# MECHANICAL LEGEND

## ( NOT ALL SYMBOLS LISTED BELOW ARE BEING USED IN THIS SET OF MECHANICAL DRAWINGS )

#### GENERAL SYMBOLS/ ABBR. PIPING SYMBOL SYMBOL | ABBR DESCRIPTION DESCRIPTION EXISTING PIPING SECTION NO. (LIGHT SOLID LINE) ---- (R) EXISTING PIPING TO BE REMOVED (DASHED LINE) SECTION VIEW SHEET NO. DOMESTIC HOT WATER HWC DOMESTIC HOT WATER DETAIL DESIGNATION M1 / RETURN EQUIPMENT DRAIN DR F-1 | EQUIPMENT DESIGNATION INDIRECT DRAIN VENT PIPE SIZE/ PIPE TYPE —2"HWS—

SHEET KEY NOTES

NEW TO EXISTING)

AIR DEVICE CALL

DEVICES.

REMOVE

EXISTING

DOWN

(E)

DN

AFF

CV

dΒ

DB

DDC

DIA

DWG

EER

ENT

GAL

MBH

NC

O.C.

P.D.

RH

VEL.

WB

OUT. TYP. OF (X)

ABOVE FINISHED FLOOR

BRITISH THERMAL UNIT PER

AFG ABOVE FINISHED GRADE

CFH CUBIC FEET PER HOUR

CONSTANT VOLUME

DIRECT DIGITAL CONTROL

ENERGY EFFICIENT RATIO

DEGREE FAHRENHEIT

GALLONS PER HOUR

TOP TOP OF PIPE (AFF)

NTS NOT TO SCALE

DECIBEL

DEFL DEFLECTION

DRY-BULB

DIAMETER

DRAWING

ENTERING

FPI FINS PER INCH

GALLON

LBS POUNDS

LVG LEAVING

MAX MAXIMUM

MIN MINIMUM

PRESS PRESSURE

QTY QUANTITY

SQ SQUARE

TYP TYPICAL

W/ | WITH

W/O | WITHOUT

GAUGE

SPECS SPECIFICATIONS

SS | STAINLESS STEEL

VELOCITY

WET-BULB

MECHANICAL/PLUMBING/

SPRINKLER/ELECTRICAL

VTR VENT THROUGH ROOF

FPM | FEET PER MINUTE

FT WC FEET WATER COLUMN

GPM GALLONS PER MINUTE

THOUSAND BTUH

NOISE CRITERIA

PRESSURE DROP/

POUNDS PER SQUARE INCH

ON CENTER

DIFFERENTIAL

PWL | SOUND POWER LEVEL

RELATIVE HUMIDITY

UON UNLESS OTHERWISE NOTED

IN WC INCH WATER COLUMN

AMB AMBIENT

 $A \frac{\text{SIZE}}{\text{CFM}} (X)$ 

`(A)CFM(X)

POINT OF CONN. (CONN.

POINT OF DISCONNECTION

ARROW INDICATES DIRECTION

STEAM										
SYMBOL	ABBR	DESCRIPTION								
	LPS	LOW PRESSURE STEAM SUPPLY								
	MPS	MEDIUM PRESSURE STEAM SUPPLY								
# #	HPS	HIGH PRESSURE STEAM SUPPLY								
	LPR	LOW PRESSURE STEAM CONDENSATE RETURN								
	MPR	MEDIUM PRESSURE STEAM CONDENSATE RETURN								
	HPR	MEDIUM PRESSURE STEAM CONDENSATE RETURN								
	PR	PUMPED CONDENSATE RETURN								
$-\!\!\otimes\!\!-$		STEAM TRAP								
	PRV	PRESSURE REDUCING VALVE								
	CRU	CONDENSATE RETURN UNIT								
	LBS/HR	POUNDS PER HOUR								

	F	TITTINGS				
SYMBOL	ABBR	DESCRIPTION				
<u> </u>	P&T	PRESSURE/ TEMPERATURE PORT TAPS				
>-	CR	CONCENTRIC REDUCER				
	ER	ECCENTRIC REDUCER				
<b>₩</b>   <sup>EJ</sup>	EJ	EXPANSION JOINT				
<b>  </b>	U	UNION				
		THERMOMETER W/THERMOWELL				
<u></u>	AV	AIR VENT				
- ‱ -	FC	FLEXIBLE PIPE CONNECTOR				
$\bigcirc$	PG	PRESSURE GAUGE W/GAUGE COCK				
<u> </u>		ELBOW UP				
<u> </u>		ELBOW DOWN				
<del></del>		TEE UP				
<del></del>		TEE DOWN				
<del></del>		PIPE CAP OR PLUG				
	TPR STR	TEMPERATURE / PRESSURE RELIEF VALVE STRAINER W / BLOW-OFF C CAPPED HOSE - END CONNECTION				

	\	/ALVES
SYMBOL	ABBR	DESCRIPTION
	DV	DRAIN VALVE W/ HOSE END CONN.
	CV	CHECK VALVE W/ INDICATIO OF FLOW DIRECTION
	PRV	PRESSURE REDUCING VALVE
[S]   <u> </u>	SV	SOLENOID VALVE
FC —————	FCV	AUTO FLOW CONTROL VALVE W/ TEST PORTS
	CS,BV	CIRCUIT SETTER OR BALANCING VALVE
->	GLV	GLOBE VALVE (STRAIGHT PATTERN)
	GLV	GLOBE VALVE (ANGLE PATTERN)
$\neg \neg \vdash \neg$	BFV	BUTTERFLY VALVE
<del>-</del> Ö-	BV	BALL VALVE
<del>-</del> <del>-</del>	TCV	AUTOMATIC TEMP. CONTROL VALVE, 2—WAY
	TCV	AUTOMATIC TEMP. CONTROL VALVE, 3—WAY
(PLAN) (ELEV)	TPR	TEMPERATURE/ PRESSURE RELIEF VALVE
$\bigcirc\!$		VALVE IN RISER
	STR	STRAINER W/ BLOW-OFF & CAPPED HOSE-END CONNECTION
$\bowtie$	GV	GATE VALVE
	OS&Y	OUTSIDE STEM AND YOKE
$-\!$		BALL VALVE W/ HOSE CONNECTION
$-\!$	PV	PLUG VALVE

	C	ONTROLS					
SYMBOL	ABBR	DESCRIPTION					
—— A ——	Α	CONTROL AIR (PNEUMATIC)					
FS	FS	FLOW SWITCH					
PS	PS	PRESSURE SWITCH					
(T)(E)	(E) T	EXISTING THERMOSTAT					
T	Т	NEW THERMOSTAT					
<b>©</b>		SPACE TEMPERATURE SENSOR					
S		DUCT MOUNTED SMOKE DETECTOR					
$\Theta$		SPACE HUMIDISTAT					
<b>(</b> 3)		SPACE HUMIDITY SENSOR					
<b>©</b>		SPACE PRESSURE SENSOR					
©		CARBON DIOXIDE SENSOR					
		CARBON MONOXIDE SENSOR					

VAI VES

**GENERAL:** 

UNLESS OTHERWISE NOTED, THE WORK DESCRIBED ON THE PLANS AND SPECIFICATIONS SHALL INCLUDE THE FURNISHING AND INSTALLATION OF ALL LABOR AND MATERIALS NECESSARY FOR COMPLETE AND OPERATIONAL HVAC, FIRE PROTECTION AND PLUMBING SYSTEMS. CONTRACTOR SHALL FURNISH THESE EVEN IF ITEMS REQUIRED TO ACHIEVE THIS (I.E. OFFSETS, ISOLATION AND BALANCING DEVICES, MAINTENANCE CLEARANCES, ETC.) ARE NOT SPECIFICALLY SHOWN.

GENERAL MECHANICAL CONTRACT REQUIREMENTS

- DATA GIVEN ON THE DRAWINGS IS AS EXACT AS COULD BE SECURED. ABSOLUTE ACCURACY IS NOT GUARANTEED AND THE CONTRACTOR SHALL OBTAIN AND VERIFY EXACT LOCATIONS, MEASUREMENTS, LEVELS, SPACE REQUIREMENTS, POTENTIAL CONFLICTS WITH OTHER TRADES, ETC. AT THE SITE AND SHALL SATISFACTORILY ADAPT HIS WORK TO THE ACTUAL CONDITIONS OF THE JOB.
- THE DRAWINGS ARE DIAGRAMMATICAL IN NATURE AND SHALL NOT BE SCALED. THEY SHOW CERTAIN PHYSICAL RELATIONSHIPS WHICH MUST BE ESTABLISHED WITHIN THE DIVISION 23 WORK AND ITS INTERFACE WITH OTHER WORK. ESTABLISHING THIS RELATIONSHIP IN THE FIELD IS THE EXCLUSIVE RESPONSIBILITY OF THE CONTRACTOR. THIS DIVISION SHALL COORDINATE ITS WORK WITH ALL DIVISIONS OF THE WORK AND ADJUST ITS WORK AS REQUIRED BY THE ACTUAL CONDITIONS OF THE PROJECT.
  - THE CONTRACTOR SHALL VISIT THE SITE BEFORE SUBMITTING A BID TO BECOME THOROUGHLY FAMILIAR WITH THE ACTUAL CONDITIONS OF THE PROJECT. NO EXTRAS WILL BE ALLOWED DUE TO LACK OF KNOWLEDGE OF EXISTING CONDITIONS.
  - CERTAIN SYSTEMS REQUIRE ENGINEERING OF INSTALLATION DETAILS BY CONTRACTOR. UNLESS FULLY DETAILED IN THE CONTRACT DOCUMENTS, SUCH ENGINEERING IS THE EXCLUSIVE RESPONSIBILITY OF THE CONTRACTOR.
  - C. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE WHERE CLEARANCES ARE LIMITED, AND WHERE INSTALLATION DRAWINGS OR SCHEMATICS, "CONSTRUCTION DRAWINGS", OR COORDINATION DRAWINGS MAY BE REQUIRED IN ACCORDANCE WITH, OR IN EXCESS OF, THOSE REQUIRED BY THE SPECIFICATIONS. THE CONTRACTOR SHALL PREPARE ALL SUCH COORDINATION DRAWINGS AS PART OF THE BASE CONTRACT. SUCH DRAWINGS MAY BE SUBMITTED TO THE ARCHITECT/ENGINEER FOR RECORD AND COMMENT (AT THE CONTRACTOR'S OPTION).
- THESE NOTES ONLY SUPPLEMENT, AND DO NOT REPLACE, THE SPECIFICATIONS.
- DEFINITIONS AND TERMINOLOGY
  - A. THE DEFINITIONS OF DIVISION 1 AND THE GENERAL CONDITIONS OF THIS SPECIFICATION ALSO APPLY TO THE DIVISION 23 CONTRACT DOCUMENTS
  - "CONTRACT DOCUMENTS" CONSTITUTE THE DRAWINGS. SPECIFICATIONS, GENERAL CONDITIONS, PROJECT MANUALS, ETC., PREPARED BY ENGINEER (OR OTHER DESIGN PROFESSIONAL IN ASSOCIATION WITH ENGINEER) FOR CONTRACTOR'S BID OR CONTRACTOR'S NEGOTIATIONS WITH THE 1. OWNER. THE DIVISION 23 DRAWINGS AND SPECIFICATIONS PREPARED BY THE ENGINEER ARE NOT CONSTRUCTION DOCUMENTS.
  - "CONSTRUCTION DOCUMENTS", "CONSTRUCTION DRAWINGS", AND SIMILAR TERMS FOR DIVISION 23 WORK REFER TO INSTALLATION DIAGRAMS, SHOP DRAWINGS AND COORDINATION DRAWINGS PREPARED BY THE CONTRACTOR USING THE DESIGN INTENT INDICATED ON THE ENGINEER'S CONTRACT DOCUMENTS. THESE SPECIFICATIONS DETAIL THE CONTRACTOR'S RESPONSIBILITY FOR "ENGINEERING BY CONTRACTOR" AND FOR PREPARATION OF CONSTRUCTION DOCUMENTS.
  - "FURNISH" MEANS TO "SUPPLY" AND USUALLY REFERS TO AN ITEM OF EQUIPMENT.
  - E. "INSTALL" MEANS TO "SET IN PLACE, CONNECT AND PLACE IN FULL OPERATIONAL ORDER".
  - F. "PROVIDE" MEANS TO "FURNISH AND INSTALL".
  - G. "EQUIVALENT" MEANS "MEETS THE SPECIFICATIONS OF THE REFERENCE PRODUCT OR ITEM IN ALL SIGNIFICANT ASPECTS." SIGNIFICANT ASPECTS SHALL BE AS DETERMINED BY THE ARCHITECT/ENGINEER.
  - "WORK BY OTHER(S) DIVISIONS"; "RE: XX DIVISION", AND SIMILAR EXPRESSIONS MEANS WORK TO BE PERFORMED UNDER THE CONTRACT DOCUMENTS, BUT NOT NECESSARILY UNDER THE DIVISION OR SECTION OF THE WORK ON WHICH THE NOTE APPEARS. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO COORDINATE THE WORK OF THE CONTRACT BETWEEN HIS/HER SUPPLIERS, SUBCONTRACTORS AND EMPLOYEES. IF CLARIFICATION IS REQUIRED, CONSULT ARCHITECT/ENGINEER BEFORE SUBMITTING BID.

- BY INFERENCE, ANY REFERENCE TO A "CONTRACTOR" OR 'SUB-CONTRACTOR" MEANS THE ENTITY WHICH HAS CONTRACTED WITH THE OWNER FOR THE WORK OF THE CONTRACT DOCUMENTS.
- "ENGINEER" MEANS THE DESIGN PROFESSIONAL FIRM WHICH HAS PREPARED THESE CONTRACT DOCUMENTS. ALL QUESTIONS, SUBMITTALS, ETC. OF THIS DIVISION SHALL BE ROUTED THROUGH THE ARCHITECT TO THE ENGINEER (THROUGH PROPER CONTRACTUAL CHANNELS).

#### **EXISTING BUILDING:**

- THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE EXISTING BUILDING WILL BE OCCUPIED BY THE OWNER DURING CONSTRUCTION. CONTINUED OPERATION OF THE FACILITY SHALL NOT BE HINDERED BY THIS WORK. THE CONTRACTOR SHALL ACCOUNT FOR ALL ADDITIONAL COSTS WHICH MAY BE INCURRED BY HIM DUE TO THE DIFFICULTY OF WORKING OVER AND AROUND EMPLOYEES, DESKS, EQUIPMENT, ETC.; AND DUE TO THE HOURS OF THE DAY IN WHICH AN AREA MAY BE AVAILABLE WHEN SUBMITTING HIS BID.
- COORDINATE ALL NEW PENETRATIONS WITH OTHER DIVISIONS OF THE WORK. ALL CONTRACTORS ARE INDIVIDUALLY RESPONSIBLE FOR ALL PENETRATIONS REQUIRED BY THEIR DIVISIONS.

