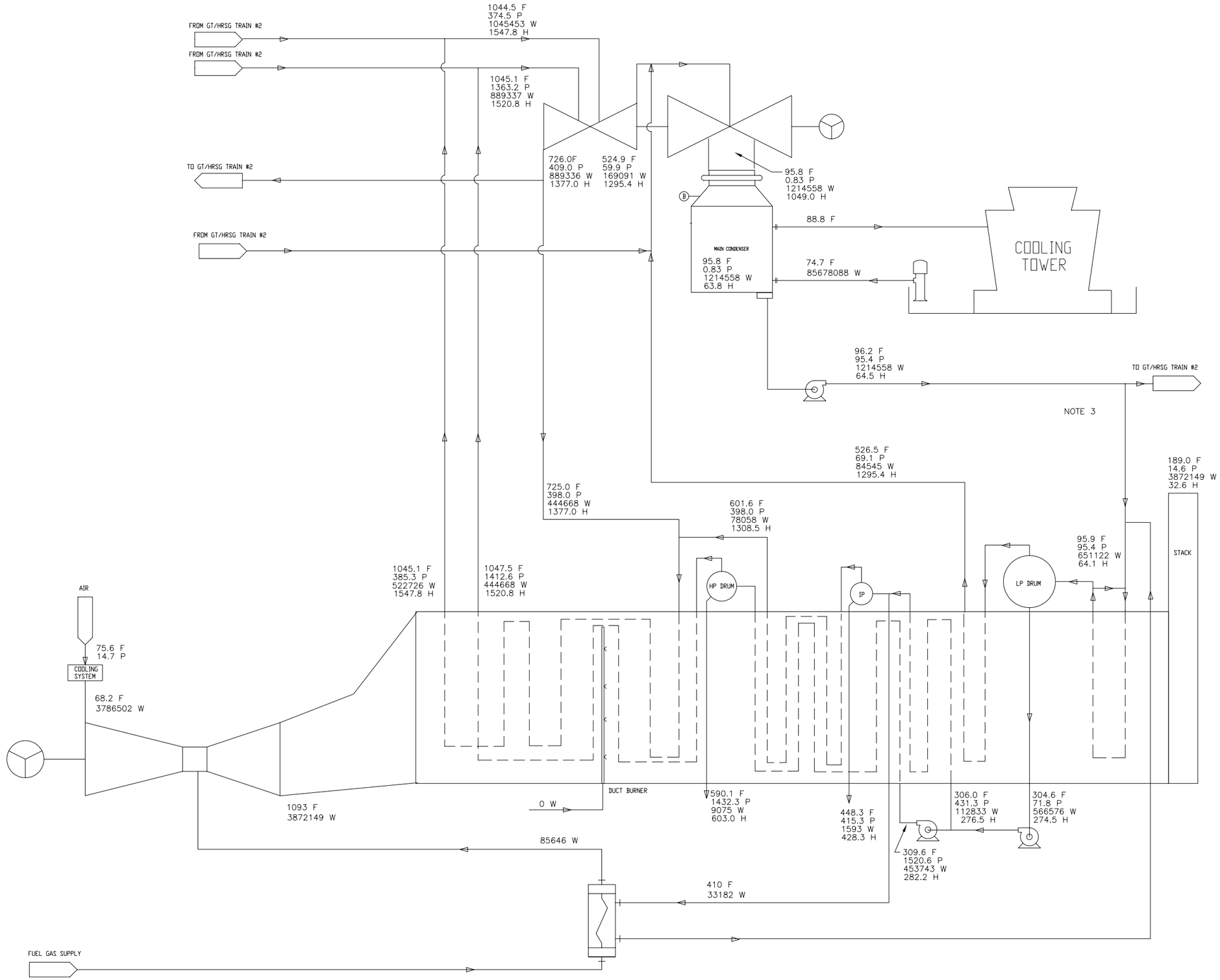
APPENDIX 2A

Heat Balance Diagrams

Heat Balance Diagrams
Siemens 5000F



LEGEND

———	WATER OR STEAM
—●—●—	FUEL
— · —	AIR
———	FLUE GAS
———	BITUMEN
F	TEMPERATURE, ^F
P	PRESSURE, PSIA
W	MASS FLOW, LBM/HR
H	ENTHALPY, BTU/LBM
KWe	POWER, KILOWATTS ELECTRICAL
GPM	GALLONS PER MINUTE

