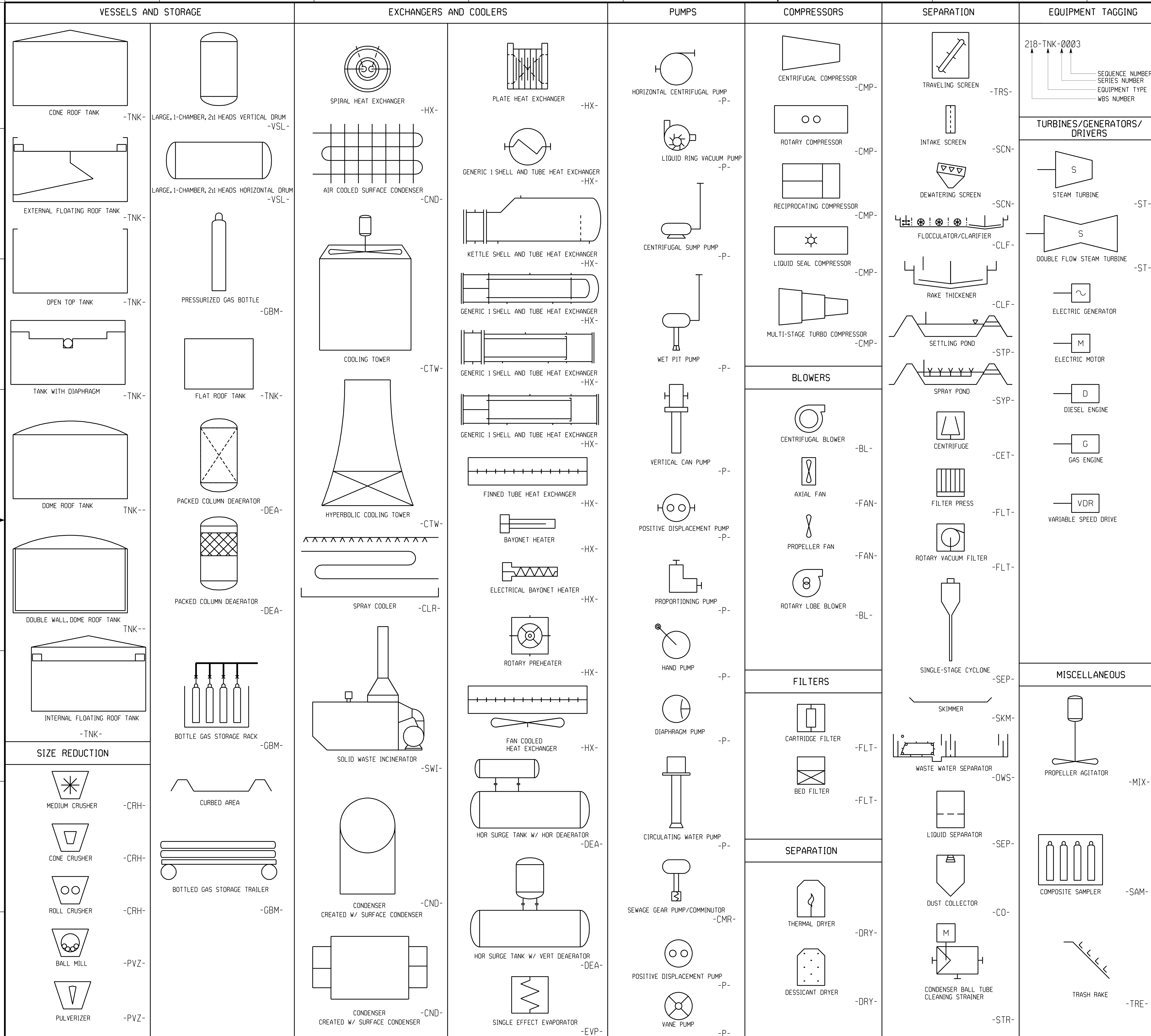

EQUIPMENT TYPE/DESCRIPTION

EQUIPMENT TYPE	DESCRIPTION
AIX	EXCHANGER, ANION
BL	BLOWER
BLR	BOILER
BNR	BURNER
BRS	BAR SCREEN
CCL	COIL, COOLING
CET	CENTRIFUGE
CIX	EXCHANGER, CATION
CLF	CLARIFIER
CMP	COMPRESSOR
CMR	COMMINUTOR
CND	CONDENSER
CO	COLLECTOR
CRH	CRUSHER
CTB	CONSTANT TEMPERATURE BATH
CTW	COOLING TOWER
DEA	DEAERATOR
DG	DIESEL GENERATOR
DGS	DEGASIFIER
DMZ	DEMINERALIZER
DRM	DRUM
DRY	DRYER
DSH	DESUPERHEATER
EDU	EDUCTOR, MIXING
EJR	EJECTOR EDUCTOR
ES	EMERGENCY SHOWER
ESW	EMERGENCY SHOWER AND EYE WASH
EW	EYE WASH
EVP	EVAPORATOR
FAN	FAN
FCH	FOAM CHAMBER
FDM	FILTER DEMINERALIZER
FEX	FIRE EXTINGUISHER
FHT	FEEDWATER HEATER
FLT	FILTER
GBM	GAS CYLINDERS AND/OR MANIFOLD
HCL	COIL, HEATING
HST	HOIST
HT	HEATER
HX	HEAT EXCHANGER
IGN	IGNITER
INJ	INJECTOR (SPRAY NOZZLE)
LFS	LIFT STATION
LMS	LIME SLAKER
MBX	EXCHANGER, MIXED BED
MIX	MIXER/BLENDER
ØWS	OIL WATER SEPARATOR
	PUMP
PCP	PRECIPITATOR
POV	POWER ROOF VENTILATOR
PVZ	PULVERIZER (BALL MILL)
RCV	RECEIVER
ROU	REVERSE OSMOSIS UNIT
RVR	RESERVOIR
SAM	SAMPLER
SBL	SOOT BLOWER
SCN	SCREEN
SEP	SEPARATOR
SG	STEAM GENERATOR
SIL	SILENCER
SKD	EQUIPMENT SKID (DEFINED BY COMMON BASEPLATE)
SKM	SKIMMER
SPF	SPECTACLE FLANGE
SPL	PANEL, SAMPLE
ST	STEAM TURBINE
STP	SETTLING POND
STU	SEWAGE TREATMENT UNIT
SWI	SOLID WASTE INCINERATOR
SYP	SPRAY POND
TG	TURBINE GENERATOR
TGR	TURNING GEAR
TNK	TANK
TRE	TRASH RAKE
TRS	TRAVELING SCREEN
VDR	VARIABLE SPEED DRIVE
VP	VACUUM PUMP
VSL	VESSEL, PRESSURE

NOTES:

1. FOR GENERAL NOTES, ABBREVIATIONS AND SYMBOLS SEE DRAWINGS CAES-1-DW-012-302-001, 002 AND 003.

PRELIMINARY DESIGN

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/TECH. SPEC.	LEAD DISC ENGINEER	PROJ ENGR MANAGER	PROJECT MANAGER
A		ISSUED FOR REVIEW COMMENT	TAD	HGE		HGE	HGE		MH

PRELIMINARY STATUS — DATE — REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
LDE

APPROVED STATUS — DATE — REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE

ORIGINATING PERSONNEL

DRAWN BY: TAD
CHECKED BY: H.G. EISENBISE
LEAD DESIGNER:
ENGINEER/TECH SPECIALIST: H.G. EISENBISE
PROJECT ENGINEERING MANAGER:
PROJECT MANAGER: M. HOLDRIDGE

Zero Harm — Leadership, No Incidents, Safe Behavior

PROFESSIONAL ENGINEER'S SEAL

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
PE: ____________ STATE: ______
LIC. NO.: __________ DATE: ______

WorleyParsons
resources & energy

CLIENT/PROJECT TITLE
NYSEG
SENECA COMPRESSED AIR ENERGY STORAGE (CAES) PROJECT

PIPING & INSTRUMENTATION DIAGRAM
LEGENDS AND SYMBOLS
EQUIPMENT SYMBOLS

SCALE: NONE
DRAWING SIZE: ARCH D (36" x 24")
WORLEYPARSONS DWG. NO.: CAES-1-DW-012-302-003
REV: A

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EQ TYPE	DESCRIPTION
AE	PRIMARY ELEMENT, ANALYSIS
AI	INDICATOR, ANALYSIS
AIS	INDICATING SWITCH, ANALYSIS
AIT	INDICATING TRANSMITTER, ANALYSIS
AP	TEST POINT, ANALYSIS
AS	SWITCH, ANALYSIS
AT	TRANSMITTER, ANALYSIS
BE	PRIMARY ELEMENT, BURNER
BI	INDICATOR, BURNER
BIS	INDICATING SWITCH, BURNER
BIT	INDICATING TRANSMITTER, BURNER
BP	TEST POINT, BURNER
BT	TRANSMITTER, BURNER
BW	PROBE, BURNER
CDR	CONTROL DRIVE
FCV	CONTROL VALVE, FLOW
FE	PRIMARY ELEMENT, FLOW
FG	GAUGE GLASS, FLOW
FI	INDICATOR, FLOW
FIS	INDICATING SWITCH, FLOW
FIT	INDICATING TRANSMITTER, FLOW
FP	TEST POINT, FLOW
FS	SWITCH, FLOW
FT	TRANSMITTER, FLOW
FY	SOLENOID, FLOW
HCV	HYDRAULIC CONTROL VALVE
HS	SWITCH, HAND
LCV	CONTROL VALVE, LEVEL
LE	PRIMARY ELEMENT, LEVEL
LG	GAUGE GLASS, LEVEL
LI	INDICATOR, LEVEL
LIS	INDICATING SWITCH, LEVEL
LIT	INDICATING TRANSMITTER, LEVEL
LRV	REGULATING VALVE, LEVEL (SELF ACTUATING)
LS	SWITCH, LEVEL
LT	TRANSMITTER, LEVEL
LY	SOLENOID, LEVEL
MI	INDICATOR, MOISTURE (HUMIDITY)
MIS	INDICATING SWITCH, MOISTURE (HUMIDITY)
MS	SWITCH, MOISTURE (HUMIDITY)
MT	TRANSMITTER, MOISTURE (HUMIDITY)
PCV	CONTROL VALVE, PRESSURE
PDCV	CONTROL VALVE, PRESSURE DIFF.
PDI	INDICATOR, PRESSURE DIFF.
PDIS	INDICATING SWITCH, PRESSURE DIFF.
PDIT	INDICATING TRANSMITTER, PRESSURE DIFF.
PDRV	REGULATING VALVE, PRESSURE DIFF. (SELF ACTUATING)
PDS	SWITCH, PRESSURE DIFF.
PDT	TRANSMITTER, PRESSURE DIFF.
PE	PRIMARY ELEMENT, PRESSURE
PI	INDICATOR, PRESSURE
PIS	INDICATING SWITCH, PRESSURE
PIT	INDICATING TRANSMITTER, PRESSURE
PP	TEST POINT, PRESSURE
PRV	REGULATING VALVE, PRESSURE (SELF ACTUATING)
PS	SWITCH, PRESSURE
PSV	SAFETY VALVE, PRESSURE (RELIEF)
PT	TRANSMITTER, PRESSURE
PY	SOLENOID, PRESSURE
SCV	CONTROL VALVE, SPEED/FREQ.
SE	PRIMARY ELEMENT, SPEED/FREQ.
SI	INDICATOR, SPEED/FREQ.
SIS	INDICATING SWITCH, SPEED/FREQ.
SIT	INDICATING TRANSMITTER, SPEED/FREQ.
SS	SWITCH, SPEED/FREQ.
SV	VALVE, SOLENOID (ALL TYPES)
TCV	CONTROL VALVE, TEMPERATURE
TE	PRIMARY ELEMENT, TEMPERATURE
THS	THERMOSTAT
TI	INDICATOR, TEMPERATURE
TIS	INDICATING SWITCH, TEMPERATURE
TIT	INDICATING TRANSMITTER, TEMPERATURE
TP	TEST POINT, TEMPERATURE
TRV	REGULATING VALVE, TEMP. (SELF ACTUATING)
TS	SWITCH, TEMPERATURE
TT	TRANSMITTER, TEMPERATURE
TW	PROBE, TEMPERATURE (THERMOWELL)
TY	SOLENOID, TEMPERATURE
VE	PRIMARY ELEMENT, VIBRATION
VI	INDICATOR, VIBRATION
VIT	INDICATING TRANSMITTER, VIBRATION
VS	SWITCH, VIBRATION
VT	TRANSMITTER, VIBRATION
VY	VIBRATION PROXIMITOR
WE	PRIMARY ELEMENT, WEIGHT/FORCE
WI	INDICATOR, WEIGHT/FORCE
WIS	INDICATING SWITCH, WEIGHT/FORCE
WIT	INDICATING TRANSMITTER, WEIGHT/FORCE
WS	SWITCH, WEIGHT/FORCE
WT	TRANSMITTER, WEIGHT/FORCE
XE	SPECIAL ANALYSIS INSTRUMENT
XI	INDICATOR, SPECIAL
XS	SWITCH, SPECIAL
XT	TRANSMITTER, MISCELLANEOUS
ZE	PRIMARY ELEMENT, POSITION/DIMENSION
ZI	INDICATOR, POSITION/DIMENSION
ZIS	INDICATING SWITCH, POSITION/DIMENSION
ZIT	INDICATING TRANSMITTER, POSITION/DIMENSION
ZS	SWITCH, POSITION/DIMENSION
ZT	TRANSMITTER, POSITION/DIMENSION

NOTE: 1. THIS TABLE IS NOT ALL-INCLUSIVE.
2. "A" IS USED FOR ANALYTICAL VARIABLES NOT LISTED IN THE TABLE.
EXAMPLE: O, H, CO, NO, CO, SO, pH, SMOKE, SP COND, CAT COND.