#### **INSTALLATION:**

- SUSPEND EACH TRADE'S WORK SEPARATELY FROM THE STRUCTURE DUCTWORK SHALL BE HELD TIGHT TO STRUCTURE EXCEPT WHERE OTHERWISE SHOWN.
- INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY INDICATED OTHERWISE OR WHERE LOCAL CODES OR REGULATIONS TAKE PRECEDENCE.
- PROVIDE MANUFACTURER'S RECOMMENDED SERVICE CLEARANCE AROUND ALL EQUIPMENT REQUIRING SAME.
- PROVIDE FOR SAFE CONDUCT OF THE WORK, CAREFUL REMOVAL AND DISPOSITION OF MATERIALS AND PROTECTION OF PROPERTY WHICH IS TO REMAIN UNDISTURBED.
- ISOLATE ALL PRESSURIZED PIPE (STEAM, STEAM CONDENSATE RETURN) EACH RISER, BRANCH, PIECE OF EQUIPMENT, AND AREA SERVED.
- MECHANICAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL CONCRETE EQUIPMENT PAD DIMENSIONS, BASED ON THE FINAL EQUIPMENT SELECTION, TO THE STRUCTURAL AND GENERAL CONTRACTOR FOR INCLUSION IN THOSE CONTRACTOR'S WORK AS DESCRIBED BY THE GENERAL CONTRACTOR.
- WARRANTY: AT A MINIMUM, THE ENTIRE MECHANICAL SYSTEM SHALL BE WARRANTED AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR AFTER ACCEPTANCE OF THE SYSTEM BY THE OWNER. REFER TO INDIVIDUAL SPECIFICATION SECTIONS FOR SPECIFIC WARRANTY REQUIREMENTS.

#### PIPE INSTALLATION:

- ALL PIPING SHALL BE ADEQUATELY SUPPORTED FROM THE BUILDING STRUCTURE TO PREVENT SAGGING, POCKETING, SWAYING OR DISPLACEMENT BY MEANS OF HANGERS AND SUPPORTS. PIPING IS NOT TO BE SUPPORTED BY EQUIPMENT.
- PROVIDE DIELECTRIC UNIONS BETWEEN DISSIMILAR MATERIALS.
- PROVIDE MANUAL AIR VENTS AND CAPPED HOSE-END DRAINS WITH ISOLATION VALVES AT PIPING HIGH AND LOW POINTS.
- WELD PIPE IN ACCORDANCE WITH APPLICABLE CODES AND STANDARDS. WELDERS SHALL BE CERTIFIED FOR TYPE OF WORK BEING PERFORMED.
- FLUSH OUT PIPING AND REMOVE CONTROL DEVICES BEFORE PERFORMING PRESSURE TEST. DO NOT USE PIPING SYSTEM VALVES TO ISOLATE SECTIONS WHERE TEST PRESSURE EXCEEDS VALVE PRESSURE RATING. PRESSURIZE PIPING AT AS SPECIFIED IN THE SPECIFICATION OR TO 100 PSIG MINIMUM. IF LEAKAGE IS OBSERVED OR IF TEMPERATURE COMPENSATED PRESSURE DROP EXCEEDS 1% OF TEST PRESSURE, REPAIR LEAKS AND RETEST. DO NOT USE AIR PRESSURE TO TEST PLASTIC PIPE.
- PROVIDE SUPPORT UNDER ELBOWS ON PUMP SUCTION AND DISCHARGE
- 7. ALL STRAINERS SHALL BE FURNISHED WITH A "ROUGHING" SCREEN AND TWO (2) SCREENS FOR NORMAL OPERATION. INSTALL STRAINER WITH ROUGHING SCREEN AND OPERATE SYSTEM FOR 24 HOURS MINIMUM (RUN DOMESTIC WATER SYSTEMS AT MAX FLOW FOR A MINIMUM OF ONE HALF (1/2) HOUR. REMOVE ROUGHING SCREEN AND INSTALL NORMAL SCREEN, AFTER TWO WEEKS OF NORMAL OPERATION INSTALL NEW NORMAL SCREEN.
- INSTALL ALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHIN THE PIPING SYSTEM. ENSURE ALL REQUIRED PIPE EXPANSION WILL OCCUR IN THE PROPER DIRECTION AND SEGMENT OF PIPE. PROPERLY ANCHOR (RE: SPECIFICATIONS) ALL PIPING REQUIRING

EXPANSION/CONTRACTION ISOLATION. COORDINATE PIPE EXPANSION/CONTRACTION TO PREVENT DAMAGE TO ANY AND ALL BUILDING COMPONENTS.

#### CUTTING, PATCHING AND DEMOLITION:

KEEP DEMOLITION & CUTTING TO MINIMUM REQUIRED FOR PROPER EXECUTION OF WORK.

METHOD AND EXTENT OF THE CUTTING.

- 2. BE RESPONSIBLE FOR ALL CUTTING AND PATCHING NECESSARY FOR THE COMPLETION OF THE WORK.
- 3. NO CUTTING (NOT SHOWN ON THE CONTRACT DOCUMENTS) SHALL BE DONE WITHOUT THE APPROVAL OF THE ARCHITECT AS TO LOCATIONS,
- REPAIR ALL ACCIDENTAL OR INTENTIONAL DAMAGE TO MATCH EXISTING CONSTRUCTION WITH NO NOTICEABLE DIFFERENCE IN CONTINUITY, APPEARANCE OR FUNCTION.
- DEMOLISH AND CAP ALL INDICATED PIPING BACK AT NEAREST MAIN.

#### STRUCTURE:

- DO NOT PENETRATE STRUCTURAL MEMBERS. ALL EQUIPMENT SUPPORTS SHALL BE ATTACHED TO THE LOAD BEARING MEMBERS OF STRUCTURAL ELEMENTS. DO NOT OVER-STRESS ANY STRUCTURAL MEMBERS. CONTACT STRUCTURAL ENGINEER FOR ALLOWABLE LOADS FOR SPECIFIC MEMBERS.
- DO NOT UTILIZE POWDER DRIVEN ANCHORS FOR ANY LOCATIONS WHICH REQUIRE THE LOAD TO BE HELD IN TENSION. SEE STRUCTURAL DIVISION FOR ADDITIONAL RESTRICTIONS.
- SEE ALSO STRUCTURAL DIVISION FOR ACCEPTABLE ANCHORING AND SUPPORT MEANS, METHODS, AND LOCATIONS.
- PROVIDE FLEXIBLE CONNECTORS, EXPANSION LOOPS, EXPANSION JOINTS, ADDITIONAL FITTINGS OR EQUIVALENT TO ACCOMMODATE THE THERMAL EXPANSION OF THE BUILDING THROUGH STRUCTURAL EXPANSION JOINTS. PROVIDE SUCH FITTING AT EVERY PIPE, DUCT, CONDUIT, ETC. CROSSING OF A STRUCTURAL EXPANSION JOINT.

#### FIRE STOPPING:

FIRE STOPPING REQUIREMENT: PENETRATIONS THROUGH RATED WALLS AND FLOORS SHALL BE SEALED WITH A MATERIAL CAPABLE OF PREVENTING THE PASSAGE OF FLAMES AND HOT GASSES WHEN SUBJECTED TO THE REQUIREMENTS OF THE TEST STANDARD SPECIFIC FOR FIRE STOPS ASTM-E-814. ACCEPTANCE MATERIALS INCLUDE: HILTI FS-ONE HIGH PERFORMANCE INTUMESCENT FIRESTOP SEALANT FOR PIPE, METAL CONDUIT, AND ELECTRICAL CABLE; HILTI CP 606 FLEXIBLE FIRESTOP SEALANT FOR BARE PIPE, METAL CONDUIT, AND BUILDING CONSTRUCTION.

#### **SCOPE CLARIFICATION NOTES:**

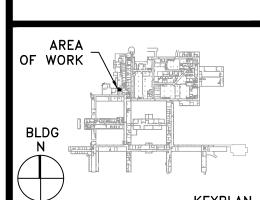
- PROVIDE FIRE STOPPING ON ALL EXISTING AND NEW PIPES. DEVICES, ETC. PENETRATING ALL FIRE RATED CONSTRUCTION ASSEMBLIES.
- 3. EQUIPMENT SHOWN IS NOT NECESSARILY TO SCALE.
- 4. THE DRAWINGS ARE DIAGRAMMATIC IN NATURE. THE CONTRACTOR IS RESPONSIBLE FOR ALL OFFSETS, TRANSITIONS, ELBOWS, ETC. AS REQUIRED IN DUCTWORK, PIPING, SUPPORTS, ETC. TO COMPLETE HIS/HER WORK IN A CLEAN, FUNCTIONAL INSTALLATION.
- THIS CONTRACTOR IS RESPONSIBLE FOR ALL SLEEVES FOR PENETRATIONS THROUGH SLABS AND BEAMS REQUIRED BY THE INTENT OF THE SCOPE OF WORK INDICATED ON THE DRAWINGS. COORDINATION OF QUANTITY AND LOCATIONS OF ALL PENETRATIONS SHALL BE DONE BY THIS CONTRACTOR DURING THE SHOP DRAWINGS PROCESS FOR REVIEW BY THE STRUCTURAL ENGINEER.





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ISSUE INFORMATION									
PACKAGE									
REV	ISIONS								
NO.	DATE	DESCRIPTION							
1	12/08/17	PROGRESS DRAWINGS							
1	12/15/17	100% CD DRAWINGS							
OGS No:									



PROJECT NO. ISSUED BY: REVIEWED BY:

DRAWN BY: ISSUE DATE: DECEMBER 15, 2017 SHEET TITLE:

MECHANICAL LEGEND SCHEDULES, AND NOTES

SCIPLINE - CATEGORY - SUB-CATEGORY - SHEET

#### STEAM SHELL AND TUBE HEAT EXCHANGER SCHEDULE TUBE SIDE (HEATING HOT WATER) SHELL SIDE (STEAM) CODE MANUFACTURER/ OPERATING | EWT | LWT | WPD | NO. OF | RATED SURFACE AREA **PRESSURE** MODEL NO. SERVICE WEIGHT (LBS) MBH | FLUID | GPM | (F) | (F) | (FT) | PASSES | PRES. (PSI) (SQFT) FLUID (PSIG) LBS/HR PRES. (PSI) REMARKS HX-M | BELL & GOSSETT / QSU 143-2 | HEATING HOT WATER 691 5,842 | WATER | 600 | 170 | 190 | 3.6 | 2 89.4 STEAM 60 6,475 150

GENERAL NOTES

. TUBE SIDE SHALL BE SELECTED WITH A FOULING FACTOR OF 0.0005

2. REFER TO DETAILS AND SPECIFICATIONS FOR PIPING ARRANGEMENT AND ACCESSORIES. 3. HEAT EXCHANGER AND TANK TO BE ASSEMBLED AT THE FACTORY AND SHIPPED FULLY ASSEMBLED.

4. STELL SHELL, CAST IRON HEAD, STEEL TUBESHEET, AND STEEL BAFFLES.

5. STEAM: 5" INLET, 1.5" OUTLET 5. WATER: 6" INLET, 6" OUTLET

# COORDINATION REQUIREMENTS FOR MECHANICAL AND PLUMBING EQUIPMENT AS INDICATED ON THE DIVISION 21, 22, AND 23 DRAWINGS, THE DIVISION 21, 22 AND 23

CONTRACTORS SHALL COORDINATE WITH DIVISION 26 CONTRACTOR TO CONNECT ALL MECHANICAL AND PLUMBING EQUIPMENT INDICATED ON THE MECHANICAL AND PLUMBING DRAWINGS. COORDINATE FOR COMPLETE WIRING, STARTERS, AND DISCONNECTING MEANS FOR ALL MECHANICAL AND PLUMBING EQUIPMENT.

#### GENERAL

- A. THE "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION," AIA DOCUMENT A201, LATEST EDITION, AS APPLICABLE, AND THIS SPECIFICATION AS APPLICABLE ARE PART OF THIS CONTRACT.
- B. 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 SPECIFICATIONS AND 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 THE ABOVE LAWS AND REGULATIONS. ANY WORK DONE BY THE CONTRACTOR CAUSING SUCH VIOLATION SHALL BE CORRECTED BY THE CONTRACTOR.
- C. INVESTIGATE EACH SPACE THROUGH WHICH EQUIPMENT MUST BE MOVED. WHERE NECESSARY, EQUIPMENT SHALL BE SHIPPED FROM MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH AVAILABLE RESTRICTIVE SPACES. ASCERTAIN FROM BUILDING OWNER AND TENANT AT WHAT TIMES OF DAY EQUIPMENT MAY BE MOVED THROUGH ALL AREAS.
- D. ALL PIPING IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL OFFSETS, DROPS AND RISES OF RUNS. THE CONTRACTOR SHALL ALLOW IN HIS PRICE FOR ROUTING OF DUCTWORK AND PIPING TO AVOID OBSTRUCTIONS. EXACT LOCATIONS ARE SUBJECT TO APPROVAL OF ARCHITECT.
- E.SUPPORT ALL PIPING FROM BUILDING STRUCTURE AND/OR FRAMING IN AN APPROVED MANNER. WHERE OVERHEAD CONSTRUCTION DOES NOT PERMIT FASTENING OF SUPPORTS FOR EQUIPMENT, FURNISH ADDITIONAL FRAMING.
- F. 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 EXTRA COST SHALL NOT BE MADE WITHOUT APPROVAL
- G. LEAVE WORK READILY ACCESSIBLE FOR OPERATION, MAINTENANCE, AND REPAIR. PROVIDE ACCESS HATCHES IN FINISHED CONSTRUCTION WHEREVER MECHANISMS REQUIRING ACCESS FOR MAINTENANCE, READING OF INSTRUMENTS, OR FOR OPERATION ARE CONCEALED IN THE STRUCTURE AND WHEREVER INDICATED ON THE DRAWINGS. SUPPLY ACCESS DOORS OF SIZES NECESSARY TO PROVIDE READY ACCESS TO THE CONCEALED ITEMS. GROUP VALVES, CONTROLS, DAMPERS, TRAPS, EXPANSION JOINTS, CLEANOUTS, GAUGES, SWITCHES AND OTHER EQUIPMENT REQUIRING ACCESS IN CEILINGS, WALLS AND FURRED SPACES TO REDUCE THE NUMBER OF ACCESS DOORS.
- H. 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
- CONNECT NEW WORK TO EXISTING WORK IN NEAT AND APPROVED MANNER. RESTORE EXISTING WORK DISTURBED WHILE INSTALLING NEW WORK TO ACCEPTABLE CONDITION AS DETERMINED BY ARCHITECT.
- J. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIALS EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW SYSTEM.
- K. THE CONTRACTOR SHALL KEEP ALL EQUIPMENT AND MATERIALS AND ALL PARTS OF THE BUILDING, EXTERIOR SPACES AND ADJACENT STREET, SIDEWALKS AND PAVEMENTS, FREE FROM MATERIALS AND DEBRIS RESULTING FROM THE EXECUTION OF THIS WORK. EXCESS MATERIALS WILL NOT BE PERMITTED TO ACCUMULATE EITHER ON THE INTERIOR OR THE EXTERIOR.
- L. SEAL OPENINGS AROUND DUCTS AND PIPING THROUGH PARTITIONS, WALLS AND FLOORS (NOT IN SHAFTS) WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL.
- M.PROVIDE ALL NECESSARY FLASHING AND COUNTER FLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THIS BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF PIPES, DUCTS, CONDUITS, AND EQUIPMENT. PROVIDE EQUIPMENT CURBS, CONCRETE HOUSEKEEPING PADS AND EQUIPMENT SUPPORT STEEL AS REQUIRED.
- N. ALL PRESENT MATERIALS AND EQUIPMENT TO BE REMOVED UNDER THIS CONTRACT WILL REMAIN THE PROPERTY OF THE OWNER OR SHALL BE DISPOSED OF BY THIS CONTRACTOR AS DIRECTED BY THE ARCHITECT.
- O. MATERIALS AND WORKMANSHIP, UNLESS OTHERWISE NOTED, SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
- P. THE WORK IN THE BUILDING SHALL BE DONE WHEN AND AS DIRECTED, AND IN A MANNER SATISFACTORY TO THE OWNER. THE WORK SHALL BE PERFORMED SO AS TO CAUSE THE LEAST POSSIBLE INCONVENIENCE AND DISTURBANCE TO THE PRESENT OCCUPANTS.
- Q. THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS. WHEN SO DIRECTED, HOWEVER, THE CONTRACTOR SHALL INSTALL WORK ON OVERTIME AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.
- R. UNLESS OTHERWISE SPECIFICALLY SPECIFIED, INCLUDE ALL CUTTING AND PATCHING OF EXISTING FLOORS, WALLS, PARTITIONS AND OTHER MATERIALS IN THE EXISTING BUILDING. THE CONTRACTOR SHALL RESTORE THESE AREAS TO ORIGINAL CONDITION.
- S. ACCESS TILE IDENTIFICATION: PROVIDE BUTTONS, TABS AND MARKERS TO IDENTIFY LOCATION OF CONCEALED VALVES, DAMPERS AND EQUIPMENT.

