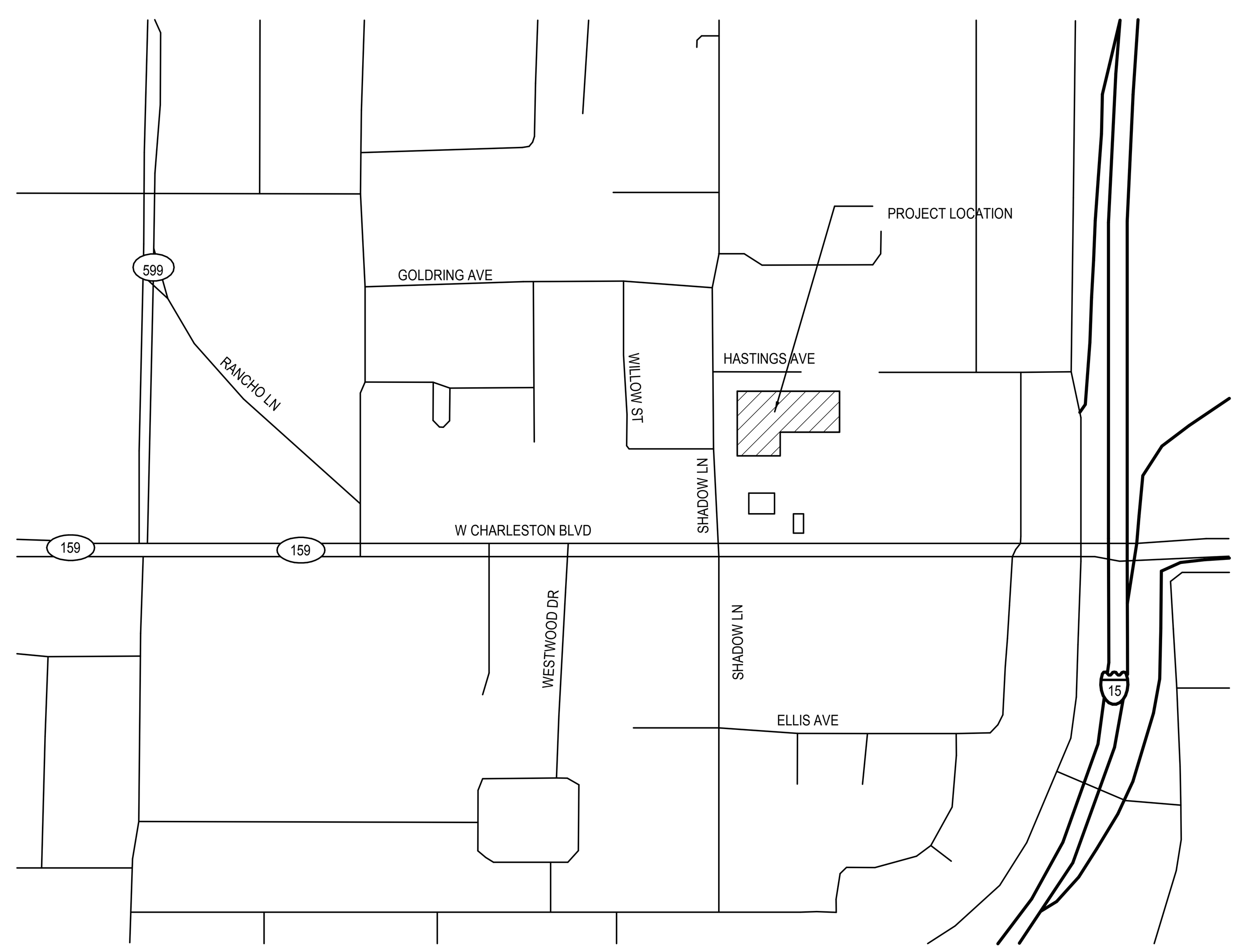
UNIVERSITY OF NEVADA, LAS VEGAS
SHADOW LANE CAMPUS
HEATING HOT WATER REPIPE

VICINITY PLAN



MECHANICAL SHEET LIST

SHEET NUMBER	SHEET TITLE	SCALE	08/15/2017 REVIEW SET
M0.01	SHEET LIST, LEGEND, AND ABBREVIATIONS	NTS	X
M0.02	GENERAL NOTES, SPECIFICATIONS, AND SCOPE OF WORK	NTS	X
M1.01.D	FIRST LEVEL - CENTRAL PLANT HEATING HOT WATER PIPING DEMO FLOOR PLAN	1/4" = 1'-0"	X
M1.01	FIRST LEVEL - CENTRAL PLANT HEATING HOT WATER PIPING FLOOR PLAN	1/4" = 1'-0"	X
M3.01	ELEVATION VIEWS	NTS	X
M5.01	DETAILS	NTS	X
M6.01	EQUIPMENT SCHEDULES	NTS	X
M8.01	HEATING HOT WATER PIPING DIAGRAM AND CONTROLS SEQUENCE OF OPERATION	NTS	X
M9.01	HEATING HOT WATER PIPING ISOMETRIC	NTS	X

ELECTRICAL SHEET INDEX

SHEET NUMBER	SHEET NAME	SCALE	IFP
E0.01	SHEET LIST AND ABBREVIATIONS	NTS	X
E0.02	ELECTRICAL SYMBOLS	NTS	X
E0.03	ELECTRICAL SPECIFICATIONS	NTS	X
E2.01	FIRST LEVEL CENTRAL PLANT POWER PLAN	1/4" = 1'-0"	X
E5.01	ELECTRICAL SINGLE LINE DIAGRAM AND SCHEDULES	NTS	X

PLUMBING SHEET INDEX

SHEET NUMBER	SHEET NAME	SCALE	IFP
PL0.01	PLUMBING GENERAL NOTES AND SPECS	NTS	X
PL0.02	PLUMBING LEGENDS AND SYMBOLS	NTS	X
PL1.01.D	PLUMBING FLOOR PLAN DEMO	1/4" = 1'-0"	X
PL1.01	PLUMBING FLOOR PLAN	1/4" = 1'-0"	X
PL3.01	PLUMBING ELEVATION VIEWS	NTS	X
PL5.01	PLUMBING DETAILS	NTS	X
PL6.01	PLUMBING EQUIPMENT SCHEDULES	NTS	X
PL8.01	PLUMBING PIPING DIAGRAM	NTS	X
PL9.01	PLUMBING PIPIING ISOMETRIC	NTS	X

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PROFESSIONAL ENGINEER STATE OF NEVADA
STEPHEN T. MULCAHY
EXP. 12-31-2017
MECHANICAL
No. 15511

DATE: 08-15-2017

COVER SHEET

DRAWING TITLE:

UNLV PROJECT NUMBER: SLC-1706/PC-9008

DRAWN BY	SI	DATE	08/15/2017
DESIGNED BY	JB	SCALE	NTS
CHECKED BY	SM	JOB NO.	5221687

KEY PLAN

N

JOB TITLE

UNLV SHADOW LANE HEATING HOT WATER REPIPE

UNLV

1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.

-

SHEET NUMBERING SYSTEM

DDS.NN.SS.P

"DD" DENOTES DISCIPLINE DESIGNATOR
- M - MECHANICAL
- MH - MECHANICAL HVAC
- MP - MECHANICAL PIPING

"S" DENOTES SHEET SERIES
- 0 - GENERAL
- 1 - FLOOR PLANS
- 2 - ELEVATIONS
- 3 - SECTIONS
- 4 - ENLARGED SCALE PLANS
- 5 - DETAILS
- 6 - SCHEDULES
- 7 - DIAGRAMS
- 8 - CONTROLS
- 9 - 3D

"NN" DENOTES SHEET SEQUENCE NUMBER FOR ALL SHEET SERIES EXCEPT FOR "1" SERIES
"NN" FOR SHEET SERIES "1" (FLOOR PLANS) DENOTES BUILDING LEVEL
- B - BASEMENT LEVEL
- C - CRAWLSPACE
- H - PENTHOUSE
- P - PARKING LEVEL
- T - TUNNEL
- UG - UNDERGROUND
- RO - ROOF
- 01 - FIRST FLOOR, 02 - SECOND FLOOR, ETC.

"SS" DENOTES SECTOR

"P" DENOTES PHASING PLANS
- D - DEMO PLANS
- T - TEMPORARY PLANS

ABBREVIATIONS

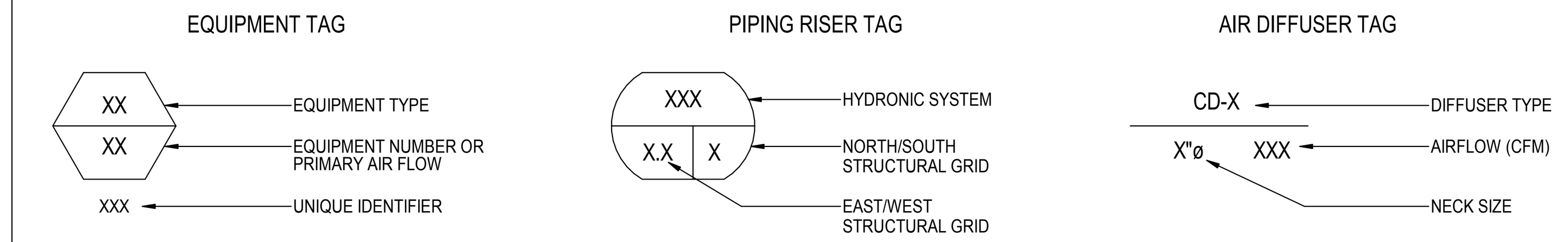
ABBREV	DESCRIPTION
ABV	ABOVE
AFF	ABOVE FINISHED FLOOR
AD	AIR DOOR UNIT
AD	ACCESS DOOR
AI	ANALOG INPUT
AP	ACCESS PANEL
ACH	AIR CHANGES PER HOUR
AC OR A/C	AIR CONDITIONER
AC	AIR COMPRESSOR
AFS	AIR FLOW MEASUREMENT STATION
AHU	AIR HANDLING UNIT
AO	ANALOG OUTPUT
AS	AIR SEPARATOR
AMB	AMBIENT
AMPS	AMPERES
ATM	ATMOSPHERE, ATMOSPHERIC
AV	AUTOMATIC AIR VENT
AUX	AUXILIARY
ACCH	AIR COOLED CHILLER
BAS	BUILDING AUTOMATION SYSTEM
BDD	BACKDRAFT DAMPER
BF	BOTTOM FLAT, BLIND FLANGE
BFV	BUTTERFLY VALVE
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BHP	BRAKE HORSEPOWER
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
BLDG	BUILDING
BMS	BUILDING MANAGEMENT SYSTEM
BT	BUFFER TANK
CAP	CAPACITY
CAV	CONSTANT AIR VOLUME
CS	PACKAGED CENTRIFUGAL SEPARATOR
CS	CARBON STEEL
CLG	CEILING
CD	CEILING DIFFUSER
CHW	CHILLED WATER
CIRC	CIRCUIT
CB	CIRCUIT BREAKER
CDA	CLEAN DRY AIR
COP	COEFFICIENT OF PERFORMANCE
COV	CHANGE OF VALUE
CIA	COMBUSTION INLET AIR
CEA	COMBUSTION EXHAUST AIR
CONC	CONCRETE
CD	CONDENSATE DRAIN (DRAIN PAN)
CV	CONSTANT VOLUME
CVCP	CHLORINATED POLYVINYL CHLORIDE PIPE
CP	CONTROL PANEL
CFM	CUBIC FEET PER MINUTE
CRAC	COMPUTER ROOM AIR CONDITIONING
CT	COOLING TOWER
CPF	CHEMICAL POT FEEDER
CH	WATER COOLED CENTRIFUGAL CHILLER
CFWT	NON CHEMICAL WATER TREATMENT
CWP	CONDENSER WATER PUMP
CHWP	CHILLED WATER PUMP
CC	CONDUCTIVITY CONTROLLER
CPF	CHEMICAL POT FEEDER
CU	CONDENSING UNIT
°C	DEGREE CELSIUS
°F	DEGREE FAHRENHEIT
DI	DIGITAL INPUT
DP	DIFFERENTIAL PRESSURE
DDC	DIRECT DIGITAL CONTROL
DISCH	DISCHARGE
DS	DISCONNECT SWITCH
DCW	DOMESTIC (POTABLE) COLD WATER
D/L	DOOR LOUVER
DN	DOWN
DHW	DOMESTIC HOT WATER
DR	DRAIN
DWG	DRAWING
DB	DRY BULB TEMPERATURE
DO	DIGITAL OUTPUT
DT	FUEL OIL DAY TANK
EFF	EFFICIENCY
EGC	EGGCRATE GRILLE
EDH	ELECTRIC DUCT HEATER
EC	ELECTRICAL CONTRACTOR
ELEV	ELEVATION
ECHW	EMERGENCY CHILLED WATER
EER	ENERGY EFFICIENCY RATIO
EAT	ENTERING AIR TEMPERATURE
EWT	ENTERING WATER TEMPERATURE
EQUIP	EQUIPMENT
EVAP	EVAPORATIVE
EA	EXHAUST AIR
EF	EXHAUST FAN
EG	EXHAUST GRILLE
ER	EXHAUST REGISTER
(E) or E	EXISTING
ESP	EXTERNAL STATIC PRESSURE
ET	EXPANSION TANK
ERU	ENERGY RECOVERY UNIT
EPF	ELEVATOR PRESSURIZATION FAN
EPO	EMERGENCY POWER OFF
FCU	FAN COIL UNIT
FT	FEET
FTR	FINNED TUBE RADIATION
FPM	FEET PER MINUTE
FRP	FIBERGLASS REINFORCED PLASTIC
FD	FIRE DAMPER
F/LS	FIRE/LIFE SAFETY
F/SD	FIRE/SMOKE DAMPER
FLR	FLOOR
FD	FLOOR DRAIN
FS	FLOOR SINK
FLA	FULL LOAD AMPS
(F) or F	FUTURE
FPIU	FAN POWERED INDUCTION UNIT
FOP	FUEL OIL POLISHER
FOT	FUEL OIL STORAGE TANK
FOSP	FUEL OIL PUMP
FM	FLOW METER
GDP	GUARDED DRIP PROOF
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GS	GALVANIZED SHEETMETAL
GC	GENERAL CONTRACTOR
G	NATURAL GAS
GI	GRAVITY INTAKE
HOA	HAND/OFF/AUTO
HX	HEAT EXCHANGER
HE	HEAT EXHAUST
HTG	HEATING
HHW	HEATING HOT WATER
HHWS	HEATING HOT WATER SUPPLY
HHWR	HEATING HOT WATER RETURN
HVAC	HEATING, VENTILATING AND AIR CONDITIONING
HZ	HERTZ
HPC	HIGH-PRESSURE CONDENSATE
HPS	HIGH-PRESSURE STEAM
HORIZ	HORIZONTAL
HP	HORSEPOWER
HV	HOUSEKEEPING VACUUM
H'STAT	HUMIDISTAT
HG	REFRIGERANT HOT GAS
HWUH	HOT WATER UNIT HEATER
HWB	HOT WATER BOILER
HEX	PLATE AND FRAME HEAT EXCHANGER
IN	INCHES
ID	INSIDE DIAMETER OR DIMENSION

ABBREV	DESCRIPTION
KV	KILOVOLTS
KVA	KILOVOLT AMPERES
KW	KILOWATTS
LAT	LEAVING AIR TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
(L)	LINED
LRA	LOCKED ROTOR AMPS
LPC	LOW-PRESSURE CONDENSATE
LPS	LOW-PRESSURE STEAM
LBS	POUNDS
LD	LINEAR SLOT DIFFUSER
MUA	MAKE UP AIR
MAU	MAKE UP AIR UNIT
MB	MAN-BARS
MV OR MAV	MANUAL AIR VENT
MAX	MAXIMUM
MCB	MAXIMUM CIRCUIT BREAKER SIZE
MFS	MAXIMUM FUSE SIZE
MOP	MAXIMUM OVERCURRENT PROTECTION
MECH	MECHANICAL
MC	MECHANICAL CONTRACTOR
MER	MECHANICAL EQUIPMENT ROOM
MPC	MEDIUM-PRESSURE CONDENSATE
MPS	MEDIUM-PRESSURE STEAM
MS	MEMORY STOP (ON A VALVE)
MEZZ	MEZZANINE
MIN	MINIMUM OR MINUTE
MCA	MINIMUM CIRCUIT AMPACITY
MA	MIXED AIR
MOD	MODULATING
MCC	MOTOR CONTROL CENTER
MTD	MOUNTED
MBH	THOUSAND BTUH
NPSH	NET POSITIVE SUCTION HEAD
(N) or N	NEW
NPW	NON-POTABLE WATER
N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
NO.	NUMBER
OC	ON CENTER
ODP	OPEN DRIP PROOF
OBD	OPPOSED BLADE DAMPER
OSA or OA	OUTSIDE AIR
OD	OUTSIDE DIAMETER OR DIMENSION
OPD	OVERCURRENT PROTECTIVE DEVICE
OS	OCCUPANCY SENSOR
PPM	PARTS PER MILLION
PH	PHASE
PHWP	PRIMARY HEATING WATER PUMP
PC	PLUMBING CONTRACTOR
PC	PUMPED CONDENSATE
POC	POINT OF CONNECTION
PP	PULSE PURE CONTROL PANEL
PPP	POLYPROPYLENE PIPE
PVC	POLYVINYL CHLORIDE
PVDF	POLYVINYLIDENE FLUORIDE
POS	POSITION
PSI	POUNDS PER SQUARE INCH
PRESS	PRESSURE
△P	PRESSURE CHANGE
PCV	PRESSURE CONTROL VALVE
PG	PRESSURE GAGE
PRS	PRESSURE REDUCING STATION
PRV	PRESSURE REGULATING VALVE
PSV	PRESSURE SAFETY (RELIEF) VALVE
PRTU	PACKAGED ROOF TOP AIR CONDITIONING UNIT
RAU	RECIRCULATION AIR UNIT
RDE	RECOMMENDED DUAL ELEMENT FUSE
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
RRE	REFRIGERANT RELIEF
RHC	REHEAT COIL
RH	RELATIVE HUMIDITY
RE	RELIEF AIR
(R) or R	RELOCATED
REQ'D	REQUIRED
RA	RETURN AIR
RAF	RELIEF AIR FAN
RG	RETURN GRILLE
RR	RETURN REGISTER
RPM	REVOLUTIONS PER MINUTE
RM	ROOM
RLA	RUNNING LOAD AMPS
RV	RELIEF VENT
SI	INTERNATIONAL SYSTEM OF UNITS
SCHED	SCHEDULE
SHT	SHEET
SD	SUCTION DIFFUSER
SD	SMOKE DETECTOR, SMOKE DAMPER
SA	SOUND ATTENUATOR, SUPPLY AIR
S/S	STAINLESS STEEL
SP	STATIC PRESSURE
SPF	STAIR PRESSURIZATION FAN
STM	STEAM
SA	SUPPLY AIR
SG	SUPPLY GRILLE
SR	SUPPLY REGISTER
SFT	SERIES FAN POWERED VAV TERMINAL
SHWP	SECONDARY HEATING WATER PUMP
TU	TERMINAL UNIT
THERM	THERMOMETER
THWP	TERTIARY HEATING WATER PUMP
T'STAT	THERMOSTAT
TF	TOP FLAT
TDH	TOTAL DYNAMIC HEAD
TP	TOTAL PRESSURE
TSP	TOTAL STATIC PRESSURE
TG	TRANSFER GRILLE
TYP	TYPICAL
U/C	UNDERCUT
UNO	UNLESS NOTED OTHERWISE
UTR	UP THRU ROOF
UST	UNDERGROUND FUEL OIL STORAGE TANK
UH	UNIT HEATER
VD	MANUAL VOLUME DAMPER
VAV	VARIABLE AIR VOLUME
VTR	VENT THROUGH ROOF
VERT	VERTICAL
V	VOLTS
VAC	VOLTS ALTERNATING CURRENT
VDC	VOLTS DIRECT CURRENT
VFD	LOOSE VARIABLE FREQUENCY DRIVE
WC	WATER CLOSET
W	WATTS
WPDS	WEATHERPROOF DISCONNECT SWITCH
WGT	WEIGHT
WB	WET BULB TEMPERATURE
WMS	WIRE MESH SCREEN
WSA	WIRE SIZING AMPS
W/	WITH
W/O	WITHOUT
X'MER	TRANSFORMER

LEGEND

SYMBOL	ABBREV	DESCRIPTION	SYMBOL	ABBREV	DESCRIPTION
CHWS	CHWS	CHILLED WATER SUPPLY		—	FLANGED JOINT
CHWR	CHWR	CHILLED WATER RETURN		—	ANCHOR
HHWS	HHWS	HEATING HOT WATER SUPPLY		—	GROOVED JOINT
HHWR	HHWR	HEATING HOT WATER RETURN		—	ALIGNMENT GUIDE
RL	RL	REFRIGERANT LIQUID		FLEX CONN	FLEXIBLE CONNECTION (METALLIC)
RS	RS	REFRIGERANT SUCTION		FLEX CONN	FLEXIBLE CONNECTION (NEOPRENE)
HG	HG	REFRIGERANT HOT GAS	PG	PG	PRESSURE GAUGE
LPS	LPS	LOW-PRESSURE STEAM	THERM	THERM	THERMOMETER
MPS	MPS	MEDIUM-PRESSURE STEAM	AV	AV	AUTOMATIC AIR VENT
HPS	HPS	HIGH-PRESSURE STEAM	MV	MV	MANUAL AIR VENT
LPC	LPC	LOW-PRESSURE CONDENSATE	P/T	—	PRESS/TEMP PORT (PETE'S PLUG)
MPC	MPC	MEDIUM-PRESSURE CONDENSATE	FS	FS	FLOW SWITCH (DIFFERENTIAL PRESSURE)
HPC	HPC	HIGH-PRESSURE CONDENSATE		—	BALANCE VALVE
PC	PC	PUMPED CONDENSATE (STEAM)	x (XL)	__x__(XL)	LINED DUCT (INSIDE CLEAR SIZE SHOWN)
CD	CD	CONDENSATE DRAIN (DRAIN PAN)		—	DUCT UP
D	D	DRAIN		—	DUCT DOWN
DCW	DCW	DOMESTIC COLD WATER		—	DUCT SECTION (SUPPLY OR OSA)
CFS	CFS	CHEMICAL FEED SYSTEM		—	DUCT SECTION (RETURN OR RELIEF)
ATV	ATV	ATMOSPHERIC VENT		—	DUCT SECTION (EXHAUST)
RRE	RRE	REFRIGERANT RELIEF		—	POINT OF STATIC PRESSURE CHANGE
RV	RV	RELIEF VENT		CD or SG	CEILING DIFFUSER
FOS	FOS	FUEL OIL SUPPLY		RR	RETURN REGISTER (CEILING MOUNTED)
FOR	FOR	FUEL OIL RETURN		RG	RETURN GRILLE (CEILING MOUNTED)
FOV	FOV	FUEL OIL VENT		ER	EXHAUST REGISTER (CEILING MOUNTED)
G	G	NATURAL GAS		EG	EXHAUST GRILLE (CEILING MOUNTED)
HRWS	HRWS	HEAT RECOVERY WATER SUPPLY		SR	SIDEWALL SUPPLY REGISTER
HRWR	HRWR	HEAT RECOVERY WATER RETURN		SG	SIDEWALL SUPPLY GRILLE
DPS	—	DIFFERENTIAL PRESSURE SENSOR		RR	SIDEWALL RETURN REGISTER
SPS	—	DIFFERENTIAL STATIC PRESSURE SENSOR		RG	SIDEWALL RETURN GRILLE
	—	UNDERGROUND PIPING		ER	SIDEWALL EXHAUST REGISTER
	—	BUTTERFLY VALVE		EG	SIDEWALL EXHAUST GRILLE
	—	BALL VALVE		TG	TRANSFER GRILLE
	—	GATE VALVE		VD	MANUAL VOLUME DAMPER
	—	GLOBE VALVE	M	MD	MOTORIZED VOLUME DAMPER
	—	PLUG VALVE		BDD	BACKDRAFT DAMPER
	—	CHECK VALVE	FD	FD	FIRE DAMPER
	—	NEEDLE VALVE	FSD	FSD	FIRE/SMOKE DAMPER
	—	BALANCING VALVE	S	S	SMOKE DAMPER
	—	AUTOMATIC BALANCING VALVE		SD	DUCT SMOKE DETECTOR
CV XX	—	CONTROL VALVE (BALL)		FLEX CONN	FLEXIBLE CONNECTION
CV XX	—	CONTROL VALVE (BUTTERFLY)		AD	ACCESS DOOR
CV XX	—	3-WAY CONTROL VALVE	T	T'SENSOR	TEMPERATURE SENSOR
S	—	SOLENOID VALVE	TST	T'STAT	THERMOSTAT
	PSV	PRESSURE SAFETY (RELIEF) VALVE	H	H'STAT	HUMIDISTAT OR HUMIDITY SENSOR
	PRV	PRESSURE REGULATING VALVE	DSD	—	DUCT SMOKE DETECTOR
	PRV	PRV (SELF CONTAINED)	S	—	SWITCH
	—	STRAINER	A	—	ALARM
	—	STRAINER WITH BLOW-OFF	dP	—	ROOM DIFFERENTIAL PRESSURE SENSOR
	—	UNION	MS	—	MOISTURE SENSOR
	—	CONCENTRIC REDUCER (OR INCREASER)	CO2	—	CARBON DIOXIDE SENSOR
	—	ECCENTRIC REDUCER (OR INCREASER)	CO	—	CARBON MONOXIDE SENSOR
	—	PIPE ELBOW TURNED UP	OS	—	OCCUPANCY SENSOR
	—	PIPE ELBOW TURNED DOWN	D/L	D/L	DOOR LOUVER
	—	PIPE TEE, BRANCH OUTLET UP	U/C	U/C	DOOR UNDERCUT
	—	PIPE TEE, BRANCH OUTLET DOWN	M	—	MOTOR LOCATION
	—	CAP	AFS	AFS	AIRFLOW MEASURING STATION
	—	BLIND FLANGE		POC	POINT OF CONNECTION
FM	—	INSERTION MAGNETIC FLOW METER		POD	POINT OF DISCONNECTION

SYMBOLS



SHEET LIST

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DRAWING TITLE:
SHEET LIST, LEGEND, AND ABBREVIATIONS

UNLV PROJECT NUMBER: SLC-1706/PC-9008

DRAWN BY	SI	DATE	08/15/2017
DESIGNED BY	JB	SCALE	NTS
CHECKED BY	SM	JOB NO.	5221687

KEY PLAN

JOB TITLE
UNLV SHADOW LANE HEATING HOT WATER REPIPE
UNLV
1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.
M0.01

SPECIFICATIONS

PART 1 - GENERAL

1. THE CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR, EQUIPMENT, APPURTENANCES, AND OTHER CONTRACTUAL REQUIREMENTS REQUIRED FOR THE COMPLETE INSTALLATION OF THE MECHANICAL WORK TO THE SATISFACTION OF THE OWNER AND ENGINEER.
2. THE MECHANICAL WORK SHALL COMPLY WITH AND BE INSTALLED IN ACCORDANCE WITH ALL LEGALLY CONSTITUTED AUTHORITIES AND CODES HAVING JURISDICTION. NO WORK INDICATED ON DRAWINGS OR SPECIFICATIONS SHALL BE PERFORMED WITH PLAN CHECK APPROVAL AND VALID PERMITS.
3. THE CONTRACTOR SHALL GUARANTEE ALL EQUIPMENT, APPARATUS, ACCESSORIES (I.E. THE ENTIRE INSTALLATION) AS FURNISHED BY HIM FOR A PERIOD OF ONE YEAR. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY ITEM WHICH MAY PROVE DEFECTIVE WITHIN ONE (1) YEAR FROM THE DATE THE APPARATUS IS ACCEPTED AND PLACED IN OPERATION WITHOUT ANY ADDITIONAL COST TO THE OWNER.
4. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS, LICENSES, AND INSPECTIONS REQUIRED TO COMPLETE THE WORK.
5. THE DRAWINGS INDICATE IN DIAGRAMMATIC FORM THE ARRANGEMENTS DESIRED FOR PRINCIPAL APPARATUS, PIPING, CONDUIT, ETC., AND SHALL BE FOLLOWED AS CLOSELY AS POSSIBLE. SCALED AND FIGURED DIMENSIONS ARE APPROXIMATE AND ARE GIVEN FOR ESTIMATE PURPOSES ONLY. BEFORE PROCEEDING WITH ANY WORK CHECK AND VERIFY EXISTING CONDITIONS, DIMENSIONS, SIZES, AND ASSUME FULL RESPONSIBILITY FOR FITTING-IN OF EQUIPMENT, MATERIALS, AND ADJUSTMENT OF ANY EXISTING DUCTWORK AND PIPING (INCLUDING PROVISION FOR OFFSETS, BENDS, ELBOWS, ETC.).
6. THE CONTRACTOR SHALL MAKE A THOROUGH FIELD SURVEY TO DETERMINE ANY EXISTING CONDITION THAT MAY AFFECT THE INSTALLATION OF THE WORK. BY THE ACT OF SUBMITTING A BID, THE CONTRACTOR IS DEEMED TO HAVE MADE A FIELD SURVEY AND HAS ACCEPTED THE EXISTING CONDITIONS AT NO ADDITIONAL COST TO THE OWNER.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING, AND PATCHING TO COMPLETE THE INSTALLATION OF THE MECHANICAL WORK. ALL EXPOSED FINISHED AREAS THAT ARE DAMAGED AS A RESULT OF THIS WORK SHALL BE REPAIRED TO MATCH THE EXISTING CONDITIONS AT NO ADDITIONAL COST TO THE OWNER.
8. ALL CONSTRUCTION SITES SHALL BE PROPERLY PROTECTED WITH BARRICADES, WARNING FLAGS, FENCING, AND LIGHTS AS REQUIRED BY CODE AND THE OWNER'S SECURITY DEPARTMENT. PROVIDE SHORING, BRACING, AND ACCESS LADDERS AS REQUIRED BY CODE. TAKE EXTRA CARE TO INSTRUCT ALL PERSONNEL ON SAFETY PROCEDURES. TAKE CARE TO AVOID DAMAGE TO ADJACENT DUCTWORK, PIPING, AND ELECTRICAL SERVICES.
9. SCHEDULE UTILITY SHUT-DOWNS AT LEAST TWO (2) DAYS IN ADVANCE THROUGH THE OWNER. PROVIDE CONTINUOUS “FIRE WATCH GUARD” TO ALL AREAS AFFECTED BY SHUT-DOWN OF ANY FIRE PROTECTION WATER SERVICE. THE CONTRACTOR'S OPERATIONS SHALL CAUSE NO UNNECESSARY INCONVENIENCE TO THE BUILDING'S PREMISES. THE ACCESS RIGHTS TO THE PUBLIC SHALL BE CONSIDERED AT ALL TIMES SCHEDULE DURING OFF-HOURS, WEEKENDS, AND NIGHTS AS REQUIRED.
10. SHOP DRAWINGS AND MATERIAL LISTS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AT LEAST THIRTY (30) DAYS PRIOR TO THE START OF ANY WORK. NO WORK INDICATED ON ANY OF THE PLANS OR SHOP DRAWINGS SHALL BE PERFORMED UNTIL THE SHOP DRAWINGS HAVE BEEN APPROVED BY THE ENGINEER.
11. IF THE CONTRACTOR'S USE OF SUBSTITUTE MATERIALS, EQUIPMENT, OR METHODS OF INSTALLATION REQUIRES ANY CHANGES IN OTHER TRADES WORK FROM THAT SHOWN ON THE DRAWINGS, THE EXTRA COST OF THE OTHER TRADES WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR INITIATING THE SUBSTITUTION.
12. APPROVAL OF THE SUBMITTALS DOES NOT RELEASE THE CONTRACTOR FROM OBLIGATIONS TO FULLY COMPLY WITH ALL REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS OR APPLICABLE CODES.
13. THE CONTRACTOR SHALL SUBMIT TWO (2) COMPLETE SETS OF AS-BUILT DRAWINGS, ONE (1) COMPLETE SET OF AS-BUILT DRAWINGS IN ELECTRONIC PDF FORMAT, TWO (2) COMPLETE SETS OF OPERATION AND MAINTENANCE MANUALS, AND ONE (1) COMPLETE SET IN ELECTRONIC PDF FORMAT TO THE OWNER AS PERMANENT RECORDS AT SUCCESSFUL COMPLETION OF THE WORK BEFORE FINAL PAYMENT CAN BE APPROVED BY THE OWNER'S REPRESENTATIVE.

PART 2 - MATERIALS

1. NEW VARIABLE FREQUENCY DRIVES (VFD) SHALL BE BY ABB. NO SUBSTITUTIONS WILL BE ALLOWED IN THIS PROJECT. SEE SCHEDULES FOR ADDITIONAL INFORMATION.
2. NEW CONTROL EQUIPMENT SHALL BE BY HONEYWELL, MODEL EXCEL 5000. NO SUBSTITUTIONS WILL BE ALLOWED IN THIS PROJECT.
3. DUCTWORK SHALL BE PROVIDED AS FOLLOWS:
   a. ALL DUCTWORK SHALL BE NEW GALVANIZED SHEET METAL. DUCT GAGES, CONSTRUCTION, SUPPORT, SEISMIC RESTRAINT, AND INSTALLATION SHALL BE FOR MEDIUM PRESSURE DUCTWORK AND IN ACCORDANCE WITH THE MECHANICAL CODE, IC, AND SMACNA DUCTWORK CONSTRUCTION HANDBOOKS. DUCTWORK MATERIALS AND JOINTS SHALL MEET STANDARDS FOR MEDIUM PRESSURE DUCTWORK AND SHALL MEET, AS A MINIMUM, THE QUALITY OF THE EXISTING INSTALLATION IN THIS BUILDING.
   b. ALL TRANSVERSE JOINTS SHALL BE SEALED AIRTIGHT WITH HARDCAST DT FIBERGLASS TAPE SATURATED WITH HARDCASE RTA-50. THE TAPE SHALL EXTEND 1-INCH ON BOTH SIDE OF THE SEAM OR JOINT.
4. DUCT INSULATION: MINERAL FIBER BLANKET, ASTM C 553, TYPE II WITH FACTORY APPLIED FSK JACKET.
5. SHUTOFF SINGLE-DUCT AIR TERMINAL UNITS CONFIGURATION: VOLUME-DAMPER ASSEMBLY INSIDE UNIT CASING WITH CONTROL COMPONENTS LOCATED INSIDE A PROTECTIVE METAL SHROUD.
   a. CASING: 0.034-INCH STEEL.
   b. CASING LINING: 1/2-INCH THICK, COATED, FIBROUS-GLASS DUCT LINER COMPLYING WITH ASTM C 1071; SECURED WITH ADHESIVE.
   c. ACCESS: REMOVABLE PANELS FOR ACCESS TO DAMPERS AND OTHER PARTS REQUIRING SERVICE, ADJUSTMENT, OR MAINTENANCE; WITH AIRTIGHT GASKET.
   d. VOLUME DAMPER: GALVANIZED STEEL WITH PERIPHERAL GASKET AND SELF-LUBRICATING BEARINGS.
   e. HOT-WATER HEATING COIL: COPPER TUBE, MECHANICALLY EXPANDED INTO ALUMINUM-PLATE FINS; LEAK TESTED UNDERWATER TO 200 PSIG; AND FACTORY INSTALLED.
   f. DDC CONTROLS: DAMPER OPERATORS AND MICROPROCESSOR-BASED CONTROLLER AND ROOM SENSOR SHALL BE HONEYWELL.
6. PIPING SHALL BE PROVIDED AS FOLLOWS:
   a. 2” AND LESS: TYPE L, DRAWN TEMPER COPPER TUBING, WROUGHT COPPER FITTINGS, AND SOLDERED JOINTS.
   b. 2-1/2” AND LARGER: NEW SEAMLESS STEEL PIPE, ASTM A53 OR A106, SCHEDULE 40 BLACK STEEL; WITH ANSI/ASTM B16.3 MALLEABLE IRON OR ASTM A234 FORGED STEEL WELDING TYPE FITTINGS; AND WITH WELDED JOINTS.
7. VALVES: 2” AND SMALLER SHALL BE 2-PIECE BRONZE WITH STAINLESS STEEL BALL, TFE SEAT, AND LEVER OPERATOR FOR SCREWED, OR SOLDERED CONNECTION. BY NIBCO OR STOCKHAM. PROVIDE LEVER ARM EXTENSION TO CLEAR INSULATION ON ALL VALVES. 2-1/2” AND LARGER SHALL BE 150 CWP, IRON, SINGLE FLANGE BUTTERFLY WITH EPDM SEAT AND STAINLESS STEEL DISC. LUG TYPE BODY.
8. DIELECTRIC UNIONS SHALL BE PROVIDED TO JOIN DISSIMILAR MATERIALS TO PREVENT GALVANIC CORROSION, BY NIBCO OR WATTS.
9. PIPE INSULATION: MINERAL OR GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. ASTM C 547, TYPE I, GRADE A, WITH FACTORY APPLIED FSK JACKET.
10. PIPE SHALL BE LABELED TO IDENTIFY SYSTEM AND FLOW DIRECTION.
11. PRE-MOLDED PIPE FITTING COVERS: ONE-PIECE PVC. CONFORM TO FEDERAL SPECIFICATION L-P-535, COMPOSITION A, TYPE II, AND SHALL BE CEEL-CO SERIES 100, CERTAINTEED “SNAP-FORM” OR ZESTON.
12. INSTALL WIRING AND CABLE IN CONDUIT. PROVIDE SEPARATE CONDUITS FOR POWER AND SIGNAL WIRING. INSTALL PLASTIC END SLEEVES AT ALL CONDUIT TERMINATIONS.
13. WHERE LOW VOLTAGE POWER IS REQUIRED PROVIDE TRANSFORMERS FROM SPARE IN NEAREST ELECTRICAL PANEL.
14. INSTALL COMPONENTS IN ACCORDANCE WITH NEC AND LOCAL AMENDMENTS.
15. LABEL EACH WIRE AT TERMINAL CONNECTIONS. TO SHOW ITEM SERVED. COLOR CODE CABLE WITH DIAGRAMS.
16. GROUND ELECTRICAL SYSTEMS PER MANUFACTURER'S REQUIREMENTS AND NEC.
17. FLOW METER: ONICON F-3500 SERIES. INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

GENERAL NOTES

UNLV CONTROL STANDARDS

BUILDING AUTOMATION AND CONTROL SYSTEM:

ANY BUILDING AUTOMATION AND CONTROL SYSTEM INSTALLED AT UNLV MUST BE FULLY COMPATIBLE AND TRANSPARENT TO THE EXISTING INSTALLED SYSTEMS INTERFACE PROTOCOL CONNECTIONS MUST BE EVALUATED AND APPROVED BY THE UNLV ENERGY MANAGEMENT AND CONTROLS SYSTEMS REPRESENTATIVES.

