGED IN CHRONOLOGICAL ORDER BY DATES REQUIRED BY CONSTRUCTION SCHEDULE FOR REVIEW AND APPROVAL. INCLUDE TIME REQUIRED FOR REVIEW, ORDERING, MANUFACTURING, FABRICATION, AND DELIVERY WHEN ESTABLISHING DATES. INCLUDE ADDITIONAL TIME REQUIRED FOR MAKING CORRECTIONS OR REVISIONS TO SUBMITTALS AS NOTED AND ADDITIONAL TIME FOR HANDLING AND REVIEWING SUBMITTALS REQUIRED BY THOSE CORRECTIONS.
4.2. CHECK AND VERIFY THE REQUIREMENTS DESCRIBED IN THE SPECIFICATIONS AND DRAWINGS AS WELL AS THE QUANTITIES OF EQUIPMENT AND MATERIALS.
4.3. MAKE AND VERIFY PERTINENT FIELD MEASUREMENTS PRIOR TO SUBMITTALS OF SHOP DRAWINGS.
4.4. CLEARLY INDICATE/DESCRIBE ANY DEPARTURES FROM DESIGN AND SPECIFICATIONS.
4.5. SHOP DRAWINGS MUST BE COMPLETE WITH ALL THE PERTINENT INFORMATION REQUIRED FOR ENGINEER'S REVIEW.
4.6. PREPARE AND SUBMIT DRAWINGS FOR ALL SYSTEMS INCLUDING EQUIPMENT, EQUIPMENT LAYOUT, DUCTWORK AND PIPING LAYOUT, RISER DIAGRAMS, CONTROL DRAWINGS, PHASING DRAWINGS ETC.
4.7. PIPING LAYOUTS IN GENERAL AREAS SHALL BE DRAWN AT 1/4" = 1'-0".
4.8. FOR EQUIPMENT, SUBMIT DRAWINGS, CATALOG CUTS AND INFORMATION APPROPRIATELY MARKED. SUBMITTAL SHALL ALSO INCLUDE INFORMATION GIVEN IN CONTRACT DOCUMENTS, WITHOUT LIMITATION, SUCH AS PERFORMANCE, DIMENSION, APPEARANCE, WEIGHT, MATERIALS, CONSTRUCTION, CLEARANCES REQUIRED, FINISH, EFFICIENCIES, ELECTRICAL REQUIREMENTS, TYPE, MODEL NUMBER AND MANUFACTURER, AS APPLICABLE. EQUIPMENT LAYOUTS SHALL INDICATE EQUIPMENT DRAWN TO SCALE.

220513 MOTORS

1. MOTOR CHARACTERISTICS
1.1. CONTINUOUS DUTY AT AMBIENT TEMPERATURE OF 40 DEG C AND AT ALTITUDE OF 3300 FEET ABOVE SEA LEVEL
1.2. CAPACITY AND TORQUE CHARACTERISTICS: SUFFICIENT TO START, ACCELERATE, AND OPERATE CONNECTED LOADS AT DESIGNATED SPEEDS, AT INSTALLED ALTITUDE AND ENVIRONMENT, WITH INDICATED OPERATING SEQUENCE, AND WITHOUT EXCEEDING NAMEPLATE RATINGS OR CONSIDERING SERVICE FACTOR

2. SINGLE-PHASE MOTORS (SMALLER THAN ½ HP)
2.1. PERMANENT-SPLIT CAPACITOR, SPLIT PHASE OR CAPACITOR START, INDUCTOR RUN
2.2. SHADED-POLE TYPE FOR MOTORS 1/20 HP AND SMALLER
2.3. MULTISPEED MOTORS: VARIABLE-TORQUE, PERMANENT-SPLIT-CAPACITOR TYPE
2.4. BEARINGS: PRELUBRICATED, ANTIFRICTION BALL BEARINGS OR SLEEVE BEARINGS SUITABLE FOR RADIAL AND THRUST LOADING
2.5. THERMAL PROTECTION: INTERNAL PROTECTION TO AUTOMATICALLY OPEN POWER SUPPLY CIRCUIT TO MOTOR WHEN WINDING TEMPERATURE EXCEEDS A SAFE VALUE CALIBRATED TO TEMPERATURE RATING OF MOTOR INSULATION. THERMAL-PROTECTION DEVICE SHALL AUTOMATICALLY RESET WHEN MOTOR TEMPERATURE RETURNS TO NORMAL RANGE

3. POLYPHASE MOTORS (½ HP AND LARGER)
3.1. NEMA MG 1, DESIGN B, MEDIUM INDUCTION MOTOR
3.2. PREMIUM EFFICIENCY, AS DEFINED IN NEMA MG 1 FOR THREE PHASE MOTORS.
3.3. SERVICE FACTOR: 1.15
3.4. MULTISPEED MOTORS: SEPARATE WINDING FOR EACH SPEED
3.5. BEARINGS: REGREASABLE, SHIELDED, ANTIFRICTION BALL BEARINGS SUITABLE FOR RADIAL AND THRUST LOADING
3.6. MOTORS USED WITH VARIABLE FREQUENCY CONTROLLERS:
3.6.1. NEMA MG1 PART 31 COMPLIANT
3.6.2. WINDINGS: COPPER MAGNET WIRE WITH MOISTURE-RESISTANT INSULATION VARNISH, DESIGNED AND TESTED TO RESIST TRANSIENT SPIKES, HIGH FREQUENCIES, AND SHORT TIME RISE PULSES PRODUCED BY PULSE-WIDTH MODULATED INVERTERS.
3.6.3. ENERGY- AND PREMIUM-EFFICIENT MOTORS: CLASS B TEMPERATURE RISE; CLASS F INSULATION.
3.6.4. INVERTER-DUTY MOTORS: CLASS F TEMPERATURE RISE; CLASS H INSULATION
3.6.5. THERMAL PROTECTION: COMPLY WITH NEMA MG 1 REQUIREMENTS FOR THERMALLY PROTECTED MOTORS.
3.6.6. BEARINGS: INSULATED TO ELIMINATE SHAFT VOLTAGES AND BEARING CURRENTS. MUST PROVIDE A HIGH IMPEDANCE TO HIGH FREQUENCY SIGNALS TO BE EFFECTIVE AGAINST COMMON MODE VOLTAGE INDUCED BEARING CURRENTS.
3.6.7. SHAFT GROUNDING: MEANS TO GROUND SHAFT TO MITIGATE STAY CURRENTS

220517 SLEEVES & SLEEVE SEALS FOR PLUMBING PIPING

1. SLEEVES:
1.1. INSTALL SLEEVES FOR PIPING PASSING THROUGH PENETRATIONS IN FLOORS, PARTITIONS, ROOFS, AND WALLS.
1.2. INSTALL SLEEVES FOR PIPES PASSING THROUGH INTERIOR PARTITIONS.
1.2.1. CUT SLEEVES TO LENGTH FOR MOUNTING FLUSH WITH BOTH SURFACES.
1.2.2. INSTALL SLEEVES THAT ARE LARGE ENOUGH TO PROVIDE 1/4-INCH ANNULAR CLEAR SPACE BETWEEN SLEEVE AND PIPE OR PIPE INSULATION.
1.2.3. SEAL ANNULAR SPACE BETWEEN SLEEVE AND PIPING OR PIPING INSULATION; USE JOINT SEALANTS APPROPRIATE FOR SIZE, DEPTH, AND LOCATION OF JOINT.
1.3. INSTALL SLEEVES IN CONCRETE FLOORS, CONCRETE ROOF SLABS, AND CONCRETE WALLS AS NEW SLABS AND WALLS ARE CONSTRUCTED.
1.3.1. CUT SLEEVES TO LENGTH FOR MOUNTING FLUSH WITH BOTH SURFACES.
1.3.2. EXTEND SLEEVES INSTALLED IN FLOORS OF MECHANICAL EQUIPMENT AREAS OR OTHER WET AREAS 2 INCHES ABOVE FINISHED FLOOR LEVEL.
1.3.3. USING GROUT, SEAL THE SPACE OUTSIDE OF SLEEVES IN SLABS AND WALLS WITHOUT SLEEVE-SEAL SYSTE
1.4. GALVANIZED-STEEL-PIPE SLEEVES: ASTM A 53/A 53M, TYPE E, GRADE B, SCHEDULE 40, ZINC COATED, WITH PLAIN ENDS.
1.5. GALVANIZED-STEEL-SHEET SLEEVES: 0.0239-INCH MINIMUM THICKNESS; ROUND TUBE CLOSED WITH WELDED LONGITUDINAL JOINT

2. FIRE-BARRIER PENETRATIONS: PROVIDE PENETRATION FIRESTOPPING THAT IS PRODUCED AND INSTALLED TO RESIST SPREAD OF FIRE ACCORDING TO REQUIREMENTS INDICATED, RESIST PASSAGE OF SMOKE AND OTHER GASES, AND MAINTAIN ORIGINAL FIRE-RESISTANCE RATING OF CONSTRUCTION PENETRATED. PENETRATION FIRESTOPPING SYSTEMS SHALL BE COMPATIBLE WITH ONE ANOTHER, WITH THE SUBSTRATES FORMING OPENINGS, AND WITH PENETRATING ITEMS IF ANY.
2.1. PENETRATIONS IN FIRE-RESISTANCE-RATED WALLS AND HORIZONTAL ASSEMBLIES: PROVIDE PENETRATION FIRESTOPPING WITH RATINGS DETERMINED PER ASTM E 814 OR UL 1479, BASED ON TESTING AT A POSITIVE PRESSURE DIFFERENTIAL OF 0.01-INCH WG.
2.2. EXPOSED PENETRATION FIRESTOPPING: PROVIDE PRODUCTS WITH FLAME-SPREAD AND SMOKE-DEVELOPED INDEXES OF LESS THAN 25 AND 450, RESPECTIVELY, AS DETERMINED PER ASTM E 84.