# . SCOPE OF WORK

- A. THE WORK UNDER CONTRACT INCLUDES ALL LABOR, MATERIALS AND APPLIANCES NECESSARY FOR THE FURNISHING, INSTALLING AND TESTING, COMPLETE AND READY FOR SAFE OPERATION OF THE SYSTEM. WORK SHALL BE INSTALLED IN A NEAT, WORKMANLIKE MANNER.
- B. THE CONTRACTOR SHALL GIVE NECESSARY NOTICE, FILE DRAWINGS AND SPECIFICATIONS WITH THE DEPARTMENT HAVING JURISDICTION, OBTAIN PERMITS OR LICENSES NECESSARY TO CARRY OUT THIS WORK AND PAY ALL FEES THEREFOR. THE CONTRACTOR SHALL ARRANGE FOR INSPECTION AND TESTS OF ANY OR ALL PARTS OF THE WORK IF SO REQUIRED BY AUTHORITIES AND PAY ALL CHARGES FOR SAME. THE CONTRACTOR SHALL PAY ALL COSTS FOR, AND FURNISH TO THE OWNER BEFORE FINAL BILLING, ALL CERTIFICATES NECESSARY AS EVIDENCE THAT THE WORK INSTALLED CONFORMS WITH ALL REGULATIONS WHERE THEY APPLY TO THIS WORK
- C. THE 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 ONE YEAR FROM THE DATE OF FINAL CERTIFICATE FOR PAYMENT AND/OR FROM DATE OF ACTUAL USE OF EQUIPMENT OR OCCUPANCY OF SPACES, BY OWNER, INCLUDED UNDER THE VARIOUS PARTS OF THE WORK, WHICHEVER DATE IS EARLIER. THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL ALSO PROVIDE THAT WHERE DEFECTS OCCUR, THE CONTRACTOR WILL ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED IN REPAIRING AND REPLACING WORK OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT

#### SUPPLIED BY THE CONTRACTOR.

- D. ALL CONTROLLED INSPECTIONS SHALL BE PERFORMED BY THIS CONTRACTOR.
- E. CONTROLLED INSPECTION ENGINEER SHALL BE A LICENSED PROFESSIONAL ENGINEER AND SHALL HAVE AT LEAST FIVE YEARS OF PRACTICAL EXPERIENCE WITH DESIGN AND CONSTRUCTION ADMINISTRATION OF THE SYSTEMS REQUIRING CONTROLLED INSPECTION.
- F. CONTRACTOR SHALL SUBMIT THE CONTROLLED INSPECTION ENGINEER CERTIFICATE OF PROFESSIONAL LIABILITY INSURANCE, UPON COMPLETION OF WORK. WHERE AS SUCH CERTIFICATE IS NOT AVAILABLE. THE CONTRACTOR SHALL ASSUME ALL LIABILITY OF THE CONTROLLED INSPECTION ENGINEER WITH UNLIMITED LIABILITY.

#### 3. PIPE TESTING AND BALANCING:

- A. ALL PRESSURIZED PIPING TO BE TESTED HYDROSTATICALLY TO 100 PSI OR 150% OF OPERATING PRESSURE, WHICHEVER IS GREATER, BUT NEVER EXCEED RATED PRESSURE. TEST DURATION TO BE 2 HOURS WITH NO PRESSURE CHANGE CORRECTED FOR TEMPERATURE CHANGE. REPAIR OR REPLACE LEAKS OR DEFECTS WITHOUT ADDITIONAL COST. WHEN AUTOMATIC CONTROL VALVES AND SIMILAR DEVICES ARE INCAPABLE OF WITHSTANDING TEST PRESSURES APPLIED TO PIPING, SUCH DEVICES SHALL BE REMOVED, OR OTHERWISE PROTECTED DURING TESTS.
- B. ALL TESTS SHALL BE MADE AFTER ERECTION AND BEFORE COVERING IS APPLIED, PIPING IS PAINTED, OR CONCEALED AND AS SECTIONS OF MAINS AND GROUPS OF RISERS ARE COMPLETED.
- C. PROVIDE ALL OTHER TESTS REQUIRED BY BUILDING DEPARTMENT, FIRE DEPARTMENT AND OTHER AUTHORITIES HAVING JURISDICTION.
- D. ALL PIPING SYSTEMS SHALL BE COMPLETELY BALANCED BY THE ADJUSTMENT OF PLUG COCKS, GLOBE VALVES, OR OTHER CONTROL DEVICES, TO OBTAIN THE FLOW QUANTITIES INDICATED ON THE DESIGN DRAWINGS.
- E. BALANCE THE WATER FLOW THROUGH ALL HEAT EXCHANGERS, CONTROL VALVES, ETC., IN ACCORDANCE WITH DESIGN REQUIREMENTS.
- F. FLOW SHALL BE BALANCED THROUGH ALL EQUIPMENT BY MEANS OF PRESSURE DROP.

# 4. SHOP DRAWINGS:

- A. INDICATE ON EACH SUBMISSION:
- 1) PROJECT NAME AND LOCATION. 2) ARCHITECT AND ENGINEER.
- 3) ITEM IDENTIFICATION. 4) APPROVAL STAMP OF PRIME CONTRACTOR.
- B. SUBMIT SHOP DRAWINGS FOR FOLLOWING:
- 1) EQUIPMENT SUPPORT DETAILS
- 2) PIPING SHOP STANDARDS
- 3) WATER BALANCE REPORT
- 4) PIPING LAYOUT
- 5) OPERATION SEQUENCE 6) CONTROL SYSTEMS, INCLUDING: CONTROL VALVES, TEMPERATURE
- PROBES, CONTROL DIAGRAMS, CONTROL WIRING 7) INSULATION
- 8) HEAT EXCHANGER
- 9) FLASH TANKS AND STEAM TRAPS 10)AS-BUILT DRAWINGS
- 5. PIPE INSULATION
- A. THE FOLLOWING PIPES SHALL NOT BE INSULATED. INSULATE ALL OTHER PIPING:
- 1) AUTOMATIC AIR VENT DRAIN PIPES.
- 2) DRAIN PIPING FROM SAFETY RELIEF VALVE DRIP PAN ELBOWS AND
- STEAM EXHAUST HEADS. 3) VENT PIPING FROM FLASH TANK.
- 4) INSTRUMENT AIR PIPING.
- B. ALL INSULATION SHALL HAVE COMPOSITE (INCLUDING INSULATION JACKET OR FACING AND ADHESIVE) FIRE AND SMOKE HAZARD RATINGS AS TESTED BY PROCEDURE ASTM E-84, NFPA 255 AND UL 723 NOT EXCEEDING:
- 1) FLAME SPREAD......25 2) SMOKE DEVELOPED....50
- C. HOT PIPE INSULATION
- 1) THE FOLLOWING PIPING SHALL BE COVERED WITH FIBERGLASS INSULATION:

#### SERVICE THICKNESS

MEDIUM PRESSURE STEAM & CONDENSATE FROM MEDIUM PRESSURE STEAM SYSTEMS

(BETWEEN 16 AND 60 PSIG) LESS THAN 1" 1" TO 1-1/4"

1-1/2" AND ABOVE LOW PRESSURE STEAM & CONDENSATE FROM

LOW PRESSURE STEAM SYSTEMS (15 PSIG AND BELOW) LESS THAN 4" 4" AND ABOVE

CONDENSATE PUMP DISCHARGE FOR LOW PRESSURE

STEAM SYSTEMS LESS THAN 4" 2-1/2" 4" AND ABOVE

HOT WATER SUPPLY AND RETURN LESS THAN 1-1/2"

1-1/2" AND ABOVE DOMESTIC COLD WATER

1-1/2" ALL SIZES

2) INSULATION SHALL BE GLASS FIBER WITH A MAXIMUM K FACTOR OF 0.22 BTU&/INCH PER SQ. FT. PER DEGREE F. PER HOUR AT 75EF. MEAN TEMPERATURE. DENSITY SHALL BE NOT LESS THAN 3 LBS. PER CUBIC FOOT. INSULATION SHALL BE SUITABLE FOR 650EF. (2" MINIMUM THICKNESS ABOVE 450EF.).

1-1/2"

- 3) INSULATION SHALL BE HEAVY DENSITY SECTIONAL PIPE INSULATION AS MADE BY OWENS-CORNING FIBERGLASS CORP., ASJ/SSL-11 OR MANVILLE MICRO-LOK WITH A.P.-T JACKET FIBERGLASS INSULATION.
- 4) ALL FITTINGS, VALVES AND FLANGES FOR PIPE SIZES 3" AND BELOW SHALL BE INSULATED WITH PREFORMED MOLDED FIBERGLASS INSULATION OF SAME THICKNESS AS THE ADJOINING PIPE INSULATION, SECURED WITH NO. 20 GAUGE GALVANIZED ANNEALED STEEL WIRE AND COVERED WITH ZESTON 2000 PVC MOLDED FITTING COVERS AS MANUFACTURED BY MANVILLE OR EQUAL

- 5) ALL FITTINGS, VALVES AND FLANGES FOR PIPE SIZES 4" AND LARGER SHALL BE INSULATED WITH FABRICATED MITERED SEGMENTS OF PIPE INSULATION OF SAME THICKNESS AS THE ADJOINING PIPE INSULATION, SECURED WITH NO. 20 GAUGE GALVANIZED ANNEALED STEEL WIRE AND COVERED WITH ZESTON 2000 MOLDED PVC FITTING COVERS AS MANUFACTURED BY MANVILLE OR EQUAL.
- 6) INSULATION SHALL BE PROTECTED BY SADDLES AT ALL HANGERS, GUIDES, ROLLERS AND ANCHORS. FILL VOID AT SADDLES WITH INSULATION SAME AS SPECIFIED FOR SERVICE.
- 7) STRAINER FLANGES AT BASKET REMOVAL ON HOT PIPES SHALL NOT BE INSULATED.
- 8) ALL PIPE INSULATION LOCATED WITHIN MECHANICAL ROOMS SHALL BE PROTECTED WITH PVC FITTED COVERS.

#### D. PVC INSULATED FITTING COVERS

- 1) FOSTER 30-65 OR CHILDERS CP-34 VAPOR BARRIER MASTIC COMPATIBLE WITH THE PVC SHALL BE APPLIED AROUND THE EDGES OF THE ADJOINING PIPE INSULATION AND ON THE FITTING COVER THROAT OVERLAP SEAM. THE PVC FITTING COVER IS THEN APPLIED AND SHALL BE SECURED WITH PRESSURE SENSITIVE PEARL GRAY Z-TAPE ALONG THE CIRCUMFERENTIAL EDGES. THE TAPE SHALL EXTEND OVER THE ADJACENT PIPE INSULATION AND HAVE AN OVERLAP ON ITSELF AT LEAST 2" ON THE DOWNWARD
- 2) QUALIFICATIONS FOR USING INSULATION: WHEN THE PIPE INSULATION THICKNESS IS GREATER THAN 1-1/2" OR THE PIPE TEMPERATURE IS GREATER THAN 250EF OR LESS THAN 45EF, ADDITIONAL INSULATION INSERTS SHOULD BE USED. USE ONE HI-LO TEMP INSERT FOR EACH ADDITIONAL 1" OF PIPE INSULATION.
- 3) FITTING COVER: THE TEMPERATURE OF THE PVC FITTING COVER MUST BE KEPT BELOW 150EF BY THE USE OF PROPER THICKNESS OF INSULATION AND BY KEEPING THE PVC COVER AWAY FROM CONTACT WITH, OR EXPOSURE TO, SOURCES OF DIRECT OR RADIANT HEAT.

#### E. INSULATION PACKING FOR PIPING

- 1) WHEREVER PIPING PENETRATES WALLS, PARTITIONS, FLOOR SLABS, ETC., THE SPACE BETWEEN THE PIPING AND THE SLEEVE SHALL BE PACKED WITH MINERAL WOOL AND SEALED WITH APPROVED TYPE NON-HARDENING CAULKING COMPOUND FOR SLEEVES THROUGH EXTERIOR WALLS.
- 2) PACKING MATERIAL SHALL BE ROCKWOOL INSULATION AS MANUFACTURED BY UNITED STATED GYPSUM CO. OR EQUAL AND SHALL COMPLY WITH FED. SPEC. HH-1-558, FORM A, CLASS 4, K=0.24, MELTING POINT 2000°F.