THE HONEYWELL ENTERPRISE BUILDINGS INTEGRATOR SHALL PROVIDE THE OPTION TO MONITOR AND REPORT ELECTRICAL, GAS, WATER CONSUMPTION AND OTHER ENERGY CONSUMABLES AND BILLABLE USAGE. THE ABILITY TO CORRECTLY MONITOR AND REPORT THESE CONSUMPTIONS SHALL BE DEMONSTRATED TO FACILITIES MANAGEMENT PERSONNEL BY THE CONTRACTOR. TO INSURE ACCURACY AND OPERABILITY, MEASUREMENTS SHALL BE BY INDEPENDENT INSTRUMENTS. ALL DATA RETRIEVED BY THE SYSTEM SHALL BE CAPABLE OF TRENDING AND HISTORICAL DATA COLLECTION METHODS.

CONTROLS:

USE OF ENVIRONMENTAL MANAGEMENT AND CONTROL SYSTEM (EMCS): EVERY BUILDING SHALL BE EVALUATED FOR THE USE OF EMCS. FINAL DECISION REGARDING THE USE OF EMCS SHALL BE MADE BY THE UNLV OFFICE OF PLANNING AND CONSTRUCTION.

EMCS STANDARDIZATION: THE UNLV CAMPUS USES HONEYWELL ENTERPRISE BUILDING INTEGRATOR AND EXCEL 5000 BUILDING CONTROL SYSTEMS AS THE STANDARD EMCS. UNLV FACILITIES MANAGEMENT HAS STANDARDIZED THE CAMPUS EMCS BASED ON THE EQUIPMENT AND TECHNICAL SUPPORT PROVIDED BY HONEYWELL INTERNATIONAL, INC. THE UNLV CAMPUS STANDARD IS TO BE MAINTAINED, AND REPRESENTS THE COST EFFECTIVE METHOD FOR CAMPUS OPERATIONS, MONITORING, AND MAINTENANCE. BUILDINGS ARE MONITORED AND CONTROLLED FROM A CENTRAL COMPUTER STATION LOCATED IN THE CAMPUS SERVICES BUILDING (CSB). ALL EMCS ARE TO BE MONITORED AND CONTROLLED WITH AN INTERNET TCP/IP PROTOCOL TO THE EXISTING CENTRAL EMCS COMPUTER STATION.

ALL PROJECTS ARE TO BE PROVIDED WITH THE MOST CURRENT VERSION OF SOFTWARE AND HARDWARE FOR THE EMCS. MULTIPLE SYSTEMS MUST HAVE FULL ACCESS AND ARCHIVING FOR ALL PROGRAM CHANGES. THE EMCS MUST HAVE FULL CAPABILITY FOR SAVING OF HISTORIES DATA. MODERNIZATION OR REMODEL PROJECTS SHALL COMPLY WITH THIS STANDARD.

CONNECTION TO EMCS CENTRAL STATION: EVERY BUILDING WITH EMCS IS TO BE CONNECTED TO THE CENTRAL EMCS COMPUTER STATIN THE CAMPUS SERVICES BUILDING. THE PREFERRED METHOD IS BY INTERNET TCP/IP PROTOCOL. THE BUILDING PROJECT SHALL PROVIDE ALL WORK, CABLE, ACCESSORIES, AND EQUIPMENT REQUIRED TO CONNECT TO THE CENTRAL STATION. COORDINATION FOR INTERNET CONNECTION IS WITH THE UNLV INFORMATION TECHNOLOGY DEPARTMENT THROUGH THE UNLV OFFICE OF PLANNING AND CONSTRUCTION. IF NO INTERNET CONNECTION IS AVAILABLE THE PROJECT SHALL PROVIDE ALL WORK AND EQUIPMENT REQUIRED TO CONNECT THE BUILDING TO THE CENTRAL EMCS COMPUTER STATION LOCATED IN THE CAMPUS SERVES BUILDING (CSB) AND THE CENTRAL EMCS COMPUTER STATION LOCATED AT THE SHADOW LANE (EBI).

THE EMCS CENTRAL STATION SHALL BE CONFIGURED TO ALLOW THE OPERATOR TO CHANGE THE STATE OF ALL PUMPS, FAN MOTORS, AND VALVES.

INSTALLATION:

ANCILLARY EQUIPMENT: ALL RELAYS INSTALLED FOR ENABLE/DISABLE OR START/STOP COMMAND CONTROL MUST BE PANEL MOUNTED OR (DIN) RAIL MOUNTED TYPE. DOUBLE BACK TAPE, TIE-WRAPS, OR RELAY MOUNTING THAT VIOLATES ELECTRICAL PANEL INTEGRITY IS NOT ACCEPTABLE.

ALL EQUIPMENT CONTROLLED SHALL HAVE POSITIVE STATUS PROVIDED BY CURRENT SENSORS OR RELAY CONTACT CLOSURE. DIFFERENTIAL PRESSURE SENSORS INSTALLED ACROSS EQUIPMENT OR MONITORING OF EMCS COMMAND RELAYS ARE NOT ACCEPTABLE METHODS OF DETERMINING EQUIPMENT STATUS. VFD STATUS SHOULD BE PROVIDED BY VFD CONTACT CLOSURE. CURRENT SENSORS FOR VARIABLE SPEED APPLICATIONS ARE NOT AN ACCEPTABLE METHOD OF DETERMINING VFD STATUS.

UNLESS NOTED OTHERWISE, ALL ACTUATORS ARE TO BE ELECTRONIC TYPE (BELIMO, HONEYWELL). AIR HANDLER MIXING DAMPERS SHALL BE PROVIDED WITH INDIVIDUAL ACTUATORS AND CONTROL SIGNALS.

VARIABLE FREQUENCY DRIVE (VFD) CONTROL MUST PROVIDE EMCS INPUT AND VFD OUTPUT TO THE MOTOR, INDICATED ON GRAPHICS. ALL VFD INTERFACE IS TO BE HARDWIRED ENABLE/DISABLE, STATUS, ALARM, SIGNAL, & FEEDBACK TO BMS.

COOLING TOWER VIBRATION SENSOR SHALL BE MONITORED BY THE EMCS.

FILTER ALARMS ARE TO BE PROVIDED BY ANALOG TYPE SENSOR. DIGITAL ALARMS ARE NOT ACCEPTABLE. CALIBRATE SENSORS FOR THE PRESSURE DROP ACROSS THE FILTERS USED. DISPLAY THE FILTER PRESSURE DROP ON THE EMCS CENTRAL COMPUTER GRAPHICS.

ALL CONTROLLERS, REPEATER, ROUTERS, TRANSMITTERS, AND RECEIVERS SHALL BE CLEARLY MARKED ON THE DRAWINGS AND RECORD DRAWINGS AND OPERATOR GRAPHICS.

PROVIDE GRAPHICS TO THE EMS DEPARTMENT FOR REVIEW BEFORE PROGRAMING AND INSTALLATION ON THE EMCS CENTRAL COMPUTER.

SYSTEM MONITORS: FIRE/LIFE SAFETY SYSTEMS WILL PROVIDE A SINGLE INPUT TO THE EMCS SYSTEM TO INDICATE AN ALARM CONDITION WITH THE FIRE/LIFE SAFETY SYSTEM.

REFRIGERATION LEAK DETECTION SYSTEM SHALL PROVIDE AN ANALOG LEVEL INDICATION OF REFRIGERANT CONCENTRATION IN THE SPACE BEING MONITORED. THE REFRIGERATION SYSTEM MONITOR WILL CONTROL THE EXHAUST FANS. MONITOR THE STATUS OF THE FAN FROM THE EMCS AND INDICATE ON THE GRAPHIC SCREEN.

ALL DDC PANELS SHALL HAVE PORTABLE OPERATOR'S TERMINAL INTERFACE FOR COMMUNICATIONS.

ALL PANEL MOUNTED DEVICES SUCH AS RELAYS, TRANSDUCERS, SWITCHES SHALL BE PROPERLY IDENTIFIED WITH LABELS.

MANUAL CONTROL: ALL FAN AND PUMP EQUIPMENT SHALL HAVE MOTOR CONTROL CENTER HAND CONTROL TO ALLOW FOR MANUAL OPERATION FROM WITHIN THE BUILDING. VARIABLE FREQUENCY DRIVES SHALL BE PROVIDED WITH MANUAL BYPASS PANEL.

GENERAL NOTES

1. PERFORM ALL WORK IN STRICT ACCORDANCE WITH THE APPROVED, ENFORCED BUILDING, MECHANICAL, AND PLUMBING CODES AND THE AUTHORITIES HAVING JURISDICTION.
2. THE CONSTRUCTION IS WORK OF COMPLEX NATURE WHICH WILL REQUIRE ACCURATE PLANNING, CAREFUL PREPARATION, ATTENTION TO DETAIL, AND CLOSE SUPERVISION BY THE CONTRACTOR WHO WILL BE REQUIRED TO DO THIS WORK IN FULL COOPERATION WITH THE OTHER TRADES.
3. THE CONTRACTOR SHALL VERIFY ALL EQUIPMENT, DUCTWORK, AND PIPING LOCATIONS, SIZES, PRESSURE, AND AVAILABILITY PRIOR TO START OF ANY WORK.
4. CONTRACTOR SHALL VERIFY ALL EQUIPMENT MODEL NUMBERS, CAPACITIES, SIZES, VOLTAGES, AND ALL OTHER SCHEDULED INFORMATION WITH ALL OTHER APPLICABLE TRADES AND WITH THE EQUIPMENT MANUFACTURER PRIOR TO INSTALLATION.
5. ALL SUPPLY, RETURN, AND EXHAUST REGISTER CONNECTIONS TO DUCTWORK SHALL BE PROVIDED WITH ACCESSIBLE MANUAL VOLUME DAMPERS. ALTERNATIVELY, ACCESSIBLE MANUAL VOLUME DAMPER MAY BE PROVIDED IN DUCTWORK FEEDER LINES SERVING INDIVIDUAL REGISTERS.
6. IN THE EVENT THERE IS A CONFLICT BETWEEN THE CONTRACT DRAWINGS AND THE SPECIFICATIONS, THE SPECIFICATIONS SHALL GOVERN, UNLESS INSTRUCTED OTHERWISE.
7. DO NOT CUT OR NOTCH ANY STRUCTURAL MEMBERS WITHOUT STRUCTURAL ENGINEER'S APPROVAL.
8. REFER TO ARCHITECTURAL, STRUCTURAL, AND ELECTRICAL DRAWINGS FOR DETAILS OF THE WORK.
9. THE CONTRACTOR SHALL COORDINATE FOR CLEARANCES PRIOR TO START OF ANY WORK.
10. THESE DRAWINGS ARE ESSENTIALLY DIAGRAMMATIC AND ARE NOT INTENDED TO INDICATE ALL NECESSARY OFFSETS OF PIPING. THE CONTRACTOR SHALL INSTALL MATERIAL AND EQUIPMENT IN A MANNER AS TO CONFORM TO STRUCTURE, AVOID OBSTRUCTIONS, PRESERVE HEADROOM, AND KEEP OPENINGS AND PASSAGEWAYS CLEAR. ALL INSTALLATIONS SHALL BE CONSISTENT WITH NORMALLY ACCEPTABLE INDUSTRY STANDARDS. CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE IN WRITING OF ANY DISCREPANCIES OR CONFLICTS THAT WOULD AFFECT THE SYSTEM PERFORMANCE OR WHICH WOULD INCUR ADDITIONAL COSTS. THIS NOTIFICATION SHALL BE MADE PRIOR TO THE INSTALLATION OF THE ITEMS CONCERNED.
11. EQUIPMENT INDICATED ON THESE DRAWINGS IS SHOWN IN APPROXIMATE POSITION(S). CONTRACTOR SHALL VERIFY ALL CONDITIONS INCLUDING EQUIPMENT LOCATIONS, CONNECTION POINTS, AND STRUCTURAL MEMBERS BEFORE INSTALLATION. IN ALL CASES ADEQUATE ACCESS (PER MANUFACTURER'S RECOMMENDATIONS AND CODE COMPLIANCE) FOR MAINTENANCE AND REPLACEMENT OF EQUIPMENT SHALL BE PROVIDED.
12. ALL WORK SHALL BE DONE IN ACCORDANCE WITH ALL APPLICABLE CODES. NOTHING SHOWN IN THE PLANS OR STATED IN THE SPECIFICATIONS IS INTENDED TO INDICATE THAT THE INSTALLATION OR CONNECTIONS OF ANY ITEM OR DEVICE SHOULD BE DONE CONTRARY TO THE MANUFACTURER'S INSTRUCTIONS AND ALL APPLICABLE CODES AND REGULATIONS. THE CONTRACTOR IS RESPONSIBLE TO INSURE THAT THE INSTALLATIONS AND CONNECTIONS OF ALL ITEMS AND DEVICES CONFORMS TO MANUFACTURER'S INSTRUCTIONS AND TO ALL APPLICABLE CODES AND REGULATIONS.
13. ALL EQUIPMENT, MATERIAL, AND CONNECTIONS SHALL BE INSTALLED COMPLETE PER MANUFACTURER'S INSTRUCTIONS TO PROVIDE A COMPLETE AND FULLY OPERATIONAL SYSTEM.
14. IF THE CONTRACTOR'S USE OF SUBSTITUTE MATERIALS, EQUIPMENT, OR METHODS OF INSTALLATION REQUIRES ANY CHANGES IN OTHER TRADES WORK FROM THAT SHOWN ON THE DRAWINGS, THE EXTRA COST OF THE OTHER TRADES WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR INITIATION THE SUBSTITUTION.
15. SUBMITTALS: APPROVAL OF SUBMITTALS DOES NOT RELEASE THE CONTRACTOR FROM OBLIGATIONS TO FULLY COMPLY WITH ALL REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS OR APPLICABLE CODE REGULATIONS.
16. BEFORE SUBMITTING BIDS FOR THE WORK THE CONTRACTOR SHALL MAKE A THOROUGH FIELD SURVEY OF THE WORK TO DETERMINE ANY INTERFERENCE THAT MAY AFFECT THE INSTALLATION ON THE WORK.
17. THE CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR, EQUIPMENT, APPURTENANCES, AND OTHER CONTRACTUAL ITEMS REQUIRED FOE THE COMPLETE INSTALLATION OF THE PLUMBING WORK TO THE SATISFACTION OF THE OWNER AND ENGINEER.
18. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS, LICENSES, AND INSPECTIONS REQUIRED TO COMPLETE THE MECHANICAL WORK.
19. SEISMIC BRACING AND ANCHORAGE OF PIPES SHALL BE PER IBC AND SMACNA SEISMIC MANUAL, “GUIDELINES FOR SEISMIC RESTRAINTS OF MECHANICAL SYSTEMS.”
20. AFFIX A MAINTENANCE LABEL TO ALL EQUIPMENT. PROVIDE MAINTENANCE MANUAL TO THE OWNER.

OTHER WORK

1. CONTRACTOR SHALL PERFORM ALL ELECTRICAL WORK TO MAKE A COMPLETE INSTALLATION FOR THIS PROJECT. REFER TO RELATED DRAWINGS FOR THE SCOPE OF WORK.
2. CONTRACTOR SHALL PERFORM ALL ARCHITECTURAL AND STRUCTURAL WORK TO MAKE A COMPLETE INSTALLATION FOR THIS PROJECT. INSTALLATION OF THE NEW UNITS ALONG WITH ALL ACCESSORIES SHALL MEET ALL ENFORCED BUILDING AND STRUCTURAL CODES.
3. FIELD VERIFY EXISTING CONDITIONS, CAPACITIES AND CONSULT WITH PLANNING AND CONSTRUCTION DEPARTMENT AND THEIR REQUIREMENTS PRIOR TO BID.

SPECIFIC NOTES

1. MAINTAIN BUILDING FIRE ALARM SYSTEM IN OPERATION.
2. SEAL ALL PENETRATIONS THROUGH RATED WALLS, FLOORS, AND CEILINGS TO MAINTAIN RATING.
3. PATCH AND PAINT SURFACES TO MATCH ORIGINAL CONDITIONS.
4. REMOVE ALL DEMOLISHED MATERIALS BACK TO THE SOURCE.
5. REPAIR PENETRATIONS THROUGH THE ROOF TO MAINTAIN ROOF WARRANTY.

DEMOLITION NOTES

1. CONTRACTORS SHALL VISIT THE SITE AND MAKE THEMSELVES THOROUGHLY FAMILIAR WITH THE EXISTING CONDITIONS AND VERIFY THE EXISTING SITE CONDITIONS PRIOR TO BIDDING.
2. ALL WORK REQUIRED TO CHANGE THE EXISTING HVAC INSTALLATION AS INDICATED SHALL BE PROVIDED.
3. REMOVE ALL DUCTWORK, MISCELLANEOUS ITEMS, AND PIPING THAT INTERFERES WITH NEW CONSTRUCTION. EXTEND AND RECONNECT ANY INTERRUPTED SYSTEM TO OF EXISTING SYSTEMS WHICH REMAIN.
4. EXCEPT AS MAY BE SPECIFICALLY INDICATED OTHERWISE, ALL MATERIALS AND EQUIPMENT REMOVED FROM THE EXISTING INSTALLATION IN THE COURSE OF PERFORMING THE INDICATED WORK (AND NOT INDICATED TO BE REUSED) SHALL BE TREATED AS FOLLOWS:
   a. ALL ABANDONED DUCTS, PIPES, BOXES, FITTINGS, AND DIFFUSERS SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE SITE.
   b. ALL OTHER ITEMS REMOVED SHALL BE TURNED OVER TO THE OWNER, OR DISPOSED OF AS DIRECTED BY THE OWNER.
5. CONTRACTOR SHALL CLEAN ALL REMAINING ITEMS THAT ARE TO BE REUSED OR ARE TO REMAIN.
6. CONTRACTOR SHALL REMOVE ALL DUCTWORK AND EXPOSED PIPES THAT ARE NOT IN USE.
7. CONTRACTOR SHALL PROVIDE ALL NECESSARY WORK AND MATERIALS TO MAINTAIN ALL EXISTING HVAC SYSTEMS IN OPERATION DURING AND AFTER CONSTRUCTION.
8. ALL EXISTING SYSTEMS INCLUDING EQUIPMENT, DUCTS, PIPES, AND OTHER ITEMS WHICH ARE NOT TO BE DEMOLISHED SHALL REMAIN IN SERVICE THROUGHOUT THE CONSTRUCTION PERIOD.
9. UNLESS NOTED ON DRAWINGS, ALL EXISTING DUCTS, PIPES, BOXES, AND OTHER HVAC SYSTEMS IN AREAS WHERE NEW WORK OCCURS SHALL BE REMOVED, EXCEPT WHEN SUCH ITEMS ARE REQUIRED TO MAINTAIN SERVICES TO OTHER AREA. IN SUCH CASES, CONTRACTOR SHALL RELOCATE THESE ITEMS AND PROVIDE DUCTS, PIPES, DAMPER, BOXES, AND CONTROL WHERE REQUIRED TO ACCOMMODATE THE NEW WORK. PROVIDE ACCESS DOORS WHERE ITEMS REQUIRE ACCESS. CONTRACTOR SHALL REMOVE ANY EXISTING ITEM, WHEN SUCH ITEM IS CONCEALED AND DOES NOT INTERFERE WITH NEW WORK.
10. ALL ABANDONED DUCTS, PIPES, BOXES, DIFFUSERS SHALL BE REMOVED COMPLETELY BACK TO THE SOURCE. CAP STUB-OUTS THAT REMAIN.
11. INFORMATION GIVEN ON THE DRAWINGS ABOUT EXISTING INSTALLATIONS HAS BEEN OBTAINED FROM THE EXISTING CONDITIONS BUT CANNOT BE GUARANTEED ACCURATE IN ALL RESPECTS.
12. THESE DEMOLITION NOTES REFER TO ALL MECHANICAL SHEETS WHERE DEMOLITION WORK IS BEING CARRIED OUT.
13. NEW AND/OR EXISTING EQUIPMENT INDICATED ON THESE DRAWINGS IS SHOWN IN APPROXIMATE POSITION(S). CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS INCLUDING EQUIPMENT LOCATIONS, CONNECTION POINTS, AND STRUCTURAL MEMBERS PRIOR TO INSTALLATION. IN ALL CASES ADEQUATE ACCESS (PER MANUFACTURER'S RECOMMENDATIONS AND CODE COMPLIANCE) FOR MAINTENANCE AND REPLACEMENT OF EQUIPMENT SHALL BE PROVIDED.
14. CONTRACTOR SHALL VERIFY ALL LOCATIONS, SIZES, CONNECTION POINTS, AND AVAILABILITY OF ALL EXISTING ITEMS (I.E. DUCTWORK, ETC.) PRIOR TO INSTALLATION OF ANY MATERIAL OR EQUIPMENT.

WATER BALANCE

BALANCING SERVICES WILL BE PERFORMED BY AN AABC CERTIFIED AGENCY. THE AGENCY WILL BE CONTRACTED BY UNLV. THIS AGENCY SHALL BE A COMPANY SPECIALIZING IN THE ADJUSTING AND BALANCING OF SYSTEMS WITH AT LEAST THREE YEARS DOCUMENTED EXPERIENCE CERTIFIED BY AABC. WORK SHALL BE PERFORMED UNDER THE SUPERVISION OF AN AABC CERTIFIED TEST AND BALANCE ENGINEER AND REGISTERED ENGINEER. THE REPORT SHALL BE PRESENTED TO THE OWNER IN BOTH DIGITAL AND PAPER FORMAT.

1. WHERE WATER FLOW RATES ARE NOT INDICATED IN THE SCHEDULES, MEASURE THE EXISTING FLOWS BEFORE WORK IS STARTED. REPORT THE MEASURED DATA TO THE ENGINEER AND THE CONTROLS CONTRACTOR.

MINIMUM PIPE INSULATION THICKNESS

FLUID OPERATING TEMP AND FLUID	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (INCHES)				
	CONDUCTIVITY BTU/IN/(H*FT^2*°F)^B	MEAN RATING TEMPERATURE, °F	<1	1 TO < 1-1/2	1-1/2 TO < 4	4 TO < 8	≥ 8
> 350	0.32 - 0.34	250	4.5	5.0	5.0	5.0	5.0
251 - 350	0.29 - 0.32	200	3.0	4.0	4.5	4.5	4.5
201 - 250	0.27 - 0.30	150	2.5	2.5	2.5	3.0	3.0
141 - 200	0.25 - 0.29	125	1.5	1.5	2.0	2.0	2.0
105 - 140	0.21 - 0.28	100	1.0	1.0	1.5	1.5	1.5
40 - 60	0.21 - 0.27	75	0.5	0.5	1.0	1.0	1.0
<40	0.20 - 0.26	75	0.5	1.0	1.0	1.0	1.5

NOTES:
A. FOR PIPING SMALLER THAN 1-1/2 INCH (38 MM) AND LOCATED IN PARTITIONS WITHIN CONDITIONED SPACES, REDUCTION OF THESE THICKNESSES BY 1 INCH (25 MM) SHALL BE PERMITTED (BEFORE THICKNESS ADJUSTMENT REQUIRED IN FOOTNOTE B) BUT NOT TO A THICKNESS LESS THAN 1 INCH (25 MM).
B. FOR INSULATION OUTSIDE THE STATED CONDUCTIVITY RANGE, THE MINIMUM THICKNESS (T) SHALL BE DETERMINED AS FOLLOWS:
T = R{(1 + T/R)K/K – 1}
WHERE:
T = MINIMUM INSULATION THICKNESS,
R = ACTUAL OUTSIDE RADIUS OF PIPE,
T = INSULATION THICKNESS LISTED IN THE TABLE FOR APPLICABLE FLUID TEMPERATURE AND PIPE SIZE,
K = CONDUCTIVITY OF ALTERNATE MATERIAL AT MEAN RATING TEMPERATURE INDICATED FOR THE APPLICABLE FLUID TEMPERATURE (BTU × IN/H × FT2 × °F) AND
K = THE UPPER VALUE OF THE CONDUCTIVITY RANGE LISTED IN THE TABLE FOR THE APPLICABLE FLUID TEMPERATURE.
C. FOR DIRECT-BURIED HEATING AND HOT WATER SYSTEM PIPING, REDUCTION OF THESE THICKNESSES BY 1-1/2 INCHES (38 MM) SHALL BE PERMITTED (BEFORE THICKNESS ADJUSTMENT REQUIRED IN FOOTNOTE B BUT NOT TO THICKNESSES LESS THAN 1 INCH (25 MM).
D. PER 2012 IECC TABLE C403.2.8

SCOPE OF WORK

PROVIDE THE FOLLOWING:
- DEMOLITION DRAWINGS OF HEATING HOT WATER SYSTEM PIPING IN CENTRAL PLANT.
- HEATING HOT WATER SYSTEM PIPING FOR CONVERSION TO PRIMARY/SECONDARY SYSTEM
- ADDITION OF ONE (1) HEATING HOT WATER BUFFER TANK TO PREVENT SHORT CYCLING OF BOILERS.
- ADDITION OF TWO (2) PRIMARY HEATING HOT WATER BOILER PUMPS.
- CONTROL SEQUENCE OF OPERATION AND POINTS FOR LIST ABOVE.
- ADD NEW DIFFERENTIAL PRESSURE SENSOR ON THIRD LEVEL.

Southland.
4765 CAMERON STREET
LAS VEGAS NEVADA
89103
702.736.4041
www.southlandind.com

NO.	REVISION DESCRIPTION	BY	DATE

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

ISSUE FOR PERMIT

PROFESSIONAL ENGINEER - STATE OF NEVADA
STEPHEN T. MULCAHY
EXP. 12-31-2017
MECHANICAL
No. 15511

DATE: 08-15-2017

DRAWING TITLE:
GENERAL NOTES, SPECIFICATIONS, AND SCOPE OF WORK

UNLV PROJECT NUMBER: SLC-1706/PC-9008

DRAWN BY	SI	DATE	08/15/2017
DESIGNED BY	JB	SCALE	NTS
CHECKED BY	SM	JOB NO.	5221687

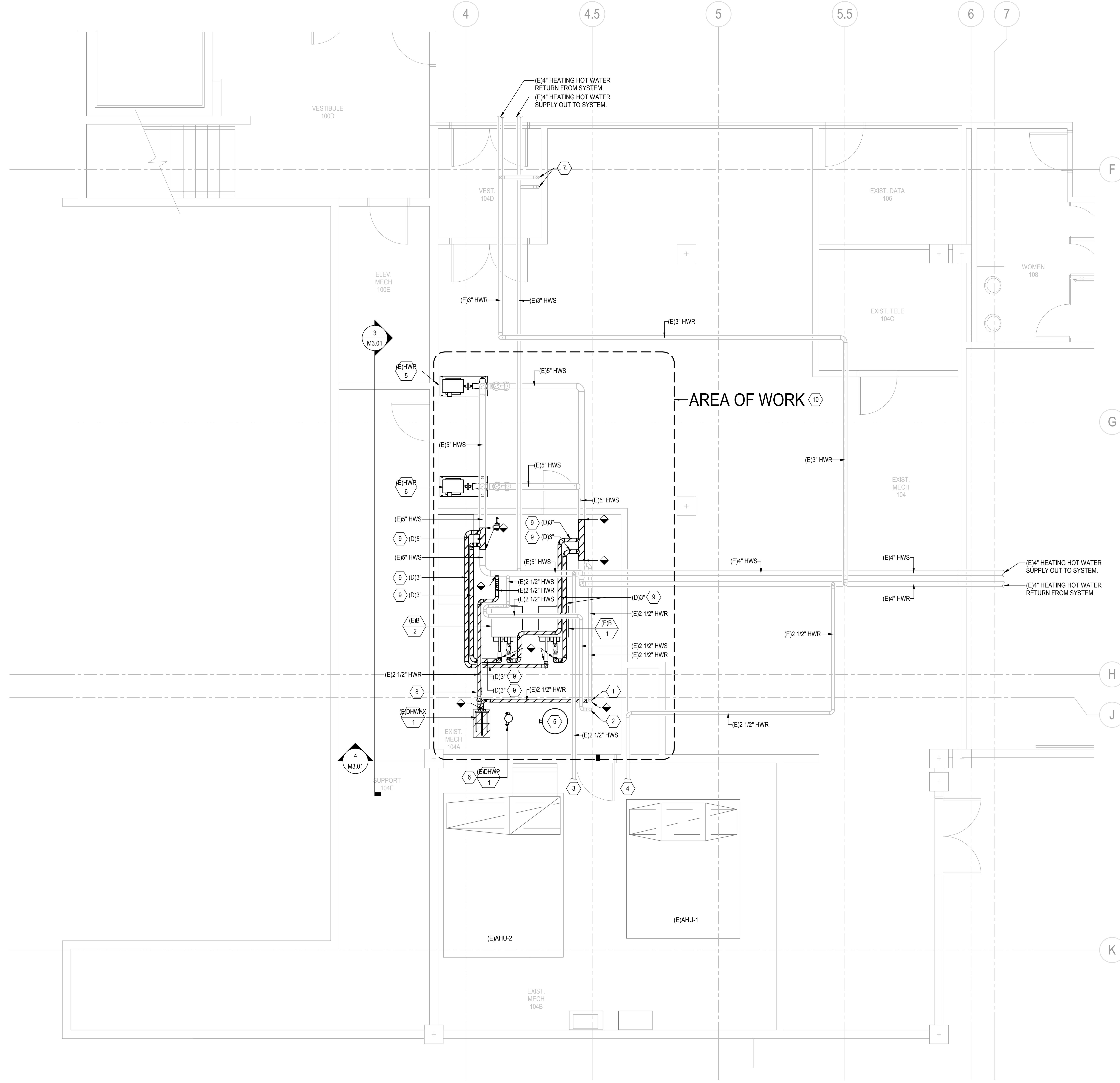
KEY PLAN

JOB TITLE
UNLV SHADOW LANE HEATING HOT WATER REPIPE
UNLV
1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.
M0.02

KEYNOTES

1. (E)2" HEATING HOT WATER RETURN DOWN FROM ROOF ADJACENT TO COOLING TOWERS.
2. (E)2" HEATING HOT WATER SUPPLY UP TO ROOF ADJACENT TO COOLING TOWERS.
3. (E)2 1/2" HEATING HOT WATER SUPPLY TO AHU-1.
4. (E)2 1/2" HEATING HOT WATER RETURN FROM AHU-1.
5. EXISTING DOMESTIC HOT WATER TANK.
6. EXISTING DOMESTIC HOT WATER PUMP SERVES DOMESTIC HOT WATER TO HOT WATER STORAGE TANK.
7. (E)2 1/2" HEATING HOT WATER SUPPLY AND RETURN TO THIRD LEVEL.
8. EXISTING HEATING HOT WATER MOTORIZED CONTROL VALVE TO BE REMOVED.
9. DEMO EXISTING HEATING HOT WATER PIPING.
10. REFER TO DEMO ELEVATION VIEWS ON SHEET M3.01.



1 FIRST LEVEL - CENTRAL PLANT HHW PIPING DEMO FLOOR PLAN

1/4" = 1'-0"

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PROFESSIONAL ENGINEER - STATE OF NEVADA
STEPHEN T. MULCAHY
EXP. 12-31-2017
MECHANICAL
No. 15511
DATE: 08-15-2017

DRAWING TITLE:

FIRST LEVEL - CENTRAL PLANT HEATING HOT WATER PIPING DEMO FLOOR PLAN

UNLV PROJECT NUMBER: SLC-1706/PC-0008

DRAWN BY	SI	DATE	08/15/2017
DESIGNED BY	JB	SCALE	As indicated
CHECKED BY	SM	JOB NO.	5221687

KEY PLAN

JOB TITLE

UNLV SHADOW LANE HEATING HOT WATER REPIPE

UNLV

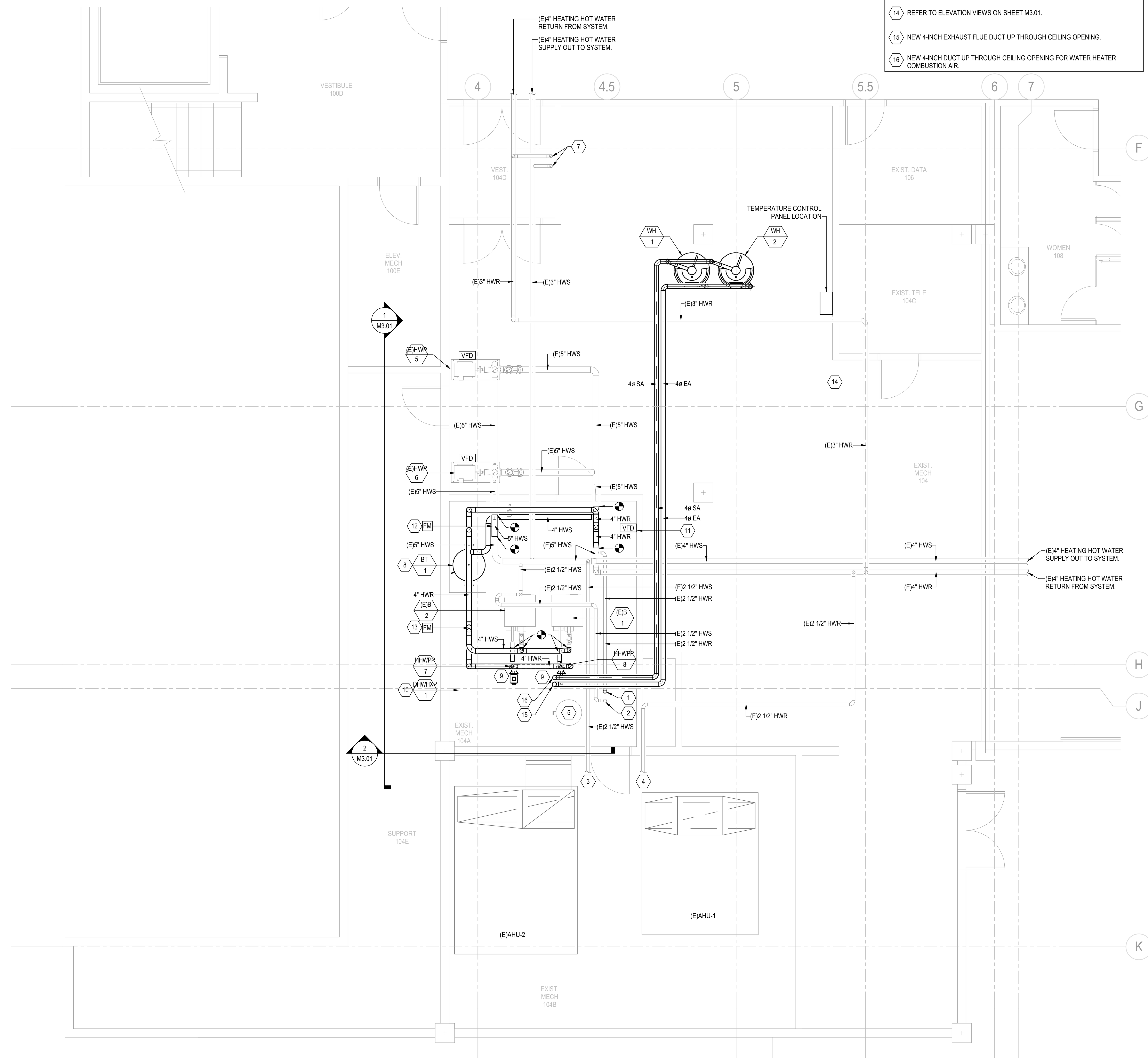
1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.

M1.01.D

KEYNOTES

1. (E)2" HEATING HOT WATER RETURN DOWN FROM ROOF ADJACENT TO COOLING TOWERS.
2. (E)2" HEATING HOT WATER SUPPLY UP TO ROOF ADJACENT TO COOLING TOWERS.
3. (E)2 1/2" HEATING HOT WATER SUPPLY TO AHU-1.
4. (E)2 1/2" HEATING HOT WATER RETURN FROM AHU-1.
5. EXISTING DOMESTIC HOT WATER TANK.
6. (E) DOMESTIC HOT WATER PUMP SERVES DOMESTIC HOT WATER TO (E) HOT WATER STORAGE TANK.
7. (E)2 1/2" HEATING HOT WATER SUPPLY AND RETURN TO THIRD LEVEL.
8. NEW HEATING HOT WATER BUFFER TANK.
9. NEW HEATING HOT WATER PRIMARY PUMP.
10. NEW HEATING HOT WATER PUMP SERVING DOMESTIC HOT WATER HEAT EXCHANGER.
11. VFD LOCATION FOR NEW HEATING HOT WATER PUMP SERVING DOMESTIC HOT WATER HEAT EXCHANGER (DHWHXP).
12. LOCATION FOR ONICON F-3500 FLOW METER ON SECONDARY LOOP HEATING HOT WATER SUPPLY PIPING. SEE TO SHEET M3.01.
13. LOCATION FOR ONICON F-3500 FLOW METER ON PRIMARY LOOP HEATING HOT WATER RETURN PIPING DOWNSTREAM OF BUFFER TANK. SEE SHEET M3.01.
14. REFER TO ELEVATION VIEWS ON SHEET M3.01.
15. NEW 4-INCH EXHAUST FLUE DUCT UP THROUGH CEILING OPENING.
16. NEW 4-INCH DUCT UP THROUGH CEILING OPENING FOR WATER HEATER COMBUSTION AIR.



1 FIRST LEVEL - CENTRAL PLANT HEATING HOT WATER PIPING FLOOR PLAN

1/4" = 1'-0"

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DRAWING TITLE:

FIRST LEVEL - PLANT HEATING HOT WATER PIPING FLOOR PLAN

UNLV PROJECT NUMBER: SLC-1706/PC-9008

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KEY PLAN

JOB TITLE

UNLV SHADOW LANE HEATING HOT WATER REPIPE

UNLV

1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.