• MODIFIED FROM ISA 5.1
•• LETTER A (ALARM-THE ANNUNCIATING DEVICE) MAY BA USED IN THE SAME FASHION AS LETTER S (SWITCH-THE ACTUATING DEVICE).
••• THE LETTERS H AND L MAY BE OMITTED IN THE UNDEFINED CASE.
ALL AUTOMATIC BLOCK VALVES NO MATTER THE CONTROL MEASURED VARIABLE WILL CARRY AN INSTRUMENT CODE OF "ABV"
ALL HYDRAULIC BLOCK VALVES NO MATTER THE CONTROL MEASURED VARIABLE WILL CARRY AN INSTRUMENT CODE OF "HBV"
ALL MOTOR OPERATED BLOCK VALVES NO MATTER THE CONTROL MEASURED VARIABLE WILL CARRY AN INSTRUMENT CODE OF "MBV"

GENERAL INSTRUMENTS

DISCRETE SINGLE-FUNCT INSTR, FIELD MOUNTED INSTRUMENT FOR SINGLE MEASURED VARIABLE AND ANY NUMBER OF FUNCTIONS. INSTRUMENT IS LOCALLY MOUNTED 704057

DISCRETE SINGLE-FUNCT INSTR, FIELD MOUNTED INSTRUMENT IS MOUNTED BEHIND A PANEL. 704D70

DISCRETE SINGLE-FUNCT INSTR, FIELD MOUNTED INSTRUMENT IS MOUNTED ON A MAIN CONTROL PANEL. 704D65

DISCRETE SINGLE-FUNCT INSTR, FIELD MOUNTED INSTRUMENT IS MOUNTED ON A LOCAL PANEL. 704D85

SIGNAL LINES

CONNECTION TO PROCESS
PNEUMATIC SIGNAL
ELECTRIC SIGNAL
CAPILLARY TUBING (FILLED SYSTEM)
HYDRAULIC SIGNAL
ELECTROMAGNETIC OR SONIC SIGNAL (WITHOUT WIRING OR TUBING)
MECHANICAL LINK SIGNAL
DCS SOFTWARE LINK

SENSORS - FLOW

ORIFICE PLATE & FLANGES 7P3C05
ORIF PLATE, FLANGES & METER RUN 7P3C06
FLOW NOZZLE 7P3C19
FLOW NOZZLE FABRICATED METER RUN 7P3C9B
VENTURI 7P3C13
VENTURI FABRICATED METER RUN 7P3C9A
IN-LINE AVERAGING PITOT TUBE 7P3C16
VORTEX FLOW INSTR 7P3C37
FLUME 7P3C44
WEIR 7P3C46
IN-LINE PROPELLER FLOW INSTR 7P3C35
BALLOON INSTR 7P3C01
VAR AREA FLOW INSTR 7P3C22
STRAIGHTENING VANE 7P3C50

SELF-ACTIVATED DEVICES-PRESSURE

SELF CONTAINED PRESS RED REG 7P1E33
PRESS RED REG W/EXT TAP 7P1E34
DIFF PRESS RED REG W/INT & EXT TAPS 7P1E42
SELF CONTAINED BACKPRESS REG 7P1E38
BACKPRESS REG W/EXT TAP 7P1E39

SELF - ACTIVATED DEVICES - FLOW

FLOW REGULATOR 7P3C01

SENSORS - ANALYSIS

BALLOON INSTR THROUGH-FLOW TYPE 7P3C01
DISCRETE SINGLE-FUNCT INSTR, FIELD MOUNTED 704D57

CONTROL VALVES

PNEUMATIC DIAPHRAGM GATE CONTROL VALVE 7P1E01
PNEUMATIC DIAPHRAGM GLOBE CONTROL VALVE 7P1E15
PNEUMATIC DIAPHRAGM BUTTERFLY CONTROL VALVE 7P1E17
PNEUMATIC DIAPHRAGM BALL METAL SEAT CONTROL VALVE 7P1E13
ELECTRO OR PNEUMATIC HYDRAULIC
PNEUMATIC CYLINDER GATE CONTROL VALVE 7P1E01
PNEUMATIC CYLINDER BUTTERFLY CONTROL VALVE 7P1E17
PNEUMATIC CYLINDER GLOBE CONTROL VALVE 7P1E15
PNEUMATIC CYLINDER BALL METAL SEAT CONTROL VALVE 7P1E13
ROTARY MOTOR GLOBE CONTROL VALVE 7P1E15
ROTARY MOTOR GATE CONTROL VALVE 7P1E01
ROTARY MOTOR BUTTERFLY CONTROL VALVE 7P1E17
ROTARY MOTOR BALL METAL SEAT CONTROL VALVE 7P1E13
ANGLE PRESS RELIEF VALVE 7P2C01
PRESS/VAC RELIEF VALVE 7P2C12
PRESS RELIEF RUPTURE DISC 7P2C16

INSTRUMENT TAGGING

TEXT LOCATION AROUND INSTRUMENT "BALLOON" SHALL BE STANDARDIZED AS SHOWN IN THE SKETCH BELOW:

J1 J2 J3 J4 J5

J1 - SYSTEM DESIGNATION (WBS CODE)
J2 - INSTRUMENT TYPE (ISA CODE)
J3 - SERIAL NUMBER & ALPHABET
J4 - INSTRUMENT TYPE IF NEEDED (REMARK 1)
J5 - REMARK 2

VALVE BODY WITH ACTUATOR (TYPICAL)

TEMPERATURE REGULATOR FIELD - SYSTEM TYPE

VALVE BODIES & FAILURE MODES

TWO-WAY (TYPICAL GLOBE SHOWN)
THREE-WAY
FOUR-WAY

FO - INDICATES FAIL OPEN
FC - INDICATES FAIL CLOSED
FL - INDICATES FAIL LOCKED (POSITION DOES NOT CHANGE)
FI - INDICATES FAIL INTERMEDIATE

PRESSURE TRANSMITTERS

REMOTE MOUNT

USE SINGLE FUNCTION INSTRUMENT BUBBLE

REMOTE MOUNT W/DIAPHRAGM SEAL

USE SINGLE FUNCTION INSTRUMENT BUBBLE

DIRECT MOUNT

USE IMPLIED SINGLE FUNCTION INSTRUMENT BUBBLE

REMARK 1 AND REMARK 2 ARE NOT REQUIRED UNLESS NOTED BY ENGINEER

PRESSURE GAUGE OR SWITCH

USE SINGLE FUNCTION INSTRUMENT BUBBLE.

REMOTE MOUNT AND DIRECT MOUNT ARE IDENTICAL

THERMOMETERS/THERMOWELLS

SIZE WILL BE DETERMINED BY THE PROCESS SYSTEM

REMARK 1 WILL BE BLANK IF "SW" AND WILL BE "NPT" IF THREADED

FILLED SYSTEM

HAND - ACTUATED DEVICES

TWO-WAY HAND CONTROL VALVE IN PROCESS LINE

FLOW METERS

VENTURI

FLOW METER IS FLANGED OR BUTT WELDED SPOOL PIECE WITH 0.75" SOCKOLETS PROVIDED AT EACH TAP LOCATION

NOZZLE

FLOW METER IS FLANGED OR BUTT WELDED SPOOL PIECE WITH 0.75" SOCKOLETS PROVIDED AT EACH TAP LOCATION

ORIFICE PLATE REMOTE MOUNT

ORIFICE PLATE DIRECT MOUNT

ORIFICE FLANGE TAPS AND ROOT VALVE SIZE IS BASED ON PIPE LINE SPEC

AVERAGING PITOT

NOMINAL CONNECTION SIZE MAY VARY

STEAM CONDITIONING VALVES

ANGLE STEAM CONDITIONING VALVE 7P1E47
STEAM CONDITIONING VALVE 7P1E49
STEAM ATOMIZED DESUPERHEATER 7P1E9B

LEVEL SWITCHES

FLOAT

MOTOR OPERATED VALVE

ALL MBV SHALL INCLUDE INTEGRAL MOTOR STARTER, LOCAL/REMOTE CONTROL SWITCH AND LOCAL OPEN/CLOSE PUSHBUTTONS UNLESS OTHERWISE NOTED IN THE REMARKS. THE FOLLOWING DCS I/O POINTS WILL APPLY TO EACH MBV UNLESS NOTED IN THE REMARKS:

OPEN COMMAND	DCS DIGITAL OUTPUT
CLOSE COMMAND	DCS DIGITAL OUTPUT
OPEN LIMIT	DCS DIGITAL INPUT
CLOSE LIMIT	DCS DIGITAL INPUT
IN REMOTE MODE	DCS DIGITAL INPUT

AIR OPERATED ON/OFF VALVE

ALL ABV VALVES SHALL INCLUDE A SOLENIOD VALVE AND OPEN AND CLOSE LIMIT SWITCHES UNLESS OTHERWISE NOTED IN THE REMARK. THE FOLLOWING DCS I/O POINTS WILL APPLY TO EACH ABV UNLESS OTHERWISE NOTED IN THE REMARKS:

CLOSE COMMAND	DCS DIGITAL OUTPUT
OPEN LIMIT	DCS DIGITAL INPUT
CLOSED LIMIT	DCS DIGITAL INPUT

• NOTE THAT REMARK 1 IS "FC" FOR FAIL CLOSED ABV TO CREATE A DIFFERENT MACRO NAME THAT WILL CREATE AN 'OPEN COMMAND' DCS DIGITAL OUTPUT IN IDM INSTEAD OF A 'CLOSE COMMAND'.

LEVEL TRANSMITTERS

DISPLACEMENT

DIFFERENTIAL PRESSURE TYPE

ULTRASONIC

LEVEL GAUGES

NOTES:

1. FOR GENERAL NOTES, ABBREVIATIONS AND SYMBOLS SEE DRAWINGS CAES-1-DW-012-302-001, 002 AND 003.
2. SYSTEM PBS DESIGNATOR FOR VALVES AND PIPING SPECIALTIES ARE THE SAME AS THE ASSOCIATED PIPE DESIGNATION.
3. ALL EQUIPMENT, VALVES, AND SPECIALTY ITEM TAG NUMBERS ARE PREFIXED WITH CAES-1-EQ (SYSTEM PBS DESIGNATOR) UNLESS OTHERWISE NOTED.
4. ALL LOCAL VENTS AND DRAINS TO HAVE A 4" LONG NIPPLE THREADED ONE END TERMINATED LOCALLY UNLESS OTHERWISE NOTED.
5. ALL INSTRUMENT ROOT VALVES ARE 0.75" AND VENTS AND DRAINS ARE 1" UNLESS OTHERWISE NOTED. ALL FLOW ELEMENT ROOT VALVES ARE 0.5" UNLESS OTHERWISE NOTED.
6. THE FOLLOWING TERMS MAY BE PLACED OUTSIDE THE INSTRUMENT BUBBLE OF A LOOP TO DENOTE THE SPECIFIC VARIABLES USING THE REMARKS 1 LABEL.

CC - CATION CONDUCTIVITY	DO2 - DISSOLVED OXYGEN
CL - CHLORIDE	O2 - GASEOUS OXYGEN
CO - CARBON MONOXIDE	PH - PH
COMB - COMBUSTIBLE	SC - SPECIFIC CONDUCTIVITY
H - DISSOLVED HYDROGEN	SIO2 - SILICA
H2 - GASEOUS HYDROGEN	SMOKE - SMOKE DENSITY
NA - SODIUM	SO2 - SULPHUR DIOXIDE
N2H4 - HYDRAZINE	TRB - TURBIDITY
NOX - NITROGEN OXIDE	CL2 - CHLORINE
LS - LOCAL SAMPLE	

7. THIS TYPE OF INSTRUMENT MAY BE NAMED OUTSIDE THE INSTRUMENT CIRCLE, e.g. MAGNETIC FLOW METER, MASS FLOW METER, FLOW SIGHT GLASS.
8. ALL MOTOR OPERATED VALVES AND PNEUMATIC ON/OFF VALVES ARE SUPPLIED WITH OPEN AND CLOSE LIMIT SWITCHES, HOWEVER, THESE LIMIT SWITCHES ARE NOT SHOWN ON THE P&ID. POSITION LIMITS SWITCHES ON MODULATING CONTROL VALVES ARE NOT PROVIDED UNLESS NOTED OTHERWISE.
9. A HAND CONTROL VALVE HCV IS A HAND-ACTIVATED VALVE THAT EITHER MODULATES A PROCESS STREAM OR IS USED AS AN INSTRUMENT DEVICE.