#### F. PIPING EXECUTION

- 1) INSULATION SHALL BE APPLIED ON CLEAN DRY SURFACES. AFTER INSPECTION RELEASE FOR INSULATION APPLICATION.
- 2) INSULATION SHALL BE CONTINUOUS THROUGH WALLS, FLOORS, CEILING OPENINGS AND SLEEVES.
- 3) INSULATION ON HOT SURFACES WHERE BARRIER JACKETS ARE USED SHALL BE APPLIED WITH A CONTINUOUS, UNBROKEN SEAL. HANGERS, SUPPORTS, ANCHORS, ETC., THAT ARE SECURED DIRECTLY TO HOT SERVICES SHALL BE ADEQUATELY INSULATED.
- 4) INSERTS SHALL BE INSTALLED AT HANGERS FOR HOT INSULATED PIPING. INSERTS BETWEEN THE PIPE AND PIPE HANGERS SHALL CONSIST OF RIGID PIPE INSULATION OF EQUAL THICKNESS TO THE ADJOINING INSULATION AND SHALL BE PROVIDED WITH VAPOR BARRIER WHERE REQUIRED. INSULATION INSERTS SHALL NOT BE LESS THAN THE FOLLOWING LENGTHS:
- 2-1/2" PIPE SIZE AND SMALLER 6" LONG 9"LONG 3" TO 6" PIPE SIZE
- 5) PROVIDE 18 GAUGE GALVANIZED METAL SHIELDS BETWEEN HANGERS OR SUPPORTS AND PIPE INSULATION. FORM SHIELDS TO FIT INSULATION. EXTEND SHIELDS UP TO CENTERLINE OF PIPE. MAKE SHIELDS SAME LENGTH AS THAT SPECIFIED ABOVE FOR INSERTS.
- 6) WHERE INSULATION IS SPECIFIED FOR PIPING, INSULATE SIMILARLY ALL CONNECTIONS, VENTS, DRAINS, AND ANY PIPING CONNECTED TO SYSTEM.
- 7) FILL SURFACE IMPERFECTIONS SUCH AS CHIPPED EDGES, SMALL JOINTS OR CRACKS AND VOIDS OR HOLES WITH INSULATION MATERIAL AND SMOOTH ALL SUCH AREAS WITH A SKIM COAT OF INSULATING CEMENT.
- 8) DO NOT COVER ANY NAMEPLATES OR IDENTIFICATION TAGS.
- 9) SPECIALTIES SHALL BE INSULATED TO MATCH THOSE OF THE SYSTEMS TO WHICH THEY ARE CONNECTED.
- 10)NO INSULATION SHALL BE INSTALLED UNTIL THE PIPING SYSTEMS HAVE BEEN HYDROSTATICALLY TESTED AS SPECIFIED ELSEWHERE TO THE SATISFACTION OF THE ENGINEER.

# G. FINISH FOR EXPOSED PIPE INSULATION

- 1) IF THE PIPE AREA IS LESS THAN 20 SQUARE INCHES, INSULATION SHALL BE CONTINUOUS FOR PENETRATIONS THROUGH BOTH FIRE-RATED WALL OR FLOOR. SLEEVES SHALL BE PACKED WITH MINERAL WOOL OR THERMOFIBER. IF PIPE AREA IS 20 SQUARE INCHES OR MORE, DISCONTINUE INSULATION AS IT PASSES THROUGH FIRE-RATED WALL OR FLOOR AND USE MINERAL WOOL OR THERMOFIBER PACKING INSTEAD. SPECIFIC MASTICS, ADHESIVE AND COATING SHALL BE APPLIED IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTION, INCLUDING RECOMMENDED COVERAGES.
- 2) ALL VALVES AND CAPPED OUTLETS LEFT FOR FUTURE WORK SHALL BE INSULATED AS HEREIN SPECIFIED FOR THE SPECIFIC SYSTEMS WITH A REMOVABLE SECTION OF INSULATION OVER CAPS.
- 3) WHERE INSULATION ON EXISTING PIPING, EQUIPMENT, ETC., HAS BEEN CUT, REMOVED OR DAMAGED, THIS CONTRACTOR SHALL REINSULATE AS HEREIN SPECIFIED.

# 6. EQUIPMENT INSULATION

# A. HEAT EXCHANGERS & FLASH TANKS

- 1) INSULATE WITH A MINIMUM OF 4.5" THICK FIBERGLASS, 3# DENSITY U.L. LABELED INSULATION AND HEXAGONAL MESH WIRE SCREEN FINISHED WITH GLASS LAGGING JACKET ADHERED AND COATED WITH TWO COATS OF FOSTER 30-36 OR CHILDERS CP-50AMV1 LAGGING ADHESIVE. FLANGES SHALL BE TREATED AS SPECIFIED UNDER HOT PIPE INSULATION "FITTINGS, VALVES & FLANGES 4" AND LARGER".
- 2) THE CONTRACTOR SHALL HAVE THE OPTION OF USING 4.5" THICK FIBERGLASS BEND-A-BOARD INSULATION WITH .016" THICK ALUMINUM JACKET WITH LOCK SEAMS AT LONGITUDINAL SEAMS AND 1/2" ALUMINUM BANDS 12" ON CENTER AT TRAVERSE JOINTS. JOINTS AND JACKET SHALL PROVIDE COMPLETE PROTECTED FOR

# THE INSULATION.

- B. HOT WATER EXPANSION TANKS, AIR SEPARATORS AND CHEMICAL TREATMENT TANKS
- 1) INSULATE WITH 2" THICK FIBERGLASS U.L. LABELED INSULATION FINISHED WITH GLASS CLOTH JACKET ADHERED AND WIRED AND COATED WITH TWO COATS OF FOSTER 30-36 OR CHILDERS CP-50AMV1 LAGGING ADHESIVE AND LAGGING CLOTH. VAPOR BARRIER TO BE PROVIDED ON CHILLED WATER EXPANSION TANK, AIR SEPARATOR AND CHEMICAL TREATMENT TANK.
- 2) THE CONTRACTOR SHALL HAVE THE OPTION OF USING 2" THICK FIBERGLASS BEND-A-BOARD INSULATION WITH .016" THICK ALUMINUM JACKET WITH LOCK SEAMS AT LONGITUDINAL SEAMS AND 1/2" ALUMINUM BANDS 12" ON CENTER AT TRAVERSE JOINTS. JOINTS AND JACKET SHALL PROVIDE COMPLETE PROTECTION FOR THE INSULATION.

#### 7. PIPING - GENERAL REQUIREMENTS:

- A. COMPLETE WITH: PIPE, FITTINGS, VALVES, STRAINERS, MOTORIZED VALVES OPERATORS, HANGERS, SUPPORTS, GUIDES, SLEEVES, AND ACCESSORIES.
- B. ALL ITEMS SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE FOLLOWING CODES AND STANDARDS:
- 1) AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME). 2) AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM). 3) AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI). 4) MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND

#### FITTING INDUSTRY (MSS). 5) NEW YORK STATE.

C. PIPE SUPPORTS:

- 1) PROVIDE ADEQUATE SUPPORT FOR PIPING AND CONTENTS TO PREVENT SAGGING, VIBRATION, OR SWAYING AND ALLOW FOR EXPANSION AND CONTRACTION. PROVIDE SUPPLEMENTAL STEEL AS REQUIRED WHERE STRUCTURE CANNOT SUPPORT POINT LOADS.
- 2) HORIZONTAL PIPING TO BE SUPPORTED BY FORGED STEEL ADJUSTABLE CLEVIS TYPE HANGER. MAXIMUM SPACING AS FOLLOWS:
- A) STEEL 1 IN. AND SMALLER 7 FT. 10 FT. B) STEEL 2 3/4 IN. AND LARGER C) COPPER 3 IN. AND SMALLER 7 FT. D) ADDITIONAL SUPPORTS AT CHANGES IN DIRECTION, RUN OUTS,

AND CONCENTRATED LOADS DUE TO VALVE, ETC.

# 3) VERTICAL PIPING:

- A) TOP SUPPORT HANGER OR SADDLE IN HORIZONTAL CONNECTION WITH PROVISIONS FOR EXPANSION.
- B) INTERMEDIATE STEEL RISER CLAMP SUPPORT BOLTED AND WELDED TO PIPE BEARINGS ON STRUCTURAL STEEL OR BEARING PLATE AT FLOOR.

# 8. HEATING HOT WATER PIPING:

- A. 2" AND SMALLER PIPE: COPPER TUBE, HARD TEMPER, TYPE L, ASTM B88 WITH WROUGHT COPPER FITTINGS. ASTM B16.22. ALL JOINTS AND FITTINGS SHALL BE BRAZED.
- B. 2 1/2" AND LARGER PIPE: STEEL, SCHEDULE 40, SEAMLESS OR ELECTRIC RESISTANCE WELD, ASTM A53. CONTRACTOR HAS OPTION TO USE TYPE L COPPER PIPE AND FITTINGS.

## C. FITTINGS:

- 1) 2" AND SMALLER: BRAZED JOINTS, WITH WROUGHT COPPER FITTINGS.
- 2) 2 1/2" AND LARGER: WELDED SCHEDULE 40 FITTINGS.
- 3) PROVIDE 1/2" DRAIN VALVE WITH CAPPED HOSE CONNECTION AT ALL LOW POINTS.
- 4) MANUAL AIR VENTS: PROVIDE LINE SIZE AIR CHAMBER WITH 1/2" GLOBE VALVE AT ALL HIGH POINTS AND WHERE FLOW DIRECTION CHANGES FROM HORIZONTAL TO DOWNWARD. 5) DIELECTRIC UNIONS: INSTALL DIELECTRIC UNIONS TO PREVENT
- GALVANIC ACTION BETWEEN FERROUS AND NON-FARROUS PIPING. DIELECTRIC UNIONS SHALL BE ACCESSIABLE FOR INSPECTION AND SERVICE. PROVIDE DIELECTRIC UNIONS AT ALL CONNECTION TO DISSIMILAR METALS, INCLUDING AT AIR HANDLING UNIT COIL CONNECTIONS.

6) PITCH, EXCEPT AS NOTED.

A) UP TO 1 IN. : 1 IN. IN 40 FT. B) 1 1/4 IN. AND LARGER: 1 IN. IN 100 FT.

# 9. DOMESTIC COLD WATER PIPING:

A. 4" AND SMALLER PIPE: COPPER TUBE, HARD TEMPER, TYPE L, ASTM B88 WITH WROUGHT COPPER FITTINGS. ASTM B16.22. ALL JOINTS AND FITTINGS SHALL BE BRAZED.

# B. FITTINGS:

- 1) 4" AND SMALLER: BRAZED JOINTS, WITH WROUGHT COPPER
- FITTINGS. 2) DIELECTRIC UNIONS: INSTALL DIELECTRIC UNIONS TO PREVENT GALVANIC ACTION BETWEEN FERROUS AND NON-FARROUS PIPING. DIELECTRIC UNIONS SHALL BE ACCESSIABLE FOR INSPECTION AND SERVICE. PROVIDE DIELECTRIC UNIONS AT ALL CONNECTION TO DISSIMILAR METALS, INCLUDING AT AIR HANDLING UNIT COIL

# 10. STEAM AND STEAM CONDENSATE PIPING:

CONNECTIONS.

D. PITCH, EXCEPT AS NOTED.

1) UP TO 1 IN. : 1 IN. IN 40 FT.

- A. ALL STEAM AND CONDENSATE PIPING: BLACK STEEL PIPE, SCHEDULE 80, ASTM A106, TYPE S, GRADE B. FITTINGS SHALL BE STEEL EXTRA HEAVY, 300# ASTM A105, GRADE 11, BUTT OR SOCKET WELDED (ASA B16.11, ASA B16.9).
- B. ALL VENTS: BLACK STEEL, SCHEDULE 80, ASTM S106, TYPE S, GRADE B. FITTINGS SHALL BE STEEL EXTRA HEAVY, 125#, GRADE 11, BUTT OR SOCKET WELDED
- C. ALL PUMP CONDENSATE PIPING: BLACK STEEL, SCHEDULE 40, ASTM A53, TYPE S, GRADE B. FITTINGS SHALL BE STEEL, 250#, SCREWED.
- 2) 1 1/4 IN. AND LARGER: 1 IN. IN 100 FT.

11. STEAM TRAPS:

A. CAPACITY: CONTINUOUS FLOW CAPACITY OF TWICE THE MAXIMUM EQUIPMENT CONDENSING RATE AT A ½ PSI PRESSURE DIFFERENTIAL.

- B. 34 INCH MINIMUM CONNECTION SIZE
- C. VALVE AND SEAT SHALL BE HEAT-TREATED STAINLESS STEEL OR CHROME STEEL.
- D. ACCESS TO INTERNAL PARTS WITHOUT DISTURBING THE PIPING
- E. PROVIDE CHECK VALVE ON TRAPS INSTALLED ON LINES WHERE THE
- F. STEAM TRAPS FOR SHELL AND TUBE HEAT EXCHANGERS SHALL BE SPIRAX SARCO FTB SERIES, OR APPROVED EQUAL.

#### G. FLOAT AND THERMOSTATIC TRAPS:

- 1) ARMSTRONG SERIES B WITH CAST IRON BODY OR SEMI-STEEL. 2) F&T TRAPS SHALL HAVE A VALVE MECHANISM, THE POSITION OF WICH IS CONTROLLED BY A CLOSED, STAINLESS STEEL BALL FLOAT. THE SEAT OF THE VALVE WILL BE WATERTIGHT AT ALL TIMES.
- 3) THE TRAPS SHALL BE PROVIDED WITH AN AUTOMATIC, THERMOSTATIC AIR BYPASS OF THE BALANCED PRESSURE, MULTIPLE BELLOWS TYPE OR DISC DIAPHRAGM.
- 4) ALL EXTERIOR COMBINATION F&T TRAPS SHALL BE SUPPLIED WITH A LIQUID EXPANSION TRAP VALVE CONNECTED TO THE DRAIN PORT OF THE TRAP, SMILER TO SPIRAX SARCO BY DRAIN.