M1.01

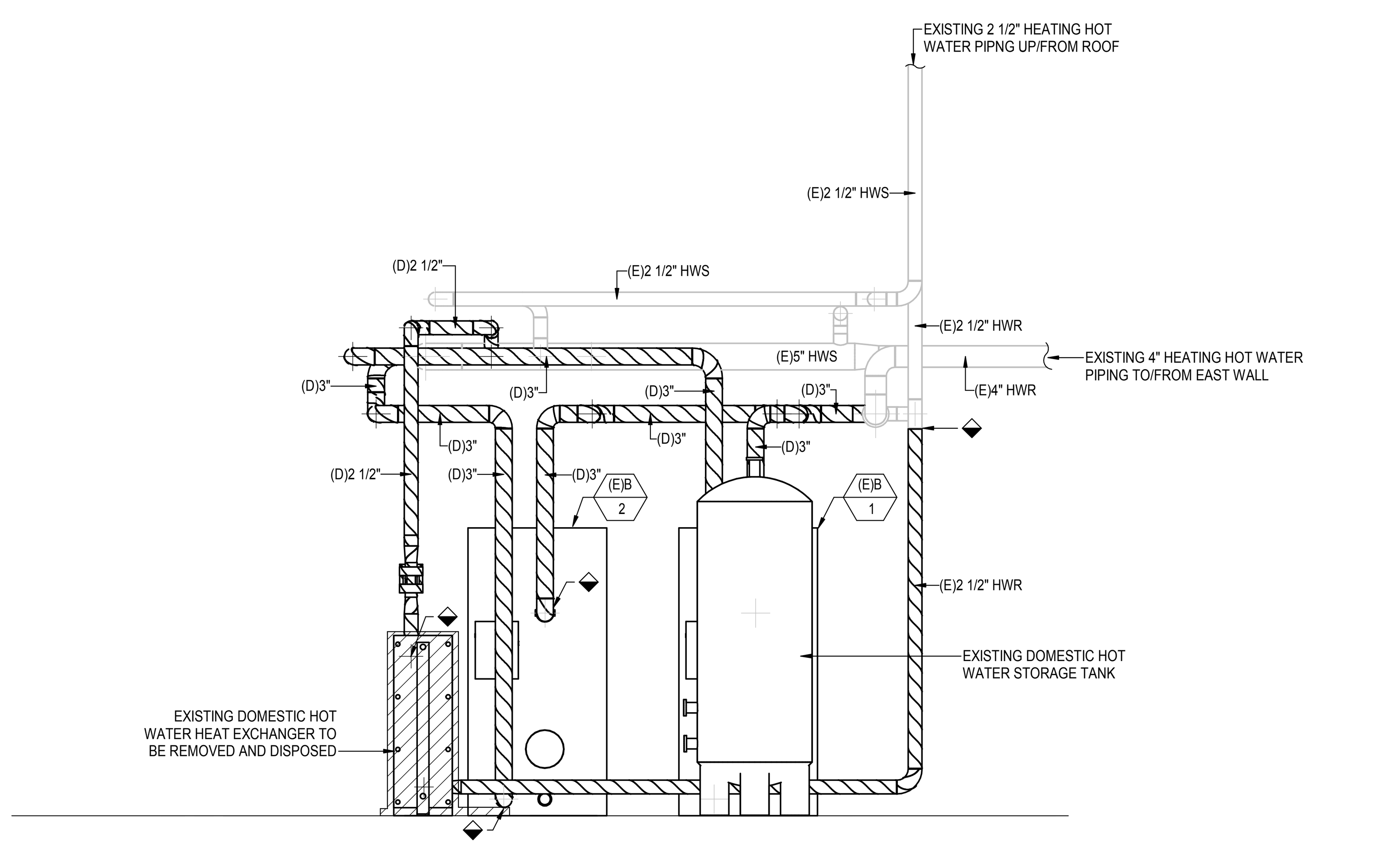
IF THIS DRAWING IS NOT 42x30 IT HAS BEEN SCALED

KEYNOTES

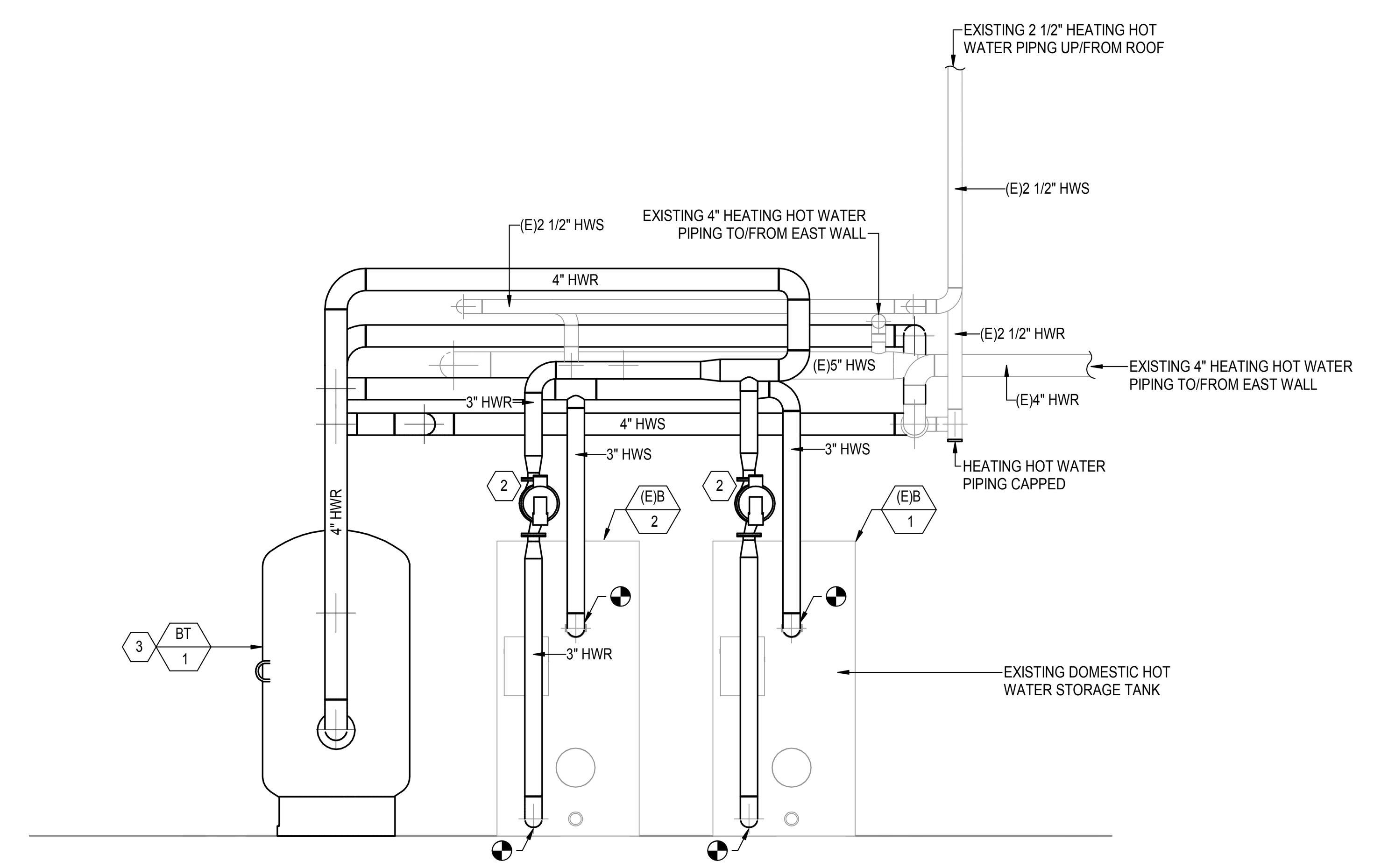
1. ONICON F-3500 FLOW METER LOCATION.
2. NEW HEATING HOT WATER PRIMARY PUMPS SERVING ASSOCIATED BOILER.
3. NEW HEATING HOT WATER BUFFER TANK. REFER TO SHEET M6.01 FOR EQUIPMENT SCHEDULE. REFER TO SHEET M5.01 FOR DETAILS.

SHEET NOTES

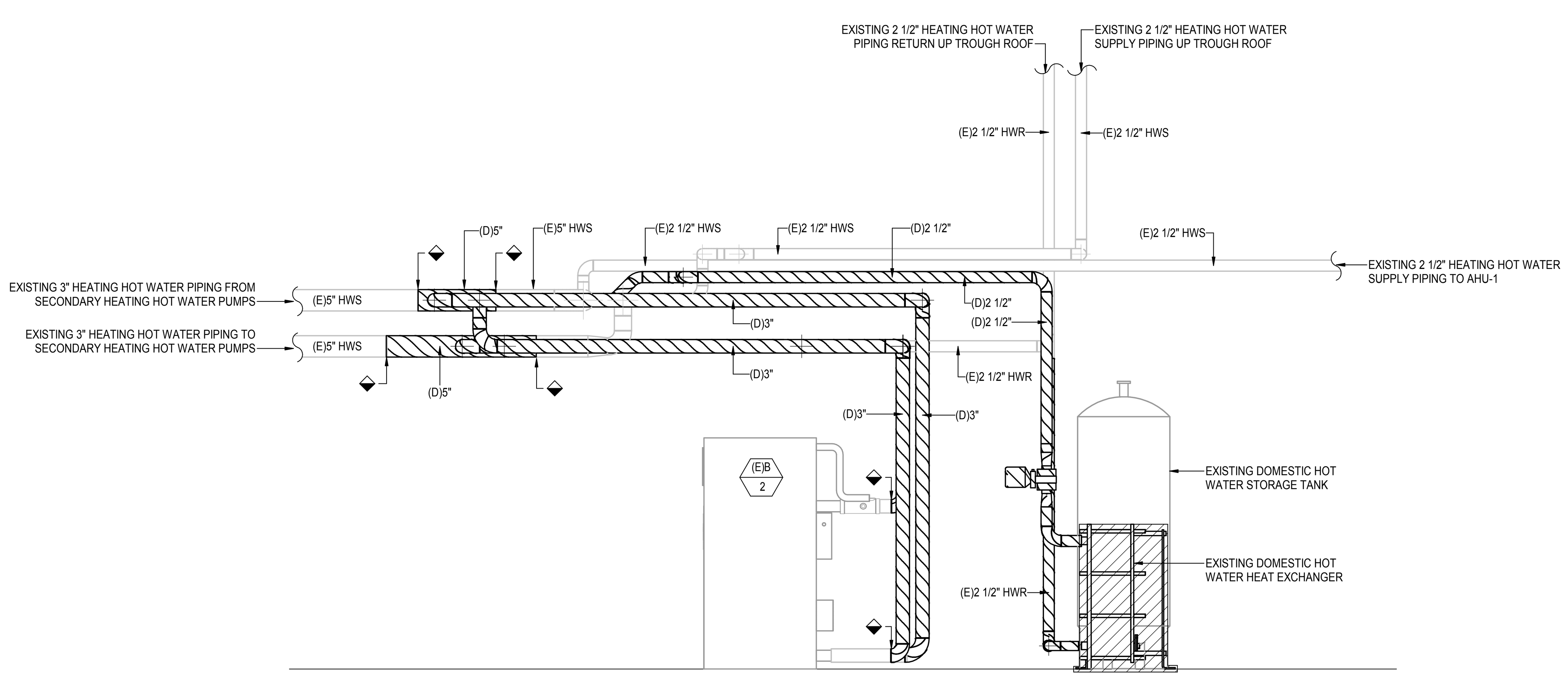
A. "(D)" DENOTES DEMOLITION OF EXISTING PIPING.



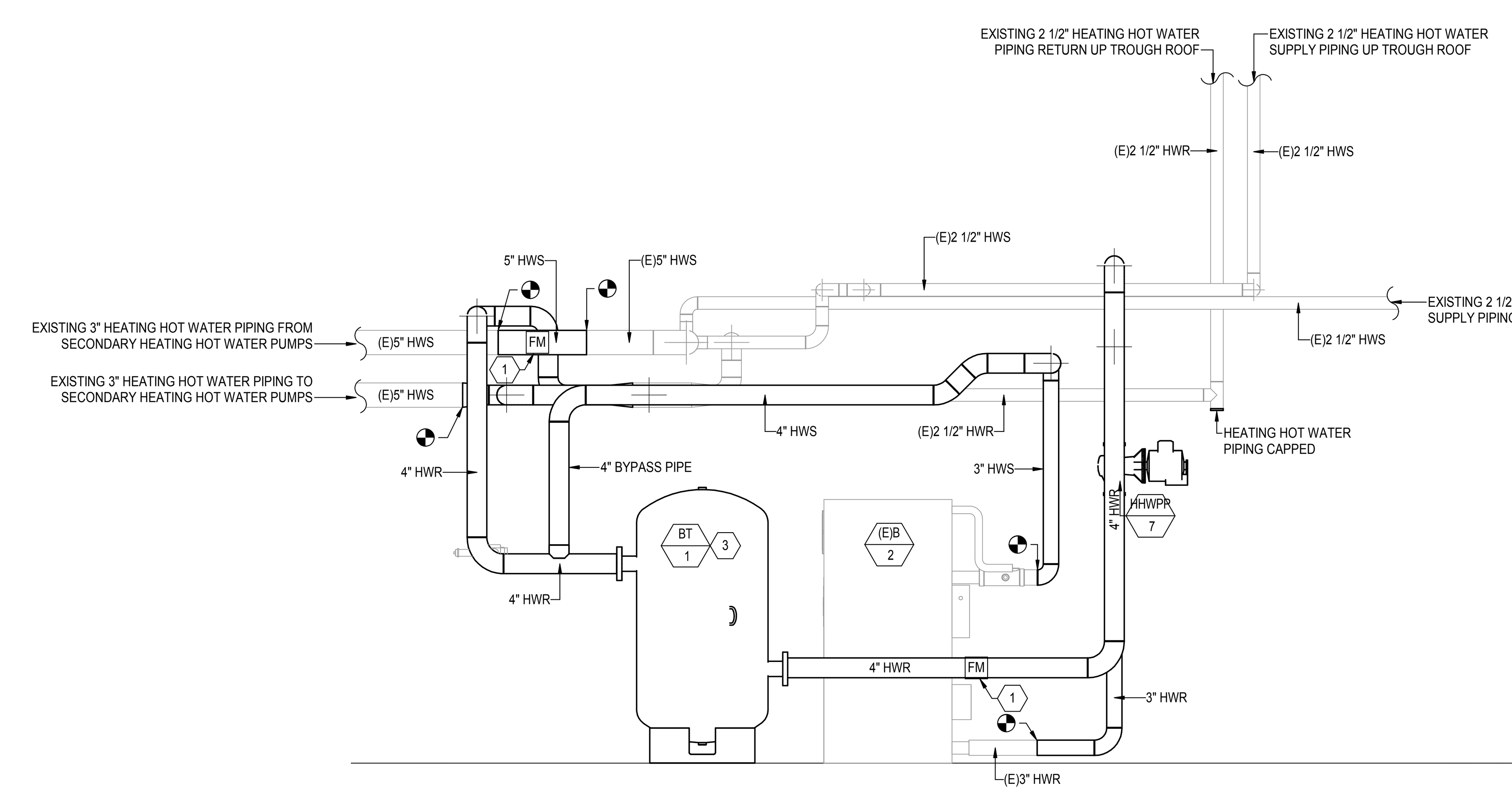
4 - NORTH DEMO ELEVATION VIEW
1/2" = 1'-0"



2 - NORTH ELEVATION VIEW
1/2" = 1'-0"



3 - EAST DEMO ELEVATION VIEW
1/2" = 1'-0"



1 - EAST ELEVATION VIEW
1/2" = 1'-0"

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DRAWING TITLE:
ELEVATION VIEWS

UNLV PROJECT NUMBER: SLC-1706/PC-0008

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KEY PLAN

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UNLV SHADOW LANE HEATING HOT WATER REPIPE
UNLV
1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.
M3.01

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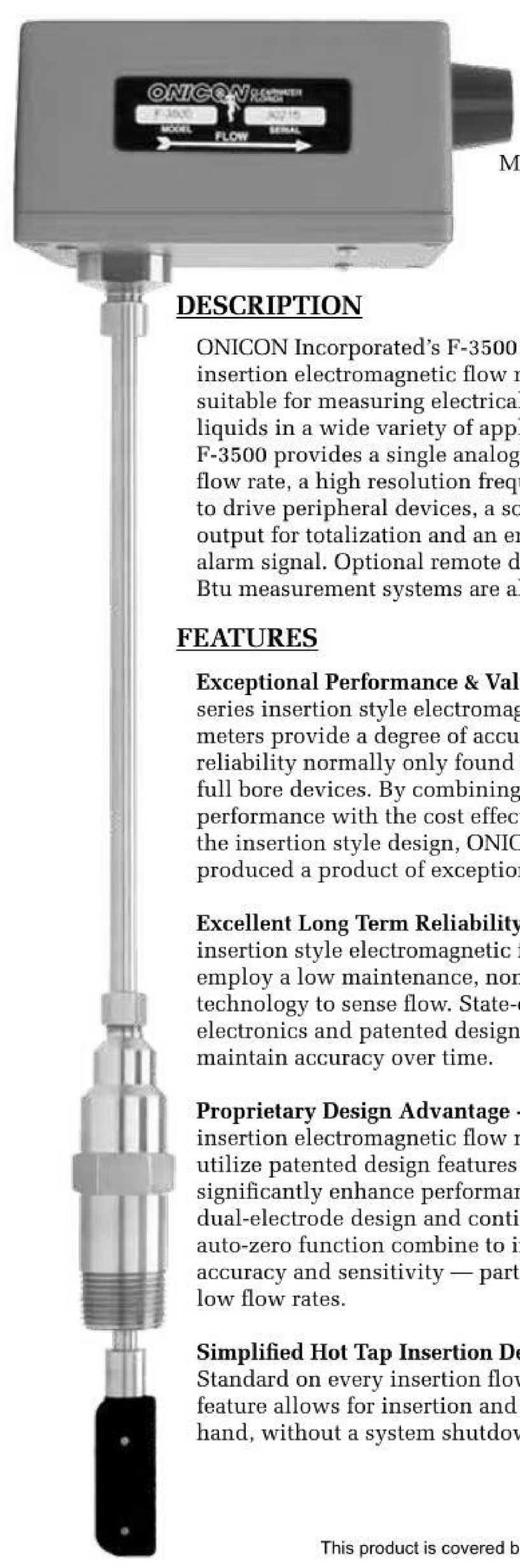
• F-3500 SERIES •
INSERTION ELECTROMAGNETIC FLOW METER

ONICON INCORPORATED



Made in the USA

DESCRIPTION

ONICON Incorporated's F-3500 series insertion electromagnetic flow meters are suitable for measuring electrically conductive liquids in a wide variety of applications. Each F-3500 provides a single analog output for flow rate, a high resolution frequency output to drive peripheral devices, a scalable pulse output for totalization and an empty pipe alarm signal. Optional remote displays and Btu measurement systems are also available.

FEATURES

Exceptional Performance & Value - F-3500 series insertion style electromagnetic flow meters provide a degree of accuracy and reliability normally only found in expensive full bore devices. By combining this level of performance with the cost effective nature of the insertion style design, ONICON has produced a product of exceptional value.

Excellent Long Term Reliability - ONICON insertion style electromagnetic flow meters employ a low maintenance, non-moving parts technology to sense flow. State-of-the-art electronics and patented design features help maintain accuracy over time.

Proprietary Design Advantage - F-3500 insertion electromagnetic flow meters utilize patented design features that significantly enhance performance. The dual-electrode design and continuous auto-zero function combine to improve accuracy and sensitivity — particularly at low flow rates.

Simplified Hot Tap Insertion Design - Standard on every insertion flow meter, this feature allows for insertion and removal by hand, without a system shutdown.

APPLICATIONS

- Chilled water, hot water, condenser water & water/glycol solutions for HVAC
- Process water & water mixtures
- Domestic/municipal water

CALIBRATION

Every ONICON flow meter is wet calibrated in a flow laboratory against standards that are directly traceable to N.I.S.T. A certificate of calibration accompanies every meter.

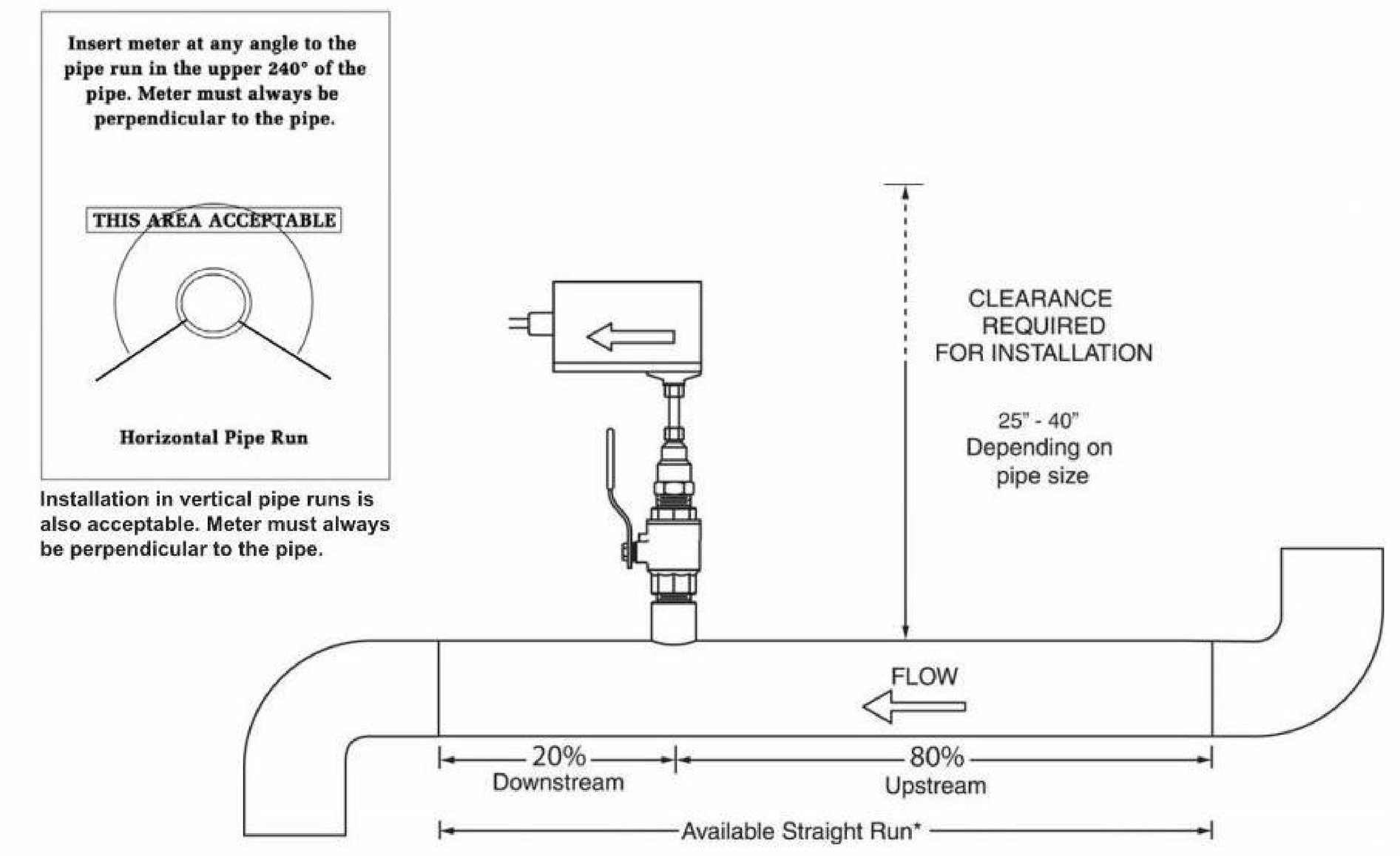
GENERAL SPECIFICATIONS

ACCURACY
± 1.0% of reading from 2 to 20 ft/sec
± 0.02 ft/sec below 2 ft/sec
FLOW RANGE
0.1 ft/s to 20 ft/s (200:1 turndown)
SENSING METHOD
Electromagnetic sensing (no moving parts)
CONDUCTIVITY RANGE
20 to 60,000 μSiemens/cm
PIPE SIZE RANGE
3" through 72" nominal diameter
INPUT POWER
20 – 28 VDC, 250mA @ 24 VDC
20 – 28 VAC 60 Hz, 6 VA
LIQUID TEMPERATURE RANGE
15° to 250° F
AMBIENT TEMPERATURE RANGE
-20° to 150° F
OPERATING PRESSURE
400 PSI maximum
PRESSURE DROP
Less than 0.1 psi at 12 ft/s velocity in 3" and larger pipes
OUTPUT SIGNALS PROVIDED
Analog Output (Isolated)
Selectable: 4-20mA, 0-10V or 0-5V
Frequency Output
0 – 15 Volt peak pulse, 0 – 500Hz
Scalable Pulse Output
Isolated solid state dry contact
Contact rating: 50VDC, 100mA maximum
Pulse Duration: 0.5, 1, 2 or 6 seconds

(continued on back)

ONICON's F-3500 Series Insertion Electromagnetic Flow Meter combined with the System-10 BTU Meter form an energy measurement system with unsurpassed accuracy and reliability.

This product is covered by one or more of the following patents: 6,431,011 and 6,463,807.



For 3" and larger pipe diameters

Upstream obstruction	Straight run required upstream of meter location	Straight run required downstream of meter location
Single bend preceded by ≥ 9 diameters of straight pipe	10 Diameters	5 Diameters
Pipe size reduction / expansion in straight pipe run	10 Diameters	5 Diameters
Single bend preceded by ≤ 9 diameters of straight pipe	15 Diameters	5 Diameters
Outflowing tee / Pump outflow	20 Diameters	5 Diameters
Multiple bends out of plane	30 Diameters	5 Diameters
Inflowing tee	30 Diameters	5 Diameters
Control / Modulating valve	30 Diameters	5 Diameters

IMPORTANT NOTE

Always use the maximum available straight run. When more than the minimum required straight run is available, place the meter such that the excess straight run is upstream of the meter location.

F-3500 SPECIFICATIONS cont.

MATERIAL
Wetted metal components: 316 stainless steel
Sensor head: Polypropylene
ELECTRONICS ENCLOSURE
Weathertight NEMA 4 aluminum enclosure
ELECTRICAL CONNECTIONS
10' of PVC jacketed cable with ½" NPT conduit connection

OPERATING RANGE FOR COMMON PIPE SIZES
0.1 to 20 ft/sec

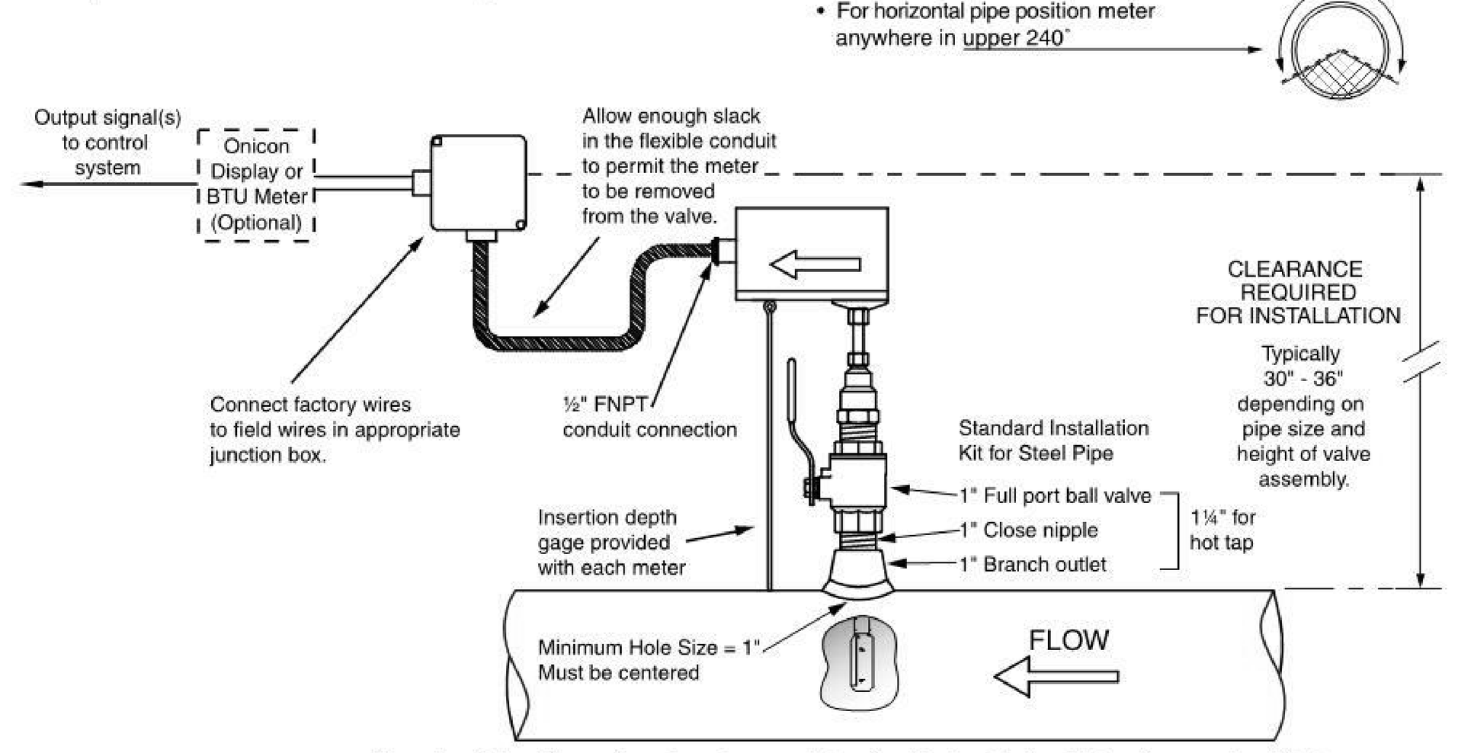
Pipe Size (inches)	Flow Rate (GPM)
3	2.4 - 460
4	4 - 800
6	6 - 1,800
8	16 - 3,100
10	24 - 4,900
12	35 - 7,050
14	42 - 8,600
16	55 - 11,400
18	70 - 14,600
20	86 - 18,100
24	125 - 26,500
30	223 - 41,900
36	304 - 60,900

F-3500 Wiring Diagram

WIRE COLOR	DESCRIPTION	NOTES
RED	(+) Supply Voltage: 24 VDC, 250 mA or 24 VAC, 60 Hz, 6 VA	Connect to power supply (+): DC (+) or AC (line)
BLACK	(-) Isolated Supply Voltage Common	Connect to power supply (-): DC (-) or AC (neutral)
GREEN/YELLOW	Earth ground connection	Required to operate the meter
GREEN	(+) Isolated Frequency Output	Required when connecting to ONICON display or BTU meter
YELLOW	(-) Frequency Output Common	
BLUE	(+) Isolated Analog Output	Configurable as a 4-20 mA, 0-10 Volt or 0-5 Volt Output
BROWN	(-) Isolated Analog Output Common	
GRAY	Scaled Output Isolated Dry Contact	Scalable dry contact pulse output for totalization
VIOLET		
DIAGNOSTIC SIGNALS		
ORANGE	Master Alarm, Dry Contact	Dry contact closure signal indicating fault condition
WHITE		

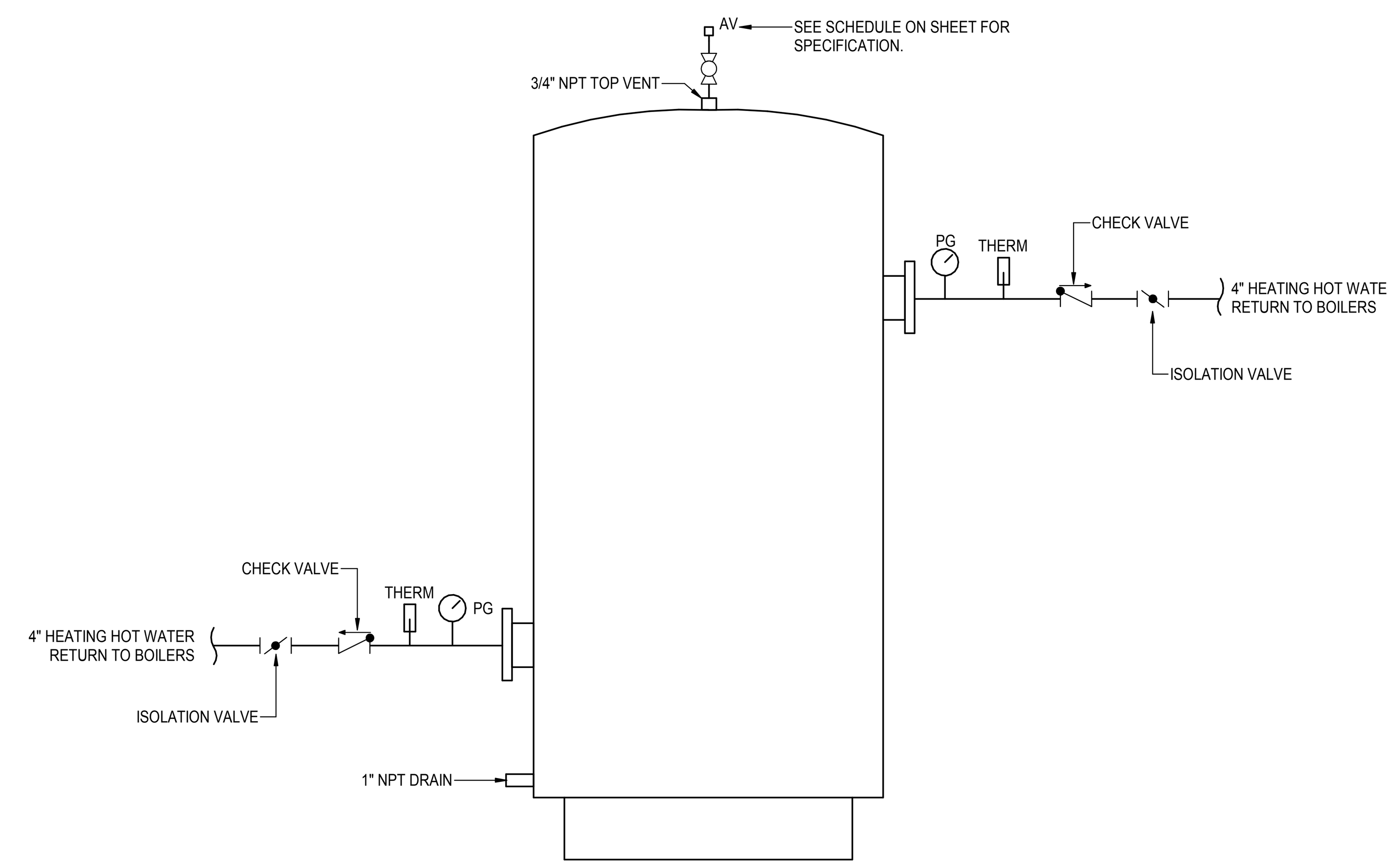
NOTE: Specifications are subject to change without notice.

Typical Meter Installation
(New construction or scheduled shutdown)



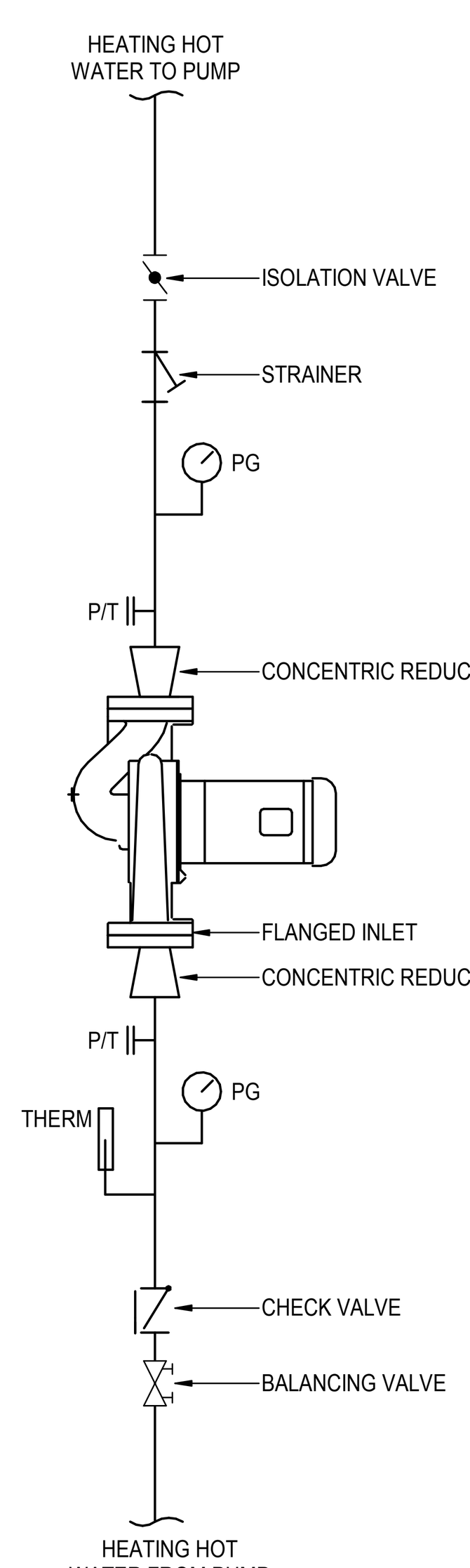
Note: Installation kits vary based on pipe material and application. For installations in pressurized (live) systems, use "Hot tap" 1¼ inch installation kit and drill hole using a 1 inch wet tap drill.

3 ONICON FLOW METER DETAIL
NTS



1. REFER TO EQUIPMENT MANUFACTURER INSTALLATION MANUAL DURING INSTALLATION OF BUFFER TANK.
2. INSTALL HOSE VALVE CONNECTION TO BOTTOM DRAIN.

2 BUFFER TANK DETAIL (BT-1)
NTS



1. PROVIDE THREE PIPE DIAMETERS OF STRAIGHT PIPE UPSTREAM OF THE CHECK VALVE.
2. PUMP SHALL BE SUSPENDED FROM CEILING THROUGH THE USE OF PIPE SUPPORTS.

1 PUMP DETAIL (HHWPP-7, HHWPP-8)
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KEY PLAN

JOB TITLE
UNLV SHADOW LANE HEATING HOT WATER REPIPE
UNLV
1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.
M5.01

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HEATING HOT WATER BUFFER TANK

EQUIPMENT TAG	MANUFACTURER	MODEL	TYPE	CAPACITY [GAL]	DIAMETER [IN]	HEIGHT [IN]	MAXIMUM OPERATING TEMP [°F]	MAX. WORKING PERSSURE [PSI]	PRI./SEC. CONNECTION [IN]	SHIPPING WEIGHT [LBS]	OPERATING WEIGHT [LBS]	NOTES
BT-1	WESSELS	HBT-210	2-PORT	210	30	75	450	125	4	458	2201	1, 2, 3, 4, 5, 6

NOTES

1. BODY OF TANK MADE WITH ASME APPROVED CARBON STEEL
2. AUXILIARY CONNECTION: 3/4" NPT TOP VENT
3. AUXILIARY CONNECTION: 1" NPT BOTTOM DRAIN
4. DESIGNED AND CONTRUCTED PER ASME CODE SECTION VIII, DIVISION 1.
5. INCLUDE 1/2" ELASTOMERIC INSULATION. PROVIDED BY MANUFACTURER
6. PROVIDE SPIRAL THERM VTP-1 AUTOMATIC AIR VENT

HOT WATER BOILER SCHEDULE

EQUIPMENT TAG	MANUFACTURER	MODEL	CAPACITY			MAX. FLOW [GPM]	MIN. FLOW [GPM]	MAX. EWT [°F]	MAX. LWT [°F]	MIN. EWT [°F]	MIN. LWT [°F]	NOTES
			INPUT [MBH]	MAX. OUTPUT [MBH]	MIN. OUTPUT [MBH]							
(E)B-1	P-K THERMIFIC	NM-2000	2,000	1,700	1,190	150	120	168	190	132	160	1,2
(E)B-2	P-K THERMIFIC	NM-2000	2,000	1,700	1,190	150	120	168	190	132	160	1,2

NOTES

1. EXISTING BOILER
2. BOILER HAS MAXIMUM SUPPLY TEMPERATURE OF 190°F AND MINIMUM OF 160°F.

CENTRIFUGAL PUMP SCHEDULE

EQUIPMENT TAG	MANUFACTURER	MODEL	LOCATION	SERVICE	FLOW [GPM]	HEAD [FT WC]	MOTOR		VARIABLE FREQUENCY DRIVE	OPERATING WEIGHT [LBS]	NOTES
							SIZE [HP]	V/PH/HZ			
(E)HWP-5	TACO	FL 2510C	BOILER ROOM	HEATING HOT WATER SECONDARY LOOP	300	60	7-1/2	480/3/60	YES	-	1
(E)HWP-6	TACO	FL 2510C	BOILER ROOM	HEATING HOT WATER SECONDARY LOOP	300	60	7-1/2	480/3/60	YES	-	1
HWPP-7	BELL & GOSSETT	60-STOCK	BOILER ROOM	HEATING HOT WATER PRIMARY LOOP	150	30	2	208/3/60	NO	75.0	2, 3, 4
HWPP-8	BELL & GOSSETT	60-STOCK	BOILER ROOM	HEATING HOT WATER PRIMARY LOOP	150	30	2	208/3/60	NO	75.0	2, 3, 4

NOTES

1. EXISTING HEATING HOT WATER PUMP TO REMAIN.
2. REFER TO SHEET M5.01 FOR EQUIPMENT DETAILS.
3. PUMP TO BE SECURED TO EQUIPMENT THROUGH THE USE OF PIPE SUPPORTS.
4. PROVIDE WITH ECCENTRIC REDUCER ON DISCHARGE/SUCTION SIDE.