SYSTEM PERFORMANCE SUMMARY

DRY BULB TEMPERATURE:	75.6
RELATIVE HUMIDITY:	64%
GAS TURBINE GROSS OUTPUT (PER UNIT):	188.9 MW
STEAM TURBINE GROSS OUTPUT:	198.4 MW
PLANT GROSS OUTPUT:	576.3 MW
AUX. POWER LOAD LOSSES:	12.0 MW
PLANT NET OUTPUT:	564.3 MW
NET PLANT HEAT RATE:	6193 BTU/kWH

NOTE

1. FUEL HEATING VALUE = 21515 BTU/LB LHV
2. FUEL GAS HHV/LHV = 1.1093
3. MAKEUP FLOW NOT DEPICTED

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH SPEC	LEAD DISC ENGINEER	PROJ ENGR MANAGER	PROJECT MANAGER
B	6/12/08	FOR INFORMATION	DG	MP		SB		MP	SB
A	03/17/08	FOR INFORMATION	KW	MP		SB		MP	SB

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

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

ORIGINATING PERSONNEL

DRAWN BY: K. WALDRON
CHECKED BY:
LEAD DESIGNER:
ENGINEER/TECH SPECIALIST: S. BRADY
PROJECT ENGINEERING MANAGER: M. PELLETIER
PROJECT MANAGER: S. BLUE