- 1) DUNHAM-BUSH 1E OR 2E WITH CAST BRASS BODY. 2) TRAPS SHALL BE OF THE CORRUGATED-BELLOWS, BALANCED PRESSURE TYPE WITH A BELLOWS MADE OF HIGH GRADE RED BRASS OR PHOSPHOR BRONZE. REGARDLESS OF WORKING PRESSURE, TRAPS SHAL HAVE A MINIMUM WORKING PRESSURE OF
- I. PROVIDE AN EXHAUST HEAD AT THE STEAM VENT DISCHARGE.
- J. FLASH TANKS SHALL BE FABRICATED OF WELDED BLACK STEEL WITH A MINIMUM OF 3/8" THICKNESS. TANKS SHALL BE SHOP TESTED AT 450 DEGREE F, 250 PSIG HYDROSTIC PRESSURE AND GIVEN SHOP COATS OF EPOXY PAINT. FLASH TANK SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE MOST RECENT ADDENDUM OF SECTION VIII DIVISION 1 OF THE ASME BOILER AND PRESSURE VESSEL CODE. FLASH TANK SHALL BE SUPPLIED WITH A DROP LEG, SPARGE PIPE, SUPPORT FLASH TANK FROM THE FLOOR.
- K. AIR VENTS SHALL BE NO. 1A OR NO. 1B VARI-VENT AS MADE BY THE DOLE VALVE CO. OR APPROVED EQUAL.
- L. VACUUM BREAKERS SHALL BE JOHNSON MODEL VB8-55, VB-75-SS-T, OR APPROVED EQUAL. BODY SHALL BE STAINLESS STEEL WITH THREATED OUTLET CONNECTIONS.
- M. GASKETS SHALL BE COMPATABLE WITH THE OPERATING PRESSURES TEMPERATURES, AND ALL COMPONENTS OF THE SYSTEM. GASKETS SHALL BE GARLOCK HTC-9800 OR APPROVED EQUAL.

# 1.5 LB/HR OF CONDENSATE PER SQFT OF SURVED DRAINED PIPE. DRIP LEGS SHALL BE PROVIDED AT THE END OF STEAM HEADER, AT

- A. GENERALLY, ALL VALVES ARE TO BE BUTTERFLY TYPE, EXCEPT THAT GLOBE VALVES SHALL BE USED FOR THROTTLING SERVICES, ON TRAPS, PRESSURE REDUCING, AND CONTROL VALVE BYPASSES. GLOBE VALVES USED ON BYPASSES SHALL HAVE MONEL METAL MOUNTING. PUMPS SHALL HAVE LUBRICATING PLUG VALVES ON
- B. ALL VALVES 2"IN DIAMETER AND SMALLER SHALL BE ALL BRONZE WITH BRONZE BODIES. VALVES 2-1/2"IN DIAMETER AND LARGER SHALL
- C. ALL FLANGED-END VALVES SHALL HAVE RENEWABLE METAL SEAT RINGS AND DISCS. ON GATE VALVES, THESE PARTS SHALL BE OF
- D. ALL SCREWED-END GLOBE. VALVES SHALL BE OF THE UNION BONNET

E. PROVIDE BLOW-OFF VALVES AT ALL STRAINERS.

HAVE IRON BODIES WITH BRONZE MOUNTINGS.

- F. ALL BRONZE AND IRON VALVES SHALL BE FURNISHED WITH TEFLON IMPREGNATED PACKING.
- BODIES, 100 PSI OR LESS SHALL BE 200#WOG CLASS, 100 PSI TO 250 PSI SHALL BE 500#WOG CLASS. I. ALL BALANCING COCKS 4" AND ABOVE SHALL BE FLANGED. ALL

H. ALL LUBRICATED PLUG VALVES CONSTRUCTION SHALL HAVE CAST IRON

- J. BALL VALVES UP TO 2"MAY BE USED FOR ALL WATER SERVICES, AS AN ALTERNATE TO GATE VALVES, GLOBE VALVES, AND BALANCING COCKS. BALL VALVES SHALL BE BRONZE BODY, BRONZE BALL AND
- K.BUTTERFLY VALVES IN SIZE 2" 20"SHALL BE OF THE TAPPED LUG BODY STYLE. ALL VALVES SHALL BE SUITABLE FOR USE WITH ANSI 150 POUND FLANGES, AND RATED AT 175 PSI AND PROVIDE DRIP-TIGHT SHUTOFF AT DIFFERENTIALS UP TO 175 PSI. ALL VALVES SHALL BE FURNISHED WITH SELF LUBRICATED BEARING OF BRONZE. SHAFTS SHALL BE ONE PIECE AND SHALL BE OF 316 STAINLESS STEEL AND MEET THE 75B STANDARD FROM AWWA SPEC C504-87 FOR BUTTERFLY VALVES. DISCS SHALL BE 316 STAINLESS STEEL.
- 13. HVAC SPECIALTIES:

- CONNECTIONS.
- TRAP DISCHARGE IS LOWER THAN THE CONDENSATE RETURN PIPING.

## G. THERMOSTATIC TRAPS:

- 125 PSI TO BE SIZED ON CONDENSATE AT STEAM TEMPERATURE.
- H. STRAINERS FOR STEAM SYSTEM SHALL BE SEMI-STEEL BODIES, WITH REMOVABLE STAINLESS STEEL SCREENS, SUITABLE FOR THE STEAM WORKING PRESSURE. ALL STRAINERS SHALL BE Y-PATTERN, SET IN A HORIZONTAL (VERTICAL DOWNWARD) RUN OF PIPE. STRAINER SHALL BE ARRANGED AS NOT TO "TRAP" PIPES, AND TO FACILITATE DISCONNECTION AND OPENING-UP FOR CLEANING. STRAINER SCREEN PERFORATIONS SHALL BE 1/32"FOR STEAM AND MIXTURE OF STEAM AND CONDENSATE. STRAINER SHALL BE SIMILAR TO SARCO BULLETIN 1220 TYPE IF AND AF OR APPROVED EQUAL.
- EXHAUST HEAD SHALL BE CAST IRON AND SHALL HAVE SUFFICIENT PASSAGE TO REDUCE THE BACK PRESSURE. EXHAUST HEADS SHALL BE MANUFACTURED BY COCHRANE CORP, SWARTWOUT, OR APPROVE
- AND HAND HOLE. PROVIDE ALL NECESSARY SUPPLEMENTAL STEEL TO
- N. DRIP LEGS SHALL BE SIZED FOR A CONTINUOUS FLOW CAPACITY OF

# THE LOW POINTS, AND AT VERTICAL OFFSETS.

- 12. VALVES:
- DISCHARGE PIPING.
- BRONZE, ON ALL GLOBE VALVES THEY SHALL BE OF BRONZE AND SUITABLE FOR THROTTLING SERVICE.
- TYPE WITH RENEWABLE TEFLON DISCS.
- G. ALL HAND WHEELS SHALL BE OF MALLEABLE IRON.
- BALANCING COCKS SHALL HAVE SQUARE HEAD (SIMILAR TO WALWORTH
- STEM, TEFLON SEAT AND SEALS THREADED ENDS, 400 PSIG COLD WOG WORCHESTER NO. 411T-SE OR APPROVED EQUAL.
- THE DISC-TO-SHAFT CONNECTION SHALL BE TYPE 316 STAINLESS
- L. GLOBE VALVES SHALL BE CONSTRUCTED OF AN IRON BODY. 250LB. WSP, OS&Y TYPE, WITH FLANGED ENDS AND BRONZE TRIM.
- M.ALL VALVES INSTALLED ON THE DOMESTIC WATER SYSTEM SHALL BE LEAD FREE AND NSF-61 CERTIFIED.
- A. THERMOMETERS



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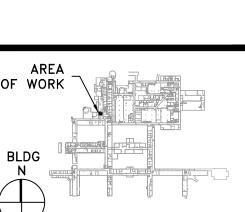
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**SPECIFICATION** 

ISSUED BY:

REVIEWED BY:

ISCIPLINE - CATEGORY - SUB-CATEGORY - SHEET

- 1) ALL THERMOMETERS SHALL BE SEPARABLE WELL—TYPE DIAL OR 9"MERCURY ADJUSTABLE ANGLE TYPE IN GLASS STEM, MANUFACTURED BY WEKSLER OR APPROVED EQUAL.
- 2) DIAL THERMOMETERS SHALL BE 5"HERMETICALLY SEALED, BIMETAL WITH STAINLESS STEEL CASES, ANTIPARALLAX DIALS WITH RAISED JET BLACK FIGURES, STAINLESS STEEL STEMS, AND BRASS SEPARABLE SOCKETS. THERMOMETERS FOR DUCT MOUNTING SHALL HAVE UNION CONNECTION IN LIEU OF SEPARABLE SOCKETS.
- 3) THE THERMOMETER SHALL BE 5"DIALS AND SHALL BE VAPOR ACTUATED AND SHALL HAVE SEPARABLE WELLS. PANEL MOUNTED THERMOMETERS SHALL BE PROVIDED WITH AN ENGRAVED NAMEPLATE MOUNTED BELOW EACH THERMOMETER TO IDENTIFY ITS SERVICE
- 4) PROVIDE A SUITABLE THERMOMETER SCALE RANGE FOR TYPICAL SERVICE TYPE.
- B. PRESSURE GAUGES
- 1) ALL PRESSURE GAUGES SHALL BE BOURDON SPRING TYPE, MANUFACTURED BY WEKSLER, OR APPROVED EQUAL.
- 2) THE GAUGES SHALL HAVE DULL, BLACK ENAMEL CAST ALUMINUM CASING WITH CHROME PLATED BEZELS OR RIMS. THE GAUGES SHALL HAVE WHITE FACES WITH BLACK FILLED ENGRAVED NUMERALS AND ADJUSTABLE POINTER. DIAL SHALL NOT BE LESS THAN 4-1/2 INCHES AND SHALL HAVE A BRASS BRONZED BRUSHED ROTARY TYPE MOVEMENT. ALL GAUGES ON WATER LINES SHALL BE FITTED WITH FILTER TYPE PRESSURE SNUBBERS CONSISTING OF A MICRO METALLIC STAINLESS STEEL FILTER, AS MANUFACTURED BY OPERATING AND MAINTENANCE SPECIALTIES OR APPROVED FOLIAL
- 3) PROVIDE A SUITABLE GAUGE SCALE RANGE FOR TYPICAL SERVICE TYPE.
- C. FURNISH AND INSTALL AUTOMATIC AIR VENTS WITH TEST PETCOCK AT EACH HIGH POINT IN THE WATER PIPING MAINS AND WHERE INDICATED ON DRAWINGS. AIR VENT SHALL BE ARMSTRONG NO. 1 AV OR APPROVED EQUAL. VENTS ON HOT WATER, DUAL TEMPERATURE WATER AND CHILLED WATER SHALL HAVE A HOKE FIG. NO. PY-271 VALVE OR APPROVED EQUAL. ALL OTHER WATERLINES SHALL HAVE HOKE FIG. NO. RB-271 VALVES OR APPROVED EQUAL. FURNISH AND INSTALL MANUAL AIR VENTS HOFFMAN NO. 500 OR APPROVED EQUAL, FOR ALL UPFED RADIATION.
- D. AIR SEPARATORS SHALL BE ROLAIRTROL, AS MANUFACTURED BY BELL AND GOSSETT OR APPROVED EQUAL. SEPARATORS SHALL BE OF ASME CONSTRUCTION AND BE STAMPED 125 PSIG WP.
- E. STRAINERS FOR WATER SYSTEMS SHALL BE FULL SIZED Y-PATTEN ON THE INLET OF EACH CONTROL VALVE AND EACH WATER PUMP AND AS INDICATED ON DRAWINGS. STRAINERS SHALL BE MANUFACTURED BY SPENCE OR APPROVED EQUAL. ALL STRAINERS SHALL HAVE BRONZE BODY UP TO 2-1/2", SEMI-STEEL ABOVE 2-1/2", RATED AT 125 PSIG FOR ALL SYSTEMS WITH 50 PSIG MAX PRESSURE AND 250 PSIG FOR ALL OTHERS. STRAINERS 2" AND SMALLER SHALL HAVE SCREWED ENDS. 2-1/2" OR LARGER SHALL HAVE FLANGED ENDS. ALL STRAINERS SHALL HAVE REMOVABLE CYLINDRICAL OR CONICAL SCREENS OF BRASS CONSTRUCTION.
- F. STRAINERS FOR STEAM SYSTEMS SHALL BE FULL SIZED Y-PATTERN ON THE INLET OF EACH CONTROL VALVE, TRAP AND AS INDICATED ON DRAWINGS. STRAINERS SHALL BE MANUFACTURED BY ARMSTRONG OR APROVED EQUAL. ALL STRAINERS SHALL HAVE CAST IRON OR BRONZE BODY RATED FOR 125 PSIG. STRAINERS 2" AND SMALLER SHALL HAVE SCREWED ENDS. 2-1/2" OR LARGER SHALL HAVE FLANGED ENDS. ALL STRAINERS SHALL HAVE REMOVABLE CYLINDRICAL OR CONICAL SCREENS OF STAINLESS STEEL CONSTRUCTION.
- G. GASKETS FOR STEAM SYSTEMS SHALL BE MANUFACTURED BY GARLOCK, MODEL HTC-9800. GASKET SHALL BE COMPRISED OF CARBON FIBERS BOUND WITH SYNTHETIC RUBBER AND SHALL CONTAIN NO ASBESTOS.
- H. REDUCING AND SAFETY VALVES FOR WATER SYSTEMS SHALL BE MODEL 7 PRESSURE REDUCING VALVE WITH FIELD ADJUSTABLE SETTING AS MANUFACTURED BY BELL & GOSSETT OR APPROVED EQUAL.
- I. FURNISH AND INSTALL PRESSURE AND TEMPERATURE TEST STATIONS IN EACH SUPPLY AND RETURN RUNOUTS TO EACH REHEAT COIL AND WHERE INDICATED ON DRAWINGS, A 1/4" MPT FITTING TO RECEIVE EITHER A TEMPERATURE OR PRESSURE PROBE 1/8" OD. TEST STATIONS AND TEST KIT SHALL BE MANUFACTURED BY PATERSON ENGINEERING COMPANY, INC. OR APPROVED EQUAL.
- 14. SHELL AND TUBE HEAT EXCHANGER
- A. STEAM TO WATER HEAT EXCHANGERS SHALL BE PROVIDED WITH STEAM IN SHELL, WATER IN TUBES.
- B. THE HEAT EXCHANGER SHALL CONSIST OF 3/4"OD COPPER TUBES, CAST IRON HEAD, STEEL TUBESHEET OF TWO PASS CONFIGURATION, STEEL SHELL AND SUPPORTS. UNIT'S SHELL AND TUBES SHALL BE SPECIFICALLY DESIGNED FOR 150 PSIG WORKING PRESSURE AT 375F.
- C. TUBES SHALL BE OF ¾"O.D. 20 GAUGE COPPER AND SHALL BE SECURED TO A STEEL TUBESHEET VIA ROLLED JOINTS.
- D. HEAT EXCHANGER SHALL BE CONSTRUCTED OF CAST IRON HEAD, STEEL SHELL, STEEL TUBESHEET, AND STEEL BAFFLES, TIE RODS, AND SPACERS. UNIT SHALL HAVE A COMPRESSED FIBER GASKET TO SEAL THE SHELL AT THE TUBESHEET.
- E. HEAT EXCHANGER SHALL BE PROVIDED WITH THE SCHEDULED SQUARE FOOTAGE OF HEAT TRANSFER AREA.
- F. UNIT SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASME CODE RULES AND SHALL HAVE A MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS, FORM NO. U-1. FORM U-1 SHALL BE FURNISHED TO THE ENGINEER FOR THE OWNER UPON REQUEST. AN AUTHORIZED INSPECTOR, HOLDING A NATIONAL BOARD COMMISSION, CERTIFYING THAT CONSTRUCTION CONFORMS TO THE LATEST ASME CODE FOR PRESSURE VESSELS MUST SIGN THIS FORM. THE ASME "U" SYMBOL SHOULD ALSO BE STAMPED ON THE HEAT EXCHANGER(S). IN ADDITION, EACH UNIT REGISTERED WITH THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS.
- G. HEAT EXCHANGER MANUFACTURER SHALL BE ISO-9001 CERTIFIED.
- H. WHERE INDICATED HEAT EXCHANGER SHALL BE PROVIDED WITH ALTERNATE MATERIALS OF CONSTRUCTION AS NOTED ON SCHEDULE AND INSTALLATION DRAWINGS
- I. STEAM HEAT EXCHANGER SHALL BE PROVIDED WITH THE PROPER VACUUM BREAKER AND/OR VENT AS REQUIRED. SHELL SHALL BE PROVIDED WITH INLET AND OUTLET TAPPINGS AND TAPPING FOR PRESSURE GAUGE AND TAPPING FOR RELIEF VALVE.
- J. THE HEAT EXCHANGER MANUFACTURER SHALL FURNISH (FOR INSTALLATION BY THE CONTRACTOR) A ONE—INCH BRASS MOUNTED POP RELIEF VALVE FOR CONNECTION TO THE WATER OUTLET PIPE (BETWEEN THE HEATER EXCHANGER AND THE SHUT—OFF VALVES). VALVE TO BE SET TO DISCHARGE AT A PRESSURE OF APPROXIMATELY 15 PSI ABOVE THE NORMAL WORKING PRESSURE AT THE HEAT