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EQUIPMENT SCHEDULES

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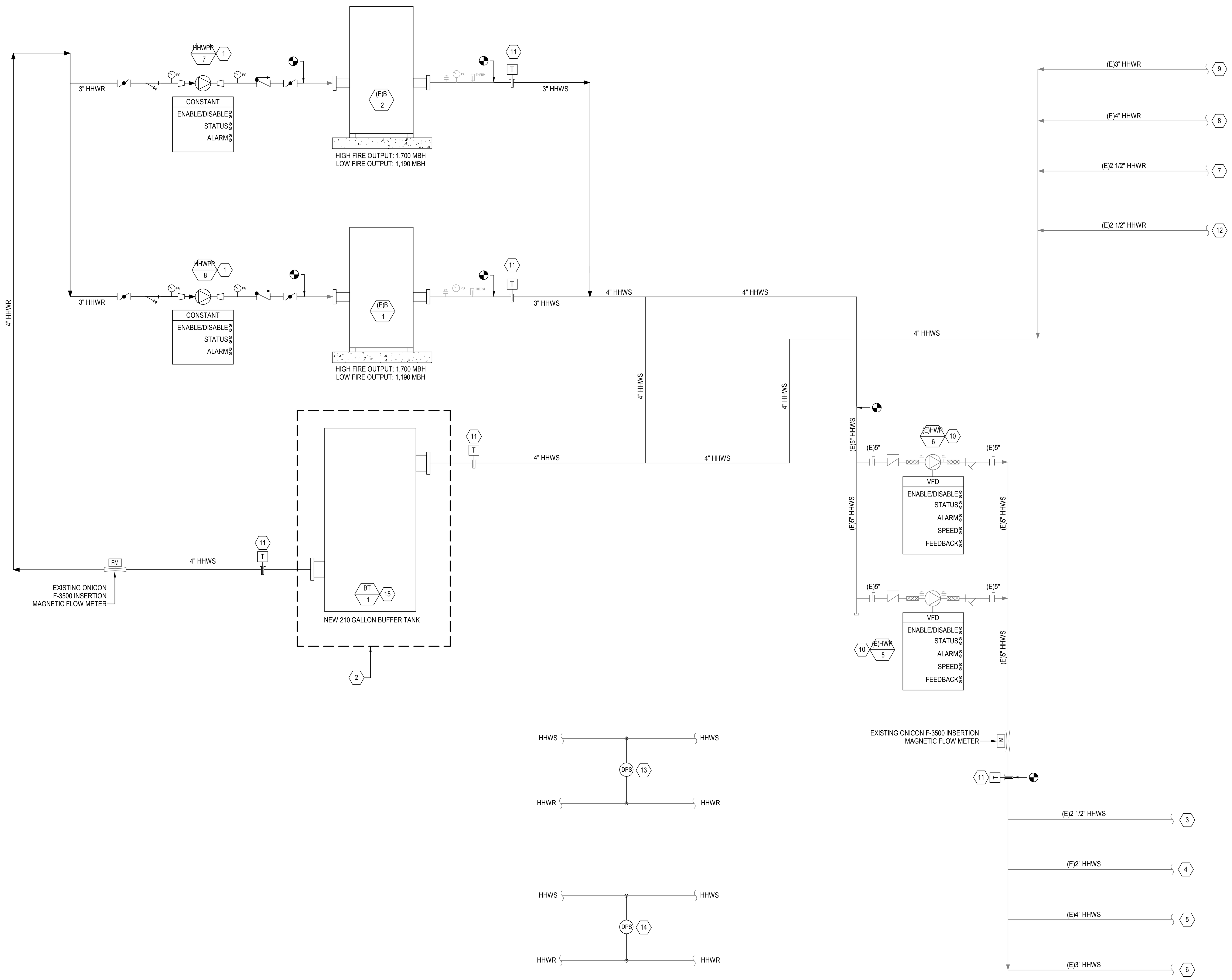
UNLV SHADOW LANE HEATING HOT WATER REPIPE

UNLV

1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.

M6.01



⬡ KEYNOTES

1. NEW HEATING HOT WATER PRIMARY PUMP
2. REFER TO DETAIL ON SHEET M5.01.
3. EXISTING 2 1/2" HEATING HOT WATER SUPPLY TO AHU-1
4. EXISTING 2 1/2" HEATING HOT WATER SUPPLY TO SYSTEM UP THROUGH CEILING TO UPPER LEVELS
5. EXISTING 4" HEATING HOT WATER SUPPLY TO BUILDING PROCEEDING EAST
6. EXISTING 3" HEATING HOT WATER SUPPLY TO BUILDING PROCEEDING NORTH
7. EXISTING 2 1/2" HEATING HOT WATER RETURN FROM AHU-1
8. EXISTING 4" HEATING HOT WATER RETURN FROM EAST SIDE OF BUILDING
9. EXISTING 3" HEATING HOT WATER RETURN FROM NORTH SIDE OF BUILDING
10. VFD ENABLE/DISABLE, STATUS, ALARM, SIGNAL AND FEEDBACK TO BE HARDWIRED TO BMS
11. INSTALL NEW TEMPERATURE SENSOR COMPATIBLE WITH EXISTING DDC CONTROLS.
12. EXISTING 2 1/2" HEATING HOT WATER RETURN FROM SYSTEM DOWN FROM UPPER LEVEL
13. NEW HEATING HOT WATER LOOP DIFFERENTIAL PRESSURE SENSOR TO BE LOCATED ON 3RD LEVEL IN LOCKER ROOM 324A.
14. NEW HEATING HOT WATER LOOP DIFFERENTIAL PRESSURE SENSOR TO BE LOCATED ON 1ST LEVEL ABOVE CORRIDOR 100A.
15. BUFFER TANK TO UTILIZE EXISTING CONCRETE PAD LOCATED IN BOILER ROOM.

SHEET NOTES

A. REFER TO LEGEND FOR SYMBOL DEFINITIONS ON SHEET M0.01.

B. EXTEND NEW CONTROLS TO CONNECT TO UPGRADED BUILDING AUTOMATION SYSTEM. NEW DDC SYSTEM SHALL BE PROVIDED BY HONEYWELL AND SHALL COMMUNICATE ALL CONTROL POINTS TO THE HONEYWELL CONTROL SYSTEM.

HEATING HOT WATER SYSTEM SEQUENCE OF OPERATIONS

BOILER

LEAD / LAG SEQUENCE:
ASSIGN STATUS TO THE PUMPS, AND BOILERS AS LEAD AND LAG ACCORDING TO RUNTIME HOURS. ROTATE EQUIPMENT IN THE LEAD / LAG SEQUENCE AFTER 320 (ADJ) HOURS OF OPERATION. MAINTAIN FLOW WHILE PUMPS ARE SWITCHED. EACH SECONDARY PUMP SHALL HAVE ITS OWN VARIABLE FREQUENCY DRIVE (VFD). WITH THE HAND-OFF-AUTO (HOA) SWITCH IN THE "ON" POSITION, THE ASSOCIATED PUMP SHALL TURN ON. WITH THE HOA SWITCH IN THE "AUTO" POSITION, THE ASSOCIATED PUMP SHALL BE UNDER NORMAL CONTROL. EACH PRIMARY PUMP WILL OPERATE WITH THE ASSOCIATED BOILER. ENABLE THE BOILER WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW THE USER SELECTED SETPOINT(INITIALLY 70°F, WITH A 10°F DEAD-BAND, OFF AT 80°F; ADJ). THE BOILER WILL ALSO BE ENABLED WHEN DOMESTIC HOT WATER TANK IS BELOW 115°F SETPOINT(ADJ.). CONTINUE TO RUN THE ASSOCIATED BOILER PUMP FOR 5 MINUTES(ADJ.) AFTER THE BOILER IS STOPPED.

CONSTANT FLOW HEATING HOT WATER PRIMARY PUMPS:
EACH PRIMARY PUMP WILL ENABLE WHEN ASSOCIATED BOILER IS ENABLED. PRIMARY PUMP WILL MODULATE TO MAINTAIN BOTH OF THE FOLLOWING:
1. HEATING HOT WATER SUPPLY TEMPERATURE SETPOINT.
2. MINIMUM FLOW OF 120 GPM TO ASSOCIATED BOILER.

VARIABLE FLOW HEATING HOT WATER SECONDARY PUMPS:
LEAD SECONDARY HEATING HOT WATER PUMP TO BE ENABLED WHEN EITHER BOILER IS ENABLED. THE HEATING HOT WATER PUMPS WILL MODULATE TO MAINTAIN BOTH OF THE FOLLOWING:
1. MINIMUM TEMPERATURE OF 140°F HEATING HOT WATER RETURN.
2. HEATING HOT WATER SYSTEM DIFFERENTIAL PRESSURE SETPOINT OF 10 PSI(ADJ.). DIFFERENTIAL PRESSURE IS LOCATED ON 3RD LEVEL IN LOCKER ROOM 324A AND 1ST LEVEL ABOVE CEILING IN CORRIDOR 100A.
3. SECONDARY LOOP FLOW MUST NOT EXCEED THE FLOW OF THE PRIMARY LOOP.

IF THE LEAD SECONDARY PUMP CANNOT MEET SETPOINT AFTER 4 MINUTES ENABLE THE LAG PUMP. START THE LAG PUMP AT ITS MINIMUM SPEED AND SLOWLY INCREASE THE SPEED TO MATCH THE LEAD PUMP. IF THE DP SENSOR INDICATES MORE THAN 2 PSI OVER SETPOINT DECREASE THE SETPOINT 1 PSI EACH MINUTE. IF THE DP SENSOR INDICATES MORE THAN 2 PSI UNDER SETPOINT INCREASE THE SETPOINT 1 PSI EACH MINUTE.

TEMPERATURE SENSORS:
GRAPHICALLY INDICATE THE TEMPERATURE OF THE HEATING HOT WATER SUPPLY AND RETURN LEAVING AND ENTERING THE CENTRAL PLANT AS SENSED BY TEMPERATURE SENSORS.

BOILER CONTROL:
BOILER WILL MODULATE BETWEEN HIGH AND LOW FIRE TO MAINTAIN 180°F HEATING HOT WATER SUPPLY.

ALARMS:
AN ALARM CONDITION SHALL BE INDICATED UPON FAILURE OF EITHER BOILER AND/OR IF THE SECONDARY HEATING HOT WATER TEMPERATURE FALLS BELOW 132°F(ADJ.).

EMERGENCY SHUT-DOWN:
HARDWIRE THE BOILER SHUT-DOWN SWITCHES TO THE BOILER CONTROL PANEL.

CONTROL POINTS LIST

POINTS	INPUT					OUTPUT				
	ANALOG			DIGITAL		ANALOG			DIGITAL	
HEATING HOT WATER SYSTEM	TEMPERATURE	0-10 VDC	4-20 MA	STATUS	ALARM	0-10 VDC	4-20 MA	2-10 VDC	START/STOP	LED AT ALARM PANEL
BOILER-1 ENABLE									X	
BOILER-1 STATUS				X						
BOILER-1 ALARM					X					X
BOILER-2 ENABLE									X	
BOILER-2 STATUS				X						
BOILER-2 ALARM					X					X
BOILER-1 PRIMARY PUMP ENABLE									X	
BOILER-1 PRIMARY PUMP STATUS				X						
BOILER-2 PRIMARY PUMP ENABLE									X	
BOILER-2 PRIMARY PUMP STATUS				X						
HEATING HOT WATER SECONDARY PUMP-1 ENABLE									X	
HEATING HOT WATER SECONDARY PUMP-1 STATUS				X						
HEATING HOT WATER SECONDARY PUMP-1 SPEED						X				
HEATING HOT WATER SECONDARY PUMP-2 ENABLE									X	
HEATING HOT WATER SECONDARY PUMP-2 STATUS				X						
HEATING HOT WATER SECONDARY PUMP-2 SPEED						X				
BOILER-1 SUPPLY TEMPERATURE	X									
BOILER-2 SUPPLY TEMPERATURE	X									
HEATING HOT WATER SUPPLY TEMPERATURE	X									
HEATING HOT WATER RETURN TEMPERATURE	X									
HEATING HOT WATER PRIMARY LOOP FLOW						X				
HEATING HOT WATER SECONDARY LOOP FLOW						X				

1 HEATING HOT WATER DIAGRAM AND CONTROLS SEQUENCE OF OPERATION

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NO.	REVISION DESCRIPTION	BY	DATE

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

ISSUE FOR PERMIT

PROFESSIONAL ENGINEER - STATE OF NEVADA
STEPHEN T. MULCAHY
EXP. 12-31-2017
MECHANICAL
No. 15511

DATE: 08-15-2017

DRAWING TITLE:
HEATING HOT WATER PIPING DIAGRAM AND CONTROLS SEQUENCE OF OPERATION

UNLV PROJECT NUMBER: SLC-1706/PC-9008

DRAWN BY	SI	DATE	08/15/2017
DESIGNED BY	JB	SCALE	NTS
CHECKED BY	SM	JOB NO.	5221687

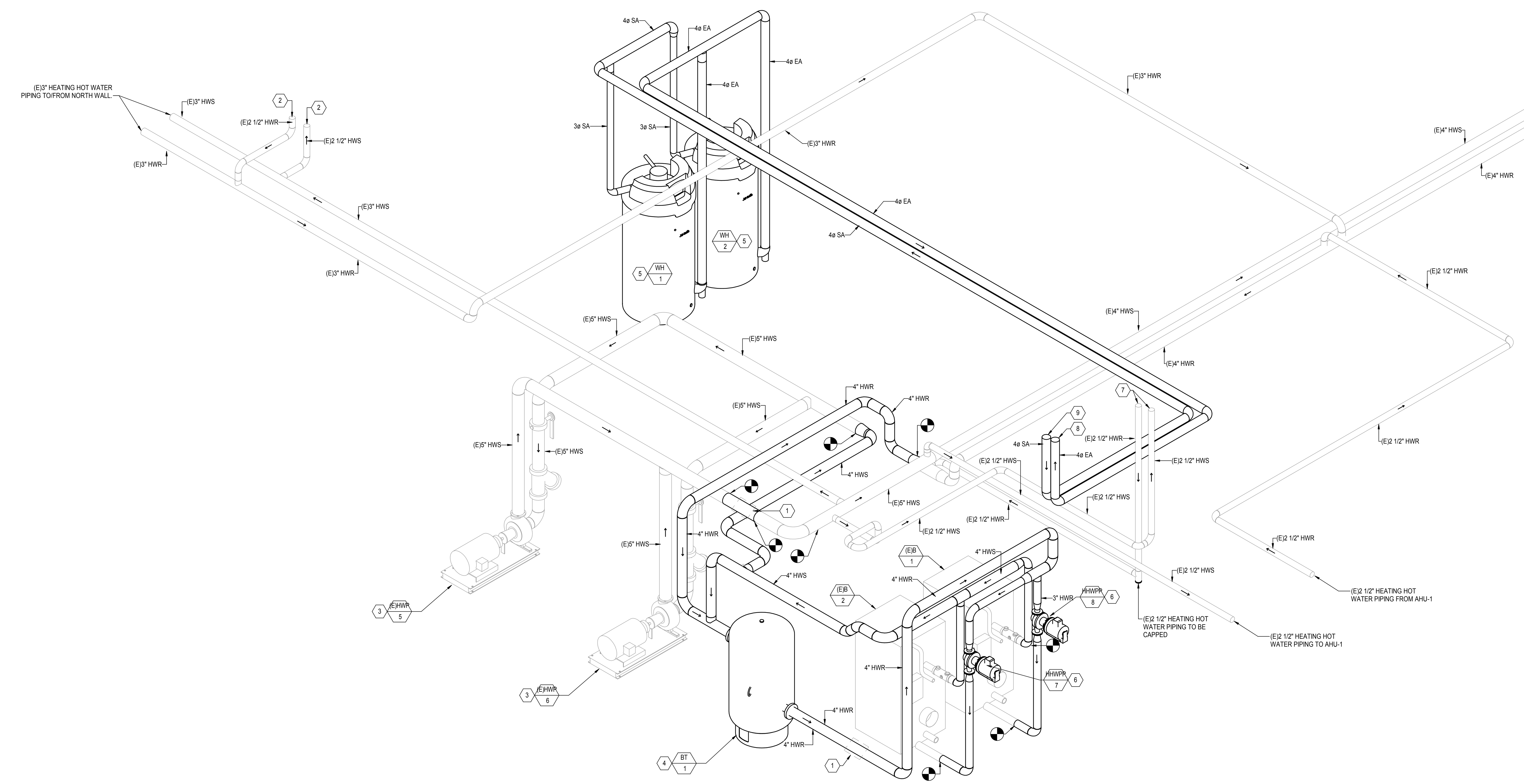
KEY PLAN

JOB TITLE
UNLV SHADOW LANE HEATING HOT WATER REPIPE
UNLV
1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.
M8.01

KEYNOTES

1. ONICON F-3500 FLOW METER LOCATION
2. E)2 1/2" HEATING HOT WATER PIPING UP TO/FROM THIRD LEVEL.
3. EXISTING HEATING HOT WATER PUMP.
4. NEW HEATING HOT WATER BUFFER TANK
5. NEW WATER HEATER SERVING DOMESTIC HOT WATER.
6. NEW HEATING HOT WATER PRIMARY PUMP.
7. (E)2 1/2" HEATING HOT WATER PIPING UP TO/FROM ROOF.
8. NEW EXHAUST AIR DUCT FROM WATER HEATER.
9. NEW SUPPLY AIR TO WATER HEATER.



1 HEATING HOT WATER PIPING ISOMETRIC
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DRAWING TITLE:
HEATING HOT WATER PIPING ISOMETRIC

UNLV PROJECT NUMBER: SLC-1706/PC-0008

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UNLV
1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.
M9.01

PLUMBING SPECIFICATIONS

PART 1 - GENERAL

1.01 CONDITIONS

A. GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, SPECIAL CONDITIONS, AND OTHER RELATED PORTIONS OF DIVISION 1, APPLY TO THIS SECTION.

1.02 REGULATIONS, CODES, PERMITS AND INSPECTIONS

A. COMPLY WITH ALL NATIONAL, STATE, COUNTY, AND CITY CODES, ORDINANCES, ETC., HAVING JURISDICTION, INCLUDING RULES AND REQUIREMENTS OF UTILITY SERVING AGENCIES.

B. INCORPORATE ALL CODES, ORDINANCES, ETC., INTO THE BASE BID AND INSTALLATION OF WORK. NO ADDITIONAL FUNDS SHALL BE ALLOCATED FOR WORK REQUIRED TO CONFORM TO REGULATIONS AND REQUIREMENTS AND/OR TO OBTAIN APPROVAL OF WORK.

C. OBTAIN AND PAY FOR ALL REQUIRED PERMITS AND LICENSES. WHEN REQUIRED BY CODE, ALL WORK MUST BE INSPECTED AND APPROVED BY LOCAL AUTHORITIES. PRIOR TO FINAL APPROVAL, FURNISH ARCHITECT WITH CERTIFICATES OF INSPECTION AND APPROVALS BY LOCAL AUTHORITIES.

1.03 DESIGN DRAWINGS

A. DESIGN DRAWINGS ARE DIAGRAMMATIC AND ARE ONLY INTENDED TO DEFINE THE BASIC FUNCTIONS REQUIRED. PROVIDE ALL WORK, MATERIAL, ETC., NECESSARY TO ACCOMPLISH THESE REQUIREMENTS. MINOR DEVIATIONS FROM THE DESIGN LAYOUT ARE ANTICIPATED AND ARE A PART OF THE WORK INCLUDED. HOWEVER, NO CHANGES THAT ALTER THE CHARACTER OF THE WORK WILL BE PERMITTED. DO NOT SCALE THE DESIGN DRAWINGS.

B. IF A CONFLICT OCCURS BETWEEN THE DESIGN DRAWINGS AND SPECIFICATIONS, PROMPTLY NOTIFY THE ARCHITECT AND/OR ENGINEER. AT THAT POINT, AN INTERPRETATION WILL BE MADE BY THE ARCHITECT AND/OR ENGINEER AND THIS DECISION SHALL BE CONSIDERED PART OF THE CONTRACT DOCUMENTS.

1.04 QUALIFICATIONS OF WORKMEN

A. USE SUFFICIENT JOURNEYMEN, CRAFTSMEN AND COMPETENT SUPERVISORS TO ENSURE PROMPT, PROPER, AND SAFE EXECUTION OF THE WORK.

1.05 SAFETY PRECAUTIONS

A. EXERCISE CAUTION AT ALL TIMES TO PROTECT ALL PERSONS AND PROPERTY. FURNISH TO EACH EMPLOYEE, EMPLOYMENT AND A PLACE OF EMPLOYMENT WHICH IS FREE FROM RECOGNIZED HAZARDS THAT ARE CAUSING, OR LIKELY TO CAUSE, DEATH OR SERIOUS INJURY OR HARM TO EMPLOYEES.

B. FURNISH AND MAINTAIN GUARDS, RAILINGS, FENCES, CANOPIES, LIGHTS, WARNING SIGNS, ETC., WHICH ARE REQUIRED BY LAW AND/OR NECESSARY TO PROTECT ALL PERSONS AND PROPERTY.

C. BE FAMILIAR WITH AND COMPLY WITH ALL APPLICABLE CODES AND LAWS, AND IN PARTICULAR, THE CODE OF FEDERAL REGULATIONS, AS ADMINISTERED BY THE INDUSTRIAL COMMISSION OF NEVADA.

1.06 SUBMITTALS

A. RECORD DRAWINGS:

1. MAINTAIN ACCURATE UNCEASING RECORDS OF ANY AND ALL CHANGES FROM THE CONTRACT DOCUMENTS AND SHOP DRAWINGS. UPON COMPLETION OF THE PROJECT, DELIVER TO THE OWNER, ONE (1) SET OF LEGIBLE AND REPRODUCIBLE COPIES OF THESE RECORD DRAWINGS.

B. GUARANTEE:

1. UPON COMPLETION OF THE PROJECT, DELIVER TO THE OWNER, A ONE (1) YEAR GUARANTEE OF THE SYSTEM, MATERIAL AND WORK PERFORMED. GUARANTEE THE ENTIRE COST, INCLUDING MATERIALS AND/OR LABOR, OF ALL WORK REQUIRED AND NECESSITATED BY DEFECT OF MATERIALS AND/OR WORKMANSHIP.

C. MANUAL AND OPERATION INSTRUCTIONS:

1. UPON THE COMPLETION OF THE PROJECT, DELIVER TO THE OWNER, A HARD BOUND "OWNER'S MANUAL". INCLUDE IN THE MANUAL INSTRUCTIONS PREPARED SPECIFICALLY FOR THE SYSTEMS PROVIDED, ALONG WITH ALL PAPERS, DESCRIPTIONS, PARTS LISTS, INSTRUCTIONS, WARRANTIES, ETC., WHICH WERE DELIVERED WITH THE MATERIALS AND EQUIPMENT UTILIZED IN THE PROJECT. IDENTIFY EACH ITEM BY DESIGNATION APPEARING ON THE DRAWINGS. AN ELECTRONIC COPY WILL BE GIVEN TO THE OWNER AS WELL.
2. AT A TIME DESIGNATED, PROVIDE A SUITABLE OPERATOR, MECHANIC OR ENGINEER TO GO OVER THE SYSTEM WITH OWNER'S REPRESENTATIVE TO THOROUGHLY FAMILIARIZE HIM WITH THE OPERATIONS AND MAINTENANCE OF THE SYSTEM.

PART 2 - PRODUCTS

2.01 GENERAL PRODUCTS

A. FURNISH AND INSTALL NEW PRODUCTS OF ESTABLISHED AND REPUTABLE AMERICAN MANUFACTURERS. ITEMS OF EQUIPMENT USED FOR THE SAME PURPOSE SHALL BE OF THE SAME MANUFACTURER.

B. SYSTEMS SHALL BE COMPLETE AND OPERABLE. ANY ACCESSORIES REQUIRED FOR OPERATION OF THE SYSTEMS SHALL BE INCLUDED AS THOUGH SPECIFICALLY INDICATED TO BE PROVIDED. PROVIDE SHUT-OFF VALVES FOR SUPPLY LINES TO EACH INDIVIDUAL ITEM OF EQUIPMENT. ALL VALVES SHALL BE CONCEALED WITHIN FIXTURE OR EQUIPMENT WHERE POSSIBLE.

C. SPECIFIC REFERENCE TO A MANUFACTURER'S PRODUCT IS ONLY TO ESTABLISH TYPE, QUALITY, AND PERFORMANCE REQUIRED. THESE QUALIFICATIONS ARE IN ADDITION TO THE REQUIREMENTS SHOWN ON THE PLANS AND ELSEWHERE IN THESE SPECIFICATIONS. LISTING OF ALTERNATE EQUIPMENT MANUFACTURERS SHALL NOT BE CONSTRUED AS AN UNCONDITIONAL APPROVAL OF THE PRODUCTS OF THOSE MANUFACTURERS.

2.02 PIPING MATERIALS

A. SEE PLUMBING MATERIALS MATRIX ON SHEET PL0.02

2.03 PIPE SUPPORTS

PIPE SUPPORTS AND HANGERS SHALL COMPLY WITH MSS SP-58 AND SP-69.

A. SOIL, WASTE, AND VENT:

1. HANGERS SHALL BE KIN-LINE NO. 455 W/ A MAXIMUM SPACING OF FIVE FEET.
2. HANGERS SHALL BE KIN-LINE NO. 455F WITH A MAXIMUM SPACING OF FOUR FEET.

B. WATER PIPING:

1. HANGERS SHALL BE KIN-LINE NO. 450F WITH A MAXIMUM SPACING OF FIVE FEET UP TO 3/4" SIZE, SIX FEET UP TO 1-1/4" SIZE, AND EIGHT FEET UP TO 2" SIZE. SUPPORT WATER PIPING IN WALLS WITH LSP "WATER FAB" KITS.

C. GAS PIPING:

1. HANGERS SHALL BE KIN-LINE NO. 455 WITH A MAXIMUM SPACING OF SIX FEET FOR 1/2" SIZE, EIGHT FEET FOR 3/4" OR 1" SIZE, AND TEN FEET FOR 1-1/4" OR LARGER.

2.04 NATURAL GAS PIPING SYSTEM:

A. GAS PIPING WILL BE SIZED BASED ON 2012 UPC TABLES 12/8-12 AND EQUATIONS 1216.3(1)(2).
B. ASSUMED SITE AVAILABLE GAS PRESSURE OF 5 PSI.
C. GAS PRESSURE REGULATORS WILL BE PROVIDED ON MEDIUM PRESSURE GAS PIPING SYSTEM TO ALL GAS FIRED MECHANICAL EQUIPMENT AND KITCHEN AREAS.
D. GAS PRESSURE REGULATOR WILL BE PROVIDED WITH A MINIMUM OF 1-INCH VENT UP TO 30 FEET AND INCREASE ONE PIPE SIZE EVERY 30 FEET TO TERMINAL POINT, OR FOLLOWING MANUFACTURER'S RECOMMENDATIONS.
E. BUILDING GAS METER TO BE PROVIDED BY OTHERS.

PART 3 - EXECUTION

3.01 GENERAL

A. INSTALL MATERIALS AND EQUIPMENT IN AN ARRANGEMENT WHICH WILL GIVE THE GREATEST PRACTICAL EASE OF OPERATION AND SERVICE BY THE OWNER.

B. INSTALL ALL EQUIPMENT IN ACCORDANCE WITH ALL MANUFACTURER'S RECOMMENDED INSTALLATION PROCEDURES.

C. PERFORM ALL WORK IN ACCORDANCE WITH THE BEST TRADE PRACTICES. INSTALL ALL MATERIALS AND EQUIPMENT SQUARELY WITH THE BUILDING LINES. PROVIDE RIGID PERMANENT BASES AND SUPPORTS FOR ALL WORK. CONSTRUCT AND BRACE EQUIPMENT, PIPING, ETC., SO THAT THERE WILL BE NO VIBRATION AND/OR RATTLING WHEN THE SYSTEM IS IN OPERATION.

D. COVER AND PROTECT ALL EQUIPMENT AND MATERIALS FROM WEATHER, THEFT, ETC., UNTIL DATE OF COMPLETION. PLUG AND/OR CAP ALL OPEN ENDS OF INSTALLED PIPING.

3.02 INSTALLATION

A. CONCEAL ALL PIPING IN WALLS, FURRED SPACES, PIPE SPACES, OR ABOVE CEILINGS, AS SHOWN ON THE DRAWINGS. GROUP PIPING WHEREVER PRACTICAL AND INSTALL UNIFORMLY IN STRAIGHT PARALLEL LINES, SQUARELY WITH BUILDING LINES.

B. SUPPORT HORIZONTAL PIPING ABOVE GRADE WITH PIPE HANGERS. DO NOT USE PERFORATED METAL TAPE. ARRANGE PIPING SO THAT THERMAL EXPANSION DOES NOT CAUSE STRESS. INSTALL AND SECURE PIPING SO THAT HOT AND COLD LINES, AND LINES OF DISSIMILAR METALS ARE NOT IN CONTACT.

C. VERIFY ALL EQUIPMENT DIMENSIONS AND REQUIREMENTS FOR ROUGH-IN WORK. BENDING OR OFFSETTING OF FINISHED PIPING CONNECTIONS AND COCKING OF FITTINGS OR TRIM WILL NOT BE ACCEPTABLE. DO NOT SUPPORT ANY PIPING WEIGHT FROM EQUIPMENT.

D. SANITARY: LAY PIPING AT A UNIFORM 1/4" PER FOOT GRADE. MAKE ALL JOINTS CLOSE AND SQUARE. USE FITTINGS FOR ALL TURNS AND OFFSETS. UNIFORMLY GRADE AND COMPACT TRENCHES PRIOR TO LAYING PIPING. PROVIDE CONTINUOUS SUPPORT FOR ALL PIPING.

E. VENTS THROUGH ROOF SHALL BE SEALED WITH A SEAMLESS LEAD FLASHING SYSTEM OF 4 LB. LEAD. VENT PIPE EXPOSED TO SUNLIGHT SHALL BE PAINTED WITH A WATER-BASE SYNTHETIC LATEX PAINT.

F. PIPING CONNECTIONS TO PLUMBING FIXTURES, EXPOSED PIPING AND FITTINGS SHALL BE CHROME PLATED.

G. CUTTING AND PATCHING SHALL BE APPROVED BY THE ARCHITECT PRIOR TO PERFORMING THE WORK.

3.03 TESTING REQUIREMENTS

A. TEST ALL SYSTEMS IN ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, ORDINANCES, ETC., IN PARTICULAR THE UNIFORM PLUMBING CODE, 2012 EDITION, AND AS FOLLOWS:

B. IF ANY TEST SHOWS THE WORK TO BE DEFECTIVE IN ANY WAY OR AT VARIANCE WITH SPECIFICATION REQUIREMENTS, MAKE ALL NECESSARY CHANGES AND REMEDY ALL DEFECTS.

C. TEST PIPING SYSTEMS AFTER INSTALLATION AND PRIOR TO BEING PUT INTO USE, COVERED OR CONCEALED BY INSULATION, BACKFILLING, OR BUILDING CONSTRUCTION.

3.04 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. DISINFECT WATER PIPING IN STRICT CONFORMANCE WITH THE REQUIREMENTS OF THE STATE OF NEVADA "WATER SUPPLY REGULATIONS", SECTION 3, AND LOCAL REQUIREMENTS.

GENERAL NOTES

1. SEE ARCHITECTURAL DRAWINGS FOR EXACT PLUMBING FIXTURE LOCATIONS, MOUNTING HEIGHTS AND QUANTITIES.

2. HANDICAPPED PLUMBING FIXTURES SHALL BE MOUNTED AT REQUIRED HEIGHTS AND WITH ALL RELATED ACCESSORIES AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION.

3. COORDINATE PLUMBING SYSTEMS WITH WORK OF ALL OTHER TRADES PRIOR TO FABRICATION OR INSTALLATION. PROVIDE ALL FITTINGS, OFFSETS AND TRANSITIONS AS REQUIRED FOR A COMPLETE WORKABLE INSTALLATION.

4. COORDINATE LOCATION OF ALLL ROOF OPENINGS WITH STRUCTURAL, MECHANICAL, AND ARCHITECTURAL PLANS PRIOR TO INSTALLATION.

5. PLATFORMS, CURBS, AND FLASHINGS FOR PLUMBING EQUIPMENT SHALL BE AS INDICATED ON THE STRUCTURAL AND ARCHITECTURAL PLANS, UNLESS NOTED OTHERWISE. COORDINATE EXACT SIZES OR REQUIRED OPENINGS AND SUPPORTS FOR FURNISHED EQUIPMENT.

6. COORDINATE WITH ELECTRICAL SECTION PRIOR TO ORDERING EQUIPMENT FOR AVAILABLE VOLTAGES AT EQUIPMENT.

7. PIPING OVER ELECTRICAL ROOMS CONTAINING MAIN DISTRIBUTION PANELS OR MOTOR CONTROL CENTERS, AND OTHER CRITICAL AREAS SHALL BE KEPT TO A MINIMUM AND SHALL NOT BE EXPOSED. SPECIAL PRECAUTIONS SHALL BE TAKEN TO PROTECT THESE AREAS FROM POSSIBLE LEAKAGE FROM NECESSARY OVERHEAD PIPING SYSTEMS.

8. VERIFY ALL EXISTING UTILITIES LOCATION, SIZE, DEPTH, PRESSURE, AND AVAILABILITY PRIOR TO START OF WORK AT POINT OF CONNECTION.

9. KEEP ALL PIPING CLEAR FROM LOAD BEARING FOOTINGS.

10. LAVATORIES IN PUBLIC RESTROOMS SHALL BE EQUIPPED WITH THE FOLLOWING:
A. OUTLET DEVICES THAT LIMIT FLOW TO A MAXIMUM OF .5 GPM.
B. DEVICES THAT LIMIT THE OUTLET TEMPERATURE TO A MAXIMUM OF 110F.

11. ALL WATER CONNECTIONS TO HVAC EQUIPMENT SHALL BE PROTECTED BY APPROVED REDUCED PRESSURE BACKFLOW DEVICES. DEVICES SHALL BE ACCESSIBLE FOR TEST AND MAINTENANCE.

12. ALL HOSE BIBBS, WALL HYDRANTS AND JANITATORIAL SERVICE SINKS AHALL BE EQUIPPED WITH APPROVED PROPERLY INSTALLED ATMOSPHERIC TYPE VACUUM BREAKER.

13. INSTALL SANITARY AND STORM PIPING 3" AND SMALLER WITH A 2% MIN. SLOPE AND 4" OR LARGER WITH A 1% MIN SLOPE.

14. ALL CLEANOUTS SHALL BE INSTALLED PER SECTION 707.0 AND SECTION 719.0 OF THE 2012 EDITION OF THE UNIFORM PLUMBING CODE.

15. ROOF DRAINS AND STORM DRAIN SYSTEM SIZED PER CITY OF LAS VEGAS REQUIREMENT OF 2" PER HOUR AVERAGE RAINFALL.

16. INTERIOR DOMESTIC HOT WATER RETURN PIPING SHALL BE INSULATED WITH 1" FIBERGLASS WITH A K-FACTOR OF .27 AT 75 DEGREES FARENHEIT, NON-COMBUSTIBLE, WITH AN ALL SERVICE JACKET AND WITH PVC FITTING COVERS IN ACCORDANCE WITH THE 2012 INTERNATIONAL ENERGY CODE.

17. PLUMBING MATERIALS INSTALLED IN A DUCT OR PLENUM SHALL NOT EXCEED A FLAME SPREAD INDEX OF MORE THAN 25 AND A SMOKE DEVELOPED INDEX OF MORE THAN 50.