220519 METERS AND GAUGES FOR PLUMBING PIPING

1. COMPLY WITH APPLICABLE PORTIONS OF AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) AND INSTRUMENT SOCIETY OF AMERICA (ISA) STANDARDS PERTAINING TO CONSTRUCTION AND INSTALLATION OF METERS AND GAGES.
2. GENERAL:
2.1. ALL THERMOMETERS SHALL BE DUAL SCALE WITH INDICATIONS IN BOTH DEG F AND DEG C.
2.2. ALL GAUGES SHALL BE DUAL SCALE IN BOTH PSI AND KPA.
2.3. SIZE INSERTION LENGTH FOR WELLS FOR INTENDED FUNCTION.
2.4. FOR WELLS WITHOUT THERMOMETERS OR THERMOSTATS, INCLUDE PLUG AND CHAIN.
3. THERMOMETERS:
3.1. DESCRIPTION: FOR DIRECT-MOUNTING, BIMETALLIC-ACTUATED DIAL THERMOMETERS COMPLYING WITH ASME B40.3 GRADE A.
3.2. CASE: DRY TYPE, STAINLESS STEEL CASE AND RING, 5-INCH DIAMETER WITH GLASS WINDOW.
3.3. DIAL: SATIN-FACED, NON-REFLECTIVE ALUMINUM WITH PERMANENTLY-ETCHED SCALE MARKINGS AND DARK-COLORED METAL POINTER, VISIBLE FROM ANY ANGLE.
3.4. CONNECTOR: ADJUSTABLE 180 DEGREES IN VERTICAL PLANE, 360 DEGREES IN HORIZONTAL PLANE, WITH LOCKING DEVICE.
3.5. STEM: STAINLESS STEEL.
3.6. ACCURACY: PLUS OR MINUS 1% OF RANGE.
3.7. PROVIDE ONE OF THE FOLLOWING PRODUCTS: ASHCROFT EI SERIES, TEL-TRU MODEL AA-575R, TRERICE MODEL B856, WEISS BIMETAL DIAL SERIES, WIKA MODEL TI.52, OR WINTERS TBM SERIES.
3.8. EXECUTION:
3.8.1. INSTALL THERMOMETERS AND ADJUST VERTICAL AND TILTED POSITIONS SO THAT THEY MAY BE CLEARLY READ FROM THE FLOOR.
3.8.2. AT A MINIMUM, INSTALL THERMOMETERS IN THE FOLLOWING LOCATIONS:
3.8.2.1. INLET AND OUTLET OF EACH WATER HEATER OR HEAT EXCHANGER.
3.8.2.2. INLET AND OUTLET OF EACH HOT WATER STORAGE TANK.
3.8.2.3. INLET AND OUTLET OF EACH MIXING VALVE (UNLESS INCLUDED).
3.8.2.4. SUCTION SIDE OF EACH RECIRCULATING PUMP.
4. PRESSURE GAUGES:
4.1. DESCRIPTION: FOR DIRECT-MOUNTING, INDICATING-DIAL BOURDON TUBE TYPE COMPLYING WITH ASME B40.100.
4.2. CASE: DRY TYPE, STAINLESS STEEL CASE AND RING, 4- OR 4.5-INCH DIAMETER WITH GLASS WINDOW.
4.3. CONNECTOR: BOTTOM-OUTLET TYPE UNLESS OTHERWISE NOTED.
4.3.1. VALVES: NPS 1/4-INCH BRASS OR STAINLESS-STEEL NEEDLE TYPE.
4.3.2. SNUBBERS: ASME B40.5, NPS 1/4-INCH BRASS BUSHING WITH CORROSION-RESISTANT, POROUS-METAL DISC OF MATERIAL SUITABLE FOR SYSTEM FLUID AND WORKING PRESSURE.
4.4. MOVEMENT: MECHANICAL WITH LINK TO PRESSURE ELEMENT AND CONNECTION TO POINTER.
4.5. DIAL: SATIN-FACED, NON-REFLECTIVE ALUMINUM WITH PERMANENTLY-ETCHED SCALE MARKINGS AND DARK-COLORED METAL POINTER, VISIBLE FROM ANY ANGLE.
4.6. ACCURACY: GRADE A, PLUS OR MINUS 1 PERCENT OF MIDDLE HALF SCALE.
4.7. VACUUM-PRESSURE RANGE: 30-IN. HG OF VACUUM TO 15 PSIG OF PRESSURE (100 KPA OF VACUUM TO 103 KPA OF PRESSURE).
4.8. RANGE FOR FLUIDS UNDER PRESSURE: TWO TIMES OPERATING PRESSURE UNLESS OTHERWISE NOTED.
4.9. PROVIDE ONE OF THE FOLLOWING PRODUCTS: ASHCROFT TYPE 1009, TEL-TRU MODEL 30, TRERICE MODEL 620B, WEISS MODEL CTS, OR WIKA MODEL 212.20.
4.10. EXECUTION:
4.10.1. INSTALL PRESSURE GAGES IN PIPING TEE WITH PRESSURE GAGE VALVE LOCATED ON PIPE AT MOST READABLE POSITION FROM THE FLOOR.
4.10.2. INSTALL NEEDLE-VALVE AND SNUBBER FITTING IN PIPING FOR EACH PRESSURE GAGE FOR FLUIDS.
4.10.3. AT A MINIMUM, INSTALL PRESSURE GAGES IN THE FOLLOWING LOCATIONS:
4.10.3.1. SUCTION AND DISCHARGE OF EACH PUMP.
4.10.3.2. ENTRANCE OF EACH WATER SERVICE INTO A BUILDING.
4.10.3.3. ACROSS THE INLET AND OUTLET OF EACH BACKFLOW PREVENTER.
4.10.3.4. INLET AND OUTLET OF EACH FILTER.
4.10.3.5. INLET AND OUTLET OF EACH PRESSURE-REDUCING VALVE.

220529 HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

1. PROVIDE PIPE AND EQUIPMENT HANGERS AND SUPPORTS WITH SUFFICIENT STRENGTH TO WITHSTAND ALL ANTICIPATED STATIC AND SPECIFIED DYNAMIC AND TEST LOADING CONDITIONS ASSOCIATED WITH THE INTENDED USE. COMPLY WITH MSS SP-58, SP-69, AND SP-89, WHERE APPLICABLE.
2. PROVIDE PRODUCTS (MSS SP-58, TYPES 1-58) BY ONE OF THE FOLLOWING MANUFACTURERS: ANVIL, B-LINE SYSTEMS (COOPER INDUSTRIES), OR NATIONAL PIPE HANGER CORP.
3. MATERIALS:
3.1. HANGERS, SUPPORTS, CONTINUOUS-THREAD HANGER RODS, ATTACHMENTS, AND ACCESSORIES: HOT-DIPPED GALVANIZED CARBON STEEL.
3.2. USE NONMETALLIC COATINGS OR COPPER-PLATED STEEL FOR ELECTROLYTIC PROTECTION WHERE IN DIRECT CONTACT WITH BARE COPPER PIPING AND TUBING.
4. HORIZONTAL PIPE HANGERS: FACTORY-FABRICATED COMPONENTS.
4.1. ADJUSTABLE, STEEL CLEVIS HANGERS (MSS TYPE 1): FOR SUSPENSION OF NONINSULATED OR INSULATED, STATIONARY PIPES.
4.2. SINGLE-PIPE ROLLS (MSS TYPE 41) OR ADJUSTABLE ROLLER HANGERS (MSS TYPE 43): FOR SUSPENSION OF PIPES IF LONGITUDINAL MOVEMENT CAUSED BY EXPANSION AND CONTRACTION MIGHT OCCUR.
4.2.1. USE WITH ALL HOT (≥90 DEG F) PIPING AND CONDENSER WATER PIPING NPS 2-1/2" AND LARGER.
4.2.2. USE WITH ALL COLD (≤60 DEG F) PIPING NPS 6" AND LARGER.
5. VERTICAL PIPING CLAMPS:
5.1. EXTENSION PIPE RISER CLAMPS (MSS TYPE 8) OR (MSS TYPE 42) IF LONGER ENDS ARE REQUIRED FOR RISER CLAMPS.
6. HANGER-ROD ATTACHMENTS:
6.1. STEEL TURNBUCKLES (MSS TYPE 13): FOR ADJUSTMENT UP TO 6" FOR HEAVY LOADS.
6.2. STEEL CLEVISES (MSS TYPE 14) AND STEEL WELDLESS EYE NUTS (MSS TYPE 17): FOR 120 TO 450 DEG F PIPING INSTALLATIONS.
7. BUILDING ATTACHMENTS:
7.1. STEEL OR MALLEABLE CONCRETE INSERTS (MSS TYPE 18): FOR UPPER ATTACHMENT TO SUSPEND PIPE HANGERS FROM CONCRETE CEILING.
7.2. TOP-BEAM C-CLAMPS (MSS TYPE 19): FOR USE UNDER ROOF INSTALLATIONS WITH BAR-JOIST CONSTRUCTION TO ATTACH TO TOP FLANGE OF STRUCTURAL SHAPE.
7.3. CENTER-BEAM CLAMPS (MSS TYPE 21): FOR ATTACHING TO CENTER OF BOTTOM FLANGE OF BEAMS.
7.4. STEEL-BEAM CLAMPS WITH EYE NUTS (MSS TYPE 28 OR TYPE 29): FOR ATTACHING TO BOTTOM OF STEEL I-BEAMS FOR HEAVY LOADS.
8. THERMAL HANGER INSERTS & SHIELDS: 100-PSIG COMPRESSIVE STRENGTH CALCIUM SILICATE INSULATION INSERT WITH GALVANIZED SHEET METAL JACKET TO PREVENT CRUSHING OF INSULATION AT EACH HANGER AND CLAMP. PRODUCT SHALL BE DESIGNED TO MAINTAIN A CONTINUOUS VAPOR BARRIER ON COLD SYSTEMS.
9. TRAPEZE HANGERS: ARRANGE FOR GROUPING OF PARALLEL RUNS OF HORIZONTAL PIPING AND SUPPORT TOGETHER ON FIELD-FABRICATED TRAPEZE PIPE HANGERS IN COMPLIANCE WITH MSS SP-69. SUPPORT PIPES OF VARIOUS SIZES TOGETHER AND SPACE TRAPEZES FOR SMALLEST PIPE SIZE OR INSTALL INTERMEDIATE SUPPORTS FOR SMALLER DIAMETER PIPES FOR INDIVIDUAL PIPE HANGERS.
10. SUPPORT SPACING:
10.1. HORIZONTAL AND VERTICAL SUPPORT SPACING AND HANGER ROD SIZES SHALL BE IN COMPLIANCE WITH MSS SP-58, MSS SP-69, THE INTERNATIONAL MECHANICAL CODE, THE INTERNATIONAL FUEL GAS CODE, AND ALL OTHER APPLICABLE STATE AND LOCAL CODES.
10.2. INSTALL ADDITIONAL ATTACHMENTS AT CONCENTRATED LOADS (INCLUDING VALVES, FLANGES, AND STRAINERS, NPS 2-1/2" AND LARGER), NEAR INSTRUMENTS AND OTHER DEVICES THAT ARE LIKELY TO BE REMOVED FOR MAINTENANCE, AND AT CHANGES IN DIRECTION OF PIPING.
10.3. INSTALL HANGERS AND SUPPORTS SO PIPING LIVE AND DEAD LOADS AND STRESSES FROM MOVEMENT WILL NOT BE TRANSMITTED TO CONNECTED EQUIPMENT.
11. MISCELLANEOUS MATERIALS:
11.1. STRUCTURAL STEEL: ASTM A 36/A 36M, CARBON-STEEL PLATES, SHAPES, AND BARS. WELD STEEL ACCORDING TO AWS D1.1. COMPLY WITH MFMA-103 FOR METAL FRAMING SYSTEM SELECTIONS AND APPLICATIONS.
11.2. GROUT: 5000 PSI, 28-DAY COMPRESSIVE STRENGTH; ASTM C 1107, FACTORY-MIXED AND -PACKAGED, DRY, HYDRAULIC-CEMENT, NONSHRINK AND NONMETALLIC GROUT; SUITABLE FOR INTERIOR AND EXTERIOR APPLICATIONS; NON-STAINING, NON-CORROSIVE, AND NON-GASEOUS.