PRELIMINARY DESIGN

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD ENGINEER	TECH. SPECIALIST	PROJECT ENGINEER	PROJECT MANAGER
A		ISSUED FOR REVIEW COMMENT	TAD	HGE		HGE	HGE	MH

PRELIMINARY STATUS — DATE — LDE — REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
APPROVED STATUS — DATE — LDE — REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: TAD	
CHECKED BY: H.G. EISENBISE	
LEAD DESIGNER:	
ENGINEER/TECH SPECIALIST: H.G. EISENBISE	
PROJECT ENGINEERING MANAGER:	
PROJECT MANAGER: M. HOLDRIDGE	

Zero Harm — Leadership No Incidents Safe Behavior

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
PE1 _____ STATE _____
LIC. NO.1 _____ DATE1 _____

WorleyParsons resources & energy

CLIENT/PROJECT TITLE
NYSEG
SENECA COMPRESSED AIR ENERGY STORAGE (CAES) PROJECT

PIPING & INSTRUMENTATION DIAGRAM
LEGENDS AND SYMBOLS
INSTRUMENT SYMBOLS

SCALE	DRAWING SIZE
NONE	ARCH D (36" x 24")

WORLEYPARSONS DWG. NO.	REV
CAES-1-DW-012-302-002	A

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PIPING VALVES

GATE VALVE	BV--	
GLOBE VALVE	BV--	
BALL VALVE	BV--	
BUTTERFLY VALVE	BV--	
CHECK VALVE	UV--	
WAFER CHECK VALVE	UV--	
Y STOP CHECK VALVE	UV--	
STOP CHECK VALVE	UV--	
TILTING DISK CHECK VALVE	UV--	
ANGLE CHECK VALVE	UV--	
KNIFE GATE VALVE	BV--	
PLUG VALVE	BV--	
3-WAY PLUG VALVE	DV--	
4-WAY PLUG VALVE	DV--	
3-WAY BALL VALVE	DV--	
V VENT WITH 4" LONG NIPPLE THREADED ONE END	BV--	
D DRAIN WITH 4" LONG NIPPLE THREADED ONE END	BV--	

VENT AND DRAIN VALVES HAVE A DEFAULT SIZE OF 1". DEFAULT IS SOCKET WELD BOTH ENDS. SIZE WILL NOT BE NOTED ON THE DRAWING UNLESS OTHER THAN DEFAULT VALUE. THE FOLLOWING ARE THE DIFFERENT VENT DRAIN VALVE BODY TYPES:

GATE, GLOBE W/ PLUG, BALL W/ PLUG, BALL, GLOBE W/ FLANGE, BALL W/ FLANGE, GLOBE, GATE W/ FLANGE, PLUG

3-WAY VALVE	DV--	
PINCH VALVE	BV--	
DIAPHRAGM VALVE	BV--	
NEEDLE VALVE	BV--	
Y GLOBE VALVE	BV--	
ANGLE VALVE	BV--	
HOSE VALVE	BV--	
ANGLE HOSE VALVE	BV--	
AUTOMATIC RECIRCULATION VALVE	ARV--	
ANGLE STOP CHECK VALVE	UV--	
FOOT VALVE	BV--	
NON-RETURN VALVE	AUV--	
FL FUSIBLE LINK VALVE	FLV--	
ANTI WHIP VALVE	AHC--	

THE FOLLOWING ARE THE INSTRUMENT ROOT VALVE BODY TYPES AND THEY HAVE A DEFAULT SIZE OF 0.75". SIZE WILL NOT BE NOTED ON THE DRAWING UNLESS OTHER THAN THE DEFAULT VALUE:

GATE, BALL, GLOBE, NEEDLE

MISCELLANEOUS

CONCENTRIC REDUCER		
ECCENTRIC REDUCER		
D WELD CAP		
PLUG		
SCREWED CAP		
HOSE CONNECTION		
QUICK DISCONNECT	QD--	
RS REMOVABLE SPOOL		
BLIND FLANGE		
OPEN SPECTACLE BLIND	SPF--	
CLOSED SPECTACLE BLIND	SPF--	
IF INSULATING FLANGE		
DU DIELECTRIC UNION		
BREATHER		
LOOP SEAL		
GOOSE NECK VENT		
X NOTE NUMBER		
OPEN DRAIN		
TARGET PLATE		

PIPING VALVE OPTIONS

VENTED BALL	POST INDICATOR POST IND	PISTON CHECK PISTON
FTE FEMALE THREADED END	LUG TYPE (THREADED BODY) LUG	HORIZONTAL CHECK HOR CHK
FULL PORT FULL PORT	VITON SEAT VITON SEAT	VERTICAL CHECK VERT CHK
RFFE RAISED FACE FLANGED END	VITON SEAT VITON SEAT	WAFER CHECK WAFER

PIPING VALVE OPENING ACTIONS

NORMALLY OPEN, NORMALLY CLOSED NC, LOCKED CLOSED LC, LOCKED OPEN LO

PIPING SPECIALTY ITEMS

GENERIC COMPONENT	
Y-TYPE STRAINER	STR--
SINGLE BASKET STRAINER	STR--
DUPLEX STRAINER	STR--
FLAT PLATE STRAINER	STR--
CONE STRAINER	STR--
TEMPORARY STRAINER	STR--
T-TYPE STRAINER	STR--
T STEAM TRAP	TRP--
FT FLOAT STEAM TRAP	TRP--
IBT INVERTED BUCKET STEAM TRAP	TRP--
TST THERMOSTATIC STEAM TRAP	TRP--
TDT THERMODYNAMIC STEAM TRAP	TRP--
IT IMPULSE STEAM TRAP	TRP--
RESTRICTION ORIFICE	FO--
PLUG RESISTANT ORIFICE	PRO--
PLUG RESISTANT ORIFICE	PRO--
MULTI-STAGE ORIFICE	ORF--
FILTER	FLT--
FLAME ARRESTOR	ARR--
SPRAY NOZZLE	INJ--
BACKFLOW PREVENTER	BFP--
EXPANSION JOINT	EXJ--
FREE VENT W/SCREEN	SCN--
VENT SILENCER	SIL--
S IN-LINE SILENCER	SIL--
SURGE ARRESTOR	SAR--
EJECTOR/EDUCTOR	EJR--
AIR FILTER	FLT--
V AIR VENT	AV--
AUTO AIR RELIEF VALVE & VAC BREAK	VBK--
PVV PRIMING VENT VALVE	VV--
IN-LINE MIXER	MIX--
FLEXIBLE HOSE	FHS--
SAMPLE COOLER	CLR--
DRIP PAN	DPN--
CALIBRATION COLUMN	CAL--
EXHAUST HEAD	EHD--
SAFETY VALVE VENT SEAL	RVS--
CONSERVATION VENT	CVN--

ATTRIBUTE BREAKS

GROUP BREAK: INDICATES A CHANGE IN ALL LINE ATTRIBUTES INCLUDING: SYSTEM NUMBER, LINE NUMBER, MATERIAL CLASS, INSULATION CODE, DESIGN PRESSURE/TEMPERATURE, OPERATING PRESSURE/TEMPERATURE, FLOW RATE, TEST PRESSURE

ATTRIBUTE BREAK: INDICATES A CHANGE ONLY IN LINE ATTRIBUTES ATTACHED TO THE BREAK. SEE BELOW FOR ATTRIBUTE SYMBOLOGY.

• BECAUSE FLOWRATES SHOWN ARE MAXIMUM, LISTED FLOWS MAY NOT RESULT IN A MASS BALANCE AT THE JUNCTION.

BREAK DESIGNATION	BREAK SYMBOL	SEGMENT SYMBOL	COMPONENT SYMBOL
NOMINAL DIAMETER		6"	6"
PIPING MATERIAL CLASS		12A1S	
SUPPLY RESPONSIBILITY		BY V	• BY V
INSULATION CLASS		HC	
DESIGN RESPONSIBILITY		BY INSTRUMENTS	
CONSTRUCTION STATUS		EXISTING	NEW
OPERATING PRESS/TEMP		999/999	
DESIGN PRESS/TEMP		999/999	
•MAXIMUM FLOW RATE	FR	999 gpm / 999 lb/h	

FIRE PROTECTION AND SAFETY

POST IND POST INDICATOR VALVE	PIV--	
DRY PIPE SPRINKLER VALVE	DPV--	
DELUGE VALVE	DEV--	
PREACTION VALVE	PAV--	
ALARM CHECK VALVE	UV--	
FIRE HYDRANT	HYD--	
3-WAY FIRE HYDRANT	HYD--	
FIRE HYDRANT W/MONITOR NOZZLE	HYD--	
STANDPIPE		
FIRE MONITOR NOZZLE	MNZ--	
FOAM MONITOR NOZZLE	MNZ--	
ELEVATED FIRE MONITOR NOZZLE	MNZ--	
REMOTELY OPERATED FIRE MONITOR NOZZLE	MNZ--	
ELEVATED FOAM MONITOR NOZZLE	MNZ--	
REMOTELY OPERATED FOAM MONITOR NOZZLE	MNZ--	
TS TAMPER SWITCH VALVE	BV--	
EYE WASH	EW--	
SAFETY SHOWER AND EYE WASH	ESW--	
SAFETY SHOWER	ES--	
FIRE DEPT CONNECTION		
PRE-ACTION SPRINKLER	SPR--	
SPRAY SPRINKLER	SPR--	
WET SPRINKLER	SPR--	
AUTOMATICALLY ACTIVATED SPRINKLER SYSTEM	SPR--	
DRY DELUGE OPEN HEAD		
SPRINKLER	SPR--	
HOSE REEL	HSS--	
HH HOSE HOUSE	HSH--	
HOSE RACK STATION	HSS--	
FOAM CHAMBER	FCH--	
BALL DRIP VALVE	BDV--	

PROCESS PIPING

MAIN PROCESS FLOW PIPING
SECONDARY PROCESS FLOW PIPING
FLOW DIRECTION
HEAT TRACING
EXISTING PROCESS FLOW PIPING
FUTURE PROCESS FLOW PIPING
8FT 1.000" SLOPE — LINE SLOPE

VENDOR PACKAGE

ALL EQUIPMENT, PIPE AND INSTRUMENTS INSIDE PACKAGE BREAK WILL BE SUPPLIED BY VENDOR

PACKAGE NO
PACKAGE NAME

SUPPLY RESPONSIBILITY
BY CONTRACTOR : WORLEYPARSONS (DEFAULT)
BY V : VENDOR

VALVE AND SPECIALTIES CODE

CODE	DESCRIPTION
ABV	AIR OPERATED BLOCK VALVE
ADV	PNEUMATIC DIVERTER VALVE (3 OR 4 WAY)
AHC	AIR HOSE CHECK VALVE (ANTI-WHIP VALVE)
ARR	ARRESTOR, FLAME
ARV	AUTOMATIC RECIRCULATION VALVE
AUV	NON-RETURN VALVE
BDV	BALL DRIP VALVE
BFP	BACKFLOW PREVENTER
BV	BLOCK VALVE
CAL	CALIBRATION COLUMN
CLR	SAMPLE COOLER
CVN	CONSERVATION VENT
DEV	DELUGE VALVE
DPN	DRIP PAN
DPV	DRY PIPE SPRINKLER VALVE
DV	DIVERTER VALVE
EJR	EJECTOR
ES	EMERGENCY SHOWER
ESW	EMERGENCY SHOWER AND EYE WASH
EW	EYE WASH
EXJ	EXPANSION JOINT
FCH	FOAM CHAMBER
FHS	FLEX HOSE
FLT	FILTER
FLV	FUSIBLE LINK VALVE
FO	FLOW RESTRICTION ORIFICE
HSH	HOSE HOUSE
HSS	STATION, HOSE (REEL)
HYD	HYDRANT
INJ	INJECTOR (SPRAY NOZZLE)
MBV	MOTOR OPERATED BLOCK VALVE
MNZ	MONITOR NOZZLE
MON	MONITOR (INCLUDES TV)
ORF	ORIFICE
PAV	PRE-ACTION VALVE
PBV	PISTON OPERATED BLOCK VALVE
PIV	POST INDICATOR VALVE
PRO	PLUG RESISTANT ORIFICE
PSV	SAFETY RELIEF VALVE
QD	QUICK DISCONNECT
RPD	RUPTURE DISK
RVS	RELIEF VALVE VENT SEAL
SAR	SURGE ARRESTOR
SCN	SCREEN
SIL	SILENCER
SPR	SPRINKLER
STR	STRAINER
SV	SOLENOID VALVE
TRP	TRAP
UV	CHECK VALVE
VBK	VACUUM BREAKER
VV	VENT VALVE

PIPING MATERIAL SPEC DESIGNATIONS

SPEC	CLASS	MATERIAL
12E61S	125	CAST IRON SEWAGE
12F53S	125	DUCTILE IRON, FIRE PROTECTION
12F55S	125	DUCTILE IRON, CIRCULATING WATER
12J16S	125	FRP, CIRCULATING WATER
12J4S	125	CPVC, SODIUM HYPOCHLORITE
12J8S	125	POLYETHYLENE-SDR 11 WATER, DRAINS
15A1S	150	CARBON STEEL, WATER, DRAINS, NITROGEN, AMMONIA
15A6S	150	CARBON STEEL, FUEL GAS, LUBE OIL
15A41S	150	CARBON STEEL, FIRE PROTECTION
15A42S	150	CARBON STEEL, FIRE PROTECTION
15D1S	150	STAINLESS STEEL 304
15D2S	150	ALLOY 20
15D7S	150	STAINLESS STEEL 304, PRESS FIT
15M61S	150	COPPER, POTABLE
60A4S	600	CARBON STEEL, FUEL GAS
60D4S	600	STAINLESS STEEL 304 FLUE GAS
90A1S	900	CARBON STEEL, COMPRESSED AIR
150D1S	1500	STAINLESS STEEL, LOW PRESSURE, COMP

SYSTEM DESIGNATORS

PBS	DESCRIPTION
201	RECUPERATOR
311	CUMBUSTION TURBINE
411	EXPANDER TURBINE
461	CIRCULATING WATER
463	CIRCULATING WATER CHEMICAL TREATMENT
511	RAW WATER SUPPLY
512	RAW WATER TREATMENT (PRETREATMENT)
513	WATER TREATMENT (DEMINERALIZER)
521	PLANT EQUIPMENT DRAINS
525	PLANT SERVICE WATER SYSTEM
526	WASTE WATER TREATMENT
541	AMMONIA
543	COMPRESSED AIR
544	INSTRUMENT AIR
546	NITROGEN SYSTEM
561	FUEL GAS HANDLING
571	FLOOR AND ROOF DRAINS
572	PLANT FIRE PROTECTION
573	PLANT HVAC
577	POTABLE WATER
578	SANITARY DRAINS
579	SEWAGE TREATMENT