- EXCHANGER. PROVIDE A BRASS MOUNTED POP RELIEF VALVE FOR CONNECTION TO THE EXCHANGER SHELL. THE RELIEF VALVE SHALL BE SET TO DISCHARGE AT 5 PSIG PRESSURE ABOVE THE STEAM INLET PRESSURE TO EXCHANGER AND BE OF THE SIZE RECOMMENDED BY THE EXCHANGER MANUFACTURER.
- K. ALL COMPONENTS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS.
- L. PROPER ACCESS SPACE AROUND A DEVICE SHOULD BE LEFT FOR SERVICING THE COMPONENT. ARRANGE PIPING SO THAT TUBES MAY BE WITHDRAWN WITHOUT DISTURBING WELDED PIPING CONNECTIONS. NO LESS THAN THE MINIMUM RECOMMENDED BY THE MANUFACTURER.
- M.PROVIDE AN ADEQUATE NUMBER OF ISOLATION VALVES FOR SERVICE AND MAINTENANCE OF THE SYSTEM AND ITS COMPONENTS.
- N. PROPER COMPONENT START—UP PRACTICES AND PROCEDURES SHALL BE FOLLOWED ON ALL COMPONENTS. NO LESS THAN THE MINIMUM RECOMMENDED BY THE MANUFACTURER.
- O. PROVIDE TEMPERATURE AND PRESSURE GAUGES WHERE AND AS DETAILED OR DIRECTED.
- A MANNER SO AS TO PREVENT THE POSSIBILITY OF ANY LOADS OR STRESSES BEING APPLIED TO THE CONNECTIONS OR PIPING. ALL PIPING SHALL BE FITTED TO THE PUMPS EVEN THOUGH PIPING ADJUSTMENTS MAY BE REQUIRED AFTER THE PIPE IS INSTALLED.

P. ALL PIPING SHALL BE BROUGHT TO EQUIPMENT CONNECTIONS IN SUCH

- Q. PROVIDE START-UP REPORTS OUTLINING FACTORY PROVIDED START-UP AND EQUIPMENT PERFORMANCE.
- R. SUPPORT FROM FLOOR. CONTRACTOR SHALL MODIFIY THE EXISTING HEAT EXCHANGER SUPPORTS AS REQUIRED TO SUPPORT THE NEW HEAT EXCAHGNERS.
- S. PROVIDE A MINIMUM ONE (1) YEAR WARRANTY ON MATERIALS AND INSTALLATION
- 15. WATER TREATMENT AND CLEANING:
- A. CHEMICAL TREATMENT CLEANING DEGREASING
- 1) PROVIDE A SUPERVISED PROGRAM OF CLEANING AND DEGREASING CHEMICALS USED IN SPECIFIED SYSTEM PRIOR TO START—UP. SUFFICIENT CHEMICALS SHALL BE ADDED TO EACH SYSTEM TO ESTABLISH A CONCENTRATION OF 120 PPM DEGREASING CHEMICALS CONTAINING 20% DIOCTYSULFOCUCCINATE AND 240 PPM OF CLEANING CHEMICAL CONTAINING 15% POLYACRILATE AND 25% DIPHOSPHONATE IN THE WATER. SYSTEM SHALL BE CIRCULATED FOR A MINIMUM OF 8 HOURS, DUMPED, FLUSHED, AND REFILLED, WITH THE CORRECT CORROSION INHIBITORS ADDED FOR OPERATION. STRAINERS SHALL BE HAND CLEANED AFTER FLUSHING.
- 16. AUTOMATIC TEMPERATURE CONTROLS
- A. THE WORK INCLUDES THE PROVIDING OF ALL LABOR, MATERIALS, EQUIPMENT, ACCESSORIES, SERVICES AND TESTS NECESSARY TO COMPLETE THE PLACE INTO SATISFACTORY OPERATION A COMPLETE SYSTEM OF AUTOMATIC TEMPERATURE CONTROLS AS SHOWN ON THE DRAWINGS AND HEREINAFTER SPECIFIED.
- B. THE CONTROL SYSTEM SHALL BE OF THE ELECTRONIC FULLY MODULATING TYPE. CONTROL EQUIPMENT SHALL BE AS MANUFACTURED BY ANDOVER. ALL CONTROLS SHALL BE THE PRODUCT OF ONE MANUFACTURER. THE TEMPERATURE CONTROL MANUFACTURER SHALL BE RESPONSIBLE FOR THE QUALITY AND SATISFACTORY OPERATION OF MATERIAL PROVIDED BUT NOT ACTUALLY MANUFACTURED BY HIM.
- C. THE CONTROL SYSTEM SHALL INCLUDE ALL NECESSARY THERMOSTATS, SENSORS, VALVE ACTUATORS, VALVES, RELAYS, ETC., AND ALL NECESSARY EQUIPMENT FOR A COMPLETE CONTROL SYSTEM, REGARDLESS OF WHETHER OR NOT SPECIFICALLY MENTIONED.
- D. THE CONTROL SYSTEM SHALL INCLUDE ALL CONTROL AND INTERLOCK WIRING, UNLESS OTHERWISE SHOWN ON THE ELECTRIC DRAWINGS. THE CONTROL WIRING SHALL INCLUDE ALL WIRING, INCLUDING POWER WIRING FOR SENSORS, CONTROLS, CONTROL DEVICES, RELAYS, AND ALL OTHER NECESSARY EQUIPMENT TO PROVIDE A COMPLETE CONTROL SYSTEM, REGARDLESS OF WHETHER OR NOT SPECIFICALLY MENTIONED, INCLUDING ELECTRIC RELAYS AND CONTACTORS REQUIRED FOR CONTROL INTERLOCKING. INTERLOCK WIRING SHALL INCLUDE INTERLOCKS BETWEEN BETWEEN PUMP STARTERS BETWEEN STARTERS AND REMOTE CONDENSING UNITS, BETWEEN PUMPS, AND WHEREVER ELSE CALLED FOR IN THESE SPECIFICATIONS. UNLESS OTHERWISE NOTED, ALL CONTROL CIRCUITS SHALL BE 120 VOLTS OR LESS.
- E. PROVIDE NAMEPLATES ON ALL DEVICES, WHETHER OR NOT MOUNTED ON THE FACE OF LOCAL CONTROL PANELS. IN OCCUPIED AREAS, NAMEPLATES SHALL BE CONCEALED BENEATH COVERS OF ROOM TYPE INSTRUMENTS, TO DESCRIBE FUNCTIONS.
- F. ONLY FIRMS REGULARLY ENGAGED IN MANUFACTURE AND INSTALLATION OF THIS EQUIPMENT WITH CHARACTERISTICS AND CAPACITIES REQUIRED AND WHOSE PRODUCTS HAVE BEEN INSTALLED BY THEM AND ARE IN SATISFACTORY USE IN SIMILAR SERVICE FOR NOT LESS THAN 10 YEARS WILL BE ACCEPTABLE. ALL CONTROL EQUIPMENT USED IN THIS PROJECT SHALL HAVE BEEN SUCCESSFULLY PROVEN IN ACTUAL FIELD INSTALLATIONS FOR A PERIOD OF TWO (2) YEARS PRIOR TO THE DATE OF SUBMITTAL OF SAID EQUIPMENT TO THE ARCHITECT FOR APPROVAL. THE CONTROL SYSTEM SHALL BE INSTALLED COMPLETE IN ALL RESPECTS BY COMPETENT MECHANICS, REGULARLY EMPLOYED BY THE MANUFACTURER OF THE CONTROL SYSTEM.
- G. COMPLETE SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE ANY FIELD INSTALLATION IS STARTED. SUCH DRAWINGS SHALL GIVE A COMPLETE DESCRIPTION OF ALL CONTROL ELEMENTS AND SHALL SHOW COMPLETED SCHEMATIC PIPING AND WIRING DIAGRAMS, INCLUDING FUNCTIONAL DESCRIPTION. VALVE AND DAMPER SCHEDULES SHALL BE INCLUDED.
- H. THE CONTROL SYSTEM HEREIN SPECIFIED SHALL BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIAL UNDER NORMAL USE AND SERVICE. IF, WITHIN ONE YEAR FROM DATE OF ACCEPTANCE BY THE ARCHITECT, ANY EQUIPMENT HEREIN DESCRIBED IS PROVED TO BE DEFECTIVE IN WORKMANSHIP OR MATERIAL, IT SHALL BE ADJUSTED, REPAIRED OR REPLACED, FREE OF CHARGE, DURING THE GUARANTEE PERIOD
- I. AUTOMATIC CONTROL VALVES:
- 1) ALL AUTOMATIC CONTROL VALVES SHALL BE FURNISHED BY THE TEMPERATURE CONTROL MANUFACTURER AND SHALL BE INSTALLED BY THE CONTRACTOR FOR HEATING, VENTILATING AND AIR CONDITIONING WORK UNDER THE CONTROL MANUFACTURER'S SUPERVISION.
- J. ALL ELECTRIC WIRING, MATERIALS AND INSTALLATION SHALL BE IN ACCORDANCE WITH THE LATEST REVISION OF THE NATIONAL ELECTRIC CODE, AND APPLICABLE LOCAL CODE, AND SHALL CARRY THE UL LABEL WHERE APPLICABLE. ALL WIRING SHALL BE INSTALLED IN EMT OR RIGID GALVANIZED STEEL CONDUIT (EXTERIOR) OR EMT, 3/4" MINIMUM, AND SHALL BE A MINIMUM OF #14 AWG. ALL SPECIALS, SUCH AS JUNCTION BOXES AND CONNECTORS, SHALL BE OF TYPE DESIGNED FOR USE WITH CONDUIT. ELECTRIC COMMUNICATIONS BETWEEN SENSORS, CONTROLLERS, CONTROL DEVICES ETC. MAY BE RUN IN THIN WALL CONDUIT IF THE VOLTAGE OF THE COMMUNICATION IS UNDER 50 VOLTS. PROVIDE COMMUNICATION WIRE THAT IS RECOMMENDED AND APPROVED BY THE COMMUNICATION EQUIPMENT

MANUFACTURER FOR THE SPECIFIC APPLICATION.

#### K. VALVES:

- 1) ALL STEAM CONTROL VALVES SHALL BE SINGLE SEATED. NO SINGLE VALVE SHALL BE LARGER WITH 2-1/2". STEAM VALVES SHALL HAVE A 50 TO 1 RANGEABILITY. THEY SHALL BE CAPABLE OF EFFECTIVELY MODULATING AT 2% FLOW THROUGH THE VALVE. WHEREVER THE FLOW RATE IS SUCH AS TO REQUIRE A VALVE LARGER THAN 2-1/2", THEN TWO VALVES IN PARALLEL SHALL BE USED, WITH ONE NO LARGER THAN 2-1/2". THE VALVES SHALL OPERATE SEQUENTIALLY. TRIM SHALL BE STAINLESS STEEL FOR INLET PRESSURE ABOVE 15 PSIG STEAM.
- 2) ELECTRIC/ELECTRONIC VALVE ACTUATORS SHALL HAVE OIL IMMERSED MOTORS AND BE FULLY MODULATING OR TWO POSITION AS HEREINAFTER REQUIRED. THEY SHALL HAVE SPRINGS TO FAIL IN THE SAFE POSITION UPON POWER FAILURE.
- 3) SELF-CONTAINED THERMOSTATIC CONTROL VALVES SHALL BE DANFOSS MODEL RA2000 OPERATOR WITH SEPARATE, REMOTE DIAL/ SENSOR, VALVE TO BE LINE SIZE.

#### L. IMMERSION THERMOSTATS:

1) ALL THERMOSTATS SHALL BE AS DESCRIBED UNDER DUCT THERMOSTATS ABOVE EXCEPT THE CONTROLLER SENSING BULB SHALL HAVE A SEPARABLE SOCKET WITH AN EXTENSION NECK EQUAL TO THE DEPTH OF THE APPLIED INSULATION.