220553 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

1. EQUIPMENT IDENTIFICATION
1.1. ACCEPTABLE MANUFACTURERS: SETON, BRADY, CRAFTMARK.
1.2. IDENTIFY PUMPS, WATER HEATERS, TANKS AND WATER TREATMENT DEVICES, COMPRESSORS, VACUUM PUMPS, GAS CHANGEOVER MANIFOLDS, MIXING VALVES, AND ALL OTHER EQUIPMENT WITH PLASTIC NAMEPLATES PERMANENTLY ATTACHED TO THE EQUIPMENT.
1.3. COORDINATE ALL EQUIPMENT IDENTIFICATION DESIGNATIONS WITH THE OWNER. BEFORE FABRICATING NAMEPLATES, SUBMIT THE AGREED-UPON DESIGNATIONS TO THE OWNER FOR APPROVAL.
2. PIPE IDENTIFICATION
2.1. ALL PIPE LINE MARKERS SHOULD FOLLOW THE KEY ELEMENTS OF LEGEND, COLOR, VISIBILITY, AND TYPE AND SIZE OF LETTERS AS DESCRIBED IN THE LATEST EDITION OF ASME - A13.1 AS WELL AS THE BELOW LISTED REQUIREMENTS.
2.2. LEGENDS SHALL BE APPLIED CLOSE TO VALVES OR FLANGES AND ADJACENT TO CHANGES IN DIRECTION, BRANCHES, AND WHERE PIPES PASS THROUGH WALLS OR FLOORS; AND AT INTERVALS ON STRAIGHT PIPE RUNS FOR SUFFICIENT IDENTIFICATION (TYPICALLY NOT EXCEEDING 25 FEET ON HORIZONTAL PIPE RUNS).
2.3. THE PIPELINE MARKER SHALL BE OF A MATERIAL COMPATIBLE WITH THE OPERATIONS WITHIN THE AREA OF PLACEMENT.
2.4. MARKERS SHALL BE OF THE "SNAP-AROUND" OR SELF-ADHESIVE TYPE AND SHALL NOT REQUIRE BANDING OR TAPING TO SECURE THEM IN PLACE.
2.5. ADDITIONAL MARKERS MAY BE APPLIED WHERE DEEMED NECESSARY FOR A PARTICULAR INSTALLATION. FOR EXAMPLE, ALL HOSE MANIFOLDS SHALL HAVE MARKERS CLOSE TO THE SHUT-OFF VALVES.
2.6. VALVE TAGGING SHALL BE COORDINATED WITH EXISTING PLANT TAGGING SYSTEM. WHERE NO TAGGING SYSTEM EXISTS, VALVE NUMBERING SHALL BE AGREED UPON BY SITE ENGINEERING AND PROJECT ENGINEERING.
2.7. SYSTEM SUPPLY AND RETURN DESIGNATION CHANGES SHALL OCCUR AT A CHANGE IN TEMPERATURE, UNLESS OTHERWISE NOTED.
2.8. WHERE REQUIRED, TAGS SHALL BE OF A MATERIAL COMPATIBLE WITH THE OPERATIONS WITHIN THE AREA OF PLACEMENT. TAGS SHALL BE PERMANENTLY FIXED.
2.9. TAG NOMENCLATURE SHALL BE A MINIMUM OF 1/2" HIGH.
2.10. LEGENDS SHALL SPELL OUT THE SERVICE IN THE PIPE LINE: I.E., SULFURIC ACID, NOT H2SO4.
2.11. CLASSIFICATION
2.11.1. MATERIALS INHERENTLY HAZARDOUS. (I.E. FLAMMABLE OR EXPLOSIVE, CHEMICALLY ACTIVE, TOXIC, EXTREME TEMPS OR PRESSURES, RADIOACTIVE)
2.11.1.1. COLOR SCHEME: YELLOW BACKGROUND, BLACK LETTERS.
2.11.1.2. TYPICAL SERVICES: CHEMICAL SEWER, CONDENSATE, FUEL OIL, HYDROGEN, NATURAL GAS, PROPANE GAS, STEAM, HEATING HOT WATER, PROCESS WASTE, HYDROCHLORIC ACID, SODIUM HYDROXIDE.
2.11.2. MATERIALS OF INHERENTLY LOW HAZARD - LIQUID OR LIQUID ADMIXTURE
2.11.2.1. COLOR SCHEME: GREEN BACKGROUND, WHITE LETTERS.
2.11.2.2. TYPICAL SERVICES: BOILER FEED WATER, CHILLED WATER, CITY WATER, DI WATER, DISTILLED WATER, POTABLE WATER, SANITARY SEWER & VENT, STORM WATER, TEMPERED WATER, TOWER WATER, VACUUM.
2.11.3. MATERIALS OF INHERENTLY LOW HAZARD - GAS OR GASEOUS ADMIXTURE
2.11.3.1. COLOR SCHEME: BLUE BACKGROUND, WHITE LETTERS.
2.11.3.2. TYPICAL SERVICES: COMPRESSED AIR, INSTRUMENT AIR, NITROGEN, PLANT AIR.