DRAWING NUMBERING

XXXX-X-DW-020-302-XXX
- UNIQUE IDENTIFIER
- DOC. SUB TYPE = 302 FOR P&IDS
- PBS = SYSTEM DESIGNATOR
- DW = DRAWING
- X = UNIT NUMBER
- XXXX = PROJECT IDENTIFIER

OFF-SHEET CONNECTORS

DRAWING CONNECTOR
UNIQUE CONNECTOR NUMBER
SERVICE DESCRIPTION
XXXXXXXXXXXXXXXXXX
9999|XXX-302-XXX
XXXXXXXXXXXXXXXXXXXXXXXX
DESCRIPTION
DRAWING NUMBER (PBS)001 (SHEET NUMBER) OR VENDOR DRAWING NUMBER
TIE-IN NO XXX TIE-IN LABEL
TIE-IN MARKER

UNIT CONNECTOR TO SHOW CONNECTION TO VENDOR SUPPLIED DRAWING OR CLIENT BATTERY LIMITS
XXXXXXXXXXXXXXXXXX
9999|XXX-XXX-XXX
XXXXXXXXXXXXXXXXXXXXXXXX

PIPE DESIGNATION

NOMINAL PIPE SIZE
SYSTEM PBS DESIGNATOR
PIPE LINE SERIES NUMBER
PIPE LINE TYPE
SEQUENCE NUMBER
PIPING LINE SPECIFICATION
INSULATION CODE
20"-218-1001-12A1S-N
OPERATING TEMPERATURE
OPERATING PRESSURE
DESIGN TEMPERATURE
DESIGN PRESSURE
MAXIMUM FLOW RATE

PIPING ELEMENT/VALVE TAGGING

VALVE/SPECIALTIES CODE
SERIES NUMBER
PIPE LINE SERIES NUMBER
OPTIONAL SUFFIX
OPTIONAL SUFFIX
PIPING COMPONENT NUMBER LABEL
BV-1001-1
6T2G01
V-21
GENERIC PIPING COMPONENT NUMBER LABEL
6T2G88
BULK VALVE TAG NUMBER (NUMBER IDENTIFIES SPECIFIC VALVE SIZE, TYPE, MATERIAL AND PRESSURE CLASS).

INSULATION CODE

AC	ACOUSTIC CONTROL
AS	ANTI SWEAT
HC	HEAT CONSERVATION
PF	FREEZE PROTECTION
PP	PERSONNEL PROTECTION
N	NONE

PRELIMINARY DESIGN

NOTES:

1. FOR GENERAL NOTES, ABBREVIATIONS AND SYMBOLS SEE DRAWINGS CAES-1-DW-012-302-001, 002 AND 003.
2. SYSTEM CODE FOR VALVES AND PIPING SPECIALTIES ARE THE SAME AS THE ASSOCIATED PIPE DESIGNATION.
3. ALL EQUIPMENT, VALVES, AND SPECIALTY ITEM TAG NUMBERS ARE PREFIXED WITH CAES-1-EQ UNLESS OTHERWISE NOTED.
4. ALL LOCAL VENTS AND DRAINS TO HAVE A 4" LONG NIPPLE THREADED ONE END TERMINATED LOCALLY UNLESS OTHERWISE NOTED.
5. ALL INSTRUMENT ROOT VALVES ARE 0.75" AND VENTS AND DRAINS ARE 1" UNLESS OTHERWISE NOTED. ALL FLOW ELEMENT ROOT VALVES ARE 0.5" UNLESS OTHERWISE NOTED.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH SPECIALIST	LEAD DESIGNER	PROJECT ENGINEER	PROJECT MANAGER
A		ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH

PRELIMINARY STATUS — DATE — LDE — REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.

APPROVED STATUS — DATE — LDE — REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: TAD	ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF: PE:, STATE:, LIC. NO.#, DATE:
CHECKED BY: H.G. EISENBISE	
LEAD DESIGNER:	
ENGINEER/TECH SPECIALIST: H.G. EISENBISE	
PROJECT ENGINEERING MANAGER:	
PROJECT MANAGER: M. HOLDRIDGE	

Zero Harm — Leadership, No Incidents, Safe Behavior

WorleyParsons — resources & energy

CLIENT/PROJECT TITLE
NYSEG
SENECA COMPRESSED AIR ENERGY STORAGE (CAES) PROJECT

PIPING & INSTRUMENTATION DIAGRAM
LEGENDS AND SYMBOLS
PIPING SYMBOLS

SCALE: NONE — DRAWING SIZE: ARCH D (36" x 24") — WORLEYPARSONS DWG. NO.: CAES-1-DW-012-302-001 — REV: A

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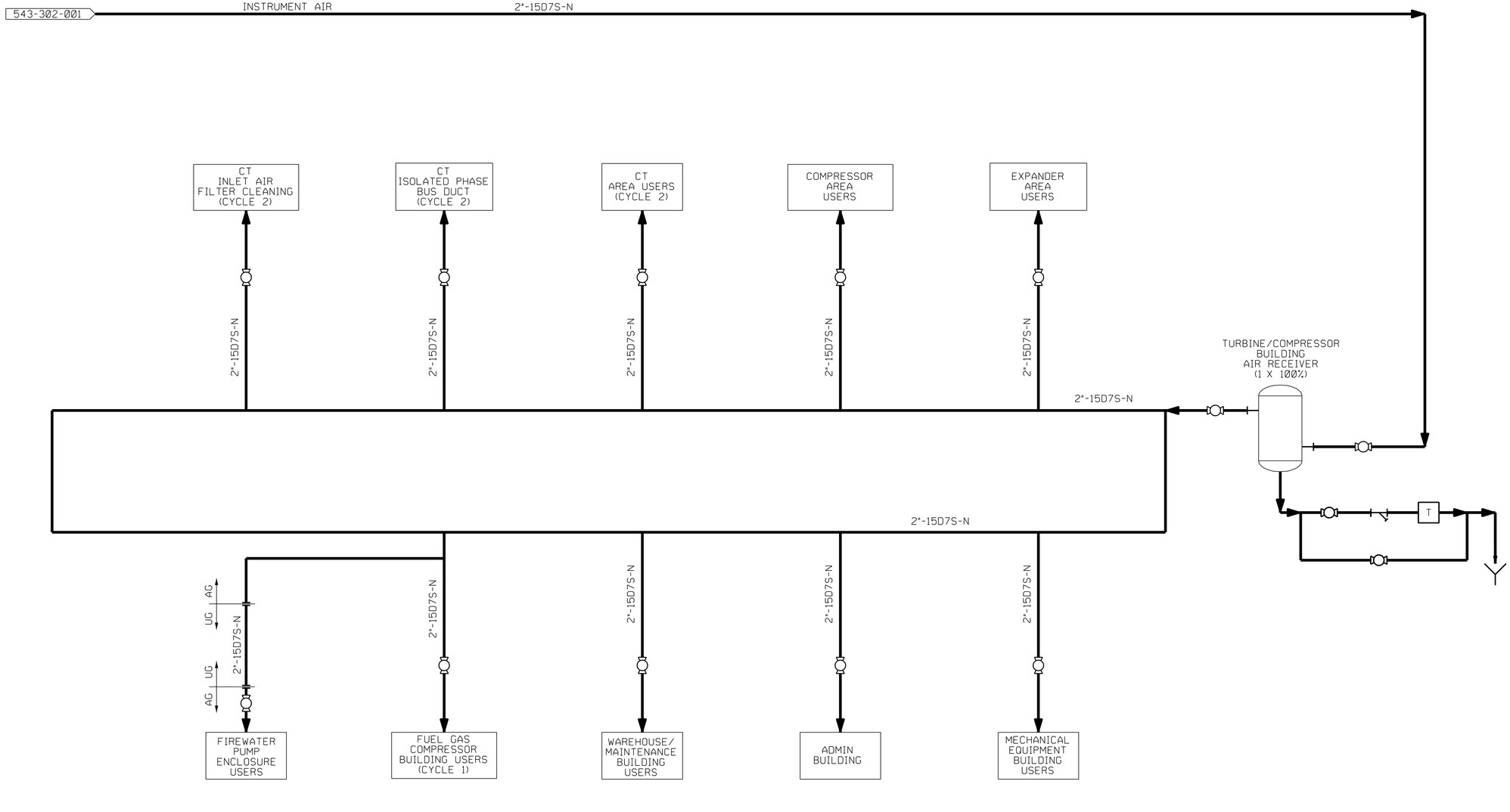

NOTES:

1. FOR GENERAL NOTES, ABBREVIATIONS AND SYMBOLS SEE DRAWINGS CAES-1-DW-012-302-001, 002 AND 003.
2. LINE SIZES ARE FOR INFORMATION ONLY AND MAY CHANGE DURING FINAL DESIGN.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH. SPEC.	LEAD ENGINEER	PROJECT ENGINEER	PROJECT MANAGER
B	08 16 11	ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH
A		ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH

PRELIMINARY STATUS — DATE — LDE — REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.

APPROVED STATUS — DATE — LDE — REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: TAD	ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF PE#_____ STATE_____ LIC. NO.#_____ DATE:_____
CHECKED BY: H.G. EISENBISE	
LEAD DESIGNER:	
ENGINEER/TECH SPECIALIST: H.G. EISENBISE	
PROJECT ENGINEERING MANAGER:	
PROJECT MANAGER: M. HOLDRIDGE	

OneWay™ to zero harm

WorleyParsons resources & energy

CLIENT/PROJECT TITLE

NYSEG
SENECA COMPRESSED AIR ENERGY STORAGE (CAES) PROJECT

PIPING & INSTRUMENTATION DIAGRAM
COMPRESSED AIR SYSTEMS

PRELIMINARY DESIGN

SCALE	DRAWING SIZE
NONE	ARCH D (36" x 24")

WORLEYPARSONS DWG. NO.	REV
CAES-1-DW-543-302-002	B

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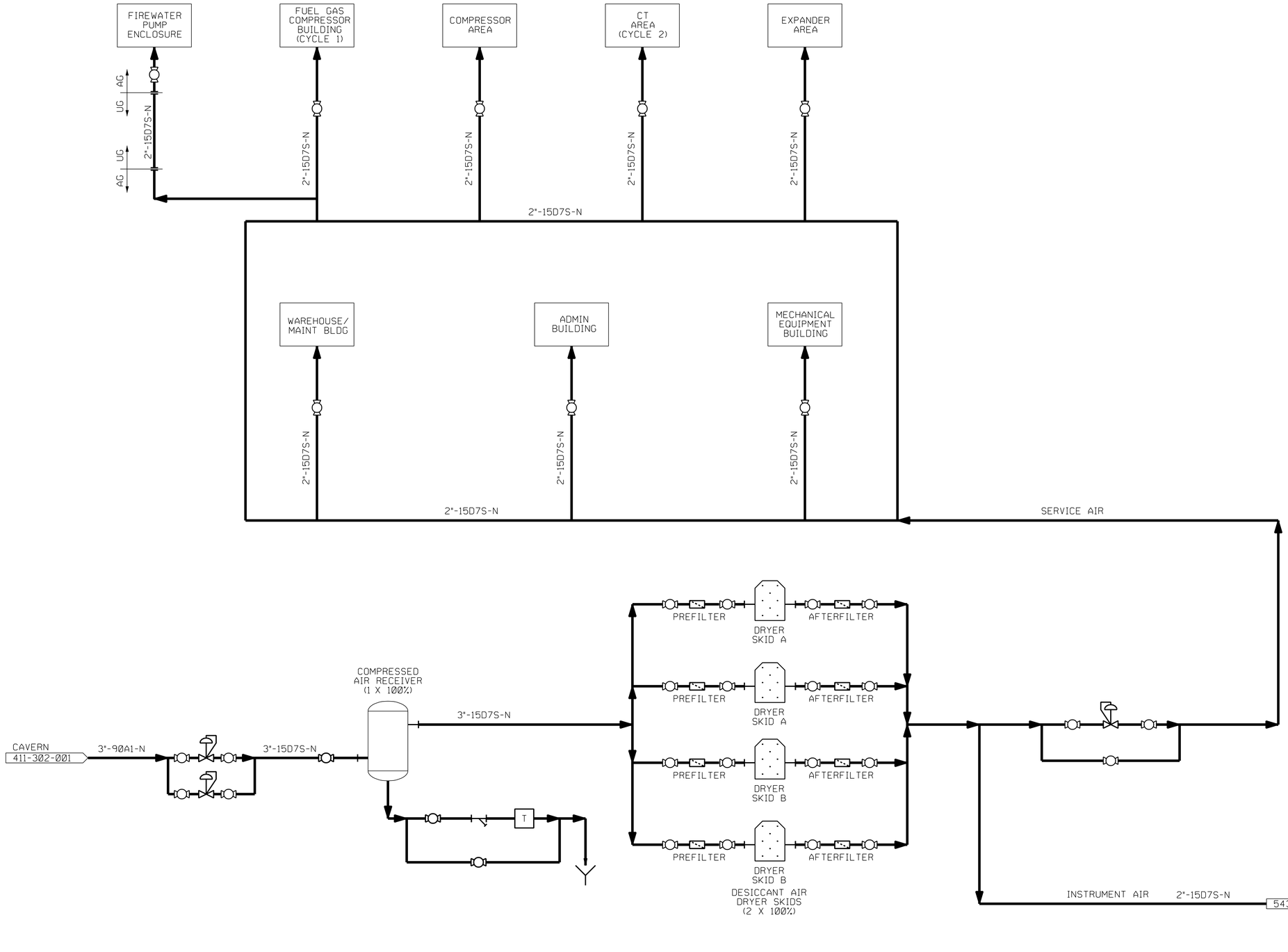

PRELIMINARY DESIGN

NOTES:

1. FOR GENERAL NOTES, ABBREVIATIONS AND SYMBOLS SEE DRAWINGS CAES-1-DW-012-302-001, 002 AND 003.
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REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH. SPEC.	LEAD ELEC. ENGINEER	PROJ. ENGR MANAGER	PROJECT MANAGER
B	08 16 11	ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH
A		ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH

PRELIMINARY STATUS — DATE — LDE
REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.