18. FLOOR DRAINS OR SIMILAR TRAPS SUBJECT TO INFREQUENT USE SHALL BE PROTECTED WITH A TRAP SEAL PRIMER.

19. SEISMIC BRACING PACKAGE TO BE INCLUDED AS A DEFFERED SUBMITTAL.

CODE NOTES

BUILDING CODES

2012 INTERNATIONAL BUILDING CODE
2012 NATIONAL ELECTRIC CODE
2012 UNIFORM MECHANICAL CODE
2012 UNIFORM PLUMBING CODE
2012 INTERNATIONAL ENERGY CONSERVATION CODE
2012 INTERNATIONAL FIRE CODE
NEVADA STATE FIRE MARSHAL REGULATIONS

SHEET LIST

SHEET	TITLE
PL0.01	PLUMBING GENERAL NOTES AND SPECS
PL0.02	PLUMBING LEGENDS AND SYMBOLS
PL1.01.D	PLUMBING FLOOR PLAN DEMO
PL1.01	PLUMBING FLOOR PLAN
PL3.01	PLUMBING ELEVATION VIEWS
PL5.01	PLUMBING DETAILS
PL6.01	PLUMBING EQUIPMENT SCHEDULES
PL8.01	PLUMBING PIPING DIAGRAM
PL9.01	PLUMBING PIPIING ISOMETRIC

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HOT WATER REPIPE
UNLV

1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.
PL0.01

PLUMBING SYSTEMS

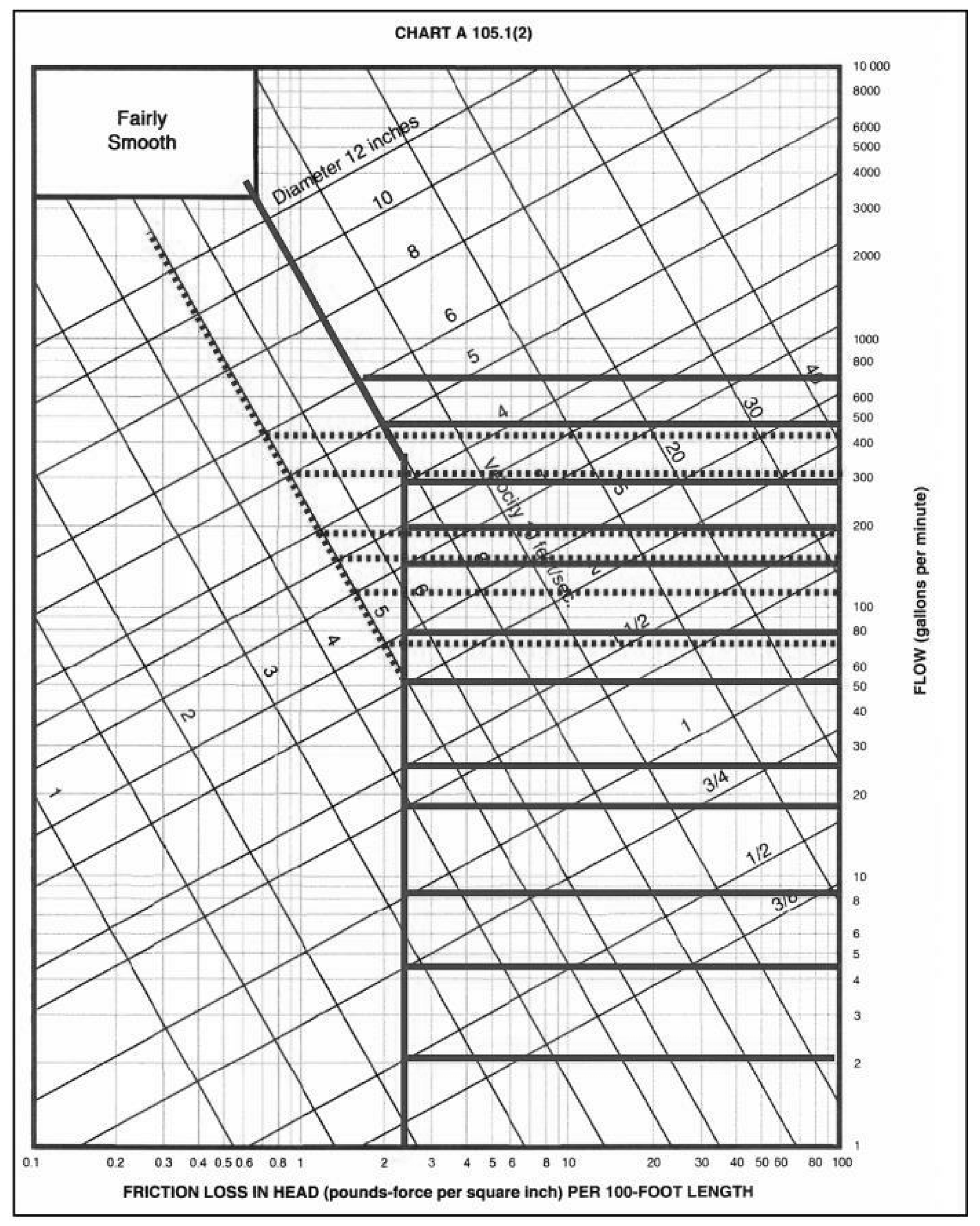
SYMBOL	DESCRIPTION
AV	ACID VENT
AW	ACID WASTE
CA	COMPRESSED AIR
CD	CONDENSATE
DCW	DOMESTIC COLD WATER
DCW[XX]	DOMESTIC COLD WATER - [TYPE]
DHW	DOMESTIC HOT WATER
DHW[XX]	DOMESTIC HOT WATER - [TYPE]
DHWR	DOMESTIC HOT WATER RETURN
DHWR[XX]	DOMESTIC HOT WATER RETURN - [TYPE]
GD	GARAGE DRAIN
GW	GREASE WASTE
HRV	HAZARDOUS RADON VENT
IW	INDIRECT WASTE
ICW	INDUSTRIAL COLD WATER
ICW[XX]	INDUSTRIAL COLD WATER - [TYPE]
IHW	INDUSTRIAL HOT WATER
IHWR	INDUSTRIAL HOT WATER RETURN
IV	INDUSTRIAL VENT
IW	INDUSTRIAL WASTE
IRW	IRRIGATION WATER
LPG	LIQUID PROPANE
G	NATURAL GAS
G[XX]	NATURAL GAS - [TYPE]
GV	NATURAL GAS VENT
NPW	NON-POTABLE WATER
PD	PUMPED DRAIN
RW	RECLAIM WATER
SAN	SANITARY SEWER
V	SANITARY VENT
SD	STORM DRAIN
OSD	STORM OVERFLOW DRAIN
SSD	SUBSOIL DRAIN
TW	TEPID WATER
TWR	TEPID WATER RETURN

TAG LEGEND

TAG	DESCRIPTION
TYPE / 01 / 1001 / COMMENT — TYPE ABBREVIATION; TYPE ID; PROJECT UNIQUE ID; COMMENT	EQUIPMENT INSTANCE TAG
TYPE-ID / 300 / 1001 / COMMENT — TYPE ABBREVIATION + INSTANCE ID; GPM; PROJECT UNIQUE ID; COMMENT	EQUIPMENT TYPE TAG W/GPM
CHWS / A 2 — SYSTEM; COLUMN GRID LETTER + NUMBER	PIPE RISER TAG (ONE SYSTEM)
01 / A 2 / SYSTEM 1 / SYSTEM 2 / SYSTEM 3 / SYSTEM 4 / SYSTEM 5 / DESTINATION — ID; COLUMN GRID LETTER + NUMBER; LIST OF SYSTEMS (SIZE + ABBREVIATION); RISER DESTINATION (LAST LINE)	PIPE RISER TAG (MULTI SYSTEM)
BLV-01 — TYPE ABBREVIATION + TYPE ID	VALVE TAG
SH-01 — TYPE ABBREVIATION + TYPE ID	PLUMBING FIXTURE TAG

PLUMBING SYMBOLS

SYMBOL	DESCRIPTION
	ANGLE VALVE
	AQUASTAT
	AUTOMATIC AIR VENT
	BACKFLOW PREVENTER - DOUBLE CHECK VALVE
	BACKFLOW PREVENTER - REDUCED PRESSURE VALVE
	BALANCING VALVE
	BALL VALVE
	BUTTERFLY VALVE
	CAP ON END OF PIPE
	CHECK VALVE
	CLEANOUT PLUG
	CLEANOUT TO GRADE
	CONCENTRIC REDUCER
	ECCENTRIC PIPE CHANGE
	EXPANSION JOINT
	FLEXIBLE CONNECTION (BRAIDED)
	FLOOR CLEANOUT
	FLOOR DRAIN WITH P-TRAP
	FLOOR SINK
	FLOW IN DIRECTION OF ARROW
	FLOW SWITCH
	GAS COCK, GAS STOP
	GATE VALVE
	GLOBE VALVE
	HOSE BIBB
	MANUAL AIR VENT
	MOTOR-OPERATED VALVE (SPECIFY TYPE)
	PIPE ANCHOR
	PIPE BRANCH – BOTTOM CONNECTION
	PIPE BRANCH – TOP CONNECTION
	PIPE GUIDE
	PIPE RISE OR DROP
	PIPE RISER DOWN
	PIPE RISER UP
	PLUG VALVE
	POINT OF CONNECTION
	POINT OF DISCONNECTION
	PRESSURE AND TEMPERATURE PORT
	PRESSURE GAUGE WITH GAUGE COCK
	PRESSURE REDUCING VALVE (GAS PRESSURE REGULATOR)
	PRESSURE REGULATING VALVE
	PRESSURE REGULATING VALVE (SELF-CONTAINED)
	PRESSURE RELIEF (SAFETY) VALVE
	PRESSURE SWITCH
	RECESSED WALL HYDRANT
	SOLENOID VALVE
	STEAM TRAP
	STRAINER
	TEE
	TEMPERATURE MIXING VALVE
	TEMPERATURE PRESSURE RELIEF VALVE
	THERMOMETER
	UNION
	WALL CLEANOUT
	WATER HAMMER ARRESTER



UPC APPENDIX A WATER PRESSURE CALCULATION

BLDG HEIGHT =	25'-0"	
25' X 0.433 P.S.I. PER FOOT =	10.825 P.S.I	
MIN. FIXTURE PRESSURE =	25 P.S.I	
BACKFLOW PREVENTER =	5 PSI	
WATER METER	5 PSI	
TOTAL	55.825 PSI	
MAX. HORZ. PIPE =	327 FEET	
MAX. VERT. PIPE =	25	
HORZ. PIPE LENGTH TAP TO METER	10	
HORZ PIPE LENGTH METER TO BUILIDING	10	
FITTING LOSS (ASSUME 50%) =	186 FEET	
TOTAL	558 FEET	
EXISTING BOOSTER PUMP PRESSURE =	60 P.S.I.	
BUILDING PRESSURE LOSS =	45.825 PSI	
DIFFERENCE	14.175 P.S.I.	
MAX ALLOWABLE PRESSURE DROP =	14.175 P.S.I. / 558 FEET	= 2.54 P.S.I / 100 FEET

MINIMUM WATER FIXTURE UNITS - DOMESTIC COLD WATER

PIPE SIZE	GPM	VELOCITY (MAX. 8 FPS)	FLUSH TANK - FU	FLUSH VALVE - FU
1/2"	2	2.79	1	0
3/4"	5	3.43	6	0
1"	10	4.02	14	0
1 1/4"	17	4.47	25	0
1 1/2"	28	4.99	48	11
2"	57	5.89	108	40
2 1/2"	101	6.76	195	84
3"	157	7.39	308	140
4"	299	8.00	591	282
6"	669	8.00	1332	652

NOTE:
1. DOMESTIC PIPING SYSTEMS DESIGNED TO 2.54 PSI FRICTION LOSS / 100 FT AND A MAX VELOCITY OF 8 FT/S

MINIMUM WATER FIXTURE UNITS - DOMESTIC HOT WATER

PIPE SIZE	GPM	VELOCITY (MAX. 5 FPS)	FLUSH TANK - FU	FLUSH VALVE - FU
1/2"	2	2.79	1	0
3/4"	5	3.43	6	0
1"	10	4.02	14	0
1 1/4"	17	4.47	25	0
1 1/2"	28	4.99	48	11
2"	48	5.00	90	31
2 1/2"	74	5.00	143	57
3"	106	5.00	206	89
4"	187	5.00	367	170
6"	418	5.00	830	401

NOTE:
1. DOMESTIC HOT WATER PIPING SYSTEMS DESIGNED TO 2.54 PSI FRICTION LOSS / 100 FT AND A MAX VELOCITY OF 5 FT/S

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DRAWING NO.
PL0.02

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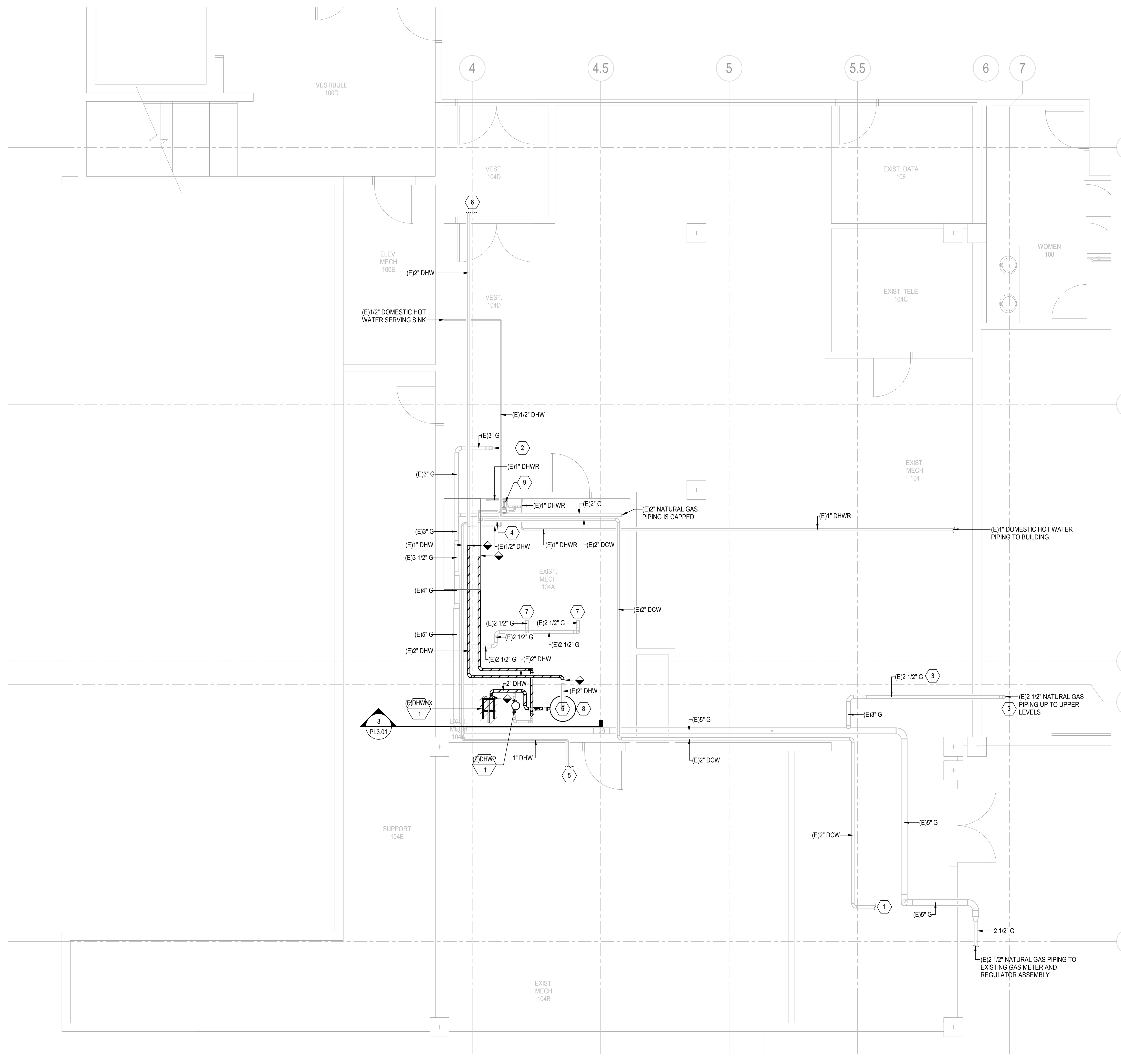
KEYNOTES

1. EXISTING 2" DOMESTIC COLD WATER FROM BOOSTER PUMP ASSEMBLY.
2. (E)3" NATURAL GAS PIPING UP TO ROOF TO SERVE EXISTING POWER GENERATOR
3. REFER TO PLUMBING DETAIL SHEET PL5.01 FOR (E)2 1/2" NATURAL GAS PIPING DIAGRAM
4. EXISTING DOMESTIC WATER CHECK VALVE TO BE EXAMINED AND REPLACED IF NECESSARY.
5. EXISTING DOMESTIC HOT WATER AND DOMESTIC HOT WATER RETURN TO/FROM SOUTH SIDE OF BUILDING.
6. EXISTING DOMESTIC HOT WATER AND DOMESTIC HOT WATER RETURN TO/FROM NORTH SIDE OF BUILDING.
7. 2 1/2" NATURAL GAS PIPING SERVING HEATING HOT WATER BOILER.
8. EXISTING DOMESTIC HOT WATER STORAGE TANK.
9. EXISTING DOMESTIC HOT WATER RECIRCULATION PUMP.



FIRST LEVEL - CENTRAL PLANT HEATING HOT WATER PLUMBING FLOOR PLAN DEMO

1 — 1/4" = 1'-0"

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STEPHEN T. MULCAHY
EXP. 12-31-2017
MECHANICAL
No. 15511

DATE: 08-15-2017

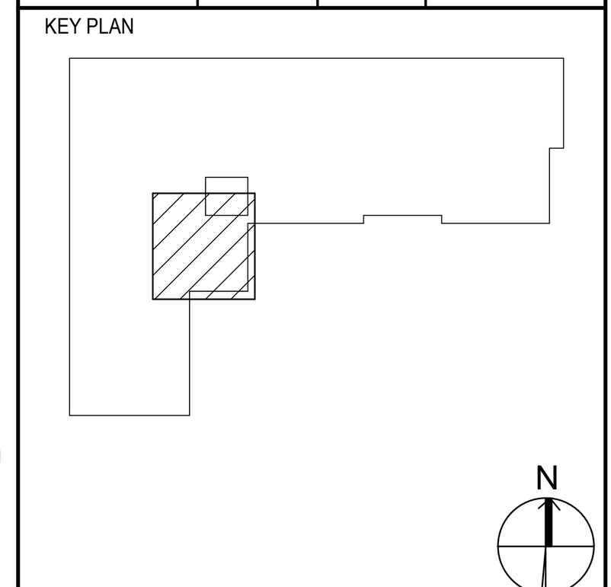
DRAWING TITLE:

PLUMBING FLOOR PLAN DEMO

UNLV PROJECT NUMBER: SLC-1706/PC-9008

DRAWN BY	SI	DATE	08/15/2017
DESIGNED BY	JB	SCALE	As indicated
CHECKED BY	SM	JOB NO.	5221687

KEY PLAN



JOB TITLE

UNLV SHADOW LANE HEATING HOT WATER REPIPE

UNLV

1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.

PL1.01.D

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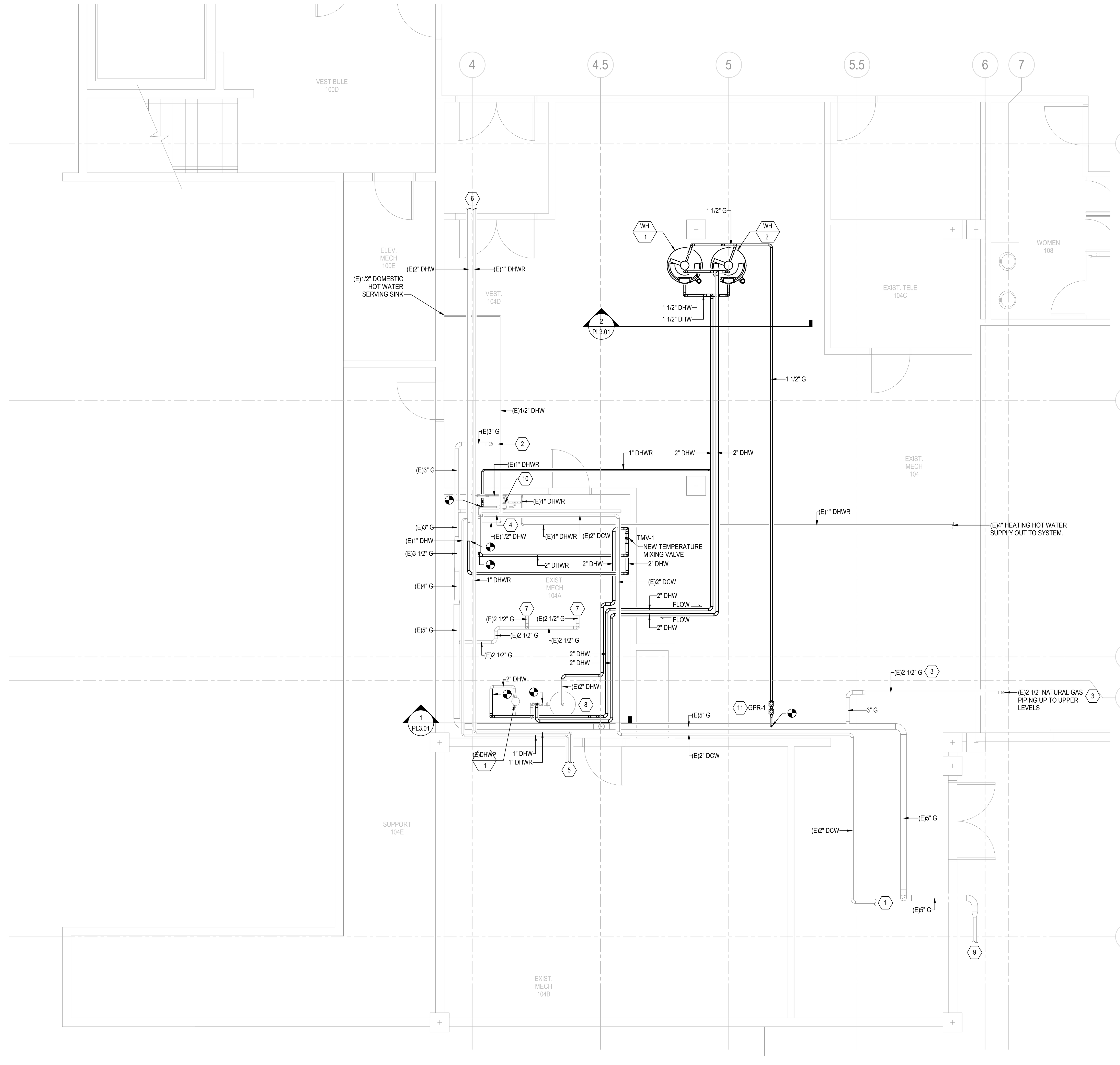
KEYNOTES

1. EXISTING 2" DOMESTIC COLD WATER FROM BOOSTER PUMP ASSEMBLY
2. (E)3" NATURAL GAS PIPING UP TO ROOF TO SERVE EXISTING POWER GENERATOR
3. REFER TO PLUMBING DETAIL SHEET PL5.01 FOR (E)2 1/2" NATURAL GAS PIPING DIAGRAM
4. EXISTING DOMESTIC WATER CHECK VALVE TO BE EXAMINED AND REPLACED IF NECESSARY.
5. EXISTING DOMESTIC HOT WATER AND DOMESTIC HOT WATER RETURN TO/FROM SOUTH SIDE OF BUILDING.
6. EXISTING DOMESTIC HOT WATER AND DOMESTIC HOT WATER RETURN TO/FROM NORTH SIDE OF BUILDING.
7. 2 1/2" NATURAL GAS PIPING SERVING HEATING HOT WATER BOILER.
8. EXISTING DOMESTIC HOT WATER STORAGE TANK.
9. NATURAL GAS PIPING TO EXISTING NATURAL GAS METER.
10. EXISTING DOMESTIC HOT WATER RETURN RECIRCULATION PUMP
11. SEE SHEET PL5.01 FOR GAS PRESSURE REDUCING VALVE DETAIL



1 FIRST LEVEL - CENTRAL PLANT HEATING HOT WATER PLUMBING FLOOR PLAN

1/4" = 1'-0"

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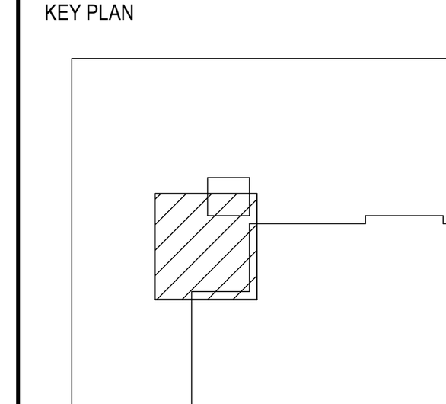
DRAWING TITLE:

PLUMBING FLOOR PLAN

UNLV PROJECT NUMBER: SLC-1706/PC-9008

DRAWN BY	SI	DATE	08/15/2017
DESIGNED BY	JB	SCALE	As indicated
CHECKED BY	SM	JOB NO.	5221687

KEY PLAN



JOB TITLE

UNLV SHADOW LANE HEATING HOT WATER REPIPE

UNLV

1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.

PL1.01

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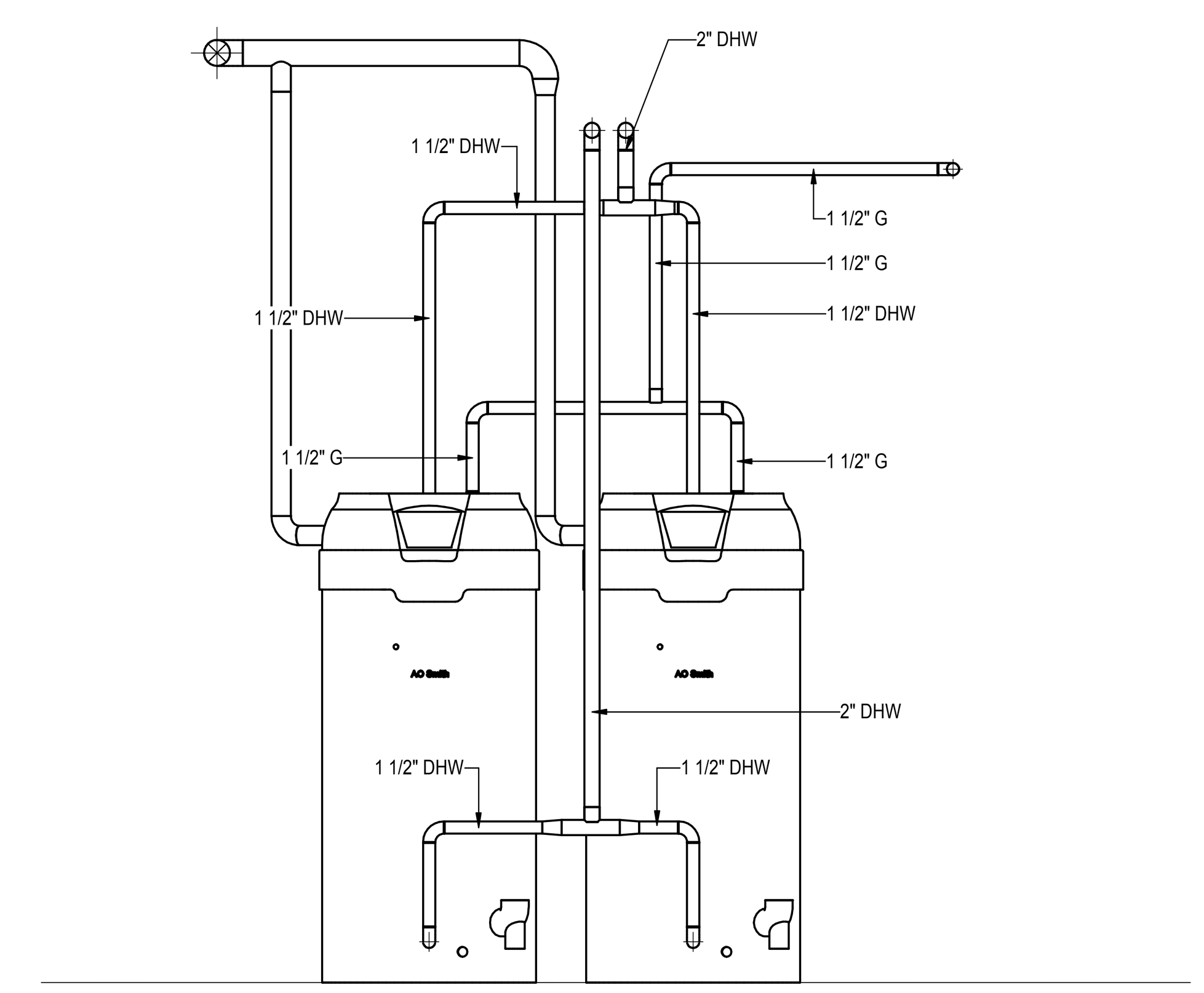
SHEET NOTES

A. REFER TO SHEET M8.01 FOR DETAILS

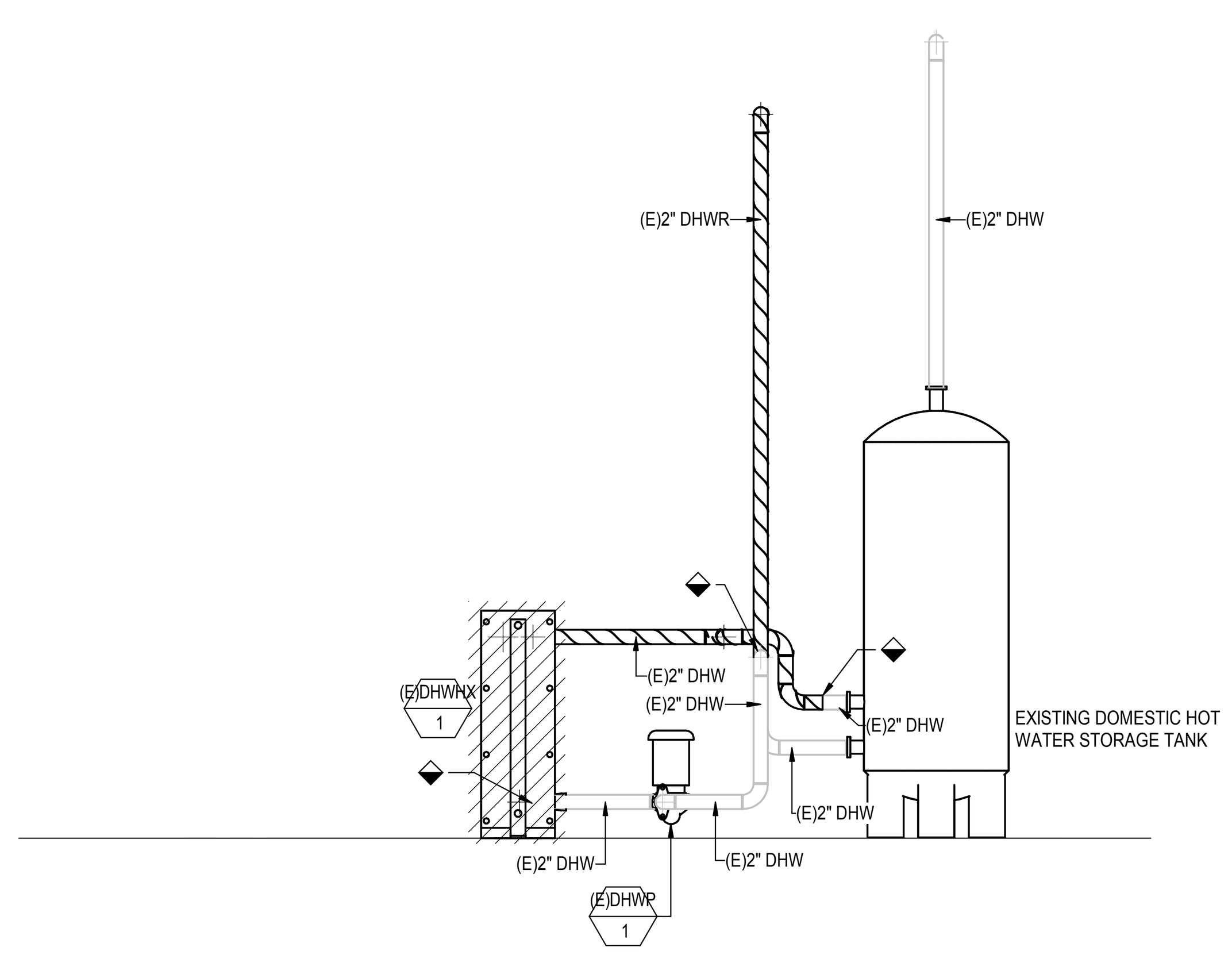
B. REFER TO SHEET M9.01 FOR ISOMETRIC



2 WATER HEATER NORTH ELEVATION VIEW

1/2" = 1'-0"

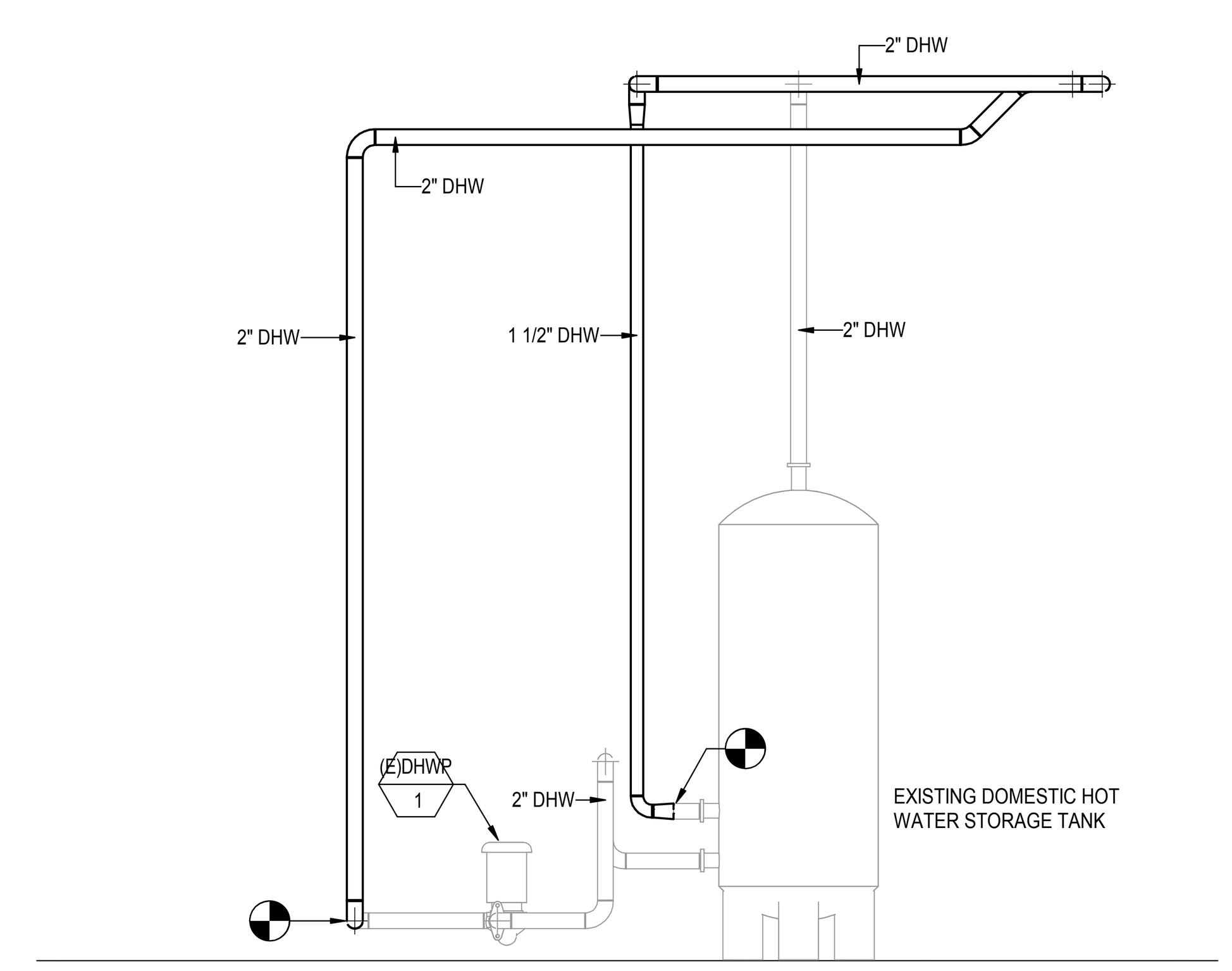
0 2' 4' 8'



3 PLUMBING NORTH DEMO ELEVATION VIEW

1/2" = 1'-0"

0 2' 4' 8'



1 PLUMBING NORTH ELEVATION VIEW

1/2" = 1'-0"

0 2' 4' 8'

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DRAWING TITLE:

PLUMBING ELEVATION VIEWS

UNLV PROJECT NUMBER: SLC-17/06PC-0008

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KEY PLAN

JOB TITLE

UNLV SHADOW LANE HEATING HOT WATER REPIPE

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PL3.01

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KEYNOTES

1. SOUTHWEST GAS TO PROVIDE GAS METER WITH ENOUGH CAPACITY TO SUFFICE LOAD REQUIREMENTS.
2. NEW HIGH PRESSURE GAS PIPING AT 5 PSI PER TABLE UPC 1216.2(6).