220716 & 220719 EQUIPMENT & PIPING INSULATION

1. INSTALL INSULATION AFTER PRESSURE TESTING SYSTEMS AND, WHERE REQUIRED, AFTER INSTALLING AND TESTING HEAT TRACING.
2. WHERE VAPOR BARRIER IS INDICATED, SEAL JOINTS, SEAMS, AND PENETRATIONS IN INSULATION AT HANGERS, SUPPORTS, ANCHORS, AND OTHER PROJECTIONS WITH VAPOR-BARRIER MASTIC. INSTALL INSULATION CONTINUOUSLY THROUGH HANGERS AND AROUND ANCHOR ATTACHMENTS.
3. CONTINUE INSULATION THROUGH ALL ROOF, WALL, PARTITION, AND FLOOR PENETRATIONS. SEAL PENETRATIONS THROUGH FIRE-RATED ASSEMBLIES WITH FIRESTOPPING MATERIALS AS REQUIRED TO MAINTAIN THE FIRE DESIGN RATING.
4. INSTALL REMOVABLE SECTION OF INSULATION OVER FITTINGS, VALVES, STRAINERS, FLANGES, UNIONS, AND OTHER SPECIALTIES WITH CONTINUOUS THERMAL AND VAPOR-RETARDER INTEGRITY UNLESS OTHERWISE INDICATED.
4.1. VALVES: INSULATE UP TO AND INCLUDING THE BONNETS, VALVE STUFFING-BOX STUDS, BOLTS, AND NUTS.
4.2. STRAINERS: INSULATE SO THAT BASKET FLANGE OR PLUG CAN BE EASILY REMOVED AND REPLACED WITHOUT DAMAGING THE INSULATION AND JACKET. PROVIDE A REMOVABLE REUSABLE INSULATION COVER.
4.3. FLANGES AND UNIONS: INSULATE USING A SECTION OF OVERSIZED PREFORMED PIPE INSULATION. OVERLAP ADJOINING PIPE INSULATION BY NOT LESS THAN TWO TIMES THE THICKNESS OF PIPE INSULATION, OR ONE PIPE DIAMETER, WHICHEVER IS THICKER. LABEL THE OUTSIDE INSULATION JACKET OF EACH UNION WITH THE WORD "UNION." MATCH SIZE AND COLOR OF PIPE LABELS.
4.4. INSULATE INSTRUMENT CONNECTIONS FOR THERMOMETERS, PRESSURE GAGES, PRESSURE TEMPERATURE TAPS, TEST CONNECTIONS, FLOW METERS, SENSORS, SWITCHES, AND TRANSMITTERS ON INSULATED PIPES.
5. FOR SERVICES NOT SCHEDULED TO RECEIVE A FIELD-APPLIED JACKET (EXCEPT FOR TYPE E), INSTALL FITTED PVC COVER OVER ELBOWS, TEES, STRAINERS, VALVES, FLANGES, AND UNIONS. TERMINATE ENDS WITH PVC END CAPS. TAPE PVC COVERS TO ADJOINING INSULATION FACING USING PVC TAPE.
6. FINISH INSTALLATION WITH SYSTEMS AT OPERATING CONDITIONS. REPAIR JOINT SEPARATIONS AND CRACKING DUE TO THERMAL MOVEMENT.
7. REFER TO THE PIPING INSULATION SCHEDULE FOR SYSTEM APPLICATION AND THICKNESS.
8. ALL INSULATION AND RELATED MATERIALS SHALL HAVE A FLAME-SPREAD INDEX OF 25 OR LESS AND SMOKE-DEVELOPED INDEX OF 50 OR LESS IN ACCORDANCE WITH ASTM E 84 OR UL 723 USING THE SPECIMEN PREPARATION AND MOUNTING PROCEDURES OF ASTM E 2231.
9. TYPE A - MINERAL-FIBER PRE-FORMED PIPE INSULATION:
9.1. DESCRIPTION: MINERAL OR GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 547 TYPE I, GRADE A, WITH FACTORY-APPLIED PRESSURE-SENSITIVE SELF-SEALING LAP ASJ-SSL
9.2. PERFORMANCE:
9.2.1. MAX. OPERATING TEMPERATURE: 850°F (140°F AT JACKET)
9.2.2. THERMAL CONDUCTIVITY: 0.23 K-VALUE [BTU-IN/(HR-FT^2-°F)] AT 75°F.
9.2.3. ASJ WATER VAPOR PERMEABILITY: 0.02 PERM
9.3. PROVIDE ONE OF THE FOLLOWING PRODUCTS: JOHNS MANVILLE MICRO-LOK DS, KNAUF EARTHWOOL, MANSON ALLEY-K, OR OWENS CORNING FIBERGLAS PIPE INSULATION.
10. TYPE E - FLEXIBLE ELASTOMERIC INSULATION:
10.1. DESCRIPTION: CLOSED-CELL, SPONGE- OR EXPANDED-RUBBER MATERIALS. COMPLY WITH ASTM C 534 TYPE I FOR TUBULAR MATERIALS.
10.2. PERFORMANCE:
10.2.1. OPERATING TEMPERATURE RANGE: -70°F TO 220°F
10.2.2. THERMAL CONDUCTIVITY: 0.245 K-VALUE [BTU-IN/(HR-FT^2-°F)] AT 75°F.
10.2.3. WATER VAPOR PERMEABILITY: 0.05 PERM
10.3. PROVIDE ONE OF THE FOLLOWING PRODUCTS: K-FLEX USA INSUL-LOCK OR INSUL-TUBE OR K-FIT, AEROFLEX USA AEROCEL, OR ARMACELL AP ARMAFLEX (THROUGH 1" THICK ONLY).
11. PVC JACKET:
11.1. DESCRIPTION: HIGH-IMPACT- & UV-RESISTANT; COMPLY WITH ASTM D 1784, CLASS 16354-C.
11.2. THICKNESS: 20 MILS FOR CONCEALED APPLICATIONS, 30 MILS FOR EXPOSED APPLICATIONS.
11.3. FACTORY-FABRICATED FITTING COVERS FOR 45- AND 90-DEGREE, SHORT- AND LONG-RADIUS ELBOWS, TEES, VALVES, FLANGES, UNIONS, REDUCERS, AND END CAPS, IF AVAILABLE; OTHERWISE, FIELD FABRICATE:
11.4. PROVIDE ONE OF THE FOLLOWING PRODUCTS: JOHNS MANVILLE ZESTON, P.I.C. PLASTICS FG SERIES, PROTO LOSMOKE, OR SPEEDLINE SMOKESAFE.
12. SELF-ADHESIVE OUTDOOR JACKET: VAPOR BARRIER AND WATERPROOFING MEMBRANE OVER INSULATION LOCATED ABOVEGROUND OUTDOORS WITH EMBOSSED ALUMINUM-FOIL FACING AND 0.00 PERMEABILITY. PROVIDE ONE OF THE FOLLOWING PRODUCTS: POLYGUARD ALUMAGUARD 60, VENTURECLAD PLUS 1579GCW-E, OR MFM FLEXCLAD 400.

221116 DOMESTIC WATER

1. SYSTEM APPLICATIONS: REFER TO PIPING SYSTEM APPLICATION SCHEDULE FOR THE PIPE DATA SHEET FOR EACH SYSTEM.
2. INSTALLATION PROCEDURES:
2.1. INSTALL COPPER TUBING UNDER BUILDING SLAB ACCORDING TO CDA'S "COPPER TUBE HANDBOOK."
2.2. INSTALL SHUTOFF VALVE, HOSE-END DRAIN VALVE, STRAINER, PRESSURE GAGE, AND TEST TEE WITH VALVE INSIDE THE BUILDING AT EACH DOMESTIC WATER-SERVICE ENTRANCE.
2.3. INSTALL SHUTOFF VALVE IMMEDIATELY UPSTREAM OF EACH DIELECTRIC FITTING.
2.4. INSTALL PIPING LEVEL AND PLUMB, FREE OF SAGS AND BENDS.
2.5. ROUGH-IN DOMESTIC WATER PIPING FOR WATER-METER INSTALLATION ACCORDING TO UTILITY COMPANY'S REQUIREMENTS.
2.6. INSTALL PIPING CONCEALED FROM VIEW AND PROTECTED FROM PHYSICAL CONTACT BY BUILDING OCCUPANTS UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.
2.7. INSTALL PIPING INDICATED TO BE EXPOSED AND PIPING IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE.
2.8. INSTALL PIPING ABOVE ACCESSIBLE CEILINGS TO ALLOW SUFFICIENT SPACE FOR CEILING PANEL REMOVAL, AND COORDINATE WITH OTHER SERVICES OCCUPYING THAT SPACE.
2.9. INSTALL PIPING TO PERMIT VALVE SERVICING.
2.10. INSTALL UNIONS IN COPPER TUBING AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT, MACHINE, AND SPECIALTY.
2.11. INSTALL NIPPLES, UNIONS, SPECIAL FITTINGS, AND VALVES WITH PRESSURE RATINGS THE SAME AS OR HIGHER THAN THE SYSTEM PRESSURE RATING USED IN APPLICATIONS BELOW UNLESS OTHERWISE INDICATED.
2.12. REAM ENDS OF PIPES AND TUBES AND REMOVE BURRS. BEVEL PLAIN ENDS OF STEEL PIPE. REMOVE SCALE, SLAG, DIRT, AND DEBRIS FROM INSIDE AND OUTSIDE OF PIPES, TUBES, AND FITTINGS BEFORE ASSEMBLY.
2.13. A WATER HAMMER ARRESTOR SHALL BE INSTALLED WHERE QUICK CLOSING VALVES (FLUSH VALVES, ELECTRONIC FAUCETS, SOLENOID VALVES, ETC) ARE UTILIZED. WATER HAMMER ARRESTORS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS, PDI-WH 201 STANDARD, AND CONFORM TO ASSE 1010. THE PREFERRED LOCATION IS AT THE END OF THE BRANCH LINE BETWEEN THE LAST TWO FIXTURES SERVED, OR FOR SINGLE FIXTURE/EQUIPMENT BRANCHES AS CLOSE AS POSSIBLE TO THE QUICK CLOSING VALVE.
3. TESTING:
3.1. FILL DOMESTIC WATER PIPING. CHECK COMPONENTS TO DETERMINE THAT THEY ARE NOT AIR BOUND AND THAT PIPING IS FULL OF WATER.
3.2. TEST FOR LEAKS AND DEFECTS IN NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED. IF TESTING IS PERFORMED IN SEGMENTS, SUBMIT A SEPARATE REPORT FOR EACH TEST, COMPLETE WITH DIAGRAM OF PORTION OF PIPING TESTED.
3.3. LEAVE NEW, ALTERED, EXTENDED, OR REPLACED DOMESTIC WATER PIPING UNCOVERED AND UNCONCEALED UNTIL IT HAS BEEN TESTED AND APPROVED.
3.4. CAP AND SUBJECT PIPING TO STATIC WATER PRESSURE OF 50 PSIG ABOVE OPERATING PRESSURE, WITHOUT EXCEEDING PRESSURE RATING OF PIPING SYSTEM MATERIALS. ISOLATE TEST SOURCE AND ALLOW IT TO STAND FOR FOUR HOURS. LEAKS AND LOSS IN TEST PRESSURE CONSTITUTE DEFECTS THAT MUST BE REPAIRED
4. CLEANING:
4.1. PURGE NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED BEFORE USING.
4.2. USE PURGING AND DISINFECTING PROCEDURES PRESCRIBED BY AUTHORITIES HAVING JURISDICTION; IF METHODS ARE NOT PRESCRIBED, USE PROCEDURES DESCRIBED IN EITHER AWWA C651 OR AWWA C652 OR FOLLOW PROCEDURES DESCRIBED BELOW.
4.3. FILL SYSTEM OR PART THEREOF WITH WATER/CHLORINE SOLUTION WITH AT LEAST 200 PPM OF CHLORINE. ISOLATE AND ALLOW TO STAND FOR THREE HOURS.
4.4. FLUSH SYSTEM WITH CLEAN, POTABLE WATER UNTIL NO CHLORINE IS IN WATER COMING FROM SYSTEM AFTER THE STANDING TIME.
4.5. REPEAT PROCEDURES IF BIOLOGICAL EXAMINATION SHOWS CONTAMINATION.