APPROVED STATUS — DATE — LDE
REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: TAD	ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF PE: _____ STATE: _____ LIC. NO.: _____ DATE: _____
CHECKED BY: H.G. EISENBISE	
LEAD DESIGNER:	
ENGINEER/TECH SPECIALIST: H.G. EISENBISE	
PROJECT ENGINEERING MANAGER:	
PROJECT MANAGER: M. HOLDRIDGE	

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WorleyParsons resources & energy

CLIENT/PROJECT TITLE

NYSEG
SENECA COMPRESSED AIR ENERGY STORAGE (CAES) PROJECT

PIPING & INSTRUMENTATION DIAGRAM
COMPRESSED AIR SYSTEMS

SCALE	DRAWING SIZE
NONE	ARCH D (36" x 24")

WORLEYPARSONS DWG. NO.	REV
CAES-1-DW-543-302-001	B

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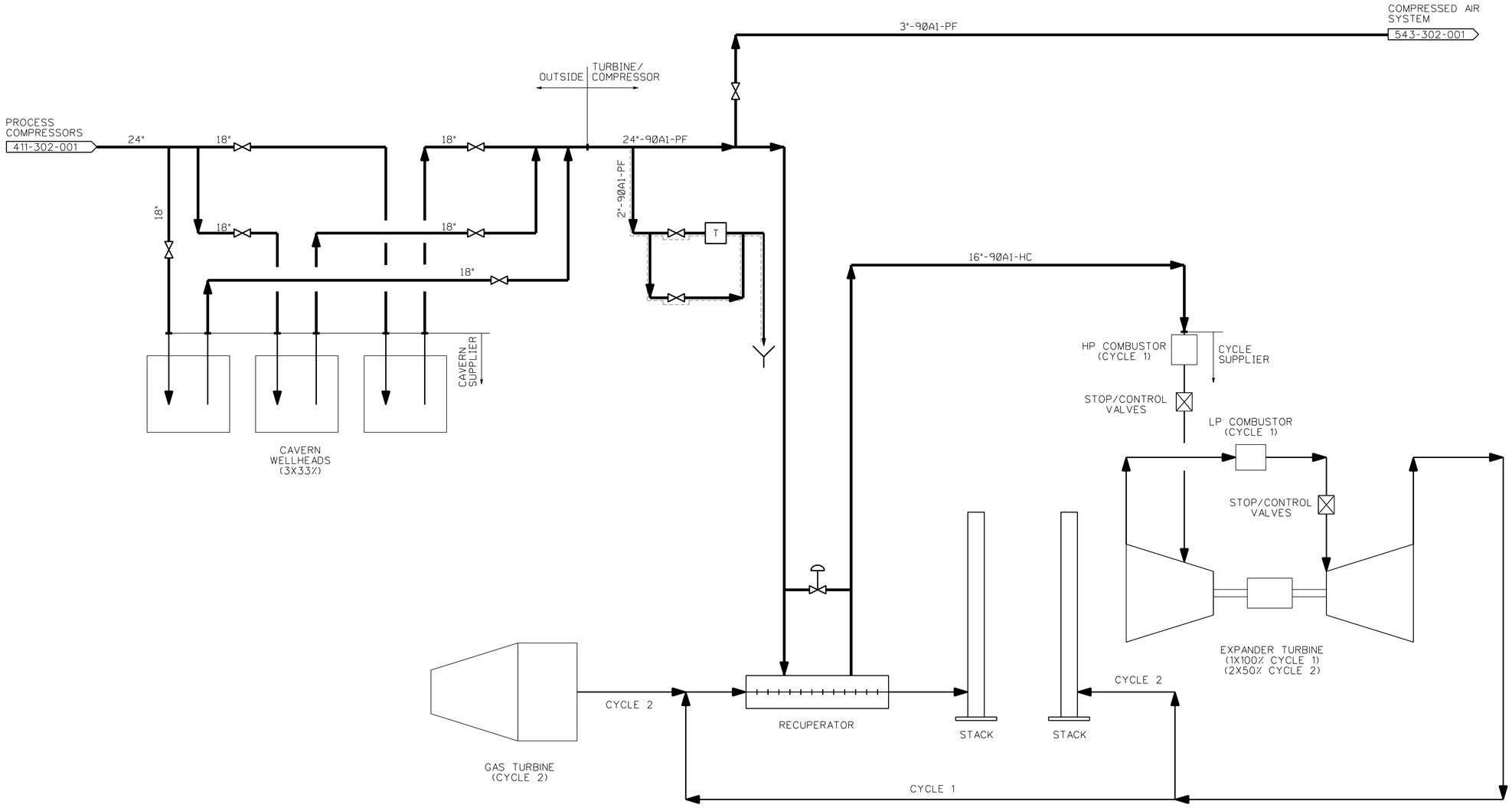

NOTES:

1. FOR GENERAL NOTES, ABBREVIATIONS AND SYMBOLS SEE DRAWINGS CAES-1-DW-012-302-001, 002 AND 003.
2. LINE SIZES ARE FOR INFORMATION ONLY AND MAY CHANGE DURING FINAL DESIGN.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER/ ENGINEER/ TECH SPEC ENGINEER	PROJ ENGR MANAGER	PROJECT MANAGER
B	10, 11	ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH
A		ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH

PRELIMINARY STATUS DATE — REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
LDE

APPROVED STATUS DATE — REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: TAD	
CHECKED BY: H.G. EISENBISE	
LEAD DESIGNER:	
ENGINEER/TECH SPECIALIST: H.G. EISENBISE	
PROJECT ENGINEERING MANAGER:	
PROJECT MANAGER: M. HOLDRIDGE	

OneWay to zero harm

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
PE:_____ STATE:_____
LIC. NO.:_____ DATE:_____

WorleyParsons
resources & energy

CLIENT/PROJECT TITLE
NYSEG
SENECA COMPRESSED AIR ENERGY STORAGE (CAES) PROJECT

PIPING & INSTRUMENTATION DIAGRAM
EXPANDER TURBINE

PRELIMINARY DESIGN

SCALE	DRAWING SIZE
NONE	ARCH D (36" x 24")

WORLEYPARSONS DWG. NO.	REV
CAES-1-DW-411-302-002	B

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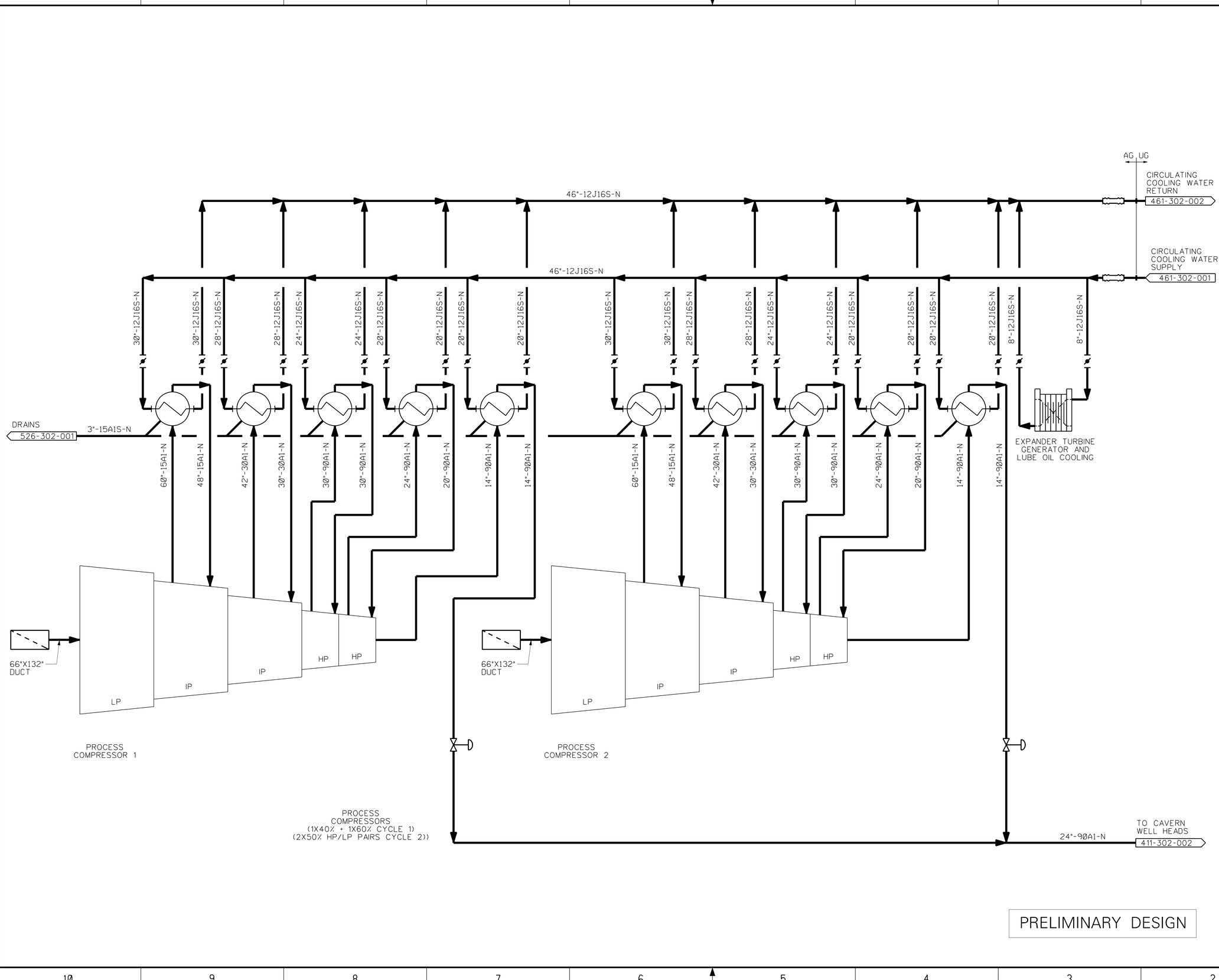

PRELIMINARY DESIGN

NOTES:

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REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH. SPEC.	LEAD ENGINEER	PROJ. ENGR MANAGER	PROJECT MANAGER
C	10/11	ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH
B	08/16/11	ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH
A		ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH

PRELIMINARY STATUS — DATE — LDE
REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.

APPROVED STATUS — DATE — LDE
REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: TAD	
CHECKED BY: H.G. EISENBISE	
LEAD DESIGNER:	
ENGINEER/TECH SPECIALIST: H.G. EISENBISE	
PROJECT ENGINEERING MANAGER:	
PROJECT MANAGER: M. HOLDRIDGE	

OneWay to zero harm

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
PE1 _____ STATE1 _____
LIC. NO.1 _____ DATE1 _____

WorleyParsons
resources & energy

CLIENT/PROJECT TITLE
NYSEG
SENECA COMPRESSED AIR ENERGY STORAGE (CAES) PROJECT

PIPING & INSTRUMENTATION DIAGRAM
EXPANDER TURBINE

SCALE: NONE
DRAWING SIZE: ARCH D (36" x 24")
WORLEYPARSONS DWG. NO.: CAES-1-DW-411-302-001
REV: C

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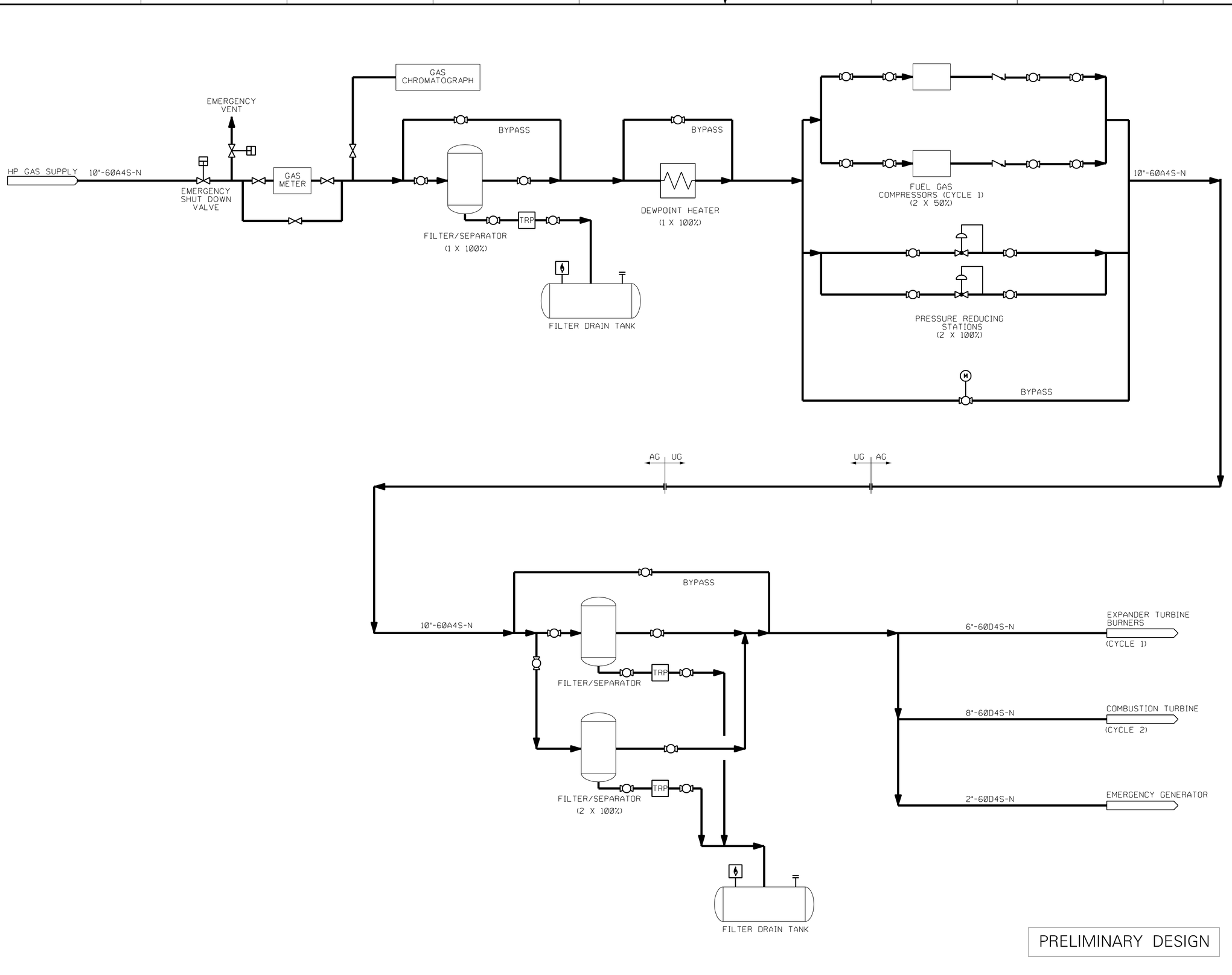