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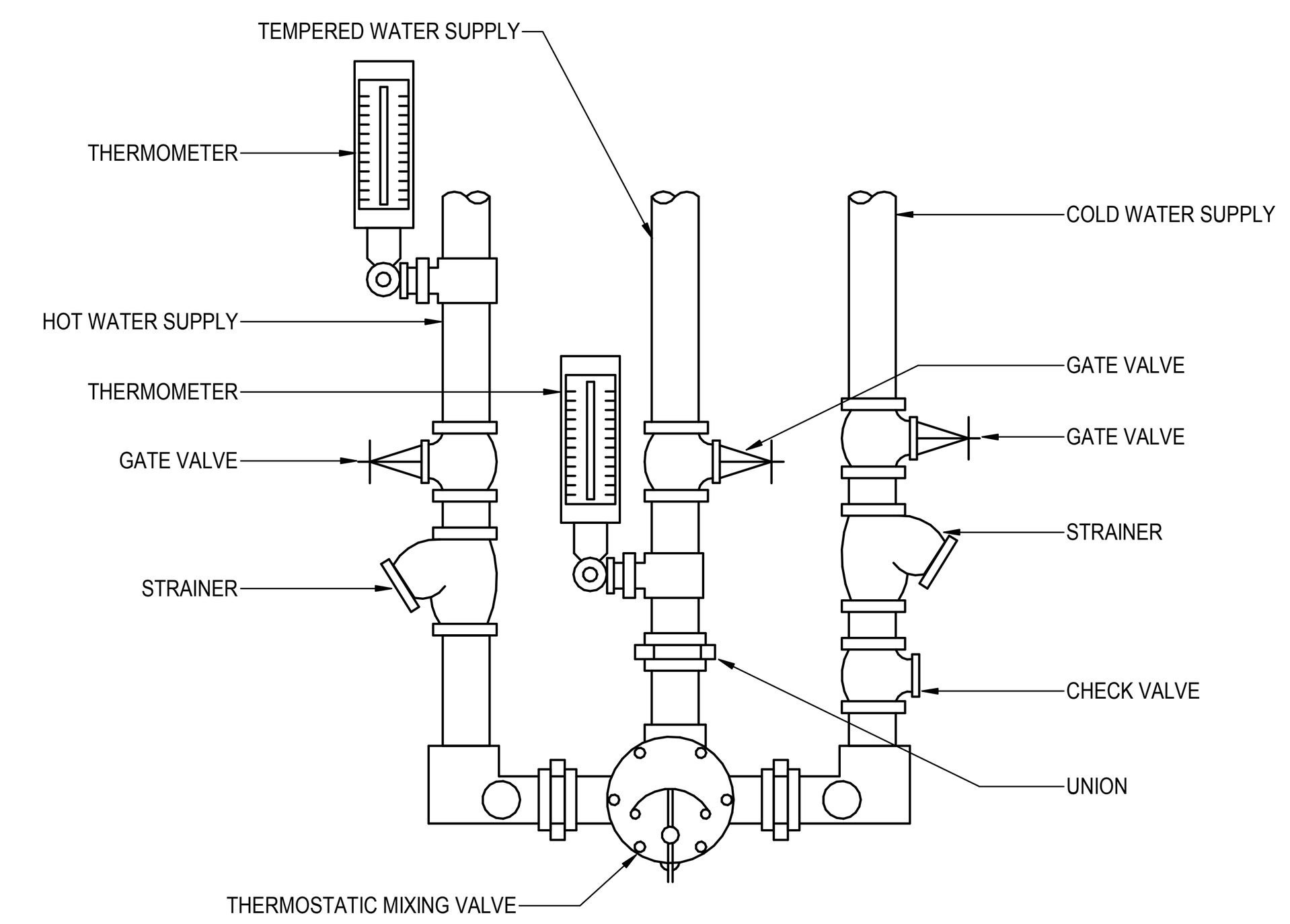
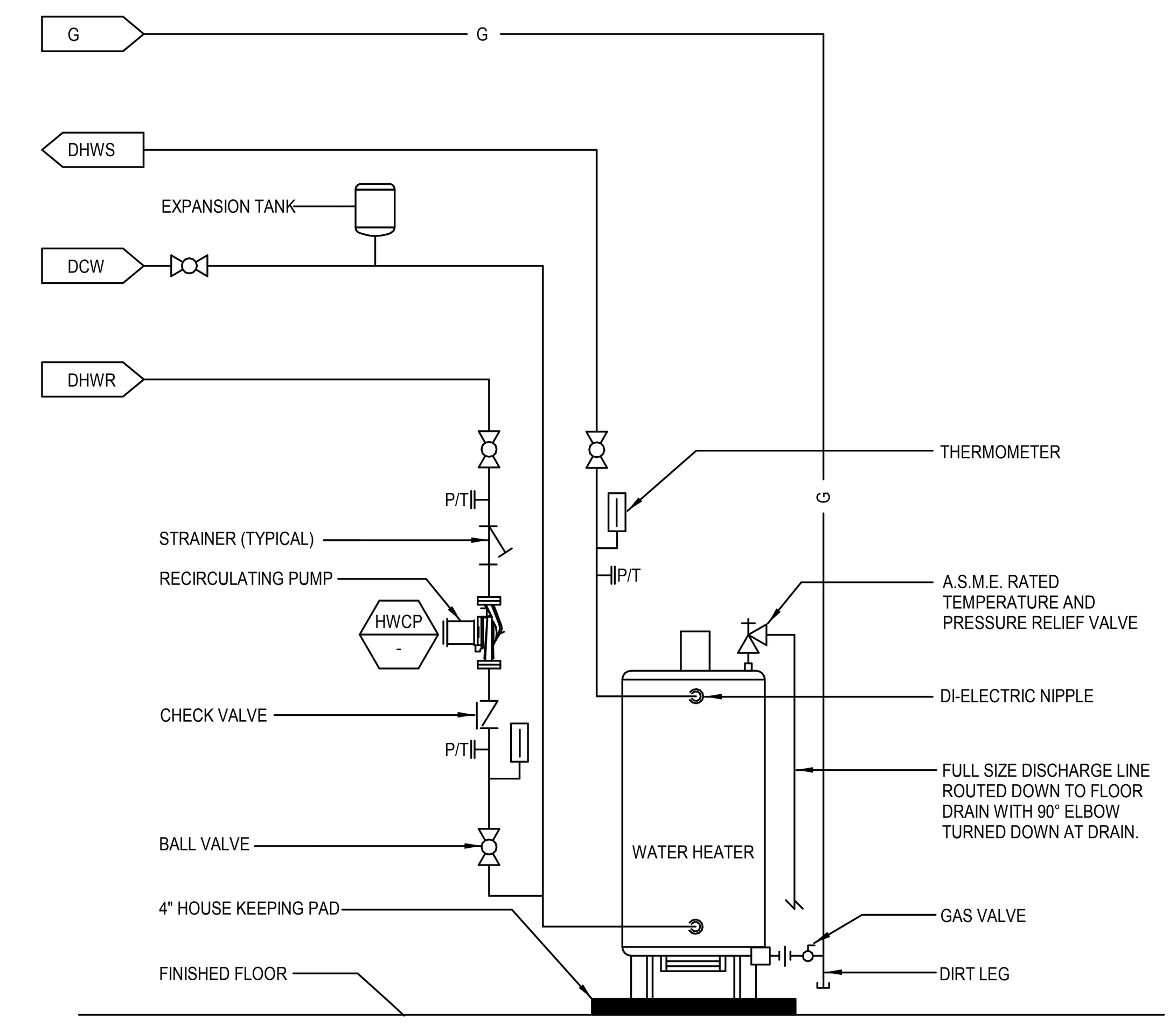


3 THERMOSTATIC MIXING VALVE DETAIL
NTS



2 GAS WATER HEATER DETAIL
NTS

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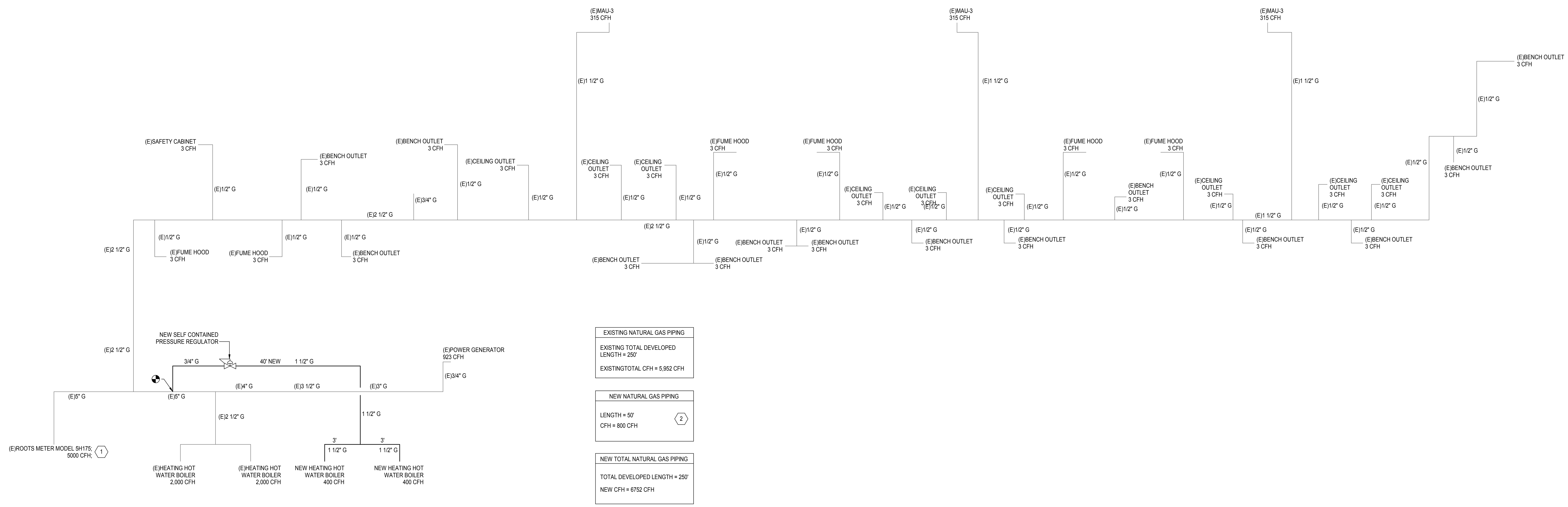

1 GAS DIAGRAM
NTS

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PLUMBING DETAILS

UNLV PROJECT NUMBER: SLC-1706/PC-9008

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KEY PLAN

JOB TITLE

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DRAWING NO.

PL5.01

DOMESTIC BOILER SCHEDULE

EQUIPMENT TAG	MANUFACTURER	MODEL				GAS DATA		MAX. FLOW [GPM]	STORAGE CAPACITY [GAL]	NAT. GAS LINE CONN. [IN]	NOTES
			RECOVERY [GPH]	TEMP RISE [° F]	LWT [°F]	INPUT [MBH]	VENT [IN]				
WH-1	AO SMITH	BTH-400(A)	576	80	140	399,900	4	150	119	1 1/2	1,2
WH-1	AO SMITH	BTH-400(A)	576	80	140	399,900	4	150	119	1 1/2	1,2

NOTES

1. COMBUSTION AIR INTAKE AND EXHAUST PIPED OUTDOORS WITH PVC PIP PER MANUFACTURER'S RECOMMENDATIONS
2. TWO UNITS MANIFOLDED TOGETHER TO PROVIDE DOMESTIC HOT WATER

GAS PRESSURE REGULATOR SCHEDULE

EQUIPMENT TAG	MANUFACTURER	MODEL	TYPE	LOCATION	SERVICE	MAXIMUM GAS FLOW [CFH]	INLET PRESSURE [PSIG]	OUTLET PRESSURE [IN. WC]	PIPE INLET [INCHES]	PIPE OUTLET [INCHES]	VENT SIZE [INCHES]	SPRING COLOR	ORIFICE SIZE	PIPE CONNECTION	REMARKS
GPR-1	GOVERNOR	30051DC 1/2"	VENTLESS	CENTRAL PLANT	WATER HEATERS	800	5	11	3/4	1 1/2	NO VENT	BLACK	-	SCREWED	1,2

NOTES

1. GAS REGULATOR SHALL COMPLY WITH CSA 6.22 FOR LINE PRESSURE VENTLESS REGULATORS
2. OVER PRESSURE DEVICE REQUIRED

THERMOSTATIC MIXING VALVE SCHEDULE

EQUIPMENT TAG	MANUFACTURER	MODEL	TYPE	LOCATION	SERVICE	CAPACITY [GPM]	PRESSURE DROP VALVE [PSI]	HOT WATER INLET [°F]	COLD WATER INLET [°F]	WATER OUTLET [°F]	REMARKS
TMV-1	LEONARD	LV-985-SW-LF	THERMOSTATIC	BOILER ROOM	DOMESTIC HOT WATER	216	50	140	60	130	1, 2

NOTES

1. ASSE 1017 CERTIFIED
2. TOP OR BOTTOM SUPPLY CONNECTIONS
3. CUPC CERTIFIED

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DATE: 08-15-2017

DRAWING TITLE:

PLUMBING EQUIPMENT SCHEDULE

UNLV PROJECT NUMBER: SLC-1706/PC-9008

DRAWN BY	SI	DATE	08/15/2017
DESIGNED BY	JB	SCALE	12" = 1'-0"
CHECKED BY	SM	JOB NO.	5221687

KEY PLAN

JOB TITLE

UNLV SHADOW LANE HEATING HOT WATER REPIPE

UNLV

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DRAWING NO.

PL6.01

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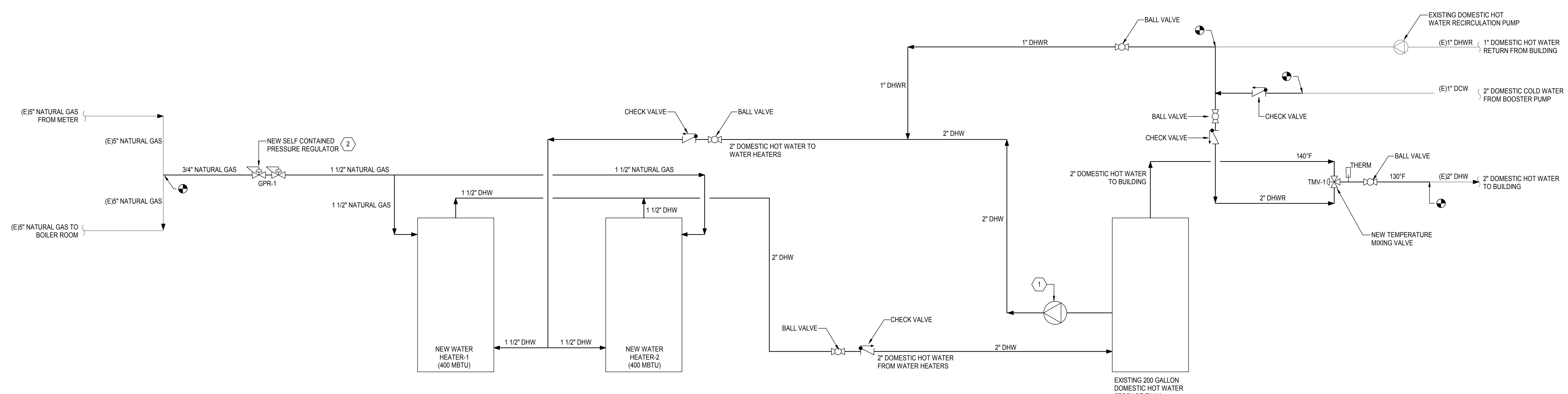
KEYNOTES

1. EXISTING DOMESTIC HOT WATER PUMP LOCATED IN BOILER ROOM TO REMAIN.
2. GAS PRESSURE REGULATOR TO BE LOCATED IN CENTRAL PLANT.



1 DOMESTIC HOT WATER DIAGRAM
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DATE: 08-15-2017

DRAWING TITLE:
DOMESTIC HOT WATER DIAGRAM

UNLV PROJECT NUMBER: SLC-1706/PC-9008

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DESIGNED BY	JB	SCALE	NTS
CHECKED BY	SM	JOB NO.	5221687

KEY PLAN

JOB TITLE

UNLV SHADOW LANE HEATING HOT WATER REPIPE

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DRAWING NO.

PL8.01

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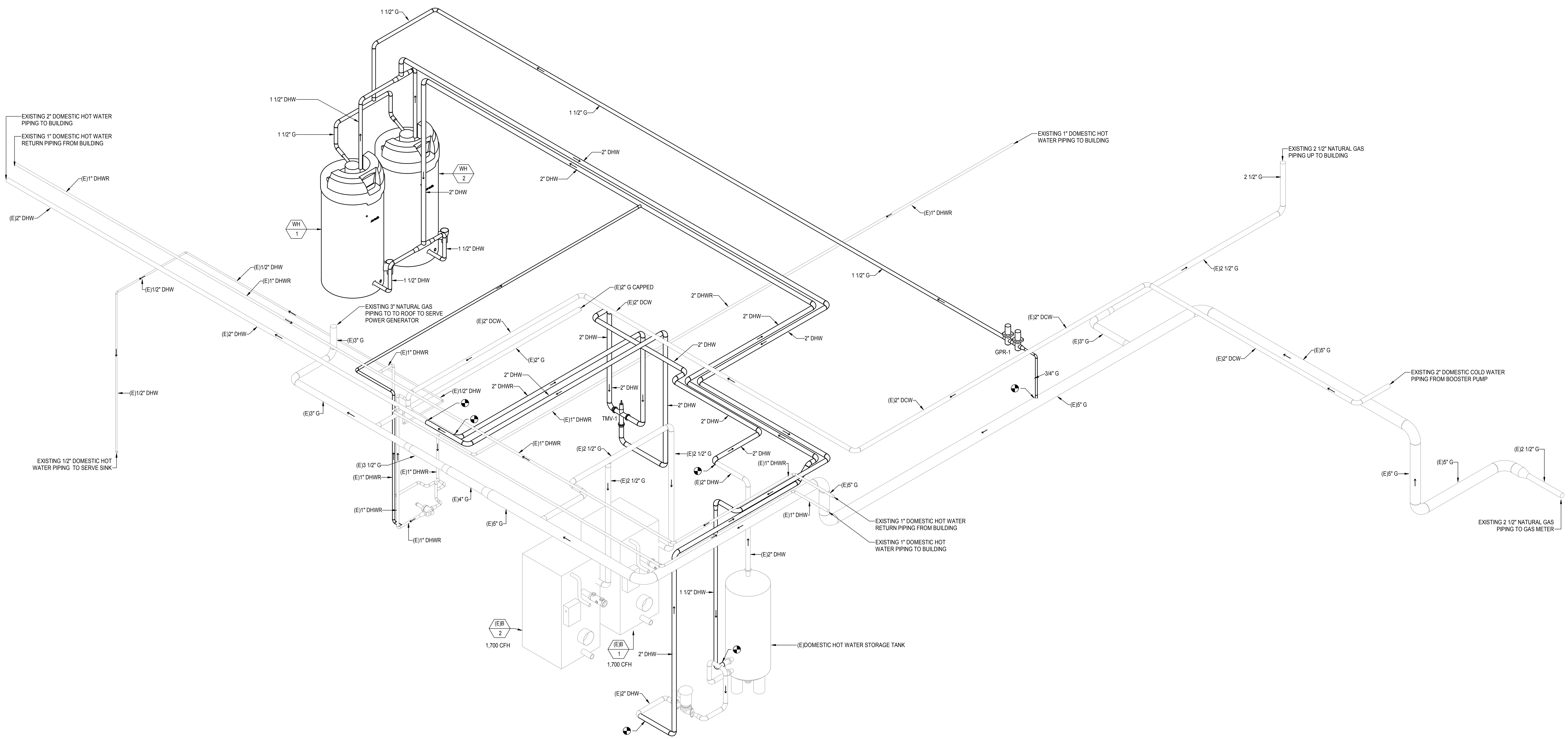

1 DOMESTIC HOT WATER PIPING ISOMETRIC

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DRAWING TITLE:

PLUMBING PIPING ISOMETRIC

UNLV PROJECT NUMBER: SLC-1706/PC-9008

DRAWN BY	SI	DATE	08/15/2017
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CHECKED BY	SM	JOB NO.	5221687

KEY PLAN

JOB TITLE

UNLV SHADOW LANE HEATING
HOT WATER REPIPE

UNLV

1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.

PL9.01

ABBREVIATIONS

ABBREV	DESCRIPTION
ABV	ABOVE
AFF	ABOVE FINISHED FLOOR
AD	AIR DOOR UNIT
AD	ACCESS DOOR
AI	ANALOG INPUT
AP	ACCESS PANEL
ACH	AIR CHANGES PER HOUR
AC OR A/C	AIR CONDITIONER
AC	AIR COMPRESSOR
AFS	AIR FLOW MEASUREMENT STATION
AHU	AIR HANDLING UNIT
AO	ANALOG OUTPUT
AS	AIR SEPARATOR
AMB	AMBIENT
AMPS	AMPERES
ATM	ATMOSPHERE, ATMOSPHERIC
AV	AUTOMATIC AIR VENT
AUX	AUXILIARY
ACCH	AIR COOLED CHILLER
BAS	BUILDING AUTOMATION SYSTEM
BDD	BACKDRAFT DAMPER
BF	BOTTOM FLAT, BLIND FLANGE
BFV	BUTTERFLY VALVE
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BHP	BRAKE HORSEPOWER
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
BLDG	BUILDING
BMS	BUILDING MANAGEMENT SYSTEM
BT	BUFFER TANK
CAP	CAPACITY
CAV	CONSTANT AIR VOLUME
CS	PACKAGED CENTRIFUGAL SEPARATOR
CS	CARBON STEEL
CLG	CEILING
CD	CEILING DIFFUSER
CHW	CHILLED WATER
CIRC	CIRCUIT
CB	CIRCUIT BREAKER
CDA	CLEAN DRY AIR
COP	COEFFICIENT OF PERFORMANCE
COV	CHANGE OF VALUE
CIA	COMBUSTION INLET AIR
CEA	COMBUSTION EXHAUST AIR
CONC	CONCRETE
CD	CONDENSATE DRAIN (DRAIN PAN)
CV	CONSTANT VOLUME
CVCP	CHLORINATED POLYVINYL CHLORIDE PIPE
CP	CONTROL PANEL
CFM	CUBIC FEET PER MINUTE
CRAC	COMPUTER ROOM AIR CONDITIONING
CT	COOLING TOWER
CPF	CHEMICAL POT FEEDER
CH	WATER COOLED CENTRIFUGAL CHILLER
CFWT	NON CHEMICAL WATER TREATMENT
CWP	CONDENSER WATER PUMP
CHWP	CHILLED WATER PUMP
CC	CONDUCTIVITY CONTROLLER
CPF	CHEMICAL POT FEEDER
CU	CONDENSING UNIT
°C	DEGREE CELSIUS
°F	DEGREE FAHRENHEIT
DI	DIGITAL INPUT
DP	DIFFERENTIAL PRESSURE
DDC	DIRECT DIGITAL CONTROL
DISCH	DISCHARGE
DS	DISCONNECT SWITCH
DCW	DOMESTIC (POTABLE) COLD WATER
D/L	DOOR LOUVER
DN	DOWN
DHW	DOMESTIC HOT WATER
DR	DRAIN
DWG	DRAWING
DB	DRY BULB TEMPERATURE
DO	DIGITAL OUTPUT
DT	FUEL OIL DAY TANK
EFF	EFFICIENCY
EGC	EGGCRATE GRILLE
EDH	ELECTRIC DUCT HEATER
EC	ELECTRICAL CONTRACTOR
ELEV	ELEVATION
ECHW	EMERGENCY CHILLED WATER
EER	ENERGY EFFICIENCY RATIO
EAT	ENTERING AIR TEMPERATURE
EWT	ENTERING WATER TEMPERATURE
EQUIP	EQUIPMENT
EVAP	EVAPORATIVE
EA	EXHAUST AIR
EF	EXHAUST FAN
EG	EXHAUST GRILLE
ER	EXHAUST REGISTER
(E) or E	EXISTING
ESP	EXTERNAL STATIC PRESSURE
ET	EXPANSION TANK
ERU	ENERGY RECOVERY UNIT
EPF	ELEVATOR PRESSURIZATION FAN
EPO	EMERGENCY POWER OFF
FCU	FAN COIL UNIT
FT	FEET
FTR	FINNED TUBE RADIATION
FPM	FEET PER MINUTE
FRP	FIBERGLASS REINFORCED PLASTIC
FD	FIRE DAMPER
F/LS	FIRE/LIFE SAFETY
F/SD	FIRE/SMOKE DAMPER
FLR	FLOOR
FD	FLOOR DRAIN
FS	FLOOR SINK
FLA	FULL LOAD AMPS
(F) or F	FUTURE
FPIU	FAN POWERED INDUCTION UNIT
FOP	FUEL OIL POLISHER
FOT	FUEL OIL STORAGE TANK
FOSP	FUEL OIL PUMP
FM	FLOW METER
GDP	GUARDED DRIP PROOF
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GS	GALVANIZED SHEETMETAL
GC	GENERAL CONTRACTOR
G	NATURAL GAS
GI	GRAVITY INTAKE
HOA	HAND/OFF/AUTO
HX	HEAT EXCHANGER
HE	HEAT EXHAUST
HTG	HEATING
HHW	HEATING HOT WATER
HHWS	HEATING HOT WATER SUPPLY
HHWR	HEATING HOT WATER RETURN
HVAC	HEATING, VENTILATING AND AIR CONDITIONING
HZ	HERTZ
HPC	HIGH-PRESSURE CONDENSATE
HPS	HIGH-PRESSURE STEAM
HORIZ	HORIZONTAL
HP	HORSEPOWER
HV	HOUSEKEEPING VACUUM
H'STAT	HUMIDISTAT
HG	REFRIGERANT HOT GAS
HWUH	HOT WATER UNIT HEATER
HWB	HOT WATER BOILER
HEX	PLATE AND FRAME HEAT EXCHANGER
IN	INCHES
ID	INSIDE DIAMETER OR DIMENSION

ABBREV	DESCRIPTION
KV	KILOVOLTS
KVA	KILOVOLT AMPERES
KW	KILOWATTS
LAT	LEAVING AIR TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
(L)	LINED
LRA	LOCKED ROTOR AMPS
LPC	LOW-PRESSURE CONDENSATE
LPS	LOW-PRESSURE STEAM
LBS	POUNDS
LD	LINEAR SLOT DIFFUSER
MUA	MAKE UP AIR
MAU	MAKE UP AIR UNIT
MB	MAN-BARS
MV OR MAV	MANUAL AIR VENT
MAX	MAXIMUM
MCB	MAXIMUM CIRCUIT BREAKER SIZE
MFS	MAXIMUM FUSE SIZE
MOP	MAXIMUM OVERCURRENT PROTECTION
MECH	MECHANICAL
MC	MECHANICAL CONTRACTOR
MER	MECHANICAL EQUIPMENT ROOM
MPC	MEDIUM-PRESSURE CONDENSATE
MPS	MEDIUM-PRESSURE STEAM
MS	MEMORY STOP (ON A VALVE)
MEZZ	MEZZANINE
MIN	MINIMUM OR MINUTE
MCA	MINIMUM CIRCUIT AMPACITY
MA	MIXED AIR
MOD	MODULATING
MCC	MOTOR CONTROL CENTER
MTD	MOUNTED
MBH	THOUSAND BTUH
NPSH	NET POSITIVE SUCTION HEAD
(N) or N	NEW
NPW	NON-POTABLE WATER
N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
NO.	NUMBER
OC	ON CENTER
ODP	OPEN DRIP PROOF
OBD	OPPOSED BLADE DAMPER
OSA or OA	OUTSIDE AIR
OD	OUTSIDE DIAMETER OR DIMENSION
OPD	OVERCURRENT PROTECTIVE DEVICE
OS	OCCUPANCY SENSOR
PPM	PARTS PER MILLION
PDU	POWER DISTRIBUTION UNIT
PH	PHASE
PHWP	PRIMARY HEATING WATER PUMP
PC	PLUMBING CONTRACTOR
PC	PUMPED CONDENSATE
POC	POINT OF CONNECTION
PP	PULSE PURE CONTROL PANEL
PPP	POLYPROPYLENE PIPE
PV	PHOTOVOLTAIC
PVC	POLYVINYL CHLORIDE
PVDF	POLYVINYLIDENE FLUORIDE
POS	POSITION
PSI	POUNDS PER SQUARE INCH
PRESS	PRESSURE
$\triangle$ P	PRESSURE CHANGE
PCV	PRESSURE CONTROL VALVE
PG	PRESSURE GAGE
PRS	PRESSURE REDUCING STATION
PRV	PRESSURE REGULATING VALVE
PSV	PRESSURE SAFETY (RELIEF) VALVE
PRTU	PACKAGED ROOF TOP AIR CONDITIONING UNIT
RAU	RECIRCULATION AIR UNIT
RDE	RECOMMENDED DUAL ELEMENT FUSE
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
RRE	REFRIGERANT RELIEF
RHC	REHEAT COIL
RH	RELATIVE HUMIDITY
RE	RELIEF AIR
(R) or R	RELOCATED
REQ'D	REQUIRED
RA	RETURN AIR
RAF	RELIEF AIR FAN
RG	RETURN GRILLE
RR	RETURN REGISTER
RPM	REVOLUTIONS PER MINUTE
RM	ROOM
RLA	RUNNING LOAD AMPS
RV	RELIEF VENT
SI	INTERNATIONAL SYSTEM OF UNITS
SCHED	SCHEDULE
SHT	SHEET
SD	SUCTION DIFFUSER
SD	SMOKE DETECTOR, SMOKE DAMPER
SA	SOUND ATTENUATOR, SUPPLY AIR
S/S	STAINLESS STEEL
SP	STATIC PRESSURE
SPF	STAIR PRESSURIZATION FAN
STM	STEAM
SA	SUPPLY AIR
SG	SUPPLY GRILLE
SR	SUPPLY REGISTER
SFT	SERIES FAN POWERED VAV TERMINAL
SHWP	SECONDARY HEATING WATER PUMP
TU	TERMINAL UNIT
THERM	THERMOMETER
THWP	TERTIARY HEATING WATER PUMP
T'STAT	THERMOSTAT
TF	TOP FLAT
TDH	TOTAL DYNAMIC HEAD
TP	TOTAL PRESSURE
TSP	TOTAL STATIC PRESSURE
TG	TRANSFER GRILLE
TYP	TYPICAL
U/C	UNDERCUT
U.O.N.	UNLESS OTHERWISE NOTED
UTR	UP THRU ROOF
UST	UNDERGROUND FUEL OIL STORAGE TANK
UH	UNIT HEATER
UPS	UNINTERRUPTED POWER SUPPLY
VD	MANUAL VOLUME DAMPER
VAV	VARIABLE AIR VOLUME
VTR	VENT THROUGH ROOF
VERT	VERTICAL
V	VOLTS
VAC	VOLTS ALTERNATING CURRENT
VDC	VOLTS DIRECT CURRENT
VFD	LOOSE VARIABLE FREQUENCY DRIVE
WC	WATER CLOSET
W	WATTS
WPDS	WEATHERPROOF DISCONNECT SWITCH
WGT	WEIGHT
WB	WET BULB TEMPERATURE
WMS	WIRE MESH SCREEN
WSA	WIRE SIZING AMPS
W/	WITH
W/O	WITHOUT
X'MER	TRANSFORMER

SHEET NUMBERING SYSTEM

DDS.NN.SS.P

"DD" DENOTES DISCIPLINE DESIGNATOR
- E - ELECTRICAL

"S" DENOTES SHEET SERIES
- 0 - GENERAL
- 1 - LIGHTING PLANS
- 2 - POWER PLANS
- 3 - AUXILIARY PLANS
- 4 - ENLARGED SCALE PLANS
- 5 - SIGNLE LINE DIAGRAMS
- 6 - SCHEDULES
- 7 - DIAGRAMS

"NN" DENOTES SHEET SEQUENCE NUMBER FOR ALL SHEET SERIES EXCEPT FOR "1" SERIES
"NN" FOR SHEET SERIES "1" (FLOOR PLANS) DENOTES BUILDING LEVEL
- B - BASEMENT LEVEL
- C - CRAWLSPACE
- H - PENTHOUSE
- P - PARKING LEVEL
- T - TUNNEL
- UG - UNDERGROUND
- RO - ROOF
- 01 - FIRST FLOOR, 02 - SECOND FLOOR, ETC.

"SS" DENOTES SECTOR

"P" DENOTES PHASING PLANS
- D - DEMO PLANS
- T - TEMPORARY PLANS

SHEET LIST

SHEET	TITLE
E0.01	SHEET LIST AND ABBREVIATIONS
E0.02	ELECTRICAL SYMBOLS
E0.03	ELECTRICAL SPECIFICATIONS
E2.01	FIRST LEVEL CENTRAL PLANT POWER PLAN
E5.01	ELECTRICAL SINGLE LINE DIAGRAM AND SCHEDULES

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NO.	REVISION DESCRIPTION	BY	DATE

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DRAWING TITLE:
SHEET LIST AND ABBREVIATIONS

UNLV PROJECT NUMBER: SLC-1706/PC-9008

DRAWN BY	JB	DATE	08/15/2017
DESIGNED BY	SP	SCALE	NTS
CHECKED BY	SP	JOB NO.	5221687

KEY PLAN

JOB TITLE
UNLV SHADOW LANE HEATING HOT WATER REPIPE
UNLV
1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.
E0.01

ELECTRICAL EQUIPMENT SYMBOLS

SYMBOL	DESCRIPTION
	MAJOR ELECTRICAL EQUIPMENT (GENERATOR, SWITCHBOARD, SWITCH GEAR, MOTOR CONTROL CENTER, PDU, UPS, ETC) SHALL BE DIMENSIONED PER EQUIPMENT MANUFACTURER'S SIZE
	480/277 VOLT DISTRIBUTION PANEL
	208/120 VOLT DISTRIBUTION PANEL
	SURFACE MOUNTED 480/277 VOLT BRANCH CIRCUIT PANEL
	FLUSH MOUNTED 480/277 VOLT BRANCH CIRCUIT PANEL
	SURFACE MOUNTED 208/120 VOLT BRANCH CIRCUIT PANEL
	FLUSH MOUNTED 208/120 VOLT BRANCH CIRCUIT PANEL
	SURFACE MOUNTED CONTROL CABINET AS INDICATED ON PLAN
	FLUSH MOUNTED CONTROL CABINET AS INDICATED ON PLAN
T	TRANSFORMER (PLAN)
	ELECTRICAL METER (PLAN)
#	MOTOR CONNECTION, NUMBER INDICATED NON-FRACTIONAL HORSEPOWER
	NON-FUSED DISCONNECT SWITCH: FIRST NUMBER INDICATES AMPERE RATING AND SECOND NUMBER INDICATES POLES, "INT" INDICATES CONNECTION TO DISCONNECT SWITCH INTEGRAL TO EQUIPMENT.
30/3/15	FUSIBLE DISCONNECT SWITCH: FIRST NUMBER INDICATES AMPERE RATING, SECOND NUMBER INDICATES POLES, AND THIRD NUMBER INDICATES FUSE SIZES, "INT" INDICATES CONNECTION TO DISCONNECT SWITCH INTEGRAL TO EQUIPMENT.
30/3*	FUSIBLE DISCONNECT SWITCH: FIRST NUMBER INDICATES AMPERE RATING, SECOND NUMBER INDICATES POLES, AND * INDICATES FUSE SIZES TO BE COORDINATED WITH MANUFACTURER OF EQUIPMENT SERVED. "INT" INDICATES CONNECTION TO DISCONNECT SWITCH INTEGRAL TO EQUIPMENT.
00	MOTOR STARTER CONTROLLER, NUMERAL INDICATES NEMA SIZE
VFD	VARIABLE FREQUENCY DRIVE
00	MOTOR STARTER CONTROLLER WITH FINAL EQUIPMNENT CONNECTION, NUMERAL INDICATES NEMA SIZE
VFD	VARIABLE FREQUENCY DRIVE WITH FINAL EQUIPMENT CONNECTION
	COMBINATION MOTOR STARTER CONTROLLER AND DISCONNECT SWITCH, NUMERAL INDICATES NEMA SIZE
VFD	COMBINATION VARIABLE FREQUENCY DRIVE AND DISCONNECT SWITCH, NUMERAL INDICATES NEMA SIZE
30/3	NON-FUSED DISCONNECT SWITCH WITH FINAL EQUIPMENT CONNECTION: FIRST NUMBER INDICATES AMPERE RATING AND SECOND NUMBER INDICATES POLES
30/3/15	FUSIBLE DISCONNECT SWITCH WITH FINAL EQUIPMENT CONNECTION: FIRST NUMBER INDICATES AMPERE RATING, SECOND NUMBER INDICATES POLES, AND THIRD NUMBER INDICATES FUSE SIZES
30/3*	FUSIBLE DISCONNECT SWITCH WITH FINAL EQUIPMENT CONNECTION: FIRST NUMBER INDICATES AMPERE RATING, SECOND NUMBER INDICATES POLES, AND * INDICATES FUSE SIZES TO BE COORDINATED WITH MANUFACTURER OF EQUIPMENT SERVED
00	COMBINATION MOTOR STARTER CONTROLLER AND DISCONNECT SWITCH WITH FINAL EQUIPMENT CONNECTION, NUMERAL INDICATES NEMA SIZE
VFD	COMBINATION VARIABLE FREQUENCY DRIVE AND DISCONNECT SWITCH WITH FINAL EQUIPMENT CONNECTION, NUMERAL INDICATES NEMA SIZE

POWER DEVICE SYMBOLS

SYMBOL	DESCRIPTION
	RECESSED WALL MOUNTED DUPLEX RECEPTACLE, +18" AFF U.O.N.
	RECESSED WALL MOUNTED SWITCHED DUPLEX RECEPTACLE, +18" AFF U.O.N.
	RECESSED WALL MOUNTED DUPLEX RECEPTACLE WITH GROUND FAULT INTERRUPTING PROTECTION, +18" AFF U.O.N.
	RECESSED WALL MOUNTED DUPLEX RECEPTACLE ON CIRCUIT DESIGNATED FOR COMPUTER POWER, +18" AFF U.O.N.
	RECESSED WALL MOUNTED DUPLEX ISOLATED GROUND RECEPTACLE, +18" AFF U.O.N.
	RECESSED WALL MOUNTED QUADRUPLEX RECEPTACLE, +18" AFF U.O.N.
	RECESSED WALL MOUNTED SWITCHED QUADRUPLEX RECEPTACLE, +18" AFF U.O.N.
	RECESSED WALL MOUNTED QUADRUPLEX RECEPTACLE WITH GROUND FAULT INTERRUPTING PROTECTION, +18" AFF U.O.N.
	RECESSED WALL MOUNTED QUADRUPLEX RECEPTACLE ON CIRCUIT DESIGNATED FOR COMPUTER POWER, +18" AFF U.O.N.
	RECESSED WALL MOUNTED QUADRUPLEX ISOLATED GROUND RECEPTACLE, +18" AFF U.O.N.
	RECESSED WALL MOUNTED SINGLE RECEPTACLE, +18" AFF U.O.N.
	RECESSED WALL MOUNTED SPECIALTY OUTLET, NEMA CONFIGURATION INDICATED, +18" AFF U.O.N.
	RECESSED WALL MOUNTED DUPLEX RECEPTACLE WITH TWO USB CHARGING PORTS, +18" AFF U.O.N.
	RECESSED WALL MOUNTED 4-PORT USB CHARGING OUTLET, +18" AFF U.O.N.
	RECESSED WALL MOUNTED CLOCK HANGER RECEPTACLE, +84" AFF U.O.N.
	RECESSED "FIRE DEPARTMENT OUTLET", L5-20R NEMA TYPE TWIST LOCK RECEPTACLE WITH WEATHERPROOF COVER PAINTED "FIRE-ALARM RED". MARKED "ONLY FOR FIRE DEPARTMENT USE", AND CONNECTED TO EMERGENCY CIRCUIT. MOUNT WITHIN 24" OF FIRE HOUSE VALVE
	RECESSED WALL MOUNTED JUNCTION BOX
	RECESSED WALL MOUNTED JUNCTION BOX WITH FINAL EQUIPMENT CONNECTION
	JUNCTION BOX
	JUNCTION BOX WITH FINAL EQUIPMENT CONNECTION
	SURFACE MOUNTED THERMAL MANUAL MOTOR STARTER SWITCH
	RECESSED WALL MOUNTED JUNCTION BOX FOR SYSTEMS FURNITURE BRANCH CIRCUITS (FINAL CONNECTION TO SYSTEMS FURNITURE POWER WHIP IS NOT INCLUDED), +18" AFF U.O.N.
	RECESSED WALL MOUNTED JUNCTION BOX FOR FINAL CONNECTION TO SYSTEMS FURNITURE WHIP, +18" AFF U.O.N.
	SURFACE MOUNTED DUPLEX RECEPTACLE, +18" AFF U.O.N.
	SURFACE MOUNTED SWITCHED DUPLEX RECEPTACLE, +18" AFF U.O.N.
	SURFACE MOUNTED DUPLEX RECEPTACLE WITH GROUND FAULT INTERRUPTING PROTECTION, +18" AFF U.O.N.
	SURFACE MOUNTED DUPLEX RECEPTACLE ON CIRCUIT DESIGNATED FOR COMPUTER POWER, +18" AFF U.O.N.
	SURFACE MOUNTED DUPLEX ISOLATED GROUND RECEPTACLE , +18" AFF U.O.N.
	SURFACE MOUNTED QUADRUPLEX RECEPTACLE, +18" AFF U.O.N.
	SURFACE MOUNTED SWITCHED QUADRUPLEX RECEPTACLE, +18" AFF U.O.N.
	SURFACE MOUNTED QUADRUPLEX RECEPTACLE WITH GROUND FAULT INTERRUPTING PROTECTION, +18" AFF U.O.N.
	SURFACE MOUNTED QUADRUPLEX RECEPTACLE ON CIRCUIT DESIGNATED FOR COMPUTER POWER, +18" AFF U.O.N.
	SURFACE MOUNTED QUADRUPLEX ISOLATED GROUND RECEPTACLE, +18" AFF U.O.N.
	SURFACE MOUNTED SINGLE RECEPTACLE, +18" AFF U.O.N.