221316 SANITARY WASTE AND VENT

1. SYSTEM APPLICATIONS: REFER TO PIPING SYSTEM APPLICATION SCHEDULE FOR THE PIPE DATA SHEET FOR EACH SYSTEM.
2. INSTALLATION PROCEDURES:
2.1. INSTALL CAST-IRON SOIL PIPING ACCORDING TO CISPI'S "CAST IRON SOIL PIPE AND FITTINGS HANDBOOK," CHAPTER IV, "INSTALLATION OF CAST IRON SOIL PIPE AND FITTINGS."
2.2. INSTALL ABOVEGROUND PVC PIPING ACCORDING TO ASTM D 2665.
2.3. INSTALL UNDERGROUND PVC PIPING ACCORDING TO ASTM D 2321.
2.4. INSTALL PIPING IN CONCEALED LOCATIONS UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.
2.5. INSTALL PIPING INDICATED TO BE EXPOSED AND PIPING IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE.
2.6. INSTALL PIPING ABOVE ACCESSIBLE CEILINGS TO ALLOW SUFFICIENT SPACE FOR CEILING PANEL REMOVAL.
2.7. INSTALL PIPING AT INDICATED SLOPES, FREE OF SAGS AND BENDS.
2.8. INSTALL PIPING TO ALLOW APPLICATION OF INSULATION.
2.9. PROVIDE CLEANOUTS FOR FLUSHING AND MAINTENANCE AT THE BASE OF EACH VERTICAL RISER 18" ABOVE FINISHED FLOOR UNLESS OTHERWISE NOTED ON DRAWINGS.
2.10. MAKE CHANGES IN DIRECTION FOR SOIL AND WASTE DRAINAGE AND VENT PIPING USING APPROPRIATE BRANCHES, BENDS, AND LONG-SWEEP BENDS. SANITARY TEES AND SHORT-SWEEP 1/4 BENDS MAY BE USED ON VERTICAL STACKS IF CHANGE IN DIRECTION OF FLOW IS FROM HORIZONTAL TO VERTICAL. USE LONG-TURN, DOUBLE Y-BRANCH AND 1/8-BEND FITTINGS IF TWO FIXTURES ARE INSTALLED BACK TO BACK OR SIDE BY SIDE WITH COMMON DRAIN PIPE. STRAIGHT TEES, ELBOWS, AND CROSSES MAY BE USED ON VENT LINES. DO NOT CHANGE DIRECTION OF FLOW MORE THAN 90 DEGREES. USE PROPER SIZE OF STANDARD INCREASERS AND REDUCERS IF PIPES OF DIFFERENT SIZES ARE CONNECTED. REDUCING SIZE OF DRAINAGE PIPING IN DIRECTION OF FLOW IS PROHIBITED.
2.11. LAY BURIED BUILDING DRAINAGE PIPING BEGINNING AT LOW POINT OF EACH SYSTEM. INSTALL TRUE TO GRADES AND ALIGNMENT INDICATED, WITH UNBROKEN CONTINUITY OF INVERT. PLACE HUB ENDS OF PIPING UPSTREAM. INSTALL REQUIRED GASKETS ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS FOR USE OF LUBRICANTS, CEMENTS, AND OTHER INSTALLATION REQUIREMENTS. MAINTAIN SWAB IN PIPING AND PULL PAST EACH JOINT AS COMPLETED.
2.12. INSTALL SOIL AND WASTE DRAINAGE AND VENT PIPING AT THE FOLLOWING MINIMUM SLOPES UNLESS OTHERWISE INDICATED: 2 PERCENT DOWNWARD IN DIRECTION OF FLOW FOR PIPING NPS 3 AND SMALLER; 1 PERCENT DOWNWARD IN DIRECTION OF FLOW FOR PIPING NPS 4 AND LARGER.
3. TESTING:
3.1. GRAVITY SEWER TESTS SHALL CONSIST OF PLUGGING THE END OF THE BUILDING SEWER AT THE POINT OF CONNECTION WITH THE PUBLIC SEWER, FILLING THE BUILDING SEWER WITH WATER, TESTING WITH NOT LESS THAN A 10-FOOT HEAD OF WATER AND MAINTAINING SUCH PRESSURE FOR 15 MINUTES. WATER LEVEL MUST NOT DROP. INSPECT JOINTS FOR LEAKS AND REPAIR AS NECESSARY. DO NOT AIR TEST.
3.2. FINISHED PLUMBING TEST PROCEDURE: THE FINAL TEST OF THE COMPLETED DRAINAGE AND VENT SYSTEMS SHALL BE VISUAL AND IN SUFFICIENT DETAIL TO DETERMINE COMPLIANCE WITH THE PROVISIONS OF THIS CODE. WHERE A SMOKE TEST IS UTILIZED, IT SHALL BE MADE BY FILLING ALL TRAPS WITH WATER AND THEN INTRODUCING INTO THE ENTIRE SYSTEM A PUNGENT, THICK SMOKE PRODUCED BY ONE OR MORE SMOKE MACHINES. WHEN THE SMOKE APPEARS AT STACK OPENINGS ON THE ROOF, THE STACK OPENINGS SHALL BE CLOSED AND A PRESSURE EQUIVALENT TO A 1-INCH WATER COLUMN SHALL BE HELD FOR A TEST PERIOD OF NOT LESS THAN 15 MINUTES.
4. CLEANING:
4.1. CLEAN NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED BEFORE USING. CLEAN PIPING BY FLUSHING WITH POTABLE WATER UNTIL DIRTY WATER DOES NOT APPEAR AT OUTLETS.
4.2. PROTECT DRAINS DURING REMAINDER OF CONSTRUCTION PERIOD TO AVOID CLOGGING WITH DIRT AND DEBRIS AND TO PREVENT DAMAGE FROM TRAFFIC AND CONSTRUCTION WORK.

226600 LAB WASTE AND VENT

1. SYSTEM APPLICATIONS: REFER TO PIPING SYSTEM APPLICATION SCHEDULE FOR THE PIPE DATA SHEET FOR EACH SYSTEM.
2. INSTALLATION PROCEDURES:
2.1. PLASTIC-PIPING ELECTROFUSION JOINTS: MAKE POLYOLEFIN DRAINAGE-PIPING JOINTS ACCORDING TO ASTM F 1290.
2.2. INSTALL PIPING IN CONCEALED LOCATIONS UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.
2.3. INSTALL PIPING INDICATED TO BE EXPOSED AND PIPING IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE.
2.4. INSTALL PIPING ABOVE ACCESSIBLE CEILINGS TO ALLOW SUFFICIENT SPACE FOR CEILING PANEL REMOVAL.
2.5. INSTALL PIPING AT INDICATED SLOPES, FREE OF SAGS AND BENDS.
2.6. INSTALL PIPING TO ALLOW APPLICATION OF INSULATION.
2.7. PROVIDE CLEANOUTS FOR FLUSHING AND MAINTENANCE AT THE BASE OF EACH VERTICAL RISER 18" ABOVE FINISHED FLOOR UNLESS OTHERWISE NOTED ON DRAWINGS.
2.8. INSTALL WASTE DRAINAGE AND VENT PIPING AT THE FOLLOWING MINIMUM SLOPES UNLESS OTHERWISE INDICATED: 2 PERCENT DOWNWARD IN DIRECTION OF FLOW FOR PIPING NPS 3 AND SMALLER; 1 PERCENT DOWNWARD IN DIRECTION OF FLOW FOR PIPING NPS 4 AND LARGER.
2.9. FIRE-BARRIER PENETRATIONS: MAINTAIN INDICATED FIRE RATING OF WALLS, PARTITIONS, CEILINGS, AND FLOORS AT PIPE PENETRATIONS. SEAL PIPE PENETRATIONS WITH FIRESTOP MATERIALS. REFER TO DIVISION 07 SECTION "PENETRATION FIRESTOPPING" FOR MATERIALS
3. TESTING:
3.1. GRAVITY SEWER TESTS SHALL CONSIST OF PLUGGING THE END OF THE BUILDING SEWER AT THE POINT OF CONNECTION WITH THE PUBLIC SEWER, FILLING THE BUILDING SEWER WITH WATER, TESTING WITH NOT LESS THAN A 10-FOOT HEAD OF WATER AND MAINTAINING SUCH PRESSURE FOR 15 MINUTES. WATER LEVEL MUST NOT DROP. INSPECT JOINTS FOR LEAKS AND REPAIR AS NECESSARY. DO NOT AIR TEST.
4. CLEANING:
4.1. CLEAN NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED BEFORE USING. CLEAN PIPING BY FLUSHING WITH POTABLE WATER UNTIL DIRTY WATER DOES NOT APPEAR AT OUTLETS.
4.2. PROTECT DRAINS DURING REMAINDER OF CONSTRUCTION PERIOD TO AVOID CLOGGING WITH DIRT AND DEBRIS AND TO PREVENT DAMAGE FROM TRAFFIC AND CONSTRUCTION WORK.