PRELIMINARY DESIGN

NOTES:

1. FOR GENERAL NOTES, ABBREVIATIONS AND SYMBOLS SEE DRAWINGS CAES-1-DW-012-302-001, 002 AND 003.
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C	10/11/11	ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH
B	08/16/11	ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH
A		ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH

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LDE

APPROVED STATUS DATE — REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: TAD	
CHECKED BY: H.G. EISENBISE	
LEAD DESIGNER:	
ENGINEER/TECH SPECIALIST: H.G. EISENBISE	
PROJECT ENGINEERING MANAGER:	
PROJECT MANAGER: M. HOLDRIDGE	

OneWay to zero harm

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
PE: _____ STATE: _____
LIC. NO.: _____ DATE: _____

WorleyParsons
resources & energy

CLIENT/PROJECT TITLE
NYSEG
SENECA COMPRESSED AIR ENERGY STORAGE (CAES) PROJECT

PIPING & INSTRUMENTATION DIAGRAM
FUEL GAS SYSTEM

SCALE: NONE
DRAWING SIZE: ARCH D (36" x 24")
WORLEYPARSONS DWG. NO.: CAES-1-DW-561-302-001
REV: C

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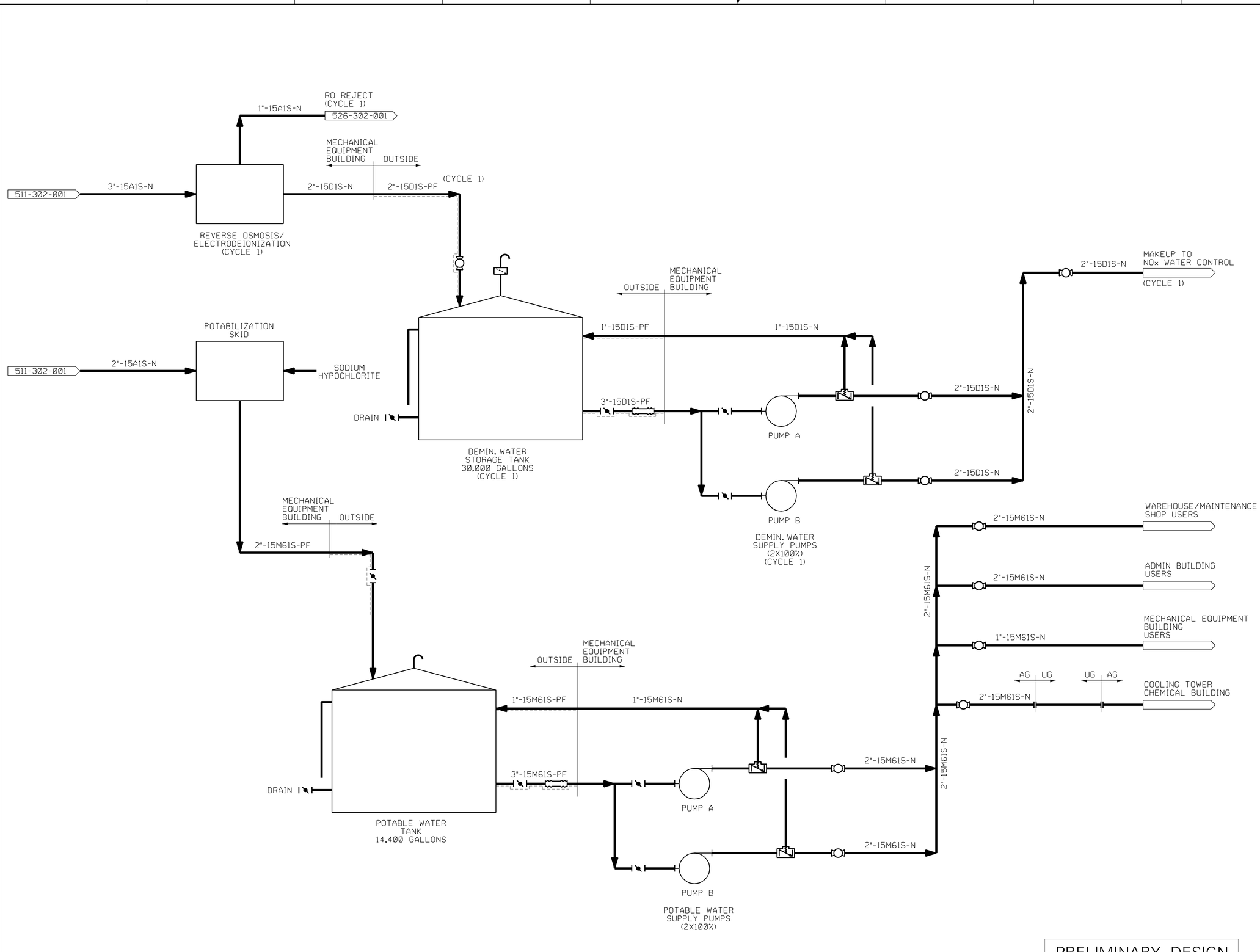

PRELIMINARY DESIGN

NOTES:

1. FOR GENERAL NOTES, ABBREVIATIONS AND SYMBOLS SEE DRAWINGS CAES-1-DW-012-302-001, 002 AND 003.
2. LINE SIZES ARE FOR INFORMATION ONLY AND MAY CHANGE DURING FINAL DESIGN.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH SPEC	LEAD ELEC ENGINEER	PROJ. ENGR MANAGER	PROJECT MANAGER
B	08 16 11	ISSUED FOR REVIEW AND COMMENT	TAD	HGE		CH	HGE		MH
A		ISSUED FOR REVIEW AND COMMENT	TAD	HGE		CH	HGE		MH

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APPROVED STATUS — DATE — LDE — REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: TAD	ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF: PE: STATE: LIC. NO.: DATE:
CHECKED BY: H.G. EISENBISE	
LEAD DESIGNER:	
ENGINEER/TECH SPECIALIST: C. HARTLINE	
PROJECT ENGINEERING MANAGER:	
PROJECT MANAGER: M. HOLDRIDGE	

OneWay to zero harm

WorleyParsons
resources & energy

CLIENT/PROJECT TITLE
NYSEG
SENECA COMPRESSED AIR ENERGY STORAGE (CAES) PROJECT

PIPING & INSTRUMENTATION DIAGRAM
WATER TREATMENT SYSTEM

SCALE: NONE
DRAWING SIZE: ARCH D (36" x 24")
WORLEYPARSONS DWG. NO.: CAES-1-DW-511-302-002
REV: B

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COOLING TOWER BLOWDOWN
461-302-001
6"-12J8S-N
OFF SITE

EVAPORATIVE COOLER BLOWDOWN (CYCLE 2)
2"-15A1S-N

4"-12J8S-N
NC
GENERATOR STEP UP TRANSFORMER FOUNDATION

4"-12J8S-N
NC
AUXILIARY TRANSFORMER FOUNDATION

4"-12J8S-N
NC
AUXILIARY TRANSFORMER FOUNDATION

4"-12J8S-N
NC
AUXILIARY TRANSFORMER FOUNDATION

NC
AMMONIA STORAGE TANK CONTAINMENT

4"-12J8S-N

4"-15A1S-N

AG,UG

UG,AG

6"-15A1S-PF

UG,AG
6"-12J8S-N
COOLING TOWER BASIN
461-302-002

AG,UG
4"-12J8S-N
COOLING TOWER BASIN
461-302-002

4"-15A1S-PF
4"-15A1S-PF

PUMP A PUMP B
SUMP PUMPS
STORM WATER
TRANSFER
(2X100%)

EMERGENCY GENERATOR
4"-12J8S-N

TURBINE/COMPRESSOR BUILDING FLOOR AND EQUIPMENT DRAINS
4"-12J8S-N

PROCESS COMPRESSOR
411-302-001
DRAINS
3"-15A1S-N

PUMP A PUMP B
SUMP PUMPS
TURBINE/COMPRESSOR BLDG
(2X100%)

PUMP A PUMP B
OIL/WATER SEPARATOR

OIL/WATER SEPARATOR DISCHARGE PUMPS
(2 X 100%)

PACKAGED SEWAGE SYSTEM
4"-12E61S-N
LEACHATE FIELD

4"-15A1S-N
4"-15A1S-N
4"-15A1S-N

AG,UG
4"-12J8S-N
COOLING TOWER BASIN
461-302-002

4"-15A1S-PF
4"-15A1S-PF

FILTER BACKWASH
511-302-001
2"-15A1S-N

RO REJECT
511-302-002
(CYCLE 1)
1"-15A1S-N

PUMP A PUMP B
SUMP PUMPS
MECHANICAL EQUIPMENT BUILDING
(2X100%)

PUMP A PUMP B
SUMP PUMPS
WAREHOUSE/MAINTENANCE SHOP
(2X100%)

PUMP A PUMP B
SUMP PUMPS
COOLING TOWER
CHEMICAL BLDG
(2X100%)

ADMIN BUILDING SANITARY
4"-12E61S-N

MECHANICAL EQUIPMENT BUILDING SANITARY
4"-12E61S-N

6"-12E61S-N

PRELIMINARY DESIGN

NOTES:

1. FOR GENERAL NOTES, ABBREVIATIONS AND SYMBOLS SEE DRAWINGS CAES-1-DW-012-302-001, 002 AND 003.
2. LINE SIZES ARE FOR INFORMATION ONLY AND MAY CHANGE DURING FINAL DESIGN.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH. SPEC.	LEAD DISC. ENGINEER	PROJ. ENGR. MANAGER	PROJECT MANAGER
C	10/11/11	ISSUED FOR REVIEW AND COMMENT	TAD	HGE		CH	HGE		MH
B	08/16/11	ISSUED FOR REVIEW AND COMMENT	TAD	HGE		CH	HGE		MH
A		ISSUED FOR REVIEW AND COMMENT	TAD	HGE		CH	HGE		MH

PRELIMINARY STATUS — DATE — LDE
REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.

APPROVED STATUS — DATE — LDE
REPRESENTS REVIEWED AND APPROVED DESIGN, ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: TAD	
CHECKED BY: H.G. EISENBISE	
LEAD DESIGNER:	
ENGINEER/TECH SPECIALIST: C. HARTLINE	
PROJECT ENGINEERING MANAGER:	
PROJECT MANAGER: M. HOLDRIDGE	

OneWay to zero harm

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
PEV. _____ STATE _____
LIC.NO. _____ DATE _____