SYMBOL	DESCRIPTION
	SURFACE MOUNTED SPECIALTY OUTLET NEMA CONFIGURATION INDICATED, +18" AFF U.O.N.
	SURFACE MOUNTED DUPLEX RECEPTACLE WITH TWO USB CHARGING PORTS, +18" AFF U.O.N.
	SURFACE MOUNTED 4-PORT USB CHARGING OUTLET, +18" AFF U.O.N.
	SURFACE "FIRE DEPARTMENT OUTLET", L5-20R NEMA TYPE TWIST LOCK RECEPTACLE WITH WEATHERPROOF COVER PAINTED "FIRE-ALARM RED". MARKED "ONLY FOR FIRE DEPARTMENT USE", AND CONNECTED TO EMERGENCY CIRCUIT. MOUNT WITHIN 24" OF FIRE HOUSE VALVE
	SURFACE MOUNTED JUNCTION BOX
	SURFACE MOUNTED JUNCTION BOX WITH FINAL EQUIPMENT CONNECTION
	SURFACE MOUNTED JUNCTION BOX FOR SYSTEMS FURNITURE POWER BRANCH CIRCUITS (FINAL CONNECTION TO SYSTEMS FURNITURE POWER WHIP IS NOT INCLUDED), +18" AFF U.O.N.
	SURFACE MOUNTED JUNCTION BOX FOR FINAL CONNECTION TO SYSTEMS FURNITURE POWER WHIP
	SURFACE MOUNTED RACEWAY WITH MULTI-OUTLET ASSEMBLY, LETTER INDICATES TYPE (PROJECT SPECIFIC)
	JUNCTION BOX FOR SYSTEMS FURNITURE POWER BRANCH CIRCUITS (FINAL CONNECTION TO SYSTEMS FURNITURE POWER WHIP IS NOT INCLUDED)
	JUNCTION BOX FOR FINAL CONNECTION TO SYSTEMS FURNITURE POWER WHIP
	FLUSH MOUNTED POKE-THRU FITTING FOR FINAL CONNECTION TO SYSTEMS FURNITURE POWER WHIP
	FLUSH MOUNTED MULTI-SERVICE FURNITURE FEED POKE-THRU FITTING WITH DUAL FINAL CONNECTIONS TO SYSTEMS FURNITURE POWER WHIP AND COMMUNICATIONS WHIP
	FLUSH MOUNTED FLOOR BOX FOR FINAL CONNECTION TO SYSTEMS FURNITURE POWER WHIP
	FLUSH MOUNTED MULTI-SERVICE FURNITURE FEED FLOOR BOX FOR DUAL FINAL CONNECTIONS TO SYSTEMS FURNITURE POWER WHIP AND COMMUNICATIONS WHIP
	FLUSH MOUNTED POKE-THRU FITTING WITH DUPLEX RECEPTACLE
	FLUSH MOUNTED POKE-THRU FITTING WITH QUADRUPLEX RECEPTACLE
	FLUSH MOUNTED POKE-THRU FITTING WITH ISOLATED GROUND DUPLEX RECEPTACLE
	FLUSH MOUNTED POKE-THRU FITTING WITH ISOLATED GROUND QUADRUPLEX RECEPTACLE
	FLUSH MOUNTED FLOOR BOX FITTING WITH DUPLEX RECEPTACLE
	FLUSH MOUNTED FLOOR BOX FITTING WITH QUADRUPLEX RECEPTACLE
	FLUSH MOUNTED FLOOR BOX FITTING WITH ISOLATED GROUND DUPLEX RECEPTACLE
	FLUSH MOUNTED FLOOR BOX FITTING WITH ISOLATED GROUND QUADRUPLEX RECEPTACLE
	DUPLEX RECEPTACLE RECESSED IN CEILING
	QUADRUPLEX RECEPTACLE RECESSED IN CEILING
	DROP CORD RECEPTACLE
	POWER POLE WITH DIVIDED RACEWAY FOR POWER AND COMMUNICATIONS CABLING
EPO	EMERGENCY POWER OFF PUSH BUTTON, +48" AFF U.O.N

SUBSCRIPTS USED WITH CONJUNCTION OF DEVICES ABOVE:

CM - COFFEE MAKER	OC - OVER COUNTER
CP - COPIER	P - PRINTER
D - DRYER	PJ - PROJECTOR
DL - DOOR LOCK DEVICE	PS - PROJECTION SCREEN
DW - DISHWASHER	REF - REFRIGERATOR
F - FAX MACHINE	SD - SMOLKE DAMPER
GD - GARBAGE DISPOSAL	TR - TAMPER RESISTANT
HG - HOSPITAL GRADE	TV - TELEVISION
HT - HOSPITAL GRADE/TAMPER RESISTANT	VAV - VAV CONTROL TRANSFORMER OR FAN ONLY
MD - MOTORIZED DAMPER	W - WASHER
MW - MICROWAVE	WP - WEATHERPROOF

GENERAL CIRCUITING INFORMATION

BASED ON SYMBOL

LIGHT FIXTURE (TYP)

A — LIGHT FIXTURE TYPE
PNL — PANEL DESIGNATION FOR CIRCUIT
1a — LIGHTING ZONE DESIGNATION
CIRCUIT NUMBER DESIGNATION

POWER DEVICE / EQUIPMENT (TYP)

PNL — PANEL DESIGNATION FOR CIRCUIT
1 — CIRCUIT NUMBER DESIGNATION

PNL — PANEL DESIGNATION FOR CIRCUIT
1,3,5 — CIRCUIT NUMBER DESIGNATION

SINGLE LINE SYMBOLS

SYMBOL	DESCRIPTION
A, CTRA	AMP METER
E, N, L	AUTOMATIC TRANSFER SWITCH
	BUSWAY
CBFR, TRTG	CIRCUIT BREAKER
	CONTACTOR/CONTROLLER
CTRA	CURRENT TRANSFORMER
	DIRECT CURRENT (DC) BATTERIES
CBFR, TRTG	DRAW-OUT CIRCUIT BREAKER
FUSZ, CBFR, TRTG	DRAW-OUT FUSED CIRCUIT BREAKER
	EXTENSION/CONTINUATION MARK
XXX, X X	FEEDER DESIGNATION
	FUSED
SWSZ, FUSZ	FUSED SWITCH
CBFR, TRTG, CBFR, TRTG	GENERATOR
~	GRAPHIC LINE BREAK
	GROUND CONNECTION
	INDUCTOR
	INVERTER
K	KEY LOCK
M	METER
	MICROTURBINE
HP	MOTOR
SWSZ	NON-FUSED SWITCH
	NORMALLY CLOSED (N.C.) RELAY
	NORMALLY OPEN (N.O.) RELAY
	RECTIFIER
###, ###	RELAY
	RESISTOR BANK
	SOLAR (PV) PANELS
	STATIC SWITCH
	SURGE ARRESTOR
	SWITCHED MOTOR CONTROLLER
	TAP BOX
•	TERMINATION/CONNECTION POINT
	TRANSFORMER
V, CTRA	VOLT METER
	WIND TURBINE

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DRAWING TITLE:

ELECTRICAL SYMBOLS

UNLV PROJECT NUMBER: SLC-1706/PC-0008

DRAWN BY	JB	DATE	08/15/2017
DESIGNED BY	SP	SCALE	NTS
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KEY PLAN

JOB TITLE

UNLV SHADOW LANE HEATING HOT WATER REPIPE

UNLV

1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.

E0.02

ELECTRICAL SPECIFICATIONS

PART 1 - CONDITIONS

A. GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, SPECIAL CONDITIONS, AND OTHER RELATED PORTIONS OF DIVISION 1 APPLY TO THIS SECTION.

B. COORDINATE WITH LOCAL UTILITIES SERVING THIS PROJECT FOR POWER, TELEPHONE, AND CABLE TV. CONTRACTOR SHALL INCLUDE IN THE BASE BID ALL COSTS FOR TRENCHING ,BACKFILL, CONDUIT, AND CABLING AS REQUIRED FOR COMPLETE AND OPERABLE INSTALLATION OF ALL UTILITY SYSTEMS AND EQUIPMENT.

C. ALL WORK FOR UTILITY COMPANY INSTALLATION SHALL COMPLY WITH UTILITY COMPANY STANDARDS AND REGULATIONS. CONTRACTOR SHALL INSTALL ALL UTILITY COMPANY CONDUITS, STRUCTURES, VAULTS AND PADS, ETC.,AS INDICATED ON THE UTILITY COMPANY SERVICE DRAWINGS FOR THIS PROJECT. OBTAIN A COPY OF ALL FINAL UTILITY SERVICE DRAWINGS AND PROVIDE ALL EQUIPMENT AND WIRING AS INDICATED. CONTRACTOR IS RESPONSIBLE FOR ALL INSTALLATION COSTS AND INPSECTION FEES FOR UTILITY COMPANY.

D. COORDINATE ALL MATERIAL DELIVERIES AND STORAGE DURING CONSTRUCTION. PROTECT ALL MATERIALAND EQUIPMENT FROM WEATHER, THEFT, OR DAMAGE. CONTRACTOR SHALL REPLACE ANY DAMAGED OR STOLEN MATERIALS WITHOUT COST TO THE OWNER.

E. COORDINATE WITH OWNER ALLOWABLE WORKING HOURS, LOCATION F OR PARKING, ETC., PRIOR TO BID AND INCLUDE ALL COSTS IN BASE BID.

F. REMOVE ALL TRASH AND CONSTRCUTION DEBRIS GENERATED AS A RESULT OF THE ELECTRICAL PORITON OF THE WORK. KEEP PROJECT SITE CLEAR OF ALL DEBRIS THROUGHOUT CONSTRUCTION PERIOD.

G. VISIT THE PROJECT SITE AND THOROUGHLY INVESTIGATE EXISTING CONDITIONS, INCLUDING EXISTING UNDERGROUND UTILITIES, PRIOR TO SUBMITTING BID. CAREFULLY EVALUATE ALL EXISTING MATERIAL, EQUIPMENT, ETC., WHICH IS TO BE REMOVED, REINSTALLED, ALTERED OR MODIFIED, AND INCLUDE ALL THESE COSTS IN THE BASE BID. DETERMINE EXISTING INSTALLATION WORK WHICH IS TO REMAIN TO SERVE AREAS OUTSIDE THE LIMITS OF THIS WORK AND INCLUDE ALL COSTS IN BASE BID FOR WORK WHICH MAY BE REQUIRED TO MAINTAIN EXISTING SERVICES. NO ADDITIONAL CHARGES WILL BE ALLOWED FOR FAILURE TO INCLUDE ALL LABOR AND MATERIAL THAT IS REQUIRED FOR RELOCATION OR MODIFICATION NECESSARY TO MAINTAIN THE EXISTING ELECTRICAL, COMMUNICATION, FIRE ALARM SYSTEM, ETC., INSTALLATIONS BEYOND THE LIMITS OF CONSTRUCTION.

H. WHERE WORK IS INDICATED OR REQUIRED IN AN AREA NOT DEFINED AS BEING RENOVATED, INCLUDE IN THE BASE BID ALL COSTS REQUIRED TO REMOVE, RELOCATE, REINSTALL, REPAIR AND/OR REPLACE EXISTING CONSTRUCTION AS MAY BE NECESSARY TO COMPLETE THE REQUIRED WORK. ALL AFFECTED AREAS SHALL BE RESTORED TO THE ORIGINAL OR BETTER CONDITION TO THE SATISFACTION OF THE ENGINEER, ARCHITECT, AND OWNER. NO ADDITIONAL CHARGES WILL BE ALLOWED FOR FAILURE TO INCLUDE ALL LABOR AND MATERIAL THAT IS REQUIRED FOR THIS WORK. WORK REQUIRED IN EXISTING FINISHED AREAS MUST BE COORDINATED WITH THE ARCHITECT AND OWNER TO ASSURE MINIMAL DISRUPTION OF NORMAL ACTIVITIES.

I. PLAN THE SEQUENCE OF DEMOLITION AND CONSTRUCTION SO THAT THE ENTIRE PROJECT IS CARRIED OUT WITH MINIMUM INTERRUPTIONS. AT LEAST TWO WEEKS PRIOR TO DEMOLITION, THE CONTRACTOR SHALL SUBMIT HIS PLAN FOR THE WORK, AND THE WORK SHALL NOT START WITHOUT THE OWNER'S APPROVAL.

J. CONFER WITH THE MANUFACTURER'S OF EXISTING EQUIPMENT AND SYSTEMS THAT ARE TO BE REWORKED OR EXTENDED, PRIOR TO ANY MODIFICATIONS TO INSURE THE INTEGRITY OF THE ORIGINAL EQUIPMENT WILL NOT BE REDUCED AND TO CONFIRM THAT SUCH MODIFICATIONS ARE FEASIBLE.

K. WHERE EXISTING ELECTRICAL WORK AND EQUIPMENT PREVENT PROPER CONSTRUCTION OF NEW WORK AS INDICATED, REMOVE, REROUTE OR IN OTHER WAYS ALTER EXISTING WORK IN ORDER TO ACCOMMODATE NEW WORK REQUIREMENTS. PROVIDE TEMPORARY WIRING AND APPARATUS AS REQUIRED TO FACILITATE PHASING OF THE WORK.

L. ALL WIRING FOR ALL NEW AND REPLACEMENT ITEMS WHICH ARE BEING PROVIDED AS PART OF THIS PROJECT SHALL BE NEW AND OF THE TYPES IDICATED IN THE CONTRACT DOCUMENTS. UNDER NO CIRCUMSTANCES WILL EXISTING WIRING BE PERMITTED TO BE REUSED. THIS INCLUDES WIRING FOR REPLACEMENT LIGHTING FIXTURES AND WIRING DEVICES FROM THE SOURCE OF POWER SUPPLY (PANELBOARDS) TO THE LAST FIXTURE OR DEVICE ON EACH CIRCUIT. EXISTING WIRING FOR LIGHTING FIXTURES AND WIRING DEVICES RENDERED OBSOLETE OR BEING REPLACED SHALL BE DISCONNECTED AND REMOVED IN THEIR ENTIRETY. THE EXISTING REACEWAYS MAY BE REUSED IF FEASIBLE AND NOT DAMAGED. OTHERWISE, NEW RACEWAYS SHALL BE PROVIDED AS PART OF THIS PROJECT.

M. WHERE THE PROJECT ENCOMPASSES DEMOLITION OF WALLS AND RELOCATION OR REPLACEMENT OF EXISTING ELECTIRCAL EQUIPMENT, FEEDERS, BRANCH WIRING, SIGNAL CABLES, ETC., WITH NEW WORK. REMOVE, REINSTALL, OR RELOCATE THAT PORTION OF THE EXISTING EQUIPMENT, SYSTEM, WIRING, FIXTURES AND DEVICES, ETC., WHICH APPLIES TO THE ELECTRICAL TRADE IN ACCORDANCE WITH THE CURRENT CODE REQUIREMENTS.

N. IN AREAS WHERE NEW CEILING, PARTITION WALLS, OR DOORS ARE ADDED, ANY EXISITNG SYSTEMS, SUCH AS FIXTURES, POWER, COMMUNICATION, FEEDERS, AND DEVICES ARE DESIGNATED TO REMAIN, RELOCATE AND REWORK THE EXISTING CIRCUITYR AND PROVIDE AND EXTEND ADDITIONAL MATERIALS AS REQUIRED TO INSURE PROPER OPERATION IN ACCORDANCE WITH CURRENT CODE REQUIREMENTS.

O. REPLACE CEILING TILES DAMAGED DURING THE WORK WITH NEW TILES TO MATCH THE EXISTING IN EVERY RESPECT.

P. ALL CODE VIOLATIONS ENCOUNTERED RELATING TO EXISTING CONDITIONS WHICH IS OR MAY BE AFFECTED BY THIS PROJECT SHALL BE IDENTIFIED AS TO TYPE OF VIOLATION, LOCATION, DESCIPTION AND CODE SECTION AS PART OF THIS PROJECT. THIS INFORMATION SHALL BE IN TYPEWRITTEN FORM AND GIVEN TO THE OWNER AND ENGINEER.

Q. RETURN ALL EQUIPMENT AND DEVICES REMOVED AND NOT RE-USED TO THE OWNER PER THEIR INSTRUCTIONS.

R. ALL RACEWAYS ABANDONED SHALL HAVE ALL WIRING REMOVED BACK TO NEXT ACTIVE SOURCE. ALL RACEWAYS ABANDONED SHALL BE REMOVED UNLESS NOTED OTHERWISE.

S. FIRE PROTECTION AND FIRE ALARM SYSTEMS SHALL NOT BE DISCONNECTED OR TAKEN OUT OF SERVICE WITHOUT FIRST OBTAINING APPROVAL FROM THE OWNER AND FIRE DEPARTMENT. COMPLY WITH THE FIRE DEPARTMENT'S REQUIREMENTS. PROVIDE ON SITE FIRE TRAINED WATCHMAN AS REQUIRED.

T. CONTRACTOR SHALL VERIFY AVAILABLE SPACE AND AMPACITY OF EXISTING SWITCHBOARDS, DISTRIBUTION PANELS, AND PANELBOARDS AFFECTED BY THE ADDITION OF NEW LOADS. PROVIDE WRITTEN DOCUMENTATION TO THE ARCHITECT / ENGINEER. DOCUMENTATION SHALL INCLUDE A MINIMUM 30 - DAY RECORDING (THREE PHASE AMPERES, KILOWATTS, AND POWER FACTOR).

U. THE TERM "PROVIDE" MEANS TO FURNISH AND INSTALL.

PART 2 - REGULATIONS, CODES, PERMITS, AND INSPECTIONS

A. COMPLY WITH ALL NATIONAL, STATE, COUNTY, CITY, AND LOCAL CODES AND ORDINANCES HAVING JURISDICTION, INCLUDING RULES AND REQUIREMENTS OF UTILITY SERVING AGENCIES.

B. INCORPORATE ALL CODES AND ORDINANCES INTO THE BASE BID AND INSTALLATION OF WORK. NO ADDITIONAL FUNDS WILL BE ALLOCATED FOR WORK REQUIRED TO CONFORM TO REGULATIONS AND REQUIREMENT AND / OR TO OBTAIN APPROVAL OF WORK.

C. OBTAIN AND PAY FOR ALL REQUIRED PERMITS AND LICENSES. WHEN REQUIRED BY CODE, ALL WORK MUST BE INSPECTED AND APPROVED BY LOCAL AUTHORITIES.

D. ALL INSTALLATIONS AT A MINIMUM SHALL COMPLY WITH THE FOLLOWING:
1. NEVADA STATE PUBLIC WORKS DIVISION ADOPTED STANDARDS
2. NATIONAL ELECTRIC CODE.
3. APPLICABLE NFPA STANDARDS.
4. HEALTH CODES.
5. FIRE CODE AS ADOPTED BY AUTHORITY HAVING JURISDICTION.
6. THE NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION STANDARDS.
7. AMERICAN NATIONAL STANDARDS INSTITUTE.
8. ALL LOCALL ADOPTED AMENDMENTS, CODES, AND ORDINANCES IN THE JURISDICTION OF THE PROJECT.
9. ALL ELECTRICAL COMPONENTS AND DEVICES SHALL BE U.L. LISTED OR OTHER RECOGNIZED TESTING FACILITY.

ALL CODES AND STANDARDS SHALL BE THE LATEST EDITIONS AS ADOPTED BY THE AUTHORITY HAVING JURISDICTION FOR THIS PROJECT. OBTAIN CURRENT COPIES OF ALL LOCALLY ADOPTED CODES AND ORDINANCES PRIOR TO BID AND INCLUDE ALL COSTS TO COMPLY WITH CODES AND ORDINANCES IN BASE BID.

PART 3 - DESIGN DRAWINGS

A. DESIGN DRAWINGS ARE DIAGRAMMATIC AND ARE ONLY INTENDED TO DEFINE THE BASIC FUNCTIONS REQURIED. PROVIDE ALL MATERIAL, ETC. NECESSARY TO ACCOMPLISH THESE REQUIREMENTS. MINOR DEVIATIONS FROM THE DESIGN LAYOUT ARE ANTICIPATED AND ARE A PART OF THE WORK INCLUDED. HOWEVER, NO CHANGES THAT ALTER THE CHARACTER OF THE WORK WILL BE PERMITTED. DO NOT SCALE THE DRAWINGS.

B. IF A CONFLICT OCCURS BETWEEN THE DESIGN DRAWINGS AND SPECIFICATIONS, BID THE GREATER QUALITY AND / OR QUANTITY.

PART 4 - SUBMITTALS

A. SHOP DRAWINGS
1. PRIOR TO ORDERING OR INSTALLATION OF ANY MATERIAL AND / OR EQUIPMENT TO THE JOB-SITE, SUBMIT SIX (6) HARD BOUND AND INDEXED COPIES OF A BROCHURE COMPLETELY DESCRIBING ALL SYSTEMS, COMPONENTS, MATERIAL, AND EQUIPMENT PROPOSED TO BE USED. ANY PIECE OF EQUIPMENT PLACED ON THE JOB WITHOUT PRIOR APPROVAL WILL BE SUBJECT TO REMOVAL.
2. PROVIDE SHOP DRAWING LAYOUT OF ALL ROOMS WITH ELECTRICAL DISTRIBUTION EQUIPMENT. LAYOUT SHALL SHOW LOCATIONS OF ELECTRICAL EQUIPMENT AND SHALL BE DRAWN TO SCALE.

B. RECORD DRAWINGS
MAINTAIN ACCURATE CONTINUOUS RECORDS OF ANY AND ALL CHANGES FROM THE CONTRACT DOCUMENTS AND SHOP DRAWINGS. UPON COMPLETION OF THE PROJECT, DELIVER TO THE OWNER, ONE (1) SET OF LEGIBLE AND REPRODUCIBLE COPIES OF THESE RECORD DRAWINGS.

C. GUARANTEE
ALL LABOR, MATERIAL, SYSTEMS, AND EQUIPMENT SHALL BE GUARANTEED FOR ONE (1) YEAR FROM PROJECT COMPLETION. GUARANTEE THE ENTIRE COST, INCLUDING MATERIALS AND / OR LABOR, OF ALL WORK REQUIRED AND NECESSITATED BY DEFECT OF MATERIALS AND / OR WORKMANSHIP. AS A CONDITION OF SUPPLYING MATERIAL FOR THIS PROJECT THE MANUFACTURERS AND SUPPLIERS AGREE TO DEFEND, HOLD HARMLESS, AND TO INDEMNIFY OWNER, ENGINEER, ARCHITECT AND ALL RELATED SUBSIDIARIES AGAINST ANY LIABILITY ARISING OUT OF PROJECT FAILURE OR MANUFACTURING DEFECT OF THE EQUIPMENT PROVIDED.

D. MANUAL AND OPERATING INSTRUCTIONS
1. UPON COMPLETION OF THE PROJECT, DELIVER TO THE OWNER, A HARD BOUND "OWNER'S MANUAL". INCLUDE IN THE MANUAL INSTRUCTIONS PREPARED SPECIFICALLY FOR THE SYSTEMS PROVIDED, ALONG WITH ALL PAPERS, DESCRIPTIONS, PARTS LISTS, INSTRUCTIONS, WARRANTIES, ETC., WHICH WERE DELIVERED WITH THE MATERIALS AND EQUIPMENT UTILIZED IN THE PROJECT. IDENTIFY EACH ITEM BY DESIGNATION APPEARING ON THE DRAWINGS.
2. AT THE TIME DESIGNATED, PROVIDE A SUITABLE OPERATOR, ELECTRICIAN, OR ENGINEER, TO REVIEW THE SYSTEM WITH OWNER'S REPRESENTATIVE TO THOROUGHLY FAMILIARIZE HIM WITH THE OPERATIONS AND MAINTENANCE OF THE SYSTEM.

PART 5 - GENERAL PRODUCTS

A. RACEWAYS
1. MINIMUM RACEWAY SIZE IS 1/2" UNLESS NOTED OTHERWISE
2. CONDUIT SHALL BE ELECTRICAL METALLIC TUBING (EMT), INTERMEDIATE METALLIC CONDUIT (IMC), OR RIGID GALVANIZED STEEL CONDUIT (RGS).
3. FLEXIBLE METAL CONDUIT MAY BE USED FOR FINAL CONNECTION TO LIGHT FIXTURES AND FOR FINAL CONNECTION TO MOTORS.
4. METAL CLAD CABLE (TYPE MC) MAY NOT BE USED.
5. CONDUIT INSTALLED CONCEALED MAY BE EMT OR IMC, UNLESS NOTED OTHERWISE.
6. CONDUIT SUBJECT TO PHYSICAL DAMAGE SHALL BE RGS, UNLESS NOTED OTHERWISE.
7. UNDERGROUND OR IN-SLAB CONDUIT SHALL BE PVC COATED RGS, UNLESS NOTED OTHERWISE.

B. CONDUIT FITTINGS
1. IMC AND RGS: NON-SPLIT THREADED STEEL, ZINC DIE CAST IS NOT ACCEPTABLE
2. EMT: SET SCREW TYPE.
3. BUSHINGS SHALL BE METALLIC INSULATED TYPE.
4. FACTORY BENDS SHALL BE USED FOR ANY CONDUIT SIZE 2" OR LARGER. UNDERGROUND BENDS SHALL BE PVC COATED RGS.

C. OUTLET / JUNCTION / PULL BOXES
1. OUTLET BOXES SHALL BE PROVIDED AS SHOWN OR REQUIRED BY CODE.
2. OUTLET BOXES SHALL BE CODE GUAGE GALVANIZED STEEL, 4" SQUARE AND 2 - 1/8" DEEP WITH PLASTER RING.
3. PROVIDE RAISED COVERS AND FIXTURE STUDS FOR OUTLET BOXES WHERE REQUIRED.
4. PROVIDE BLANK COVERS FOR OUTLET BOXES WITHOUT DEVICES.
5. PROVIDE 6" SEPARATION BETWEEN BACK - TO - BACK OUTLET BOXES.
6. BOXES FOR OUTDOOR USE AND DAMP LOCATIONS SHALL BE WEATHERPROOF GASKETED CAST METAL TYPE.
7. BOXES IN HAZARDOUS LOCATIONS SHALL BE CAST FREE ALUMINUM OR AS REQUIRED TO SUIT INTENDED APPLICATION.
8. ALL BOXES SHALL BE SIZED PER NEC REQUIREMENTS FOR NUMBER AND SIZE OF CONDUCTORS AND CONDUIT ENTRIES TO SUIT INTENDED APPLICATION.
9. COVERS SHALL BE FULLY ENCLOSED AND SECURED AT ALL CORNERS.
10. GRADE MOUNTED PULL BOXES SHALL BE MADE OF CONCRETE CONSTRUCTION WITH BOLT DOWN CONCRETE CONCRETE COVERS. PROVIDE A MINIMUM 4" CONCRETE COLLAR AROUND PULLBOX.
11. FLOOR BOXES SHALL BE GALVANIZED CAST IRON TYPE WITH BRASS COVERS AND FLANGES SUITABLE FOR CONDUIT AND DEVICES INDICATED. FLOOR BOXES SHALL BE MANUFACTURED BY STEEL CITY OR APPROVED EQUAL.

D. WIRE AND CABLE
1. CONDUCTORS #10 AWG AND SMALLER SHALL BE SOLID. CONDUCTORS LARGER THAN #10 AWG SHALL BE STRANDED.
2. ALL CONDUCTORS SHALL BE MINIMUM 75 DEGREES C COPPER UNLESS NOTED OTHERWISE.
3. POWER AND LIGHTING CONDUCTOR SIZE SHALL BE MINIMUM #12 AWG UNLESS NOTED OTHERWISE.
4. CONDUCTOR INSULATION TYPE SHALL BE THHN/THWN UNLESS NOTED OTHERWISE.
5. ALL TERMINATIONS AND DEVICES SHALL BE LISTED FOR 75 DEGREES C UNLESS NOTED OTHERWISE.
6. ALL WIRING SHALL BE IDENTIFIED WITH MARKERS TO REFLECT CIRCUIT DESIGNATIONS AT ALL POINTS WHERE WIRING IS ACCESSIBLE.
7. ALUMINUM CONDUCTORS SHALL NOT BE USED UNLESS SPECIFICALLY INDICATED IN THE DRAWINGS.
8. THE FOLLOWING CONDUCTOR SIZES SHALL BE PROVIDED FOR 20A, 1Φ BRANCH CIRCUITS (HOT, NEUTRAL, & GROUND) BASED ON ACTUAL CIRCUIT LENGTH, UPSIZE RACEWAYS ACCORDINGLY.

CONDUCTOR SIZE	120V	208V	277V	480V
#12 AWG	0-70FT.	0-135FT.	0-160FT.	0-310FT.
#10 AWG	71-120FT.	136-220FT.	161-250FT.	311-500FT.
#8 AWG	121-180FT.	221-325FT.	251-375FT.	501.-760FT.
#6 AWG	181-315FT.	-	376-585FT.	-

9. CONDUCTORS SHALL THE FOLLOWING COLOR UNLESS OTHERWISE REQUIRED PER LOCAL ORDINANCES OR REQUIREMENTS

VOLTAGE SYSTEM	PHASE A	PHASE B	PHASE C	NEUTRAL	GROUND
120/240V, 3ϕ, 4W	BLACK	RED	ORANGE (HIGH LEG)	WHITE	GREEN
208/120V, 3ϕ, 4W	BLACK	RED	BLUE	WHITE	GREEN
480V, 3ϕ, 4W	BROWN	ORANGE	YELLOW		GREEN
480/270V, 3ϕ, 4W	BROWN	ORANGE	YELLOW	GRAY	GREEN

E. DEVICES
WIRING DEVICES SHALL BE COMMERCIAL SPECIFICATION GRADE AS FOLLOWS:
1. WALL SWITCHES: 20A RATED, 120/277V, SINGLE POSE, SILENT TYPE
2. DIMMER SWITCHES: LUTRON NOVAT SERIES RATED FOR LOAD SERVED
3. RECEPTACLES: 20A RATED ,125V DUPLEX GROUNDED TYPE
4. GFI TYPE: 20A RATED GROUND FAULT CIRCUIT INTERRUPTER DUPLEX RECEPTACLE
5. SPECIAL PURPOSE RECEPTACLES SHALL TYPE AND RATING PER PLANS AND VERIFIED WITH EQUIPMENR SUPPLIER.
6. DEVICES AND COLOR PLATES SHALL BE WHITE UNLESS OTHERWISE OTED OR INSTRUCTED BY THE ARCHITECT OR THE INTERIOR DESIGNER.
7. MOUNTING HEIGHTS SHALL BE INDICATED ON THE DRAWINGS OR AS REQUIRED BY ADA OR AUTHORITY HAVING JURISDICTION.

F. FUSES AND CIRCUIT BREAKERS
1. FUSES PROTECTING MOTORS SHALL BE BUSSMAN DUAL ELEMENT TIME DELAY CLASS RK-5
2. CIRCUIT BREAKERS SHALL BE OF THE SAME MANUFACTURER AS THE SWITCHBOARD, DISTRIBUTION PANELOR PANELBOARDS WITH THE RATING AND NUMBER OF POLES AS INDICATED OR SCHEDULES.
3. CIRCUIT BREAKERS SERVING HVAC TYPE EQUIPMENT SHALL BE HACR TYPE AS RECOMMENDED BY THE EQUIPMENT MANUFACTURER.
4. CIRCUIT BREAKERS USED FOR SWITCHING SHALL BE SWD TYPE RATED FOR SWITCHING USE.
5. SERIES RATED CIRCUIT BREAKERS AND EQUIPMENT ARE NOT ACCEPTABLE.

G. MOTOR STARTERS AND DISCONNECTS
1. MOTOR CONTROLLERS: 600V AC HEAVY DUTY RATED, SINGLE OR MULTI-POLE TO SUIT APPLICATION AND MOUNTED IN SUITABLE NEMA ENCLOSURE.
2. ALL MOTOR CONTROLLERS SHALL BE HORSEPOWER RATED TO SUIT MOTOR BEING CONTROLLED.
3. PROVIDE H-O-A OR START/STOP OPERATION AS NEEDED FOR APPLICATION, VERIFY WITH EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN.
4. PROVIDE MINIMUM TWO (2) NORMALLY OPEN AND TWO (2) NORMALLY CLOSED AUXILIARY CONTACTS FOR MOTOR CONTROLLERS.
5. DISCONNECTS: 600V AC HEAVY DUTY RATED, FUSED OR NON-FUSED AS INDICATED, SINGLE OR MULTI-POLE TO SUIT APPLICATION AND MOUTNED IN SUITABLE NEMA ENCLOSURE.

H. SWITCHBOARDS, DISTRIBUTION PANELS AND PANELBOARDS
1. ACCPETABLE EQUIPMENT MANUFACTURERS SHALL BE GENERAL ELECTRIC SQUARE D, CUTLER-HAMMER OR APPROVED EQUAL.
2. SWITCHBOARDS, DISTRIBUTION PANELS AND PANELBOARDS SHALL MEET THE SEISMIC QUALIFICATIONS OF THE ADOPTED BUILDING CODE.
3. GROUNDING CONNECTIONS SHALL BE MADE WIT APPROVED CONNECTORS AND METHODS ACCEPTABLE TO AUTHORITY HAVING JURISDICTION.
4. ALL PANELBOARDS SHALL BE BOLT-ON CIRCUIT BREAKER TYPE, UNLESS NOTED OTHERWISE ON THE DRAWINGS.
5. WIRE TERMINATIONS SHALL BE U.I. LISTED FOR 75°C.
6. FLUSH MOUNTED PANELBOARDS SHALL HAVE A MINIMUM OF TWO (2) 1" AND FOUR (4) 3/4" EMPTY CONDUITS STUBBED UP FROM PANEL TO ABOVE ACCESIBLE CEILING SPACE FOR FUTURE BRANCH CIRCUIT WIRING.
7. ALL SWITCHBOARDS, DISTRIBUTION PANELS AND PANELBOARDS SHALL HAVE A SEPARATE GROUND BUS ISOLATED FROM THE NEUTRAL BUS.
8. ALL SWITCHBOARDS SHALL BE FRONT AND REAR ALIGNED.
9. ALL SWITCHBOARDS DISTRIBUTION PANELS AND PANELBOARDS SHALL HAVE A SEPARATE GROUND BUS ISOLATED FROM THE NEUTRAL BIAS.
10. METERING CTS AND PTS SHALL BE INSTALLED IN THE MAIN SWITCHBOARD OR AT A REMOTE LOCATION AS INDICATED ON THE DRAWINGS.
11. METER DEVICE SHALL BE INSTALLED IN THE MAIN SWITCHBOARD OR AT A REMOTE LOCATION AS INDICATED ON THE DRAWINGS. METER DEVICE AND REQUIREMENTS SHALL BE VERIFIED BY THE CONTRACTOR WITH THE SERVING UTILITY COMPANY PRIOR TO COMMENCEMENT OF CONSTRUCTION.
12. CONTRACTOR IS RESPONSIBLE TO CNFIRM SUBMITTED EQUIPMENT WILL FIT WITHIN ALOTTED SPACE SHOWN AND COMPLY WITH ALL NEC CLEARANCE REQUIREMENTS.

I. TRANSFORMERS
1. ACCEPTABLE EQUIPMENT MANUFACTURERS SHALL BE GENERAL ELECTRIC SQUARE D, CUTLER-HAMMER OR APPROVED EQUAL.
2. TRANSFORMERS SHALL MEET THE SEISMIC QUALIFICATIONS OF THE ADOPTED BUILDING CODE.
3. TRANSFORMERS SHALL BE 80°C RISE, UNLESS NOTED OTHERWISE.
4. TRANSFORMERS SHALL BE UL LISTED AND MEET ANSI OVERLOAD LISTED.
5. TRANSFORMERS SHALL MEET NEMA ST-20 SOUND LEVEL REQUIREMENTS.
6. TRANSFORMERS SHALL HAVE COPPER WINDINGS.
7. TRANSFORMERS SHALL HAVE APPROPRIATE NEMA RATING FOR LOCATIONS BEING INSTALLED.
8. TRANSFORMERS SHALL HAVE K-FACTOR RATING AS INDICATED ON THE DRAWINGS.
9. TRANSFORMERS SHALL HAVE CLASS 155 INSULATION, UNLESS NOTED OTHERWISE.

J. LIGHTING FIXTURES
1. ALL LIGHTING FIXTURES SHALL BE UL LISTED.
2. ALL FLOURESCENT FIXTURES SHALL BE PROVIDED WITH ENERGY SAVING LAMPS AND ELECTRONIC BALLASTS. PROVIDE ZERO DEGREE BALLASTS FOR EXTERIOR LIGHTING FIXTURES.
3. ALL LAMPS SHALLBE BY THE SAME MANUFACTURER AND FURNISHED BY THE CONTRACTOR UNLESS NOTED OTHERWISE ON THE DRAWINGS. ALL BALLASTS SHALL BE LOW HARMONIC TYPE, THD<10%.

K. FIRE ALARM/LIFE SAFETY SYSTEM
1. CONTRACTOR SHALL BE RESPONSIBLE FOR DESIGN AND INSTALLATION OF A COMPLETE AND OPERABLE FIRE ALARM SYSTEM FULLY APPROVED FOR USE BY AUTHORITY HAVING JURISDICTION. CONTRACTOR SHALL PROVIDE COMPLETE SYSTEM WIRING DIAGRAMS INCLUDING BUILDING FLOOR PLANS, SYSTEM COMPONENT SPECIFICATIONS, DEVICE LOCATIONS, ETC. FOR REVIEW AND APPROVAL BY AUTHORITY HAVING JURISDICTION.
2. FIRE ALARM DRAWINGS AND SPECIFICATIONS ARE SHOWN FOR DESIGN INTENT ONLY AND ESTABLISH A PERFRMANCE SPECIFICATION.
3. CONTRACTOR SHALL ENGAGE THE SERVICES OF A NEVADA LICENSED FIRE ALARM CONTRACTOR AND/OR MANUFACTURER TO PROVIDE A COMPLETE AND OPERABLE FIRE ALARM SYSTEM APPROVED BY THE AUTHORITY HAVING JURISDICTION UNDER THE BASE BID. CONTRACTOR SHALL BE RESPONSIBLE FOR AND INCLUDE IN BID ALL PLAN REVIEW AND PERMIT FEES, WHICH MAY BE APPLICABLE.
4. ALL DEVICES REQUIRED BUT NOT SHOWN ON THE DRAWINGS TO OBTAIN APPROVAL FROM AUTHORITY HAVING JURISDICTION SHALL BE INCLUDED IN THE BASE BID.
5. CONTRACTOR SHALL INCLUDE IN BASE BID ALL FACTORY START UP AND TESTING OF THE FIRE ALARM SYSTEM.
6. PRELIMINARY SYSTEM TESTING SHALL BE PERFORMED BY THE CONTRACTOR PRIOR TO FINAL TESTING WITH INSPECTION AUTHORITIES.
7. FIRE ALARM SYSTEM SHALL INCLUDE ALL NECESSARY COMPONENTS, DEVICES, RACEWAYS, WIRING, ETC. TO MAKE A COMPLETE AND APPROVED FIRE ALARM SYSTME UNDER THE BASE BID.

L. TV, TELEPHONE AND DATA SYSTEMS
1. PROVIDDE A COMPLETE CONDUIT SYSTEM FOR TV, TELEPHONE, DATA AND COMBINATION OUTLETS SHOWN.
2. TV, TELEPHONE, DATA AND COMBINATION OUTLETS INDICATED SHALL TERMINATE AT THE TERMINAL BOARD OR CABINET INDICATED ON THE DRAWINGS, UNLESS OTHERWISE NOTED.
3. TERMINAL BOARD SHALL BE A 4'X8'X3/4" FIRE RATED SHEET OF PLYWOOD, UNLESS OTHERWISE NOTED.
4. TERMINAL CABINETS SHALL BE SIZED AS INDICATED ON THE DRAWINGS OR SUITABLE FOR INSTALLATION IF NOT INDICATED WITH NEMA ENCLOSURE RATED FOR APPLICATION.
5. TELEPHONE SERVICE AND CABLE TV SERVICE DEMARK CONDUITS AND REQUIREMENTS SHALL BE COORDINATED AND VERIFIED WITH THE SERVING UTILITIES AND OWNER PRIOR TO BID.