#### M. TRANSMITTERS AND SENSORS:

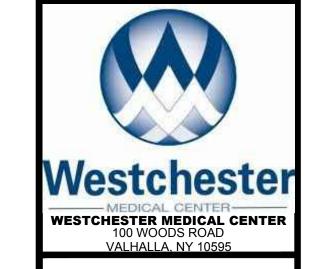
- 1) ALL TRANSMITTERS SENSING AIR TEMPERATURE SHALL BE CAPABLE OF MEASURING SPACE OR DUCT TEMPERATURE AND TRANSMITTING A PNEUMATIC SIGNAL DIRECTLY PROPORTIONAL TO THE TEMPERATURE. THE RANGE OF THE TRANSMITTERS SHALL BE 50°. FOR ROOM AIR SENSING, AND 100°. OR 200°. FOR ALL OTHER SENSING, AS APPROVED. EACH TRANSMISSION SYSTEM SHALL HAVE AN ACCURACY OF 1% OF SCALE RANGE. ALL TRANSMITTERS SHALL BE LOCATED AT POINT OF MEASUREMENT, WITH INSTRUMENT CASE LOCATED OUTSIDE OF UNIT OR DUCTWORK WITH CAPILLARIES AND SENSING BULBS AS DESCRIBED ABOVE THE THERMOSTATS.
- 2) WATER PRESSURE TRANSMITTERS SHALL BE OF THE SAME QUALITY AS TEMPERATURE TRANSMITTERS.
- 3) ELECTRONIC SENSORS SHALL HAVE LINEAR PRECISION RESISTANCE ELEMENTS. THEIR ACCURACY SHALL BE 1° OVER THE FULL RANGE OF THE SENSOR.
- 4) PIPE (WATER) SENSORS SHALL BE OF THE IMMERSION TYPE COMPLETE WITH WELL AND INSUL GREASE FOR FASTER RESPONSE

#### N. SERVICE:

1) AFTER COMPLETION OF THE CONTROL SYSTEM INSTALLATION, THE CONTROL MANUFACTURER SHALL REGULATE AND ADJUST ALL THERMOSTATS, CONTROL VALVES, DAMPER ACTUATORS, ETC., AND PLACE IN COMPLETE OPERATING CONDITION, SUBJECT TO THE APPROVAL OF THE ARCHITECT. THE CONTROL CONTRACTOR SHALL PROVIDE TWO COMPLETE INSTRUCTION MANUALS, IN ADDITION TO ANY OTHER MANUALS CALLED FOR IN THIS SPECIFICATION, TO THE OWNER'S OPERATING PERSONNEL. THE MANUAL SHALL INCLUDE THE FUNCTION AND OPERATION OF ALL CONTROL COMPONENTS ON THIS PROJECT. COMPLETE INSTRUCTION SHALL BE GIVEN TO THE OPERATING PERSONNEL. THERE SHALL BE TWO DAY'S INSTRUCTION GIVEN TO WINTER CYCLE AND TWO DAY'S INSTRUCTION FOR SUMMER CYCLE OPERATION.

# O. CONTROL SEQUENCE:

- 1) UNLESS OTHERWISE INDICATED, AN INDUSTRY STANDARD CONTROL SEQUENCE SHALL BE PROVIDED FOR ALL EQUIPMENT PROVIDED UNDER THIS CONTRACT. AFTER FINAL ADJUSTMENT, AND BEFORE ACCEPTANCE, THE CONTROL SHALL BE REVIEWED, OR SUPPLEMENTED, AS REQUIRED TO PROVIDE PROPER SYSTEM OPERATION. CAPACITY CONTROLS FOR REFRIGERATION EQUIPMENT AND HEATING EQUIPMENT SHALL BE COORDINATED WITH COMPONENTS FURNISHED WITH THE MACHINES AND THE NECESSARY CONTROLLERS, RELAYS, ETC.
- 2) A SEPARATE TABULATION SHALL BE PROVIDED OF CONTROL SETTINGS OF ALL AUTOMATIC CONTROLS INCLUDING COMPONENTS FURNISHED WITH THE MACHINES. TABULATION SHALL ALSO INCLUDE UPPER AND LOWER LIMITS FOR ALL SAFETY AND OPERATING CONTROLS ON THE MACHINES. ALL OF THE ABOVE ADJUSTMENTS WILL BE REQUIRED AT THE COMPLETION OF THE JOB.





# WESTCHESTER MEDICA CENTER MACY HX REPLACEMEN

	ISSUE	INFORMATION
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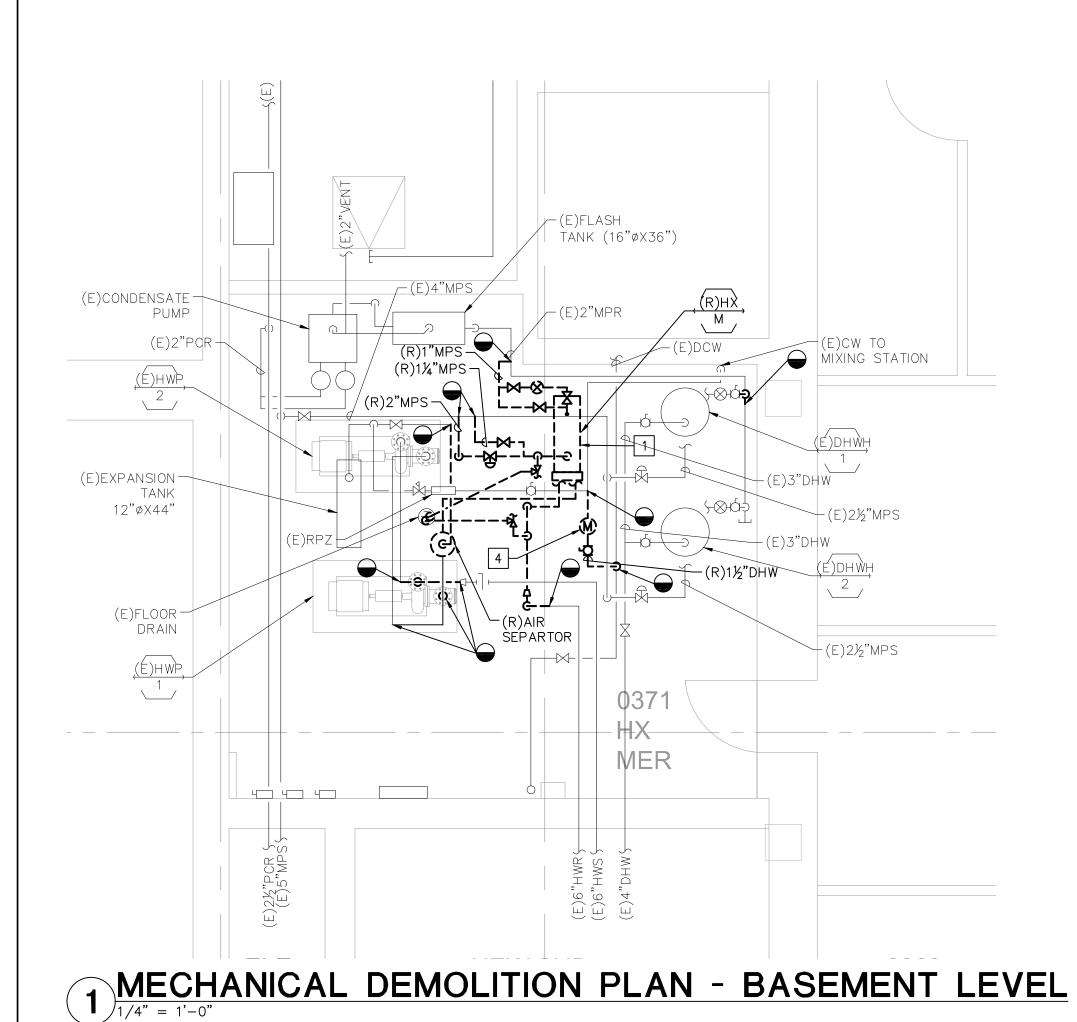
PROJECT NO. ISSUED BY:
NY17116.00 ME
DRAWN BY: REVIEWED BY:
ME
ISSUE DATE:
DECEMBER 15, 2017

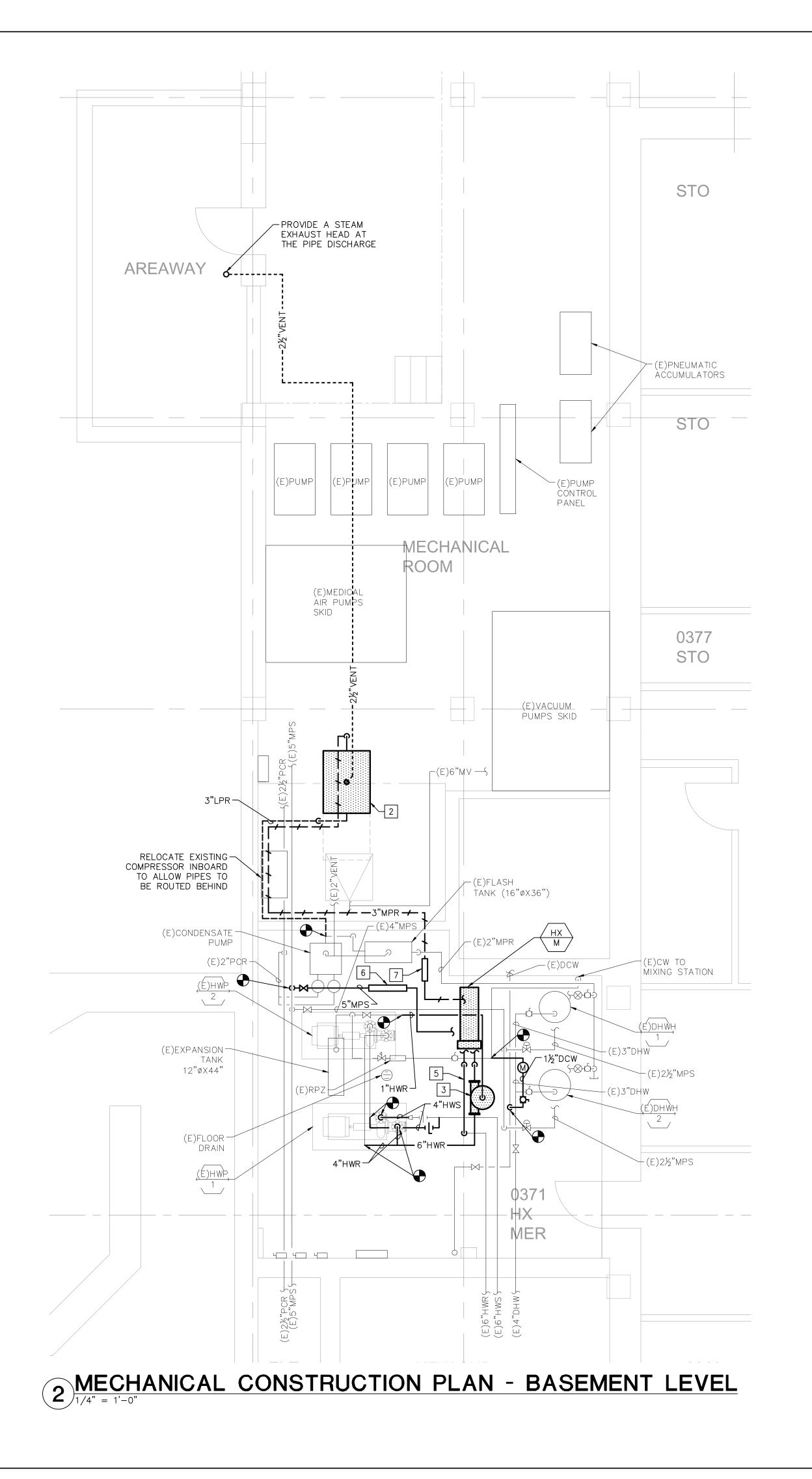
MECHANICAL SPECIFICATION

SHEET TITLE:

M-02100

ISCIPLINE - CATEGORY - SUB-CATEGORY - SHEET





# **GENERAL NOTES**

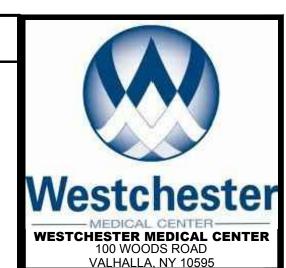
- 1. CONTRACTOR SHALL NOTE IMPROVEMENT PLANS SHOW EXISTING (E) SYSTEMS. EXISTING SYSTEM INFORMATION IS SHOWN TO HELP IDENTIFY THE "SCOPE OF WORK". EXACT TIE—IN LOCATIONS OF NEW WORK TO EXISTING SYSTEMS SHOULD BE FIELD VERIFIED. REFER TO DEMOLITION PLANS FOR ADDITIONAL INFORMATION REGARDING EXISTING SYSTEMS. EXISTING SYSTEMS NOTES ARE NOT SHOWN ON CONSTRUCTION PLANS FOR CLARITY OF THE DRAWINGS.
- S. DEMOLITION TO OCCUR ONLY WHEN SPACES ARE NOT OCCUPIED.

  THE CONTRACTOR SHALL FREEZE ANY AND ALL PIPING THAT DOES NOT HAVE A POSITIVE SHUT DOWN OR OPERATING/EXISTING VALVE.
  CONTRACTOR SHALL PROVIDE VALVES TO INSTALL AND BE ADVISED THAT THE WORK MAY BE REQUIRED TO BE DONE ON PREMIUM TIME.

  CONTRACTOR SHALL PROVIDE CORE
- DRILLING AS REQUIRED FOR NEW PIPE PENETRATIONS.

  6. COORDINATE WITH ALL TRADES FOR
- EXISTING AND NEW OBSTRUCTIONS

  7. ALL WORK AFFECTING BUILDING
  SYSTEM OPERATION SHALL BE
  COORDINATED WITH BUILDING
  ENGINEERING.
- 8. ALL WORK SHALL BE COORDINATED WITH THE NUCLEAR CAMERA REPLACEMENT LOCATED ON THE FLOOR ABOVE THIS ROOM.
  9. MODIFY THE EXISTING HEAT
- EXCHANGER SUPPORT STRUCTURE AS REQUIRED TO SUPPORT NEW HEAT EXCHANGER.





# WESTCHESTER MEDICAL CENTER MACY HX REPLACEMENT

# INFECTION CONTROL

REFER TO PROJECT DOCUMENTS FOR INFECTION CONTROL REQUIREMENTS.

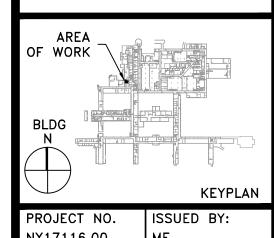
# **KEYNOTES**

- 1 CONTRACTOR SHALL MAINTAIN AND MODIFY EXISTING HEAT EXCHANGER SUPPORTS TO ACCOMMODATE FUTUR HEAT EXCHANGER.
- PROVIDE NEW STEAM FLASH TANK, WESSEL MODEL FTA-180. PROVIDE DEDICATED 2½" VENT TO THE EXTERIOR AS INDICATED.
- 3 PROVIDE NEW 6" AIR SEPARATOR, BELL AND GOSSETT MODEL R-6F.
- 4 RELOCATE EXISTING 1½" STRAP ON WATER METER AS INDICATED.
- 5 LOCATE 6"HWR PIPE UP TIGHT TO UNDERSIDE OF SLAB, ABOVE EXISTIN HWS PIPES.
- 6 PROVIDE STEAM CONTROL VALVE STATION & PIPING PACKAGE FOR HEAT EXCHANGER. SEE STEAM HEAT EXCHANGER DETAIL.
- 7 PROVIDE NEW STEAM TRAP RIG AT HEAT EXCHANGER. SEE STEAM HEAT EXCHANGER DETAIL.