WorleyParsons
resources & energy

CLIENT/PROJECT TITLE
NYSEG
SENECA COMPRESSED AIR ENERGY STORAGE (CAES) PROJECT

PIPING & INSTRUMENTATION DIAGRAM
WASTE WATER TREATMENT SYSTEM

SCALE: NONE
DRAWING SIZE: ARCH D (36" x 24")
WORLEYPARSONS DWG. NO.: CAES-1-DW-526-302-001
REV: C

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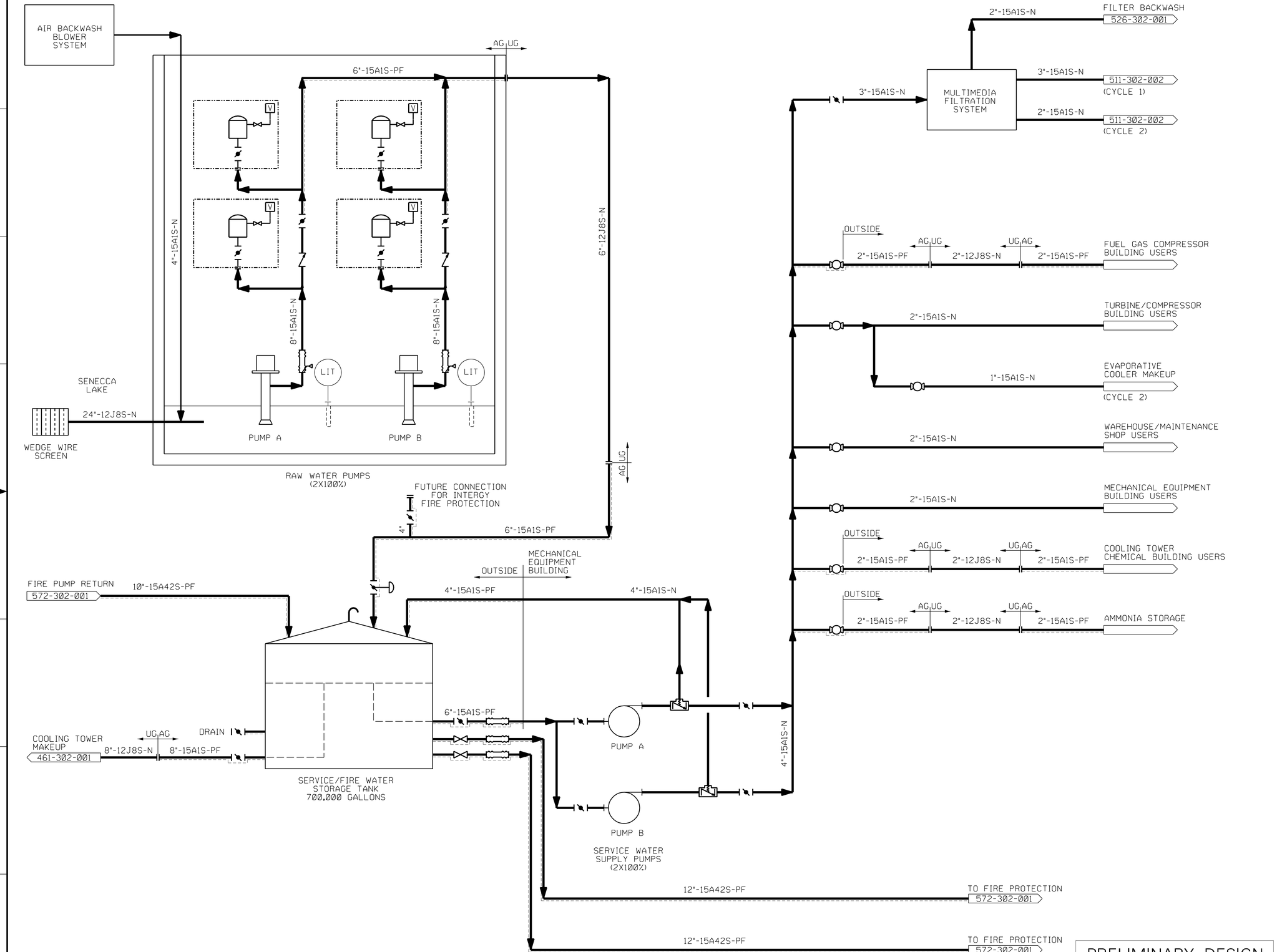

PRELIMINARY DESIGN

NOTES:

1. FOR GENERAL NOTES, ABBREVIATIONS AND SYMBOLS SEE DRAWINGS CAES-1-DW-012-302-001, 002 AND 003.
2. LINE SIZES ARE FOR INFORMATION ONLY AND MAY CHANGE DURING FINAL DESIGN.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH SPEC	ENGINEERING MANAGER	PROJECT MANAGER
C	10, 11	ISSUED FOR REVIEW AND COMMENT	TAD	HGE		CH	HGE	MH
B	08, 16, 11	ISSUED FOR REVIEW AND COMMENT	TAD	HGE		CH	HGE	MH
A		ISSUED FOR REVIEW AND COMMENT	TAD	HGE		CH	HGE	MH

PRELIMINARY STATUS — DATE — LDE
REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.

APPROVED STATUS — DATE — LDE
REPRESENTS REVIEWED AND APPROVED DESIGN, ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: TAD	
CHECKED BY: H.G. EISENBISE	
LEAD DESIGNER:	
ENGINEER/TECH SPECIALIST: C. HARTLINE	
PROJECT ENGINEERING MANAGER:	
PROJECT MANAGER: M. HOLDRIDGE	

OneWay to zero harm

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF PE:_____ STATE:_____ LIC. NO.:_____ DATE:_____

WorleyParsons resources & energy

CLIENT/PROJECT TITLE

NYSEG
SENECA COMPRESSED AIR ENERGY STORAGE (CAES) PROJECT

PIPING & INSTRUMENTATION DIAGRAM
WATER TREATMENT SYSTEM

SCALE: NONE
DRAWING SIZE: ARCH D (36" x 24")
WORLEYPARSONS DWG. NO.: CAES-1-DW-511-302-001
REV: C

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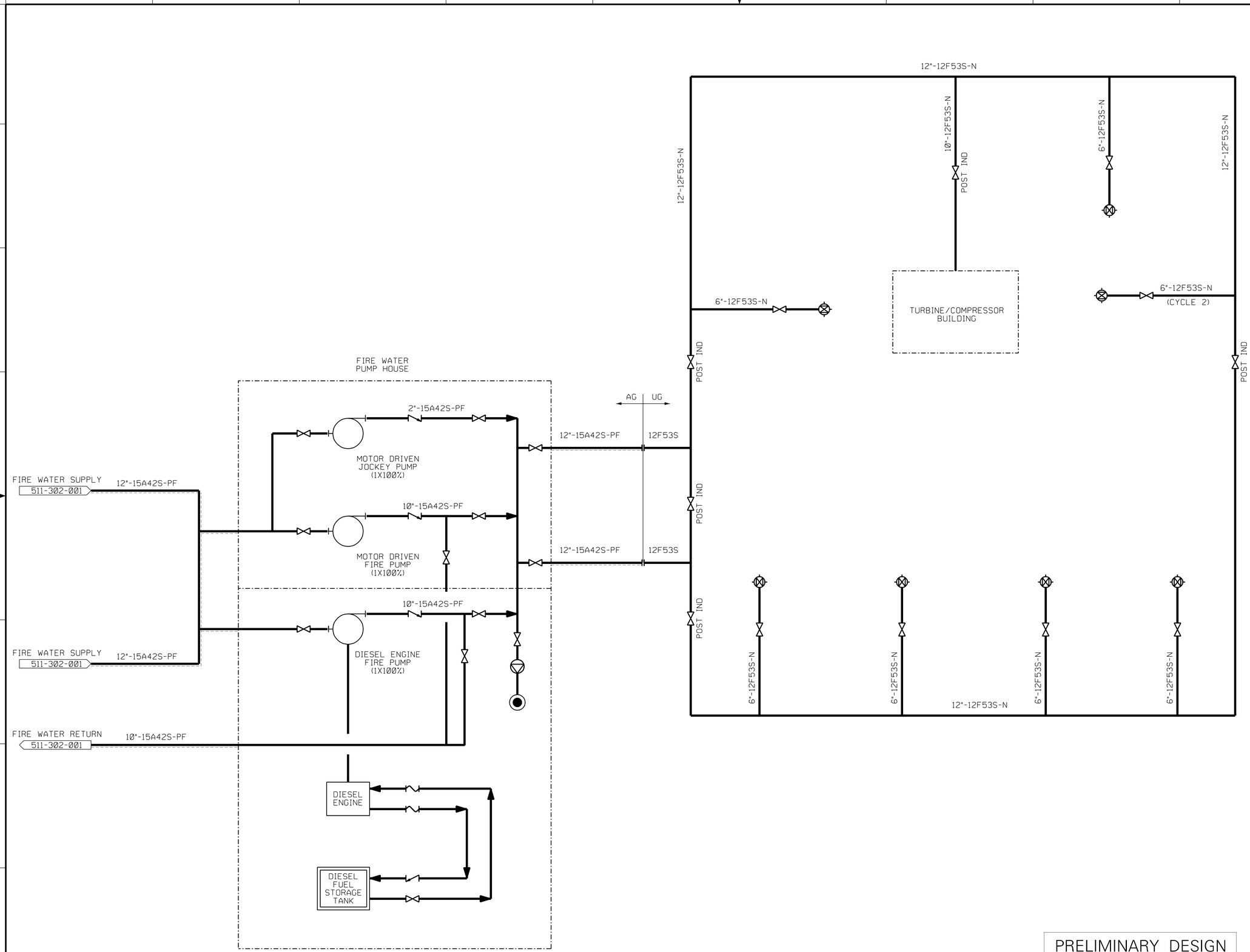

PRELIMINARY DESIGN

NOTES:

1. FOR GENERAL NOTES, ABBREVIATIONS AND SYMBOLS SEE DRAWINGS CAES-1-DW-012-302-001, 002 AND 003.
2. LINE SIZES ARE FOR INFORMATION ONLY AND MAY CHANGE DURING FINAL DESIGN.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH. SPEC.	LEAD DISCIPLINE ENGINEER	PROJ. ENGR. MANAGER	PROJECT MANAGER
B	08 16 11	ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH
A		ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH

PRELIMINARY STATUS — DATE — LDE: REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.

APPROVED STATUS — DATE — LDE: REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: TAD	
CHECKED BY: H.G. EISENBISE	
LEAD DESIGNER:	
ENGINEER/TECH SPECIALIST: H.G. EISENBISE	
PROJECT ENGINEERING MANAGER:	
PROJECT MANAGER: M. HOLDRIDGE	

OneWay to zero harm

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
PE: _____ STATE: _____
LIC. NO.: _____ DATE: _____

WorleyParsons
resources & energy

CLIENT/PROJECT TITLE

NYSEG
SENECA COMPRESSED AIR ENERGY STORAGE (CAES) PROJECT

PIPING & INSTRUMENTATION DIAGRAM
FIRE PROTECTION SYSTEM

SCALE: NONE
DRAWING SIZE: ARCH D (36" x 24")
WORLEYPARSONS DWG. NO.: CAES-1-DW-572-302-001
REV: B

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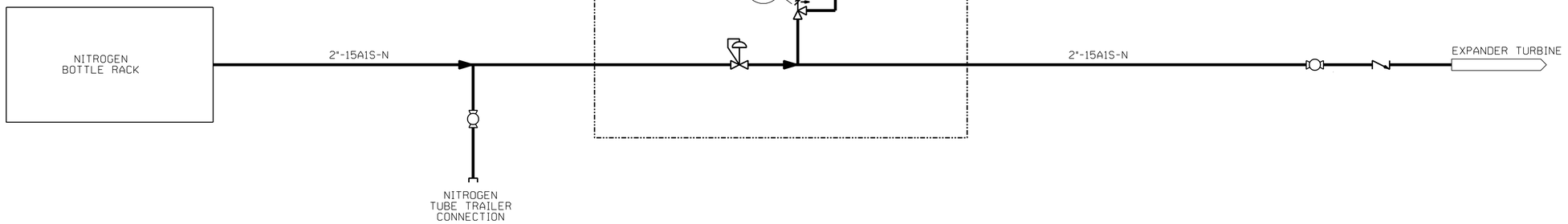

PRELIMINARY DESIGN

NOTES:

1. FOR GENERAL NOTES, ABBREVIATIONS AND SYMBOLS SEE DRAWINGS CAES-1-DW-012-302-001, 002 AND 003.
2. LINE SIZES ARE FOR INFORMATION ONLY AND MAY CHANGE DURING FINAL DESIGN.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH SPEC.	PROJECT ENGR	PROJECT MANAGER
A		ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE	MH

PRELIMINARY STATUS — DATE — LDE: REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.

APPROVED STATUS — DATE — LDE: REPRESENTS REVIEWED AND APPROVED DESIGN, ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL	
DRAWN BY	TAD
CHECKED BY	H.G. EISENBISE
LEAD DESIGNER	
ENGINEER/TECH SPECIALIST	H.G. EISENBISE
PROJECT ENGINEERING MANAGER	
PROJECT MANAGER	M. HOLDRIDGE

PROFESSIONAL ENGINEER'S SEAL

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF PE: _____ STATE: _____ LIC. NO.: _____ DATE: _____

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WorleyParsons resources & energy

CLIENT/PROJECT TITLE

NYSEG
SENECA COMPRESSED AIR ENERGY STORAGE (CAES) PROJECT

PIPING & INSTRUMENTATION DIAGRAM
COMPRESSED GAS

SCALE: NONE | DRAWING SIZE: ARCH D (36" x 24")

WORLEYPARSONS DWG. NO.: CAES-I-DW-546-302-001 | REV: A

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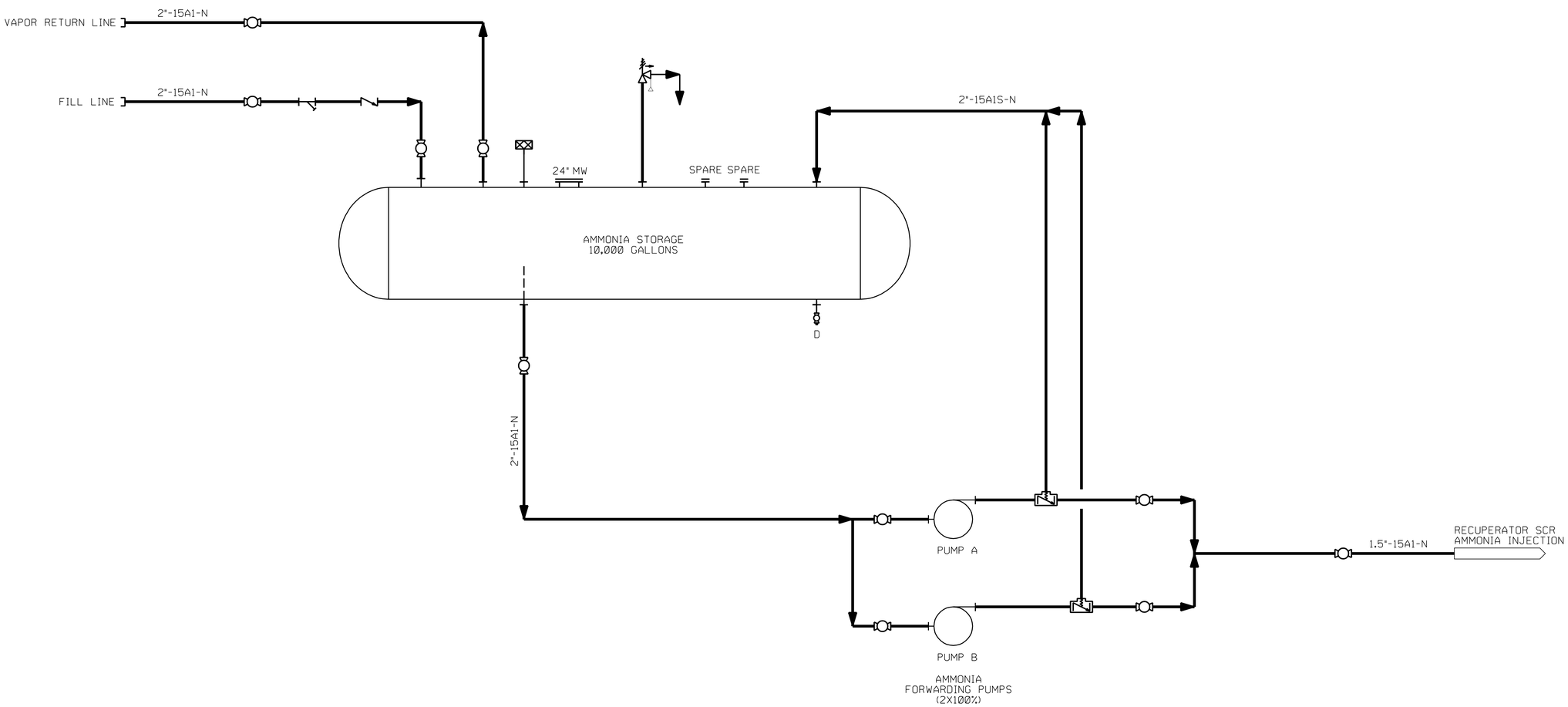