231123 NATURAL GAS

1. SYSTEM APPLICATIONS: REFER TO PIPING SYSTEM APPLICATION SCHEDULE FOR THE PIPE DATA SHEET FOR EACH SYSTEM.
2. INSTALLATION PROCEDURES:
2.1. COMPLY WITH NFPA 54 THE INTERNATIONAL FUEL GAS CODE FOR INSTALLATION AND PURGING OF NATURAL-GAS PIPING.
2.2. INSTALL FITTINGS FOR CHANGES IN DIRECTION AND BRANCH CONNECTIONS.
2.3. ARRANGE FOR PIPE SPACES, CHASES, SLOTS, SLEEVES, AND OPENINGS IN BUILDING STRUCTURE DURING PROGRESS OF CONSTRUCTION, TO ALLOW FOR MECHANICAL INSTALLATIONS.
2.4. INSTALL PIPING IN CONCEALED LOCATIONS UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.
2.5. INSTALL PIPING INDICATED TO BE EXPOSED AND PIPING IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE.
2.6. INSTALL PIPING ABOVE ACCESSIBLE CEILINGS TO ALLOW SUFFICIENT SPACE FOR CEILING PANEL REMOVAL.
2.7. INSTALL PIPING LEVEL AND PLUMB, FREE OF SAGS AND BENDS.
2.8. INSTALL PIPING TO PERMIT VALVE SERVICING.
2.9. INSTALL NATURAL-GAS PIPING AT UNIFORM GRADE OF 2 PERCENT DOWN TOWARD DRIP AND SEDIMENT TRAPS, FREE OF SAGS AND BENDS.
2.10. FIRE-BARRIER PENETRATIONS: MAINTAIN INDICATED FIRE RATING OF WALLS, PARTITIONS, CEILINGS, AND FLOORS AT PIPE PENETRATIONS. SEAL PIPE PENETRATIONS WITH FIRESTOP MATERIALS.
2.11. VERIFY FINAL EQUIPMENT LOCATIONS FOR ROUGHING-IN. COMPLY WITH REQUIREMENTS IN SECTIONS SPECIFYING GAS-FIRED APPLIANCES AND EQUIPMENT FOR ROUGHING-IN REQUIREMENTS.
2.12. DRIPS AND SEDIMENT TRAPS: INSTALL DRIPS AT POINTS WHERE CONDENSATE MAY COLLECT, INCLUDING SERVICE-METER OUTLETS. LOCATE WHERE ACCESSIBLE TO PERMIT CLEANING AND EMPTYING. DO NOT INSTALL WHERE CONDENSATE IS SUBJECT TO FREEZING.
2.13. EXTEND RELIEF VENT CONNECTIONS FOR SERVICE REGULATORS, LINE REGULATORS, AND OVERPRESSURE PROTECTION DEVICES TO OUTDOORS AND TERMINATE WITH WEATHERPROOF VENT CAP.
2.14. DO NOT INSTALL NATURAL-GAS PIPING IN OR THROUGH CIRCULATING AIR DUCTS, CLOTHES OR TRASH CHUTES, CHIMNEYS OR GAS VENTS (FLUES), VENTILATING DUCTS, OR DUMBWAITER OR ELEVATOR SHAFTS. DO NOT INSTALL NATURAL-GAS PIPING IN SOLID WALLS OR PARTITIONS.
2.15. INSTALL UNIONS IN PIPES NPS 2 AND SMALLER, ADJACENT TO EACH VALVE, AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT. UNIONS ARE NOT REQUIRED AT FLANGED CONNECTIONS
2.16. INSTALL STRAINER ON INLET OF EACH LINE-PRESSURE REGULATOR AND AUTOMATIC OR ELECTRICALLY OPERATED VALVE.
2.17. NATURAL GAS PIPING LOCATED IN INACCESSIBLE AREAS SHALL HAVE WELDED JOINTS.
3. TESTING: TEST, INSPECT, AND PURGE NATURAL GAS ACCORDING TO NFPA 54 INTERNATIONAL FUEL GAS CODE SECTION 406 "INSPECTION, TESTING, AND PURGING" AND AUTHORITIES HAVING JURISDICTION.
3.1. THE TEST PRESSURE TO BE USED SHALL BE NO LESS THAN 1.5 TIMES THE PROPOSED MAXIMUM WORKING PRESSURE, BUT NOT LESS THAN 3 PSI, IRRESPECTIVE OF DESIGN PRESSURE. THE PIPING SYSTEM SHALL WITHSTAND THE TEST PRESSURE SPECIFIED WITHOUT SHOWING ANY EVIDENCE OF LEAKAGE OR OTHER DEFECTS.
3.2. TEST DURATION SHALL NOT BE LESS THAN 30 MINUTES FOR EACH 500 CUBIC FEET OF PIPE VOLUME.
3.3. THE TEST MEDIUM SHALL BE LIMITED TO AIR, NITROGEN, CARBON DIOXIDE, OR AN INERT GAS.
3.4. WHERE THE PIPING SYSTEM IS CONNECTED TO APPLIANCES OR EQUIPMENT DESIGNED FOR OPERATING PRESSURES EQUAL TO OR GREATER THAN THE TEST PRESSURE, SUCH APPLIANCES OR EQUIPMENT SHALL BE ISOLATED FROM THE PIPING SYSTEM BY CLOSING THE INDIVIDUAL APPLIANCE OR EQUIPMENT SHUTOFF VALVE.
4. CLEANING: REMOVE SCALE, SLAG, DIRT, AND DEBRIS FROM INSIDE AND OUTSIDE OF PIPE AND FITTINGS BEFORE ASSEMBLY.

226113 LAB GASES (COMPRESSED AIR CLEAN COMPRESSED AIR, HIGH PURITY NITROGEN, CARBON DIOXIDE, HELIUM, ARGON, OXYGEN)

1. SYSTEM APPLICATIONS: REFER TO PIPING SYSTEM APPLICATION SCHEDULE FOR THE PIPE DATA SHEET FOR EACH SYSTEM.
2. INSTALLATION PROCEDURES:
2.1. COMPLY WITH NFPA 99 FOR INSTALLATION OF LAB GAS PIPING.
2.2. INSTALL PIPING CONCEALED FROM VIEW AND PROTECTED FROM PHYSICAL CONTACT BY BUILDING OCCUPANTS UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.
2.3. INSTALL PIPING INDICATED TO BE EXPOSED AND PIPING IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE.
2.4. INSTALL PIPING ABOVE ACCESSIBLE CEILINGS TO ALLOW SUFFICIENT SPACE FOR CEILING PANEL REMOVAL AND COORDINATE WITH OTHER SERVICES OCCUPYING THAT SPACE.
2.5. INSTALL PIPING ADJACENT TO EQUIPMENT AND SPECIALTIES TO ALLOW SERVICE AND MAINTENANCE.
2.6. INSTALL BRANCH CONNECTIONS TO LAB GAS MAINS FROM TOP OF MAIN. PROVIDE DRAIN LEG AND DRAIN TRAP AT END OF EACH MAIN AND BRANCH AND AT LOW POINTS.
2.7. INSTALL PIPING LEVEL AND PLUMB, FREE OF SAGS AND BENDS.
2.8. INSTALL PIPING TO PERMIT VALVE SERVICING.
2.9. INSTALL FITTINGS FOR CHANGES IN DIRECTION AND FOR BRANCH CONNECTIONS.
2.10. INSTALL SHUTOFF VALVE AT EACH CONNECTION TO AND FROM EQUIPMENT AND SPECIALTIES.
2.11. REMOVE SCALE, SLAG, DIRT, AND DEBRIS FROM OUTSIDE OF CLEANED TUBING AND FITTINGS BEFORE ASSEMBLY.
3. TESTING:
3.1. PREPARATION: PERFORM THE FOLLOWING INSTALLER TESTS ACCORDING TO REQUIREMENTS IN NFPA 99 AND ASSE STANDARD #6010:
3.1.1. INITIAL BLOWDOWN
3.1.2. INITIAL PRESSURE TEST
3.1.3. CROSS-CONNECTION TEST
3.1.4. PIPING PURGE TEST
3.1.5. STANDING PRESSURE TEST FOR POSITIVE-PRESSURE LAB GAS PIPING
3.1.6. REPAIR LEAKS AND RETEST UNTIL NO LEAKS EXIST
3.2. SYSTEM VERIFICATION: PERFORM THE FOLLOWING TESTS AND INSPECTIONS ACCORDING TO NFPA 99, ASSE STANDARD #6020, AND ASSE STANDARD #6030:
3.2.1. STANDING PRESSURE TEST
3.2.2. CROSS-CONNECTION TEST
3.2.3. VALVE TEST
3.2.4. MASTER AND AREA ALARM TESTS
3.2.5. PIPING PURGE TEST
3.2.6. PIPING PARTICULATE TEST
3.2.7. PIPING PURITY TEST
3.2.8. FINAL TIE-IN TEST
3.2.9. OPERATIONAL PRESSURE TEST
3.2.10. AIR PURITY TEST
3.2.11. VERIFY CORRECT LABELING OF EQUIPMENT AND COMPONENTS
4. CLEANING:
4.1. IF MANUFACTURER-CLEANED AND CAPPED FITTINGS OR TUBING IS NOT AVAILABLE OR IF PRECLEANED FITTINGS OR TUBING MUST BE RECLEANED BECAUSE OF EXPOSURE, HAVE SUPPLIER OR SEPARATE AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION PERFORM THE FOLLOWING PROCEDURES BELOW.
4.2. CLEAN TUBE AND FITTINGS, VALVES, GAGES, AND OTHER COMPONENTS OF OIL, GREASE, AND OTHER READILY OXIDIZABLE MATERIALS AS REQUIRED FOR OXYGEN SERVICE ACCORDING TO CGA G-4.1.