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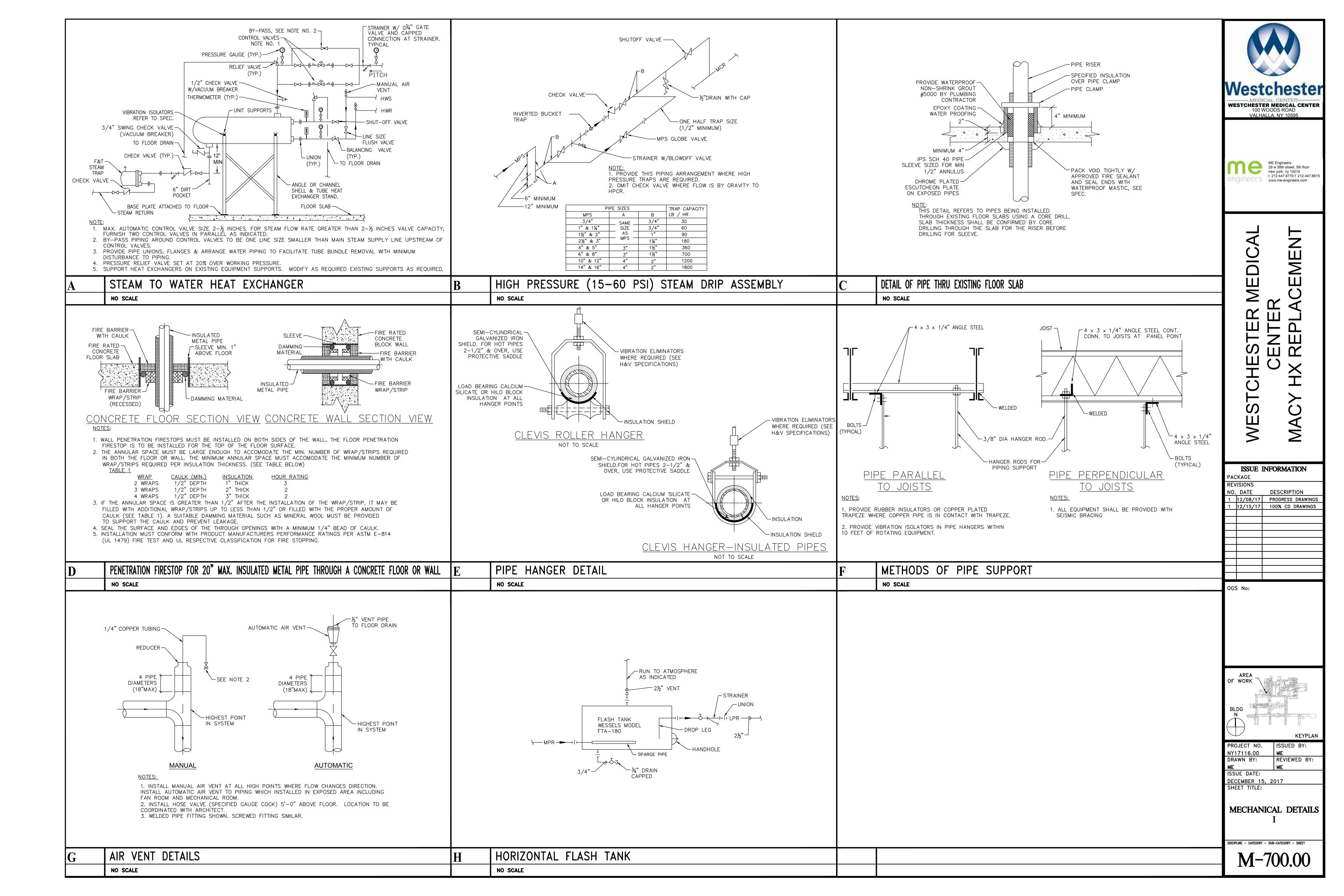
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MECHANICAL
DEMOLITION AND
CONSTRUCTION PLAN

- BASEMENT LEVEL

DISCIPLINE - CATEGORY - SUB-CATEGORY - SHEET

M-200.00



	CONTROL LEGEND (NOT ALL ABBREVIATION ARE USED FOR THIS PROJECT)											
AI AO BDD C CC CD CHR CHS CI CO COND CSEN DI DO DP DPT EA EP ED	ANALOG INPUT ANALOG OUTPUT BACKDRAFT DAMPER CONTROLLER COOLING COIL CONTROL DAMPER CHILLED WATER RETURN CHILLED WATER SUPPLY COMMUNICATION INTERFACE CARBON MONOXIDE SENSOR CONDENSATE OVERFLOW CURRENT SENSOR DIGITAL INPUT DIGITAL OUTPUT DIFFERENTIAL PRESSURE SWITCH DIFFERENTIAL PRESSURE TRANSMITTER EXHAUST AIR ELECTRICAL—PNEUMATIC TRANSDUCER SWITCH ENABLE/DISABLE	E/SU FAP FS F T FR T C H H H WR M M A O O P C	END SWITCH FAN COIL UNIT FIRE ALARM PANEL FLOW SWITCH FILTER ASSEMBLY FLOW TRANSDUCER FREEZESTAT HUMIDITY TRANSMITTER HEATING COIL HIGH LIMIT HUMIDITY SWITCH HARDWIRED INTERFACE HOT WATER RETURN HOT WATER SUPPLY INTERLOCK RELAY MOTORIZED CONTROL MINIMUM OUTSIDE AIR OCCUPANCY SENSOR PREHEAT COIL	PE PT RA RF SA SD SF SPT SR T TS T TTAB V VFD VS WBT	PNEUMATIC ELECTRIC SWITCH PRESSURE TRANSMITTER RETURN AIR RETURN FAN SUPPLY AIR SMOKE DETECTOR (BY ELECTRICAL) SUPPLY FAN STATIC PRESSURE TRANSMITTER SWITCHING RELAY START/STOP THERMOSTAT SPACE TEMPERATURE SENSOR TEMPERATURE TRANSMITTER TEMPERATURE TRANSMITTER VALVE VARIABLE FREQUENCY DRIVE VELOCITY SENSOR WET BULB TEMPERATURE TRANSMITTER							

# BUILDING MANAGEMENT SYTEM (BMS) GENERAL NOTES:

#### GENERAL:

- A. BMS CONTRACTOR SHALL COORDINATE ALL INTERFACE REQUIREMENTS. CONTROLS SHALL BE ANDOVER.
- B. BMS/ATC CONTRACTOR IS RESPONSIBLE FOR UNDERSTANDING NEW YORK STATE ENERGY CODE AND ALL OTHER RELEVANT NEW YORK STATE STANDARDS.
- C. TC CONTRACTOR SHALL COORDINATE WITH ENGINEER CM/GC, AND MC FOR VALVE ACTUATOR AND OTHER CONTROL COMPONENT REPLACEMENT OR INSTALLATION PROVISIONS SHOWN OR IMPLIED THROUGHOUT THE CONTRACT DOCUMENTS. PROVIDE ALL MISCELLANEOUS ACCESSORIES, DEVICES,, TRANSLATORS, AND MODULES REQUIRED FOR A COMPLETE SYSTEM.

D. PROVIDE INDIVIDUAL INPUTS OR OUTPUTS FOR EACH POINT LISTED IN THE DIAGRAMS AND POINTS LIST. PROVIDE ANY ADDITIONAL CONTROL POINTS NOT LISTED IN THE DIAGRAMS OR POINTS LISTS, BUT REQUIRED TO MEET THE SEQUENCES OF OPERATION. ALL ANALOG OUTPUTS SHALL BE 4-20MA, 0-10VDC OR 0-20VDC UNLESS OTHERWISE INDICATED. AO=ANALOG OUTPUT, AI=ANALOG INPUT, DO=DIGITAL (BINARY) OUTPUT, DI=DIGITAL (BINARY) INPUT.

- E. ALL SETPOINTS SHALL BE MAPPED WITH GRAPHIC DISPLAY AND BE FULLY ADJUSTABLE AT THE OPERATOR WORKSTATION.
- F. PROVIDE OVERRIDE CONTROL OF ALL POINTS AT THE OPERATOR WORKSTATION.
- G. ALL "MONITORING" POINTS SHALL BE MAPPED TO THE BMS WORKSTATION GRAPHIC DISPLAY
- H. ALL CONTROL POINTS SHALL BE DISPLAYED AT THE OPERATOR WORKSTATION.
- I. "OPERATOR" IS DEFINED AS THE OWNER'S REPRESENTATIVE DESIGNATED TO OPERATE THE BMS.
- J. THE BMS SHALL MONITOR CONTROL, AND CALCULATE ALL THE POINTS AND FUNCTIONS LISTED.

# A CONTROL SYSMBOL LEGEND

NO SCALE

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## **HEATING PLANT:**

- A. HEATING HOT WATER PUMP AND HEAT EXCHANGER SHALL BE MANUALLY ENABLED LOCALLY TO THE HEAT EXCHANGER. AT NO POINT SHALL THIS SYSTEM BE ENGAGED IF THE DISTRICT HOT WATER SYSTEM IS ENABLED.
- B. SPACE HEATING SHALL BE PROVIDED VIA CIRCULATION OF HOT WATER AS PROVIDED BY A STEAM TO HOT WATER CONVERTER. HOT WATER PUMPS ARE DESIGNED TO OPERATE SIMULTANEOUSLY FOR CIRCULATION OF HEATING HOT WATER TO ALL POINTS OF USE.
- C. EACH HOT WATER PUMP IS EXISTING TO REMAIN. EXISTING CONTROLS SHALL BE UPDATED TO ALLOW THE SYSTEM TO BE CONTROLLED BY THE BMS. HOT WATER SUPPLY TEMPERATURE SHOULD BE ON A RESET SCHEDULE.
- D. THE HEATING WATER SUPPLY TEMPERATURE FOR THE HX SHALL BE CONTROLLED BY A 2/3, 1/3 TWO WAY CONTROL VALVE STATION TO MAINTAIN 190F (ADJ.). THE CONTROL VALVES SHALL MODULATE TO MAINTAIN A SUPPLY WATER TEMPERATURE RESET WITH OUTSIDE AIR ACCORDING TO FOLLOWING SCHEDULE:

OUTSIDE AIR TEMPERATURE SUPPLY WATER TEMPERATURE 20F (ADJ.) 190F (ADJ.) 120F (ADJ.)

- E. THE RESET CONTROL SEQUENCE CAN BE SWITCHED ON/OFF AT THE OPERATOR'S WORKSTATION.
- F. HOT WATER PUMP FLOW SHALL BE MAINTAINED UNTIL THERE ARE NO SYSTEMS REQUESTING HEATING.
- G. EACH PUMP SHALL BE PROVIDED WITH A NEW CURRENT SENSOR TO OPERATE AS FLOW PROOF OF THAT PUMPING UNIT. ANY PUMP ENERGIZED THROUGH THE BMS SYSTEM WHICH DOES NOT GIVE POSITIVE INDICATION OF FLOW SHALL SIGNAL AN ALARM AFTER 92 SECONDS. CONTINUED LACK OF FLOW PROOF FOR AN ENERGIZED PUMP TO A PERIOD OF 180 SECONDS SHALL DE-ENERGIZE THAT PUMP.
- H. THE STEAM CONTROL VALVES SHALL NOT OPEN IF FLOW IS NOT SENSED THROUGH THE HEAT EXCHANGER VIA THE FLOW SWITCH.
- I. UPON A LOSS OR INABILITY TO MAINTAIN HOT WATER SUPPLY TEMPERATURE, AN ALARM SHALL SIGNAL THE BMS.
- J. PUMP CONTROL:
  - 1. WHEN SYSTEM IS ENABLED. BOTH PUMPS SHALL START, AND STEAM CONTROL VALVE SHALL MODULATE TO MAINTAIN SUPPLY WATER TEMPERATURE.
- 2. WHEN SYSTEM IS DISABLED, BOTH PUMPS SHALL STOP AND THE STEAM CONTROL VALVE SHALL CLOSE.
- 3. HEATING PUMPS SHALL BE OFF AND CONTROL VALVES CLOSED WHEN OUTSIDE AIR TEMPERATURE IS GREATER THAN 70F (ADJ.).

					ANA	LOG								BINA	RY									ALARMS			
				INP	UT				OUTF	PUT		INF	PUT			OU	TPUT							1			
POINT DESCRIPTION	INPUT VALUE	TEMP	PRES	HUMIDITY AMPS	GPM GPM	CFM	МРМ	PERCENT	DDC 4-20 ma, 0-10 VDC	SETPOINT ADJ	INPUT VALUE	NO S	TATUS	STATUS OPEN\CLOSED	START\STOP	OPEN\CLOSED	LOCK OUT	ENABLE\DISABLE	HIGH ANALOG	LOW ANALOG	BINARY	SCINSON I AIL	OMM P	ALARM LABEL	CALCULATED VALUE	BACNET	TREND DISPLAY ON GRAPHIC
LOW PRESSURE STEAM VALVE POSITION COMMAND									Χ																		XX
SUPPLY WATER TEMPERATURE (LWT)		Х																									XX
SUPPLY WATER TEMPERATURE SETPOINT	Х																		Χ	Χ			SU	JPPLY WATER TEMPERATURE OUT OF RANGE			XX
RETURN WATER TEMPERATURE (EWT)		X																									XX
SYSTEM LOW PRESSURE			X									X								Х			SY	STEM LOW PRESSURE			X X
SYSTEM PRESSURE SETPOINT	Х																										X   X
FLOW SWITCH					X																		NC	O FLOW			XX
HOT WATER DISCHARGE PRESSURE			X									X							X					JPPLY WATER PRESSURE OUT OF RANGE			XX
HWP-1 START/STOP															X							×		WP-1 PUMP TROUBLE	X		XX
HWP-1 STATUS - CURRENT SENSOR														X							<u> </u>			NP-1 CURRENT SWITCH FAILURE			XX
HWP-2 START/STOP														X	X							×		NP-2 PUMP TROUBLE	X		XX
HWP-2 STATUS - CURRENT SENSOR														X							>	(	HW	VP-2 CURRENT SWITCH FAILURE			XX

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ISSUE INFORMATION										
PAC	CKAGE									
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NO.	DATE	DESCRIPTION								
1	12/08/17	PROGRESS DRAWINGS								
1	12/15/17	100% CD DRAWINGS								

AREA OF WORK	
BLDG N	
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ı	PROJECT NO.	ISSUED BY:
ı	NY17116.00	ME
ı	DRAWN BY:	REVIEWED BY
ı	ME	ME
ı	ISSUE DATE:	

ISSUE DATE:
DECEMBER 15, 2017
SHEET TITLE:

MECHANICAL CONTROL DETAILS

SCIPLINE - CATEGORY - SUB-CATEGORY - SHEET

M-701.00