NOTES:

1. FOR GENERAL NOTES, ABBREVIATIONS AND SYMBOLS SEE DRAWINGS CAES-1-DW-012-302-001, 002 AND 003.
2. LINE SIZES ARE FOR INFORMATION ONLY AND MAY CHANGE DURING FINAL DESIGN.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH. SPEC.	LEAD DISC. ENGINEER	PROJ. ENGR. MANAGER	PROJECT MANAGER
A		ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH

PRELIMINARY STATUS DATE — REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
LDE

APPROVED STATUS DATE — REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED 'HOLD' RETAINS PRELIMINARY STATUS.
LDE

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: TAD	
CHECKED BY: H.G. EISENBISE	
LEAD DESIGNER:	
ENGINEER/TECH SPECIALIST: H.G. EISENBISE	
PROJECT ENGINEERING MANAGER:	
PROJECT MANAGER: M. HOLDRIDGE	

OneWay to zero harm

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
PE: _____ STATE: _____
LIC. NO.: _____ DATE: _____

WorleyParsons
resources & energy

CLIENT/PROJECT TITLE
NYSEG
SENECA COMPRESSED AIR ENERGY STORAGE (CAES) PROJECT

PIPING & INSTRUMENTATION DIAGRAM
AMMONIA STORAGE & FORWARDING

SCALE: NONE
DRAWING SIZE: ARCH D (36" x 24")
WORLEYPARSONS DWG. NO.: CAES-1-DW-541-302-001
REV: A

PRELIMINARY DESIGN

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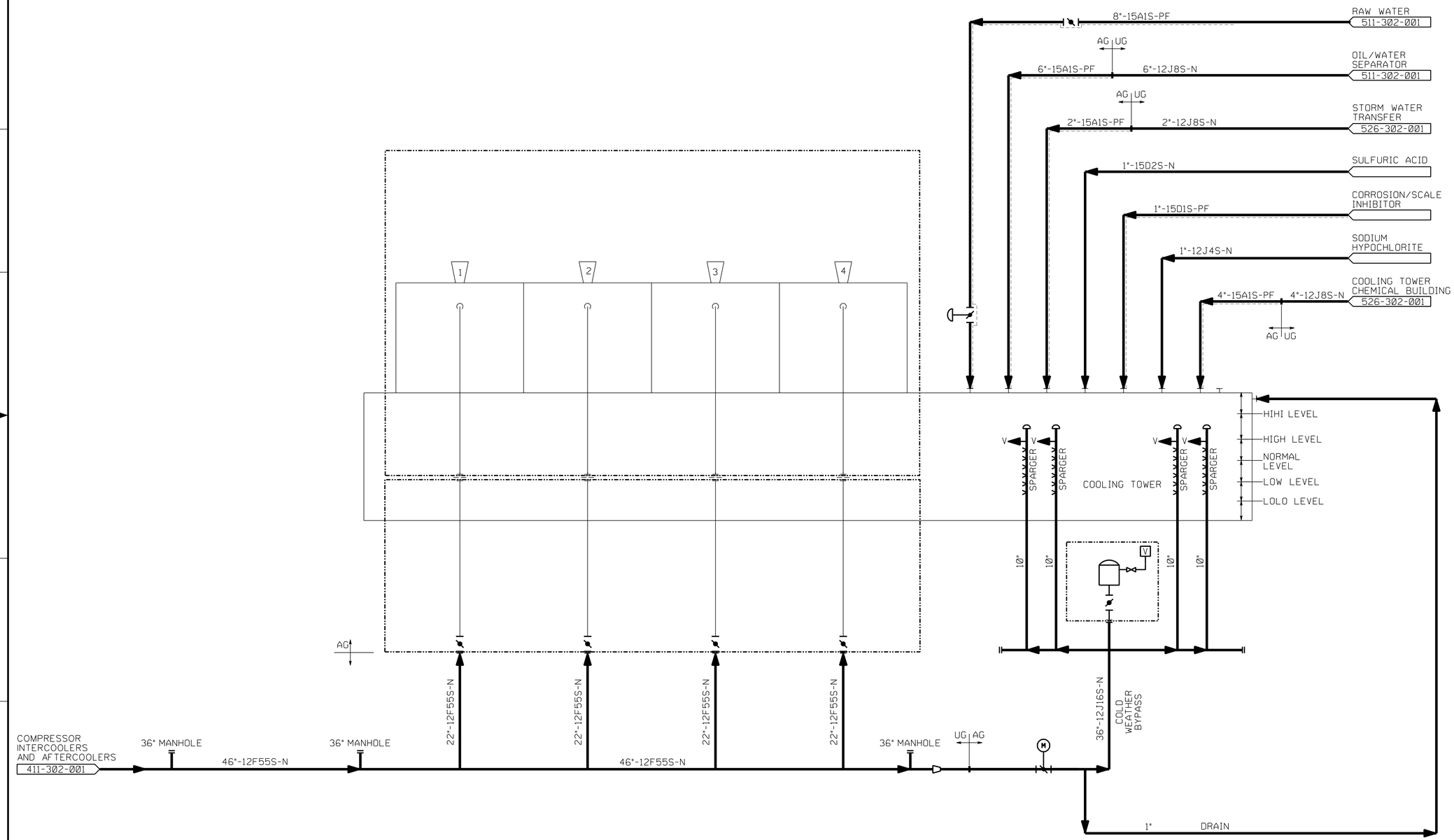

PRELIMINARY DESIGN

NOTES:

1. FOR GENERAL NOTES, ABBREVIATIONS AND SYMBOLS SEE DRAWINGS CAES-1-DW-012-302-001, 002 AND 003.
2. LINE SIZES ARE FOR INFORMATION ONLY AND MAY CHANGE DURING FINAL DESIGN.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH. SPECIL.	LEAD DISC. ENGINEER	PROJECT ENGINEER	PROJECT MANAGER
C	10/11/11	ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH
B	09/16/11	ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH
A		ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE		MH

PRELIMINARY STATUS — DATE — LDE — REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.

APPROVED STATUS — DATE — LDE — REPRESENTS REVIEWED AND APPROVED DESIGN, ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: TAD	
CHECKED BY: H.G. EISENBISE	
LEAD DESIGNER:	
ENGINEER/TECH SPECIALIST: H.G. EISENBISE	
PROJECT ENGINEERING MANAGER:	
PROJECT MANAGER: M. HOLDRIDGE	

OneWay to zero harm

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF: PE: _____ STATE: _____ LIC. NO.: _____ DATE: _____

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CLIENT/PROJECT TITLE

NYSEG
SENECA COMPRESSED AIR ENERGY STORAGE (CAES) PROJECT

PIPING & INSTRUMENTATION DIAGRAM
CIRCULATING WATER

SCALE	DRAWING SIZE
NONE	ARCH D (36" x 24")

WORLEYPARSONS DWG. NO.	REV
CAES-1-DW-461-302-002	C

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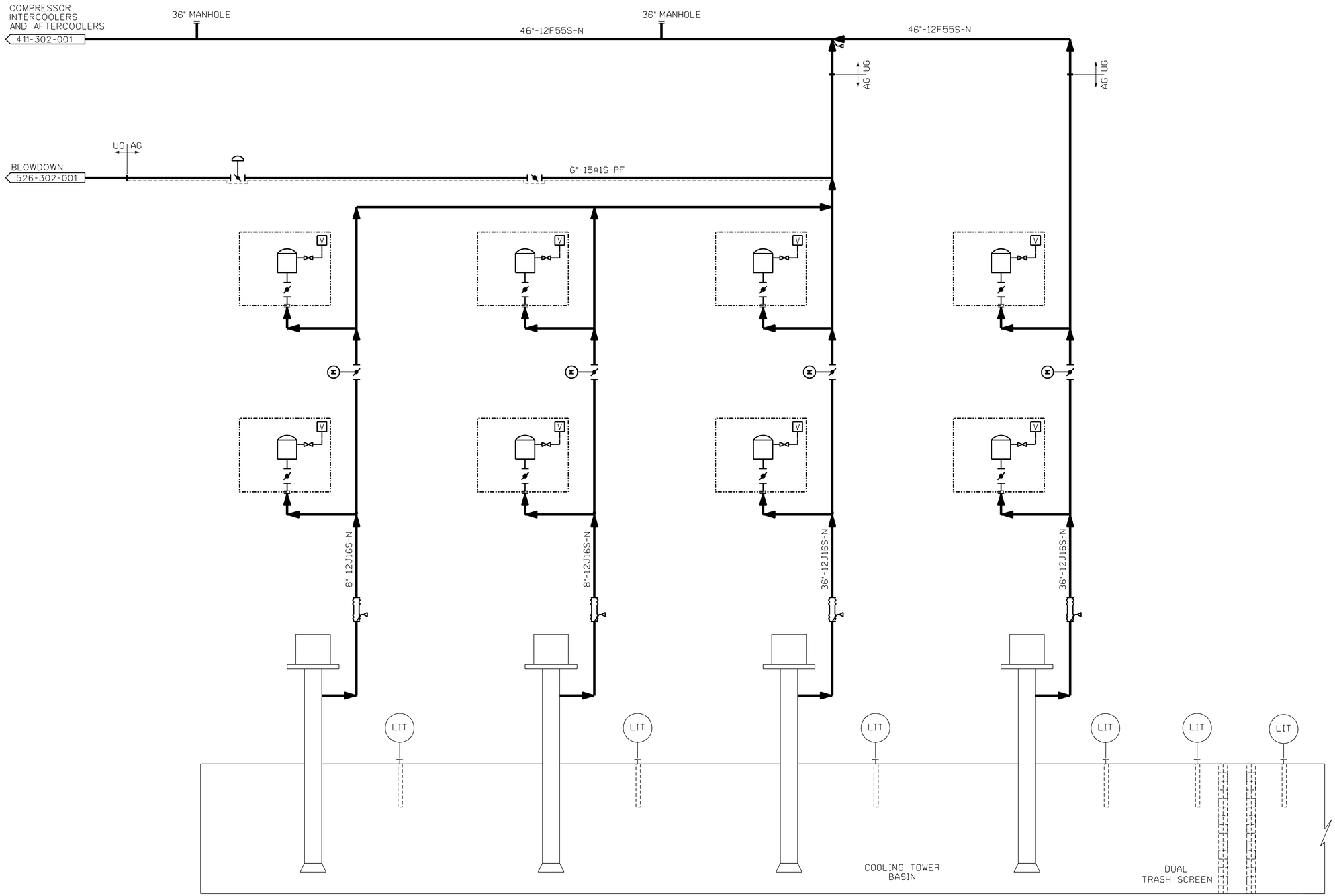
10/17/2011 11:03:40 AM



NOTES:

1. FOR GENERAL NOTES, ABBREVIATIONS AND SYMBOLS SEE DRAWINGS CAES-1-DW-012-302-001, 002 AND 003.
2. LINE SIZES ARE FOR INFORMATION ONLY AND MAY CHANGE DURING FINAL DESIGN.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH SPECIALIST	PROJECT ENGINEER	PROJECT MANAGER
B	08 16 11	ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE	MH
A		ISSUED FOR REVIEW AND COMMENT	TAD	HGE		HGE	HGE	MH

PRELIMINARY STATUS — DATE — LDE
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APPROVED STATUS — DATE — LDE
REPRESENTS REVIEWED AND APPROVED DESIGN, ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: TAD	ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF: PEv_____ STATE_____ LIC. NO.# _____ DATE# _____
CHECKED BY: H.G. EISENBISE	
LEAD DESIGNER:	
ENGINEER/TECH SPECIALIST: H.G. EISENBISE	
PROJECT ENGINEERING MANAGER:	
PROJECT MANAGER: M. HOLDRIDGE	

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WorleyParsons resources & energy

CLIENT/PROJECT TITLE

NYSEG
SENECA COMPRESSED AIR ENERGY STORAGE (CAES) PROJECT

PIPING & INSTRUMENTATION DIAGRAM
CIRCULATING WATER

SCALE: NONE
DRAWING SIZE: ARCH D (36" x 24")

WORLEYPARSONS DWG. NO.: CAES-1-DW-461-302-001
REV: B

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