NOT FOR CONSTRUCTION

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INTEGRA

REGENERATIVE CENTER OF EXCELLENCE - B104

Seal:

Revision Schedule

A	2019-03-19	PRICING SET

PLUMBING SPECIFICATIONS

P-901

DATE: 2019.01.22 | PROJ. #: 19001A

PIPING SYSTEM DATA SHEET APPLICATION SCHEDULE

PIPING SYSTEM	SYSTEM ABBREV.	SIZE RANGE	EXPOSED PIPING	CONCEALED PIPING	MAX OPERATING PRESSURE (PSIG)	NOTES
COMPRESSED AIR	CA	ALL	-	CU14	150	
DOMESTIC COLD WATER, ABOVE GROUND	DCW	ALL	-	CU11	100	
DOMESTIC HOT WATER RETURN, ABOVE GROUND	DHWR	ALL	-	CU11	100	
DOMESTIC HOT WATER, ABOVE GROUND	DHW	ALL	-	CU11	100	
DOMESTIC TEMPERED WATER	TPW	ALL	-	CU11	100	
LAB DRAINAGE, ABOVE GROUND	LW	ALL	-	PP1	4	1
LAB VENT, ABOVE GROUND	LV	ALL	-	PP1	4	1
NATURAL GAS PIPING, ABOVE GROUND	G	ALL	-	CS11	10	
SANITARY DRAINAGE, ABOVE GROUND	SAN	ALL	-	PVC1	4	1
SANITARY DRAINAGE, UNDERGROUND	SAN	ALL	-	CI1	4	1
SANITARY VENT, ABOVE GROUND	V	ALL	-	PVC1	4	1
SANITARY VENT, UNDERGROUND	V	ALL	-	CI1	4	1
VACUUM	VAC	ALL	-	CU14	100	
NOTES:						
1) TESTING WITH AIR NOT PERMITTED						

PIPING DATA SHEET, CI1

ITEMS AND SIZES	GENERAL DESCRIPTION
PRESSURE & TEMPERATURE RATING	6 PSIG MAXIMUM PRESSURE, 140oF MAXIMUM TEMPERATURE
PIPE & FITTINGS:	
2" - 15"	SERVICE WEIGHT HUB AND SPIGOT CAST IRON PIPE AND FITTINGS SHALL BE MANUFACTURED FROM GRAY CAST IRON AND SHALL CONFORM TO ASTM A74. ALL PIPE AND FITTINGS SHALL BE MARKED WITH THE COLLECTIVE TRADEMARK OF THE CAST IRON SOIL PIPE INSTITUTE (CISPI) AND LISTED BY NSF INTERNATIONAL.
JOINTS:	
ALL SIZES	JOINTS CAN BE MADE USING A COMPRESSION GASKET MANUFACTURED FROM AN ELASTOMER MEETING THE REQUIREMENTS OF ASTM C564. OR PURE LEAD AND OAKUM CAULKED JOINTS MEETING THE REQUIREMENTS OF ASTM B29.
NOTES:	
ACCEPTABLE MANUFACTURERS' INCLUDE: CHARLOTTE PIPE OR TYLER PIPE.	
THIS SPECIFICATION COVERS SERVICE WEIGHT CAST IRON PIPE, FITTINGS, AND COMPRESSION GASKETS USED IN UNDERGROUND SANITARY DRAIN, WASTE AND VENT (DWV), SEWER, AND STORM DRAINAGE APPLICATIONS. THIS SYSTEM IS INTENDED FOR USE IN NON-PRESSURE APPLICATIONS.	
PROTECT DRAINS DURING REMAINDER OF CONSTRUCTION PERIOD TO AVOID CLOGGING WITH DIRT AND DEBRIS AND TO PREVENT DAMAGE FROM TRAFFIC AND CONSTRUCTION WORK. PLACE PLUGS IN ENDS OF UNCOMPLETED PIPING AT END OF DAY AND WHEN WORK STOPS.	

PIPING DATA SHEET, CS11

ITEMS AND SIZES	GENERAL DESCRIPTION
PRESSURE & TEMPERATURE RATING	150 PSIG MAXIMUM PRESSURE, 300oF MAXIMUM TEMPERATURE
PIPE:	
1-1/2" AND SMALLER	SCHEDULE 40 CARBON STEEL PIPE, ASTM A53, BLACK STEEL, TYPE F, GRADE A
2" AND LARGER	SCHEDULE 40 CARBON STEEL PIPE, ASTM A53, BLACK STEEL, TYPE E, GRADE B
FITTINGS:	
2" AND SMALLER	< 2 PSIG - MALLEABLE IRON THREADED ENDS, ASME B16.3, ASTM A197,CLASS 150, STANDARD PATTERN
2-1/2" AND LARGER	< 2 PSIG - WROUGHT-STEEL WELDING ENDS, ASTM A234/A234M FOR BUTT WELDING AND SOCKET WELDING
1/2" AND LARGER	> 5 PSIG - WROUGHT-STEEL WELDING ENDS ASTM A234/A234M FOR BUTT WELDING AND SOCKET WELDING
JOINTS:	
ALL SIZES	JOINT COMPOUND AND TAPE: SUITABLE FOR NATURAL GAS
	WELDING FILLER METALS: COMPLY WITH AWS D10.12/D10.12M FOR WELDING MATERIALS APPROPRIATE FOR WALL THICKNESS AND CHEMICAL ANALYSIS OF STEEL PIPE BEING WELDED
	NATURAL GAS PIPING LOCATED IN INACCESSIBLE AREAS SHALL HAVE WELDED JOINTS
UNIONS & FLANGES:	
UNIONS	1/2" THRU 1" - ASME B16.39, CLASS 150, MALLEABLE IRON WITH BRASS-TO-IRON SEAT, GROUND JOINT, AND THREADED ENDS
DIELECTRIC UNIONS	ASSE 1079, CLASS 150, SOLDER-JOINT COPPER ALLOY AND THREADED FERROUS.
DIELECTRIC FLANGES	ASSE 1079, CLASS 150, FACTORY-FABRICATED, BOLTED, COMPANION-FLANGE ASSEMBLY, SOLDER-JOINT COPPER ALLOY AND THREADED FERROUS.
FLANGES	1-1/2" AND LARGER - ASME B16.5, MINIMUM CLASS 150, INCLUDING BOLTS, NUTS, AND GASKETS OF THE FOLLOWING MATERIAL GROUP, END CONNECTIONS, AND FACINGS. NOT PERMITTED UNDERGROUND.
GASKETS	ASME B16.20, METALLIC, FLAT, ASBESTOS FREE, ALUMINUM O-RINGS, AND SPIRAL-WOUND METAL GASKETS.
BOLTING	ASME B18.2.1, STAINLESS STEEL
DRIP/SEDIMENT TRAPS:	
ALL SIZES	INSTALL DRIPS AT POINTS WHERE CONDENSATE MAY COLLECT, INCLUDING SERVICE-METER OUTLETS. LOCATE WHERE ACCESSIBLE TO PERMIT CLEANING AND EMPTYING. DO NOT INSTALL WHERE CONDENSATE IS SUBJECT TO FREEZING.
VALVES, BALL:	
3" AND SMALLER	TWO-PIECE, FULL-PORT, BRONZE BALL VALVES WITH BRONZE TRIM. MSS SP-110, ASTM B 584, 600 PSIG CWP, TREADED OR SOCKET ENDS. SUITABLE FOR NATURAL-GAS SERVICE WITH "WOG" INDICATED ON VALVE BODY.
4" AND LARGER	CLASS 150, CARBON STEEL BODY WITH STAINLESS STEEL TRIM, FLANGED ENDS
VALVES, PLUG:	
4" AND LARGER	CLASS 150, DUCTILE IRON BODY & PLUG, RF FLANGED ENDS
NOTES:	
ACCEPTABLE VALVE MANUFACTURERS INCLUDE WATTS, APOLLO, NIBCO, OR MILWAUKEE.	
THIS SPECIFICATION COVERS PIPE, FITTINGS, AND ACCESSORIES USED IN NATURAL GAS APPLICATIONS.	
DO NOT INSTALL NATURAL-GAS PIPING IN OR THROUGH CIRCULATING AIR DUCTS, CLOTHES OR TRASH CHUTES, CHIMNEYS OR GAS VENTS (FLUES), VENTILATING DUCTS, OR DUMBWAITER OR ELEVATOR SHAFTS.	
DO NOT INSTALL NATURAL-GAS PIPING IN SOLID WALLS OR PARTITIONS.	
INSTALL UNIONS IN PIPES NPS 2 AND SMALLER, ADJACENT TO EACH VALVE, AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT. UNIONS ARE NOT REQUIRED AT FLANGED CONNECTIONS.	

PIPING DATA SHEET, CU11

ITEMS AND SIZES	GENERAL DESCRIPTION
PRESSURE & TEMPERATURE RATING	150 PSIG @ 150F
PIPE:	
1/2" - 6"	TYPE L HARD COPPER TUBE, DRAWN TEMPER, ASTM B 88, NSF/ANSI 61 & 372.
FITTINGS:	
1/2" - 6"	WROUGHT COPPER AND COPPER ALLOY SOLDER JOINT PRESSURE FITTINGS, ASME B16.22, NSF/ANSI 61 & 372.
JOINTS:	
1/2" - 6"	SOLDERED, LEAD FREE ALLOYS, ASTM B 32 WITH WATER FLUSHABLE FLUX, NON-TOXIC. ASTM B 813.
UNIONS & FLANGES:	
UNIONS	1/2" THRU 1" - WROUGHT COPPER WITH COPPER SEATS, ASME B16.22, MSS SP-104, NSF/ANSI 61 & 372.
FLANGES	1" THRU 4" - BRONZE, CLASS 150, SOLDER JOINT ENDS, ASME B16.24, ANSI/NSF 61.
GASKETS	1/8" THICKNESS, EPDM, FULL FACE, CLASS 150 ANSI DIMENSIONS.
BOLTING	HEAVY HEX HEAD MACHINE BOLTS OR SCREWS, ALLOY STEEL PER ASTM A193-B7, WITH HEAVY HEX FULL NUTS TYPE 304 STAINLESS STEEL PER ASTM A194-GR. 2H.
VALVES, BALL:	
1/2" - 4"	600 PSIG CWP, FULL PORT, 2-PIECE BRONZE BODY, STAINLESS STEEL TRIM, PTFE SEATS, SOLDER ENDS, 2-1/4" STEM EXTENSION, NSF/ANSI 61 & 372. APOLLO 77FLF-240 SERIES OR APPROVED EQUAL.
6"	CLASS 125, 200 PSI CWP, FULL PORT, DUCTILE IRON FDA EPOXY COATED SPLIT BODY. STAINLESS STEEL TRIM, PTFE SEATS, FLANGED ENDS, AND NSF/ANSI 61 & 372. APOLLO 6Q SERIES OR APPROVED EQUAL.
VALVES, CHECK:	
1/2" - 2"	200 PSIG CWP, Y-PATTERN, BRONZE BODY & DISC, SOLDER ENDS, AND ANSI/NSF 61-8 & 372. APOLLO 161SLF OR APPROVED EQUAL.
STRAINERS:	
1/2" - 4"	400 PSIG CWP, Y-PATTERN, BRONZE BODY, SOLDER ENDS, AND NSF/ANSI 61 & 372. APOLLO 59LF-300 SERIES OR APPROVED EQUAL.
NOTES:	
THIS SPECIFICATION COVERS COPPER PIPE, FITTINGS, AND ACCESSORIES USED IN POTABLE WATER APPLICATIONS.	
LEAD FREE REFERS TO THE WETTED SURFACE OF PIPE AND FITTINGS IN POTABLE WATER SYSTEMS THAT HAVE A WEIGHTED AVERAGE LEAD CONTENT ≤ 0.25%. ALL POTABLE WATER SERVICE MUST MEET NSF/ANSI 61 & 372.	
NSF/ANSI 61 IS A PERFORMANCE BASED STANDARD ESTABLISHED TO MEASURE CONTAMINATES INTRODUCED INTO DRINKING WATER FROM PRODUCTS.	
NSF/ANSI 372 IS A LEAD CONTENT STANDARD THAT CAN BE USED TO VERIFY THE LEAD CONTENT OF ANY PRODUCT, MATERIAL, AND COMPONENT THAT CONVEYS OR DISPENSES WATER FOR HUMAN CONSUMPTION.	
ACCEPTABLE VALVE MANUFACTURERS INCLUDE WATTS, APOLLO, NIBCO, JOMAR, OR MILWAUKEE.	