GENERAL EXECUTION

A. THOROUGHLY CLEAN ALL ITEMS BEFORE INSTALLATION.
B. ALL WORK SHALL BE PROPERLY SUPPORTED FROM THE BUILDING STRUCTURE IN AN APPROVED MANNER.
C. ALL EQUIPMENT SHALL BE FASTENED TO BUILDING CONSTRUCTIONWITH APPROVED SUPPORTS.
D. COORDINATE ELECTRICAL WORK WITH OTHER TRADES PRIOR TO SUBMITTING BID.
E. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATION OF ELECTRICAL DEVICES, INCLUDING RECEPTACLES, SWITCHES, DATA AND TELEPHONE OUTLETS IF LOCATIONS ARE NOT DEPICTED ON ARCHITECTURAL DRAWINGS, OBTAIN APPROVAL OF ARCHITECT PRIOR TO ROUGH-IN.
F. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING, PATCHING AND COMPLETE REPAIR OF EXISTING BUILDING WALLS, CEILINGS, ETC. AS REQUIRED FOR INSTALLATION OF ELECTRICAL SYSTEMS.
G. PROVIDE ENGRAVED NAME PLATES WITH SHEET METAL SCREWS FOR EACH PIECE OF EQUIPMENT, INCLUDING PANELBOARDS, TRANSFORMERS, DISTRIBUTION PANELS, SWITCHBOARDS, DISCONNECTS, MOTOR STARTERS, ETC. LABELED PER AS-BUILT DRAWINGS.
H. ALL ELECTRICAL DISTRIBUTION EQUIPMENT SHALL BE OF THE SAME MANUFACTURER, INCLUDING: PANELBOARDS, TRANSFORMERS, DISTRIBUTION PANELS, SWITCHBOARDS, DISCONNECTS, MOTOR STARTES, ETC.

INSTALLATION

A. RACEWAYS
1. RACEWAYS SHALL BE INSTALLED CONCEALED, UNLESS OTHERWISE NOTES.
2. ALL RACEWAYS REQUIRED TO BE EXPOSED SHALL BE PAINTED TO MATCH THE ADJACENT BUILDING SURFACE.
3. SUPPORT RACEWAYS WITH TOGGLE BOLTS ON HOLLOW MASONRY, MACHINE SCREWS ON METAL SURFACES, BEAM CLAMPS ON FRAMEWORK, WOOD SCREWS ON WOOD.
4. RACEWAYS SHOULD BE INSTALLED PARALLEL AND PERPENDICULAR TO BUILDING SURFACES AND AT RIGHT ANGLES.
5. PROVIDE 200LB PULL STRING IN ALL EMPTY RACEWAYS.
6. RACEWAYS PASSING THROUGH FIRE RATED CONSTRUCTION SHALL BE SEALED WITH UL LISTED FIRE RATED SEALANT. WHERE ELECTRICAL RACEWAYS ARE INSTALLED THROUGH RATED FLORS OR WALLS, THE CONTRACTOR SHALL PROVIDE APPROPRIATE FITTINGS SPPROVED BY ALL REQUIRED LOCAL AUTHORITIES FOR THE INTENDED APPLICATION.
7. OBTAIN FINAL APPROVAL FROM THE ARCHITECT PRIOR TO THE INSTALLATION OF RACEWAYS THROUGH RATED WALLS OR FLOORS.
8. DO NOT COMBINE HOMERUNS UNLESS OTHERWISE NOTED.
9. INSTALL ALL RACEWAY SYSTEMS PER THE NEC. DEVIATIONS FROM THE WIRING METHODS INDICATED SHALL NOT BE ALLOWED WITHOUT SPECIFIC WRITTEN APPROVAL PRIOR TO PLACING BID AND INSTALLATION.
10. INCLUDE ALL COSTS FOR RACEWAY SYSTEMS AS SPECIFIED UNLESS WRITTEN APPROVAL FOR AN ALTERNATE WIRING METHOD IS OBTAINED FROM THE ARCHITECT, ENGINEER, AND OWNER PRIOR TO SUBMITTING BID.
11. PROVIDE EQUIPMENT GROUNDING CONDUCTOR PER NEC 250 IN ALL RACEWAYS.
12. PROVIDE SEPARATE RACEWAYS FOR EMERGENCY SYSTEM WIRING AND NORMAL SYSTEM WIRING.
13. ALL RACEWAYS AND CONDUCTOR SIZES SHOWN ARE TO BE INSTALLED WITHIN THE BUILDING STRUCTURE NOT EXPOSED TO AMBIENT CONDITIONS. IF RACEWAYS AND CONDUCTORS ARE ROUTED EXPOSED TO AMBIENT CONDITIONS, CONTRACTOR SHALL DERATE CONDUCTORS AND UPSIZE RACEWAYS ACCORDINGLY.
14. RACEWAYS PENETRATING THROUGH ROOF SHALL HAVEROOF FLASHING WITH CAULK AND SLEEVE. INSTALLATION SHALL BE WATERTIGHT.
15. ALL UNDERGROUND SERVICE CONDUITS SHALL BE SEALED PER NEC ARTICLE 230.8.
16. ALL EMERGENCY FEEDERS SHALL BE ROUTED IN COMPLIANCE WITH NEC 700.9 AND SNECA.
17. ALL UNDERGROUND OR BELOW GRADE RACEWAYS SHALL BE INSTALLED IN COMPLIANCE WITH NEC TABLE 300.5.

B. FITTINGS AND ACCESSORIES
1. PROVIDE EXPANSION AND DEFLECTION FITTINGS FOR CONDUITS CROSSING EXPANSION JOINTS. PROVIDE BONDING JUMPERS FOR ALL EXPANSION FITTINGS.
2. FITTINGS SHALL BE SUITABLE FOR CONDITIONS OF INSTALLATION. REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION.

C. OUTLET, JUNCTION AND PULL BOXES
1. OUTLET BOXES SHALL BE METALLIC WITH GROUND CONNECTION AND EQUIPMENT GROUNDING CONDUCTOR CONNECTION.
2. PROVIDE INSULATED SUPPORTS FOR CABLES.
3. PROVIDE SEPARATE BOXES FOR DIFFERENT VOLTAGE SYSTEMS.
4. PROVIDE SEPARATE BOXES FOR EMERGENCY SYSTEM WIRING AND FOR NORMAL SYSTEM WIRING.
5. COORDINATE FLOOR BOX LOCATIONS WITH ARCHITECT, STRUCTURAL ENGINEER, FURNITURE CONSULTANT AND INTERIOR DESIGNER PRIOR TO ROUGH-IN. SEE THOSE DRAWINGS FOR ADDITIONAL INFORMATION.
6. PROVIDE FIRE BARRIER PUTTY PADS TO ALL NEW AND MODIFIED ELECTRICAL BOX (IE OUTLET, JUNCTION BOX, PULL BOXES, ETC.) LOCATED IN THE DEMISING WALLS. FIRE BARRIER PUTTY PADS SHALL BE 3M TYPE "MPP+" OR APPROVED EQUAL.

D. WIRE AND CABLE
1. DO NOT COMBINE HOMERUNS, UNLESS NOTED OTHERWISE.
2. PROVIDE INSULATION TESTING DOCUMENTATION OF ALL FEEDER AND DISTRIBUTION WIRING. REMOVE AND REPLACE WIRING NOT MEETING MANUFACTURER'S RECOMMENDED INSULATION RESISTANCE.
3. PROVIDE TESTING DOCUMENTATION SHOWING GROUNDING SYSTEM FOR THIS PROJECT WITH RESISTANCE OF LESS THAN 5 OHMS.

E. DEVICES
1. INSTALL SWITCHES @48" AFF TO CENTER OF SWITCH, UNLESS OTHERWISE NOTED.
2. INSTALL RECEPTACLES @18" AFF TO CENTER IF DEVICE, UNLESS OTHERWISE NOTED.
3. RECEPTACLES LOCATED FOR COUNTERTOP USE SHALL BE 6" TO THE QCENTER OF DEVICE ABOVE THE COUNTERTOP, UNLESS OTHERWISE NOTED.

F. FUSES AND CIRCUIT BREAKERS
1. PROVIDE ALL FUSES FOR DEVICES SHOWN.
2. PROVIDE OWNER TWO (2) SPARE SETS OF FUSES OF EACH TYPE AND RATING INSTALLED.
3. PROVIDE FUSE PULLER FOR EACH TYPE OF FUSE.
4. PROVIDE SPARE FUSE CABINET WHERE INDICATED ON THE DRAWINGS.
5. VERIFY FUSES WITH MANUFACTURER OF EQUIPMENT PRIOR TO INSTALLATION.
6. WHERE NEW OVERCURRENT DEVICES ARE ADDED TO EXISTING SWITCHBOARD DISTRIBUTION PANELS AMD PANELBOARDS, UTILIZE SPARES AND/OR PROVIDE ADDITIONAL BREAKERS OR SWITCHES AS REQUIRED TO EXISTING SPACES OR PROVIDE A NEW PANELBOARD OR SECTION SUBFED FROM THE EXISTING SYSTEM. SHORT CIRCUITING INTERRUPTING RATING OF NEW OVERCURRENT DEVICES SHALL MATCH THE RATING OF THE EXISTING EQUIPMENT.

G. MOTOR STARTERS AND DISCONNECTS
1. INSTALL MOTOR STARTERS AND DISCONNECTS AS RQUIRED PER THE NEC.
2. WALL MOUNTED MOTOR STARTERS AND DISCONNECTS SHALL BE INSTALLED @54" TO BOTTOM OF DEVICE, UNLESS OTHERWISE NOTED.

H. SWITCHBOARDS, DISTRIBUTION PANELS AND PANEL BOARDS
1. CONTRACTOR SHALL BALANCE THE LOADS IN ALL PANELBOARDS TO LESS THAN 10% IMBALANCE BETWEEN THE PHASES.
2. PROVIDE TYPEWRITTEN PANELBOARD SCHEDULES IN PANELBOARD DOORS DEPICTING THE FINAL AS-BUILT CONDITIONS AT PROJECT COMPLETION.
3. ALL ELECTRICAL SYSTEMS, EQUIPMENT, AND COMPONENTS SHALL BE GROUNDED IN ACCORDANCE WITH NEC 250.
4. ALL FLOOR MOUNTED SWITCHBOARDS AND DISTRIBUTION PANELS SHALL HAVE A 4" HIGH HOUSEKEEPING PAD EXTENDING 4" OUTSIDE THE EQUIPMENT FOOTPRINT IN ALL DIRECTIONS.
5. ALL SWITCHBOARDS, DISTRIBUTION PANELS AND PANELBOARDS SHALL BE INSTALLED TO MEET THE NEC 110-26 CLEARANCE AND REQUIREMENTS.
6. ALL UTILITY METERING DEVICES SHALL BE INSTALLED PER THE SERVING UTILITY COMPANY'S REQUIREMENTS.
7. ANY CUSTOMER OWNED METERING DEVICES SHALL BE INSTALLED AS INDICATED ON THE DRAWINGS.
8. PROVIDE ALL REQUIRED DEVICES AND EQUIPMENT FOR A COMPLETE AND OPERABLE METER INSTALLATION.

I. TRANSFORMERS
1. INSPECT TRANSFORMERS FOR PHYSICAL DAMAGE, MECHANICAL AND ELECTRICAL CONNECTIONS.
2. PROVIDE GROUNDING CONNECTION TO GROUNDING ELECTRODE SYSTEM PER NEC AND LOCAL CODE REQUIREMENTS FOR ALL SEPARATELY DERIVED SYSTEMS.
3. ALL FLOOR MOUNTED TRANSFORMERS SHALL HAVE A 4" HIGH HOUSEKEEPING PAD EXTENDING 4" OUTSIDE THE EQUIPMENT FOOTPRINT IN ALL DIRECTIONS.
4. VERIFY WITH PROJECT STRUCTURAL ENGINEER OR RETAIN THE SERVICS OF LICENSED STRUCTURAL ENGINEER TO PROVIDE ANY MOUNTING DIAGRAMS OR CALCULATIONS REQUIRED FOR MOUNTING OF ANY WALL OR TRAPIEZE MOUNTED TRANSFORMERSPRIOR TO ROUGH-IN. ALL COSTS TO BE INCLUDED IN BASE BID.
5. PROVIDE ISOLATION VIBRATION SPRINGS TYPE AS RECOMMENDED BY MANUFACTURER.

J. LIFE SAFETY SYSTEM
1. PROVIDE ALL NECESSARY SUPPORTS FOR LIGHTING FIXTURES REQUIRED.
2. WHERE FIXTURES ARE INSTALLED ON OR IN SUSPENDED CEILING SYSTEMS, SECURES FIXTURES TO CEILING FRAME SYSTEM AND PROVIDE FIXTURE SUPPORTS INDEPENDENT OF CEILING SUSPENSION SYSTEM AS REQUIRED PER APPLICABLE CODE.
3. INCLUDE IN BASE BID ALL LABOR AND MATERIAL TO INSTALL FIXTURES, INCLUDING THOSE PROVIDED BY THE OWNER.
4. PROVIDE CEILING MOUNTED PENDANT FIXTURE WITH APPROVED SUPPORT FOR WEIGHT TO BE SUPPORTED AND FOR SEISMIC COMPLIANCE.
5. RECESSED FIXTURES IN FIRE RATED CEILINGS AND RETURN AIR PLENUMS SHALL BE APPROVED FOR THE FIRE RATING OF THE CEILING OR SHALL BE FULLY ENCLOSED IN A FIRE RATED HOUSING ACCEPTABLE TO AUTHORITY HAVING JURISDICTION.
6. SEAL ALL OPENINGS AS REQUIRED TO ELIMINATE AIR LEAKS.
7. VERIFY TYPE OF MOUNTING REQUIRED FOR ALL LIGHTING FIXTURES AND PROVIDE ALL MOUNTING HARDWARE REQUIRED FOR A COMPLETE INSTALLATION.
8. ALL ADJUSTABLE FIXTURES SHALL BE LOCATED AND PROPERLY AIMED AS DIRECTED BY THE ARCHITECT OR LIGHTING DESIGNER. ALL AIMING OF BUILDING FACADE LIGHTING SHALL BE PERFORMED BY CONTRACTOR AT NIGHT.

K. LIFE SAFETY SYSTEM
1. DESIGN AND INSTALLATION SHALL BE PERFORMED BY A STATE LICENSED FIRE ALARM CONTRACTOR. INSTALLATION SHALL BE PERFORMED BY LICENSED AND EXPERIENCED INSTALLERS.
2. MINIMUM RACEWAY IS 3/4", UNLESS OTHERWISE NOTED.
3. PROVIDE ALL DEVICES REQUIRED FOR A COMPLETE AND OPERABLE SYSTEM.
4. ALL WIRING SHALL BE INSTALLED IN CONDUIT. ALL CONDUCTORS SHALL BE LABELED AT EACH JUNCTION BOX AND AT EACH DEVICE.
5. ALL OUTLET, PULL AND JUNCTION BOXES SHALL BE PAINTED RED ON THE EXTERIOR AND MARKED FOR FIRE ALARM.
6. INSTALL END OF LINE RESISTORS WHERE REQUIRED IN A JUNCTION BOX ADJACENT TO THE LAST DEVICE SERVED.

L. TV, TELEPHONE AND DATA SYSTEM
1. MINIMUM RACEWAY SIZE IS 3/4", UNLESS OTHERWISE NOTED.
2. PROVIDE #6 AWG GROUND WIRE FROM SERVICE ENTRANCE GROUNDING ELECTRODE TO TELEPHONE SYSTEM LOCATION AND ALL TELEPHONE TERMINAL BOARDS UNLESS OTHERWISE NOTED.

M. IDENTIFICATION
1. CONDUIT IDENTIFICATION: USE ADHESIVE MARKING TAPE LABELS TO IDENTIFY ALL CONDUITS LOCATED ABOVE NON-ACCESSIBLE CEILING OR ON FLOORS AND WALLS SHALL BE LABELED WITHIN 3 FEET OF BECOMING ACCESSIBLE. LABELS FOR MULTIPLE CONDUITS SHALL BE ALIGNED AND READ THE SAME DIRECTION; USE THE FOLLOWING COLORS:
ABOVE 250 VOLTS: BLACK LETTERS ON ORANGE BACKGROUND INDICATING SOURCE EQUIPMENT DESIGNATION, CIRCUIT NUMBER (IF APPLICABLE), AND VOLTAGE.
250V AND BELOW NORMAL: WHITE LETTERS ON BLACK BACKGROUND INDICATING SOURCE EQUIPMENT DESIGNATION, CIRCUIT NUMBER(S), AND VOLTAGE.
600 VOLT AND BELOW EMERGENCY: BLACK LETTERS ON RED BACKGROUND INDICATING SOURCE EQUIPMENT DESIGNATION, CIRCUIT NUMBER(S) AND VOLTAGE.
FIRE ALARM: RED LETTERS ON WHITE BACKGROUND INDICATING 'FIRE ALARM'.
TEMPERATURE CONTROL: BLACK LETTERS ON BLUE BACKGROUND INDICATING 'TEMP CONTROL'.
LIGHTING CONTROL AND DMX: BLACK LETTERS ON GREEN BACKGROUND INDICATING 'GROUND' AND EQUIPMENT DESIGNATION.
SECURITY AND CARD ACCESS: BLACK LETTERS ON YELLOW BACKGROUND INDICATING 'SECURITY'.
NETWORK FIBER AND DATA: BLACK LETTERS ON WHITE BACKGROUND INDICATING 'NETWORK FIBER DATA'.
GROUND: BLACK LETTERSON GREEN BACKGROUND INDICATING 'GROUND' AND EQUIPMENT DESIGNATION.
WHERE CONDUITS ENTER OR EXIT A PANELBOARD, PULL OR JUNCTION BOX, SWITCHBOARD, OR OTHERDISTRIBUTION EQUIPMENT, CONDUIT LABELS SHALL INCLUDE CIRCUIT NUMBER IN ADDITION TO FEEDER IDENTIFICATION AND VOLTAGE (SEE SAMPLE BELOW):

PANEL L2A LEVEL 2 ELECTRICAL ROOM
225A 480Y/277V 3 PHASE
FED FROM DBL1A LEVEL 1 ELECTRICAL ROOM

2. IDENTIFY JUNCTION, PULL AND CONNECTION BOXES: IDENTIFICATION OF SYSTEMS AND CURCUITS SHALL INDICATE SYSTEM VOLTAGE AND IDENTITY OF CONTAINED CIRCUITS ON OUTSIDE OF BOX COVER. COLOR CODE SHALL BE SMAE AS CONDUITS FOR PRESSURE SENSITIVE LABELS. USE SELF ADHESIVE BRADY MARKING LABELS AT EXPOSED LOCATIONS. ALL FIRE ALARM BOXES SHALL HAVE COVERS PAINTED RED. ALL TEMPERATURE CONTROL BOXES SHALL HAVE COLORS PAINTED BLUE.
3. PROVIDE BLACK LETTERS ON CLEAR BACKGROUND TAPE LABELS FOR IDENTIFICATION OF INDIVIDUAL RECEPTACLE AND LIGHT SWITCH WALLPLATES. LOCATE TAPE ON FRONT OF PLATE AND IDENTIFY BRANCH CIRCUIT SERVING THE RECEPTACLE. PROVIDE TAPE LABELS FOR IDENTIFICATION OF INDIVIDUAL SWITCHES OR THERMAL OVERLOAD SWITCHES SERVING AS EQUIPMENT DISCONNECTS. LOCATE THE TAPE ON THE FRONT OF THE COVERPLATE AND IDENTIFY THE BRANCH CIRCUIT SERVING THE EQUIPMENT.

SCOPE OF WORK

PROVIDE FOR THE FOLLOWING:
- POWER CONNECTIONS TO TWO (2) NEW PRIMARY PUMPS.
- POWER CONNECTIONS TO TWO (2) NEW WATER HEATERS FOR DOMESTIC HOT WATER
- POWER CONNECTION TO ONE (1) TEMPERATURE CONTROL PANEL.

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DRAWING TITLE:
ELECTRICAL SPECIFICATIONS

UNLV PROJECT NUMBER: SLC-1706/PC-9008

DRAWN BY	JB	DATE	08/15/2017
DESIGNED BY	SP	SCALE	NTS
CHECKED BY	SP	JOB NO.	5221687

KEY PLAN

JOB TITLE
UNLV SHADOW LANE HEATING HOT WATER REPIPE
UNLV
1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.
E0.03

IF THIS DRAWING IS NOT 42x30 IT HAS BEEN SCALED

KEYNOTES

1. REMOVE EXISTING STARTER IN MOTOR CONTROL "MCCA" AND PROVIDE FEEDER TO NEW VFD. EXTEND CONDUIT AND PROVIDE NEW CONDUCTORS AS REQUIRED.
2. REFER TO MECHANICAL DRAWINGS FOR EXACT LOCATION, ADDITIONAL INFORMATION, AND REQUIREMENTS.
3. REFER TO SINGLE LINE DIAGRAM FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
4. REFER TO PANEL SCHEDULE FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
5. PROVIDE FINAL CONNECTION AS REQUIRED TO MOTOR FROM MOTOR STARTER OR VFD.
6. VFD TO BE FURNISHED BY MECHANICAL CONTRACTOR AND INSTALLED BY ELECTRICAL CONTRACTOR.
7. PROVIDE NEMA SIZE 0 COMBINATION MOTOR STARTER-FUSED DISCONNECT SWITCH. PROVIDE TWO (2) N.O. AND TWO (2) N.C. AUXILLARY CONTACTS WITH HAND-OFF-AUTO (HOA) CONTROLS AS INDICATED ON MECHANICAL DRAWINGS.
8. PROVIDE COMPLETE ELECTRICAL CONNECTION TO TEMPERATURE CONTROL PANEL, 120V, 500 WATT MAX. REFER TO MECHANICAL DRAWINGS FOR MORE INFORMATION.
9. PROVIDE COMPLETE ELECTRICAL CONNECTION TO GAS WATER HEATER, 120V, 500W MAX. REFER TO MECHANICAL DRAWINGS FOR MORE INFORMATION.

SHEET NOTES

A. REFER TO ELECTRICAL SPECIFICATIONS ON SHEET E0.03 FOR CONDUIT AND WIRE SIZES REQUIRED FOR VOLTAGE DROP.

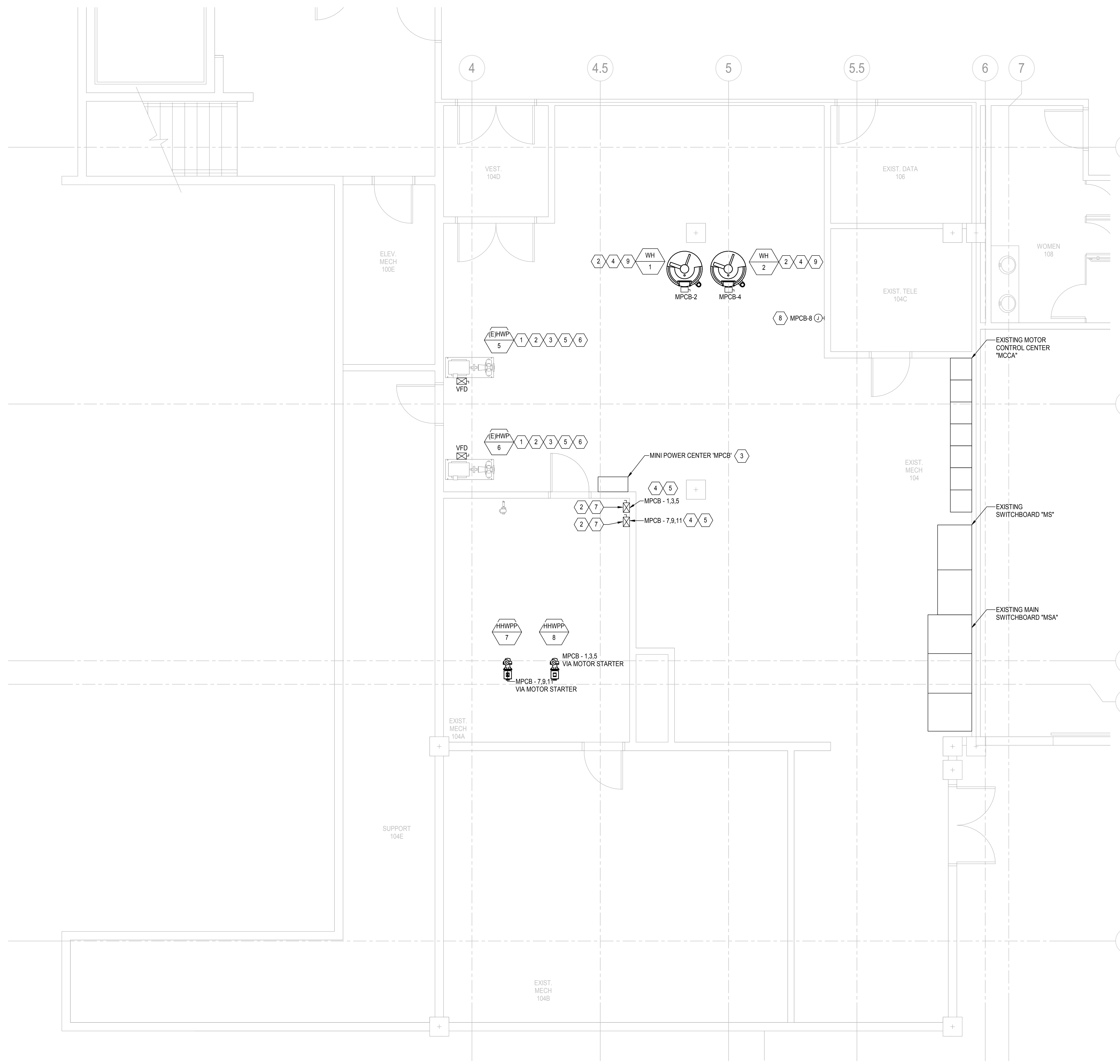
B. REFER TO MECHANICAL AND PLUMBING DRAWINGS FOR EXACT LOCATIONS AND ADDITIONAL REQUIREMENTS.

C. COORDINATE AND OBTAIN APPROVAL FROM STRUCTURAL ENGINEER FOR ROUTING OF ANY CONDUIT OR RACEWAY IN SLAB PRIOR TO ROUGH-IN.

D. COORDINATE ROUTING OF RACEWAYS WITH OTHER TRADES PRIOR TO ROUGH-IN.

E. SEE SINGLE LINE DIAGRAM FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

F. EXISTING INFORMATION INDICATED WAS OBTAINED FROM AVAILABLE AS-BUILT INFORMATION PROVIDED BY OWNER, CONTRACTOR IS RESPONSIBLE TO VERIFY ALL EXISTING INFORMATION INDICATED AND NOTIFY ENGINEER IN WRITING IF FIELD CONDITIONS DIFFER PRIOR TO THE COMMENCEMENT OF CONSTRUCTION; INCLUDE ALL COSTS IN BASE BID FOR VERIFICATION OF EXISTING CONDITIONS.



1 FIRST LEVEL ELECTRICAL POWER PLAN

1/4" = 1'-0"

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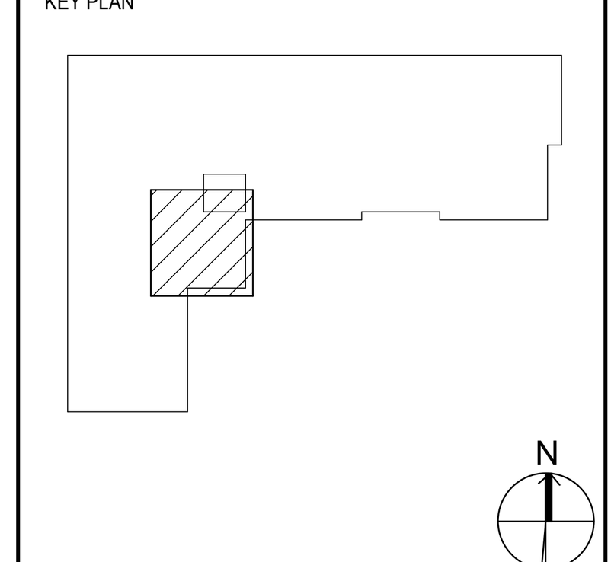
DRAWING TITLE:

FIRST LEVEL ELECTRICAL POWER PLAN

UNLV PROJECT NUMBER: SLC-1706/PC-9008

DRAWN BY	JB	DATE	08/15/2017
DESIGNED BY	SP	SCALE	As indicated
CHECKED BY	SP	JOB NO.	5221687

KEY PLAN



JOB TITLE

UNLV SHADOW LANE HEATING HOT WATER REPIPE

UNLV

1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.

E2.01

KEYNOTES

1. REMOVE EXISTING STARTER WITHIN MCC AND PROVIDE FEEDER ONLY TO NEW VFD.
2. VERIFY EXISTING FUSE SIZES AND WIRE SIZES WITH NEW VFD EQUIPMENT SUPPLIER AND PROVIDE NEW FUSES AND WIRING AS REQUIRED.
3. REMOVE EXISTING STARTER AND PROVIDE NEW FUSES IN EXISTING DISCONNECT AS REQUIRED FOR NEW FEED TO MINIPOWER CENTER "MPCB".
4. EXISTING LOAD INFORMATION WAS OBTAINED FROM LSW ENGINEERS DRAWINGS DATED 01/17/2003. CONTRACTOR IS RESPONSIBLE TO VERIFY EXISTING LOADS IN COMPLIANCE WITH SPECIFICATIONS ON SHEET E0.03 PRIOR TO THE CONNECTION OF ANY NEW LOADS.
5. VFD TO BE FURNISHED BY MECHANICAL CONTRACTOR INSTALLED BY ELECTRICAL CONTRACTOR.

SHEET NOTES

A. ALL ELECTRICAL EQUIPMENT AND DEVICES SHALL BE FULLY RATED TO WITHSTAND THE AVAILABLE FAULT CURRENT.

B. PROVIDE 4" HIGH HOUSEKEEPING PAD UNDER ALL FLOOR MOUNTED ELECTRICAL EQUIPMENT.

C. MATERIALS AND INSTALLATION SHALL COMPLY WITH THE LATEST CODES, LAWS AND ORDINANACES OF THE AUTHORITY HAVING JURISDICTION INCLUDING THE LOCALLY ADOPTED AMENDMENTS.

D. PROVIDE SHOP DRAWINGS SHOWING ELECTRICAL EQUIPMENT ROOM LAYOUTS IN COMPLIANCE WITH NEC ART 110 REQUIREMENTS BASED ON SUBMITTED EQUIPMENT.

E. PROVIDE OVERSIZED LUGS, ADAPTERS, GUTTERS, WIREWAYS AND ENCLOSURES AS REQUIRED WHERE CONDUCTORS HAVE BEEN INCREASED FOR VOLTAGE DROP.

F. ALL ELECTRICAL EQUIPMENT AND DEVICES LOCATED OUTDOORS SHALL BE NEMA 3R WEATHERPROOF TYPE.

G. PROVIDE A MINIMUM OF 20% FULLY RATED BUSSED SPACE IN ALL SWITCHBOARDS, DISTRIBUTION BOARDS AND DISTRIBUTION PANELS IN ADDITION TO THE DEVICES.

H. EXISTING INFORMATION INDICATED WAS OBTAINED FROM AVAILABLE AS-BUILT INFORMATION PROVIDED BY OWNER, CONTRACTOR IS RESPONSIBLE TO VERIFY ALL EXISTING INFORMATION INDICATED AND NOTIFY ENGINEER IN WRITING IF FIELD CONDITIONS DIFFER PRIOR TO THE COMMENCEMENT OF CONSTRUCTION; INCLUDE ALL COSTS IN BASE BID FOR VERIFICATION OF EXISTING CONDITIONS.

I. EXISTING LOAD SHOWN IN PARENTHESIS AND NEW DEMAND LOAD SHOWN ADJACENT.

ELECTRICAL FEEDER SCHEDULE

COPPER CONDUCTORS, 600V THHN/THWN INSULATION, UON

AMPRERE RATING	# OF CONDUCTORS	VERSION	CONDUCTORS	CONDUIT
40	3	1	3#8, #10G, 1"C	EMT

G=GROUND, BJ = BONDING JUMPER

FEEDER SCHEDULE NOTES:
1. PROVIDE INCREASED SIZED EQUIPMENT GROUNDING CONDUCTORS LARGER THAN THOSE SHOWN WHERE UNGROUNDED CONDUCTORS HAVE BEEN INCREASED FOR VOLTAGE DROP PER NEC 250.122(B).
2. PROVIDE INCREASED SIZED EQUIPMENT GROUNDING CONDUCTORS LARGER THAN THOSE SHOWN FOR MOTOR CIRCUITS PER NEC 250.122 AND 430 BASED ON MOTOR CIRCUIT OVERCURRENT PROTECTIVE DEVICE RATING.

FAULT AND VOLTAGE DROP CALCULATIONS

FAULT LOCATION	DESIGNATION	ISC (A)	VOLTAGE DROP (%)
F1	MINI POWER CENTER MPCB	2,743	0.01

PANEL DESIGNATION: **MINI POWER CENTER MPCB (15kVA 480V-208Y/120V)**

LOCATION:	CENTRAL PLANT	VOLTAGE:	208 / 120	A.I.C. RATING:	25,000A
SUPPLY FROM:	MCCA	PHASE:	3	BUS RATING:	100A
MOUNTING:	SURFACE	WIRE:	4	MAIN TYPE:	MCB, TOP ENTRY
ENCLOSURE:	NEMA 1	NEUTRAL:	100%	MCB RATING:	50A

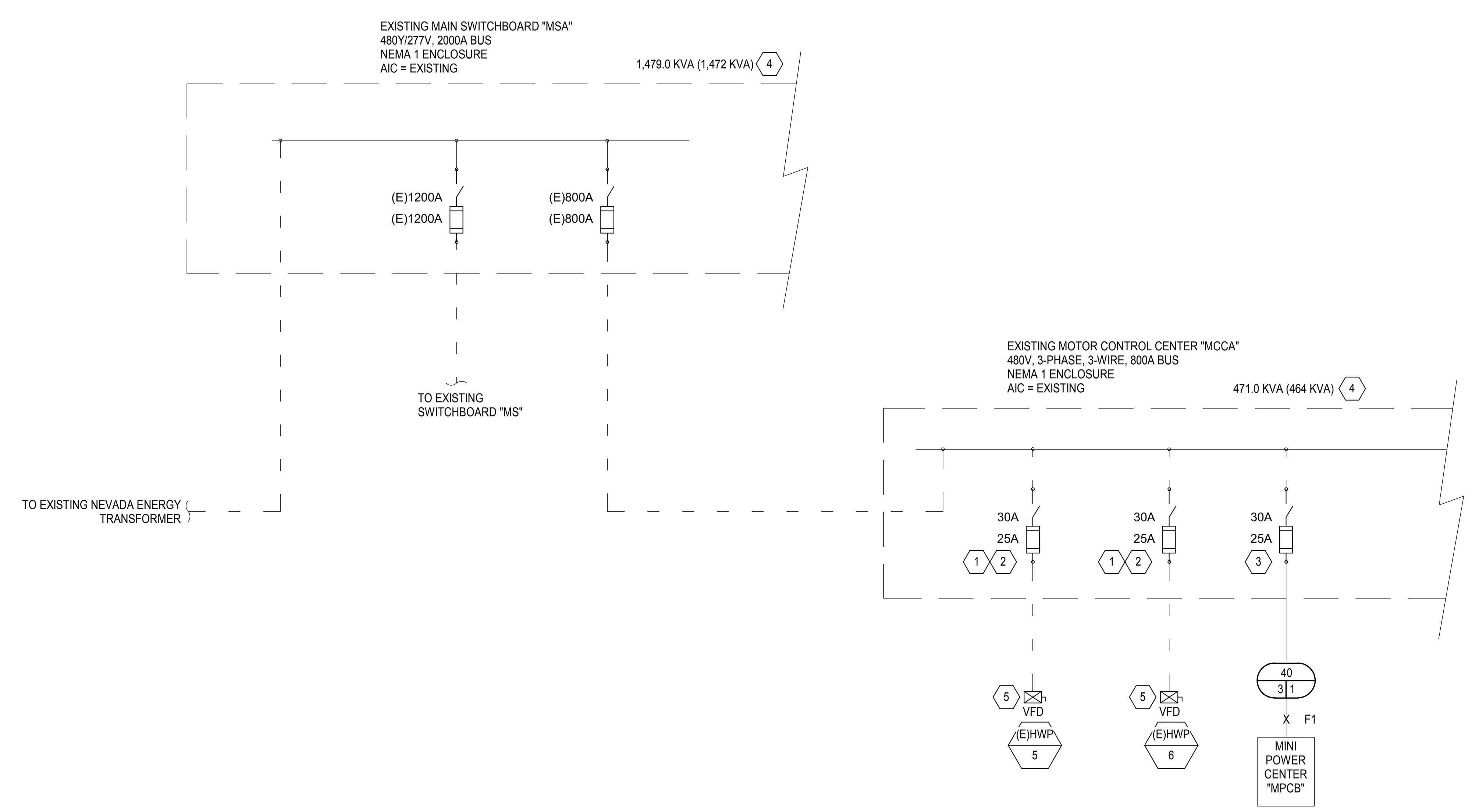
CKT	DESCRIPTION	BKR TRIP	POLE	WIRE AND CONDUIT	LOAD TYPE	CONN. VA	Ø	CONN. VA	LOAD TYPE	WIRE AND CONDUIT	POLE	BKR TRIP	DESCRIPTION	CKT
1	HHWPP-7 (2 HP)	20	3	3#10, #10G, 3/4"C	M	820	A	500	Q	2#12, #12G, 3/4"C	20	1	WH-1	2
3	-	20	3	3#10, #10G, 3/4"C	M	820	B	500	Q	2#12, #12G, 3/4"C	20	1	WH-2	4
5	-	20	3	3#10, #10G, 3/4"C	M	820	C				20	1	SPARE	6
7	HHWPP-8 (2 HP)	20	3	3#10, #10G, 3/4"C	M	820	A	500	Q	2#12, #12G, 3/4"C	20	1	CONTROLS	8
9	-	20	3	3#10, #10G, 3/4"C	M	820	B				20	1	SPARE	10
11	-	20	3	3#10, #10G, 3/4"C	M	820	C				20	1	SPARE	12
13	SPARE	15	3				A						SPACE	14
15	-	15	3				B						SPACE	16
17	-	15	3				C						SPACE	18
19	SPARE	20	3				A						SPACE	20
21	-	20	3				B						SPACE	22
23	-	20	3				C						SPACE	24

1. CONNECTED LOAD COLUMN INCLUDES SUBFED PANELS.

EQUIPMENT DEMAND CALCULATION PER NEC ARTICLE 220	TOTAL CONN. LOAD	%	TOTAL DEMAND LOAD
LIGHTING (L)	0.0	1.25	0.0
FIRST 10 KW RECEPTACLES (R) PER NEC 220.44	0.0	1.00	0.0
>10KW RECEPTACLES	0.0	0.50	0.0
HEATING (H)	0.0	1.25	0.0
AIR COND. MOTORS (AC)	0.0	1.00	0.0
MOTORS (M)	2.4	1.00	2.4
LARGEST MOTOR	2.5	1.25	3.1
KITCHEN EQUIPMENT (K)	0.0	1.00	0.0
ELEVATORS (E)	0.0	1.00	0.0
EQUIPMENT (Q)	1.5	1.00	1.5
OTHER (O)	0.0	1.00	0.0

LOAD CALCULATION SUMMARY

TOTAL CONNECTED LOAD:	6.4	KVA
	18	A
TOTAL DEMAND LOAD:	7.0	KVA
	20	A
OVERCURRENT PROTECTION:	50	A



1 PARTIAL SINGLE LINE DIAGRAM
NTS

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DRAWING TITLE:
ELECTRICAL SINGLE LINE DIAGRAM AND SCHEDULES

UNLV PROJECT NUMBER: SLC-1706/PC-9008

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KEY PLAN

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UNLV SHADOW LANE HEATING HOT WATER REPIPE
UNLV
1001 SHADOW LANE, LAS VEGAS, NV 89106

DRAWING NO.
E5.01