PIPING DATA SHEET, CU14

ITEMS AND SIZES	GENERAL DESCRIPTION
PRESSURE & TEMPERATURE RATING	150 PSIG @ 150F
PIPE:	
1/2"-4"	ASTM B 819, TYPE L, SEAMLESS, DRAWN TEMPER, THAT HAS BEEN MANUFACTURER CLEANED, PURGED, AND SEALED FOR MEDICAL GAS SERVICE OR ACCORDING TO CGA G-4.1 FOR OXYGEN SERVICE. INCLUDE STANDARD COLOR MARKING "OXY" IN BLUE FOR TYPE L TUBE.
FITTINGS:	
1/2"-4"	ASME B16.22, WROUGHT COPPER SOLDER-JOINT PRESSURE TYPE OR MSS SP-73, WITH DIMENSIONS FOR BRAZED JOINTS. MANUFACTURER CLEANED, PURGED, AND BAGGED ACCORDING TO CGA G-4.1 FOR OXYGEN SERVICE.
JOINTS:	
ALL SIZES	BRAZED, AWS A5.8/A5.8M, BCUP SERES, COPPER-PHOSPHORUS ALLOYS FOR GENERAL-DUTY BRAZING UNLESS OTHERWISE INDICATED. THE USE OF FLUX IS PROHIBITED. CONTINUOUSLY PURGE JOINT WITH OIL-FREE DRY NITROGEN DURING BRAZING.
UNIONS & FLANGES:	
UNIONS	ASME B16.22 OR MSS SP-123, WROUGHT COPPER OR CAST-COPPER ALLOY. MANUFACTURER CLEANED, PURGED, AND BAGGED ACCORDING TO CGA G-4.1 FOR OXYGEN SERVICE.
FLANGES	1" THRU 4" – FLAT FACE, CAST COPPER ALLOY, CLASS 150. SOLDER JOINT ENDS, ASME B16.24.
GASKETS	1/16" THICKNESS, FULL FACE EPDM BINDER (FDA COMPLIANT), CLASS 150, ASTM 1621. GARLOCK 8316 OR APPROVED EQUAL.
BOLTING	HEAVY HEX HEAD MACHINE BOLTS OR SCREWS, ALLOY STEEL PER ASTM A193-B7, WITH HEAVY HEX FULL NUTS TYPE 304 STAINLESS STEEL PER ASTM A194-GR. 2H
VALVES, BALL:	
4" AND SMALLER	MSS SP-110, 600 PSI WOG PRESSURE, THREE PIECE CONSTRUCTION, BRONZE BODY, FULL PORT, STAINLESS STEEL BALL AND STEM, BLOWOUT PROOF STEM WITH PTFE SEATS, AND COPPER TUBE EXTENSIONS WITH SOLDER ENDS. MANUFACTURER CLEANED, PURGED, AND BAGGED ACCORDING TO CGA G-4.1 FOR OXYGEN SERVICE.
VALVES, CHECK:	
2" AND SMALLER	2" AND UNDER – CLASS 125, 250 PSI WOG PRESSURE, BRONZE ALLOY BODY, INLINE LIFT TYPE, TFE SEAT AND RESILIENT DISCS, STAINLESS STEEL SPRING ACTUATED, THREADED ENDS. MANUFACTURER CLEANED, PURGED, AND BAGGED ACCORDING TO CGA G-4.1 FOR OXYGEN SERVICE.
NOTES:	
THIS SPECIFICATION COVERS COPPER PIPE, FITTINGS, AND ACCESSORIES USED IN LABORTORY GAS APPLICATIONS.	
ACCEPTABLE VALVE MANUFACTURERS INCLUDE BEACON, MEDAES APOLLO, NIBCO, JOMAR, OR MILWAUKEE.	

PIPING DATA SHEET, PP1

ITEMS AND SIZES	GENERAL DESCRIPTION
PRESSURE & TEMPERATURE RATING	180F CONSTANT FLOW, 200F INTERMITTENT FLOW
PIPE:	
1-1/2" AND LARGER	SCHEDULE 40 PLAIN END ACID WASTE PIPE WILL BE MANUFACTURED TO THE DIMENSION AND TOLERANCES OF ASTM F1412 FROM FIRE RETARDANT MATERIAL IN 10' LENGTHS. THE POLYPROPYLENE MATERIAL WILL CONFORM TO ASTM D4101 AND D635.
FITTINGS:	
1-1/2" AND LARGER	ELECTROFUSION FITTINGS WILL BE MANUFACTURED TO SCHEDULE 40 DIMENSIONS PER ASTM F1412 AND WILL BE MADE OF FIRE RETARDANT POLYPROPYLENE. FITTING LAYOUTS WILL CONFORM TO ASTM D3311 AND F1412. THE POLYPROPYLENE MATERIAL WILL CONFORM TO ASTM D4101 AND D635.
JOINTS:	
ALL SIZES	ELECTROFUSION COUPLINGS. JOINTS WILL CONFORM TO ASTM 1290 TECHNIQUE I
NOTES:	
ACCEPTABLE MANUFACTURERS' INCLUDE: ORION, GEORGE FISCHER, OR ASAHI	
THIS SPECIFICATION COVERS PP SCHEDULE 40 PIPE AND FITTINGS INTENDED FOR NON-PRESSURE WASTE AND VENT APPLICATIONS WHERE THE OPERATING TEMPERATURE WILL NOT EXCEED 180°F.	
PROTECT PIPING AND DRAINS DURING REMAINDER OF CONSTRUCTION PERIOD TO AVOID CLOGGING WITH DIRT AND DEBRIS AND TO PREVENT DAMAGE FROM TRAFFIC AND CONSTRUCTION WORK. PLACE PLUGS IN ENDS OF UNCOMPLETED PIPING AT END OF DAY AND WHEN WORK STOPS.	
ELECTROFUSION SOCKET WELD JOINTS SHALL BE USED FOR ALL CONNECTIONS ABOVE AND BELOW GROUND. USE MECHANICAL JOINTS ONLY AS REQUIRED SUCH AS UNDER LABORATORY CASEWORK.	

PIPING DATA SHEET, PVC1

ITEMS AND SIZES	GENERAL DESCRIPTION
PRESSURE & TEMPERATURE RATING	6 PSIG MAXIMUM PRESSURE, 140oF MAXIMUM TEMPERATURE
PIPE & FITTINGS:	
1-1/2"-16"	SCHEDULE 40 PIPE AND FITTINGS SHALL BE MANUFACTURED FROM VIRGIN RIGID PVC COMPOUND WITH A CELL CLASS OF 12454 PER ASTM D1784 AND CONFORM TO NSF 14. THE PIPING SHALL BE IRON PIPE SIZE (IPS) CONFORMING TO ASTM D1785 AND ASTM D2665. INJECTION MOLDED PVC DWV FITTINGS SHALL CONFORM TO ASTM D2665. ALL PIPE AND FITTINGS SHALL BE MANUFACTURED IN THE UNITED STATES.
JOINTS:	
ALL SIZES	IAPMO LISTED, SOLVENT WELD CEMENT, ASTM D2564, AND PURPLE PRIMER ASTM F656, AS RECOMMENDED BY PIPE AND FITTING MANUFACTURER.
CAST IRON TO PVC TRANSITION JOINTS:	
ALL SIZES	HEAVY DUTY HUBLESS COUPLINGS SHALL CONFORM TO CISPI STANDARD 310 AND BE CERTIFIED BY NSF INTERNATIONAL, AND INCORPORATE A SHIELD AND CLAMP ASSEMBLY FABRICATED FROM 300 SERIES STAINLESS STEEL. THE GASKET SHALL BE MADE FROM A NEOPRENE ELASTOMER COMPOUND CONFORMING TO ASTM C 564.
NOTES:	
ACCEPTABLE MANUFACTURERS' INCLUDE: CHARLOTTE PIPE, HARVEL, ASAHI	
THIS SPECIFICATION COVERS PVC SOLID WALL SCHEDULE 40 PIPE AND FITTINGS INTENDED FOR NON-PRESSURE DRAINAGE AND VENT APPLICATIONS WHERE THE OPERATING TEMPERATURE WILL NOT EXCEED 140°F	
PROTECT DRAINS DURING REMAINDER OF CONSTRUCTION PERIOD TO AVOID CLOGGING WITH DIRT AND DEBRIS AND TO PREVENT DAMAGE FROM TRAFFIC AND CONSTRUCTION WORK. PLACE PLUGS IN ENDS OF UNCOMPLETED PIPING AT END OF DAY AND WHEN WORK STOPS.	
PVC PIPING IS NOT PLENUM RATED.	

NOT FOR CONSTRUCTION

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Revision Schedule

A	2019-03-19	PRICING SET

PLUMBING SPECIFICATIONS

P-902

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