PROFESSIONAL ENGINEER'S SEAL

Zero Harm — Leadership, No incidents, Safe Behavior

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

WorleyParsons resources & energy

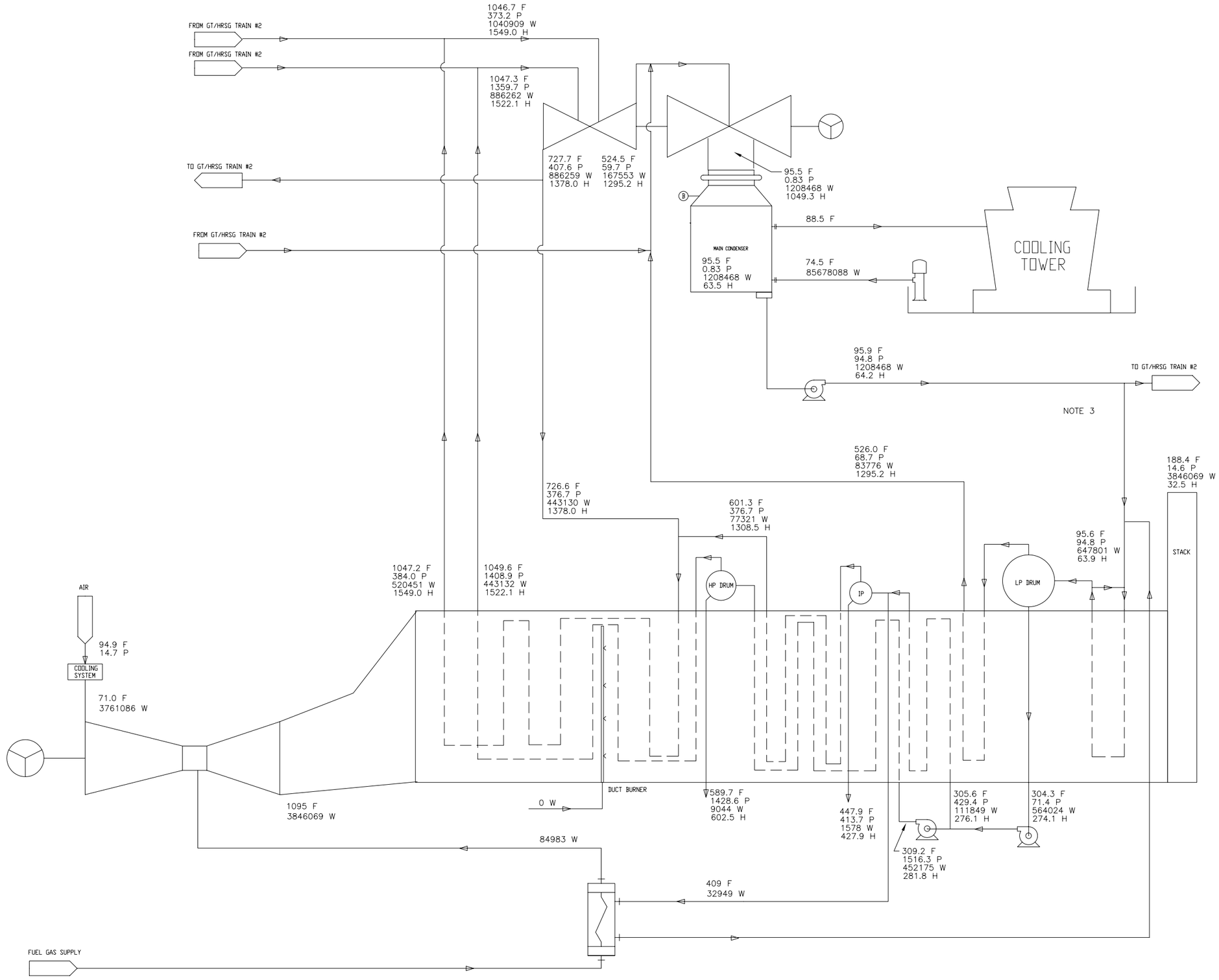
CLIENT/PROJECT TITLE
COMPETITIVE POWER VENTURES
VACAVILLE PROJECT

PROCESS FLOW DIAGRAM
HEAT BALANCE
2X1 SIEMENS 5000F COMBINED CYCLE,
ANNUAL AVERAGE, UNFIRED

SCALE: NONE
DRAWING SIZE: ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.: VACA-1-HT-021-0001
REV: B

FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC

CAD FILE NAME: VACA-1-HT-021-0001
LAST UPDATE: 03/17/08



LEGEND

———	WATER OR STEAM
●—●	FUEL
— · —	AIR
———	FLUE GAS
—— ——	BITUMEN
F	TEMPERATURE, ^F
P	PRESSURE, PSIA
W	MASS FLOW, LBM/HR
H	ENTHALPY, BTU/LBM
KWe	POWER, KILOWATTS ELECTRICAL
GPM	GALLONS PER MINUTE

SYSTEM PERFORMANCE SUMMARY

DRY BULB TEMPERATURE:	94.9
RELATIVE HUMIDITY:	22%
GAS TURBINE GROSS OUTPUT (PER UNIT):	187.0 MW
STEAM TURBINE GROSS OUTPUT:	197.9 MW
PLANT GROSS OUTPUT:	571.9 MW
AUX. POWER LOAD LOSSES:	12.0 MW
PLANT NET OUTPUT:	559.9 MW
NET PLANT HEAT RATE:	6193 BTU/kWH

NOTE

1. FUEL HEATING VALUE = 21515 BTU/LB LHV
2. FUEL GAS HHV/LHV = 1.1093
3. MAKEUP FLOW NOT DEPICTED

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH SPEC.	LEAD DISC ENGINEER	PROJ. ENGR MANAGER	PROJECT MANAGER
B	6/12/08	FOR INFORMATION	DG	MP		SB		MP	SB
A	03/17/08	FOR INFORMATION	KW	MP		SB		MP	SB

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

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

ORIGINATING PERSONNEL

DRAWN BY: K. WALDRON

CHECKED BY:

LEAD DESIGNER:

ENGINEER/TECH SPECIALIST: S. BRADY

PROJECT ENGINEERING MANAGER: M. PELLETIER

PROJECT MANAGER: S. BLUE

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

COMPETITIVE POWER VENTURES

VACAVILLE PROJECT

PROCESS FLOW DIAGRAM
HEAT BALANCE
2X1 SIEMENS 5000F COMBINED CYCLE,
SUMMER TYPICAL, UNFIRED

SCALE: NONE

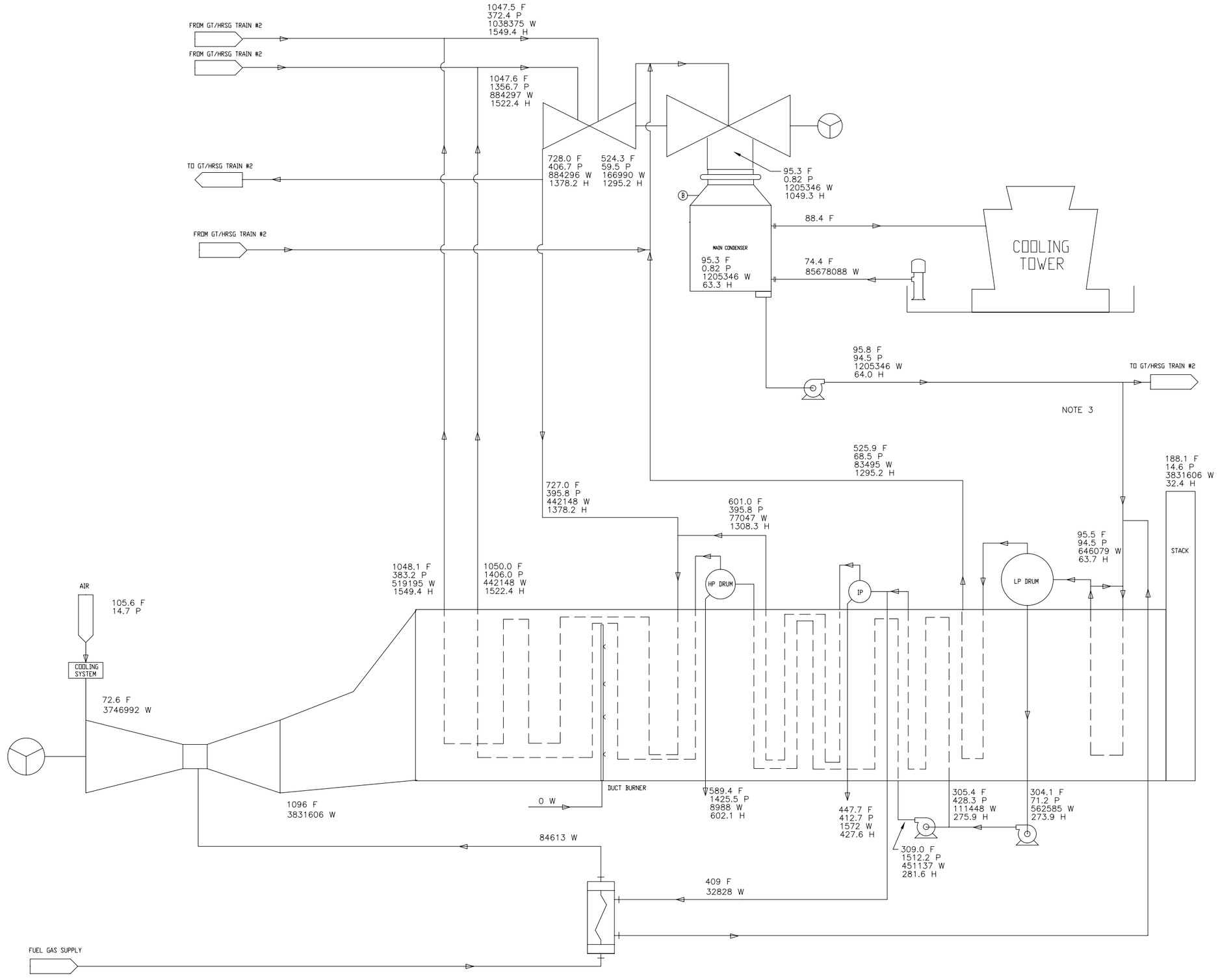
DRAWING SIZE: ARCH D (24" x 36")

WORLEYPARSONS DWG. NO.: VACA-1-HT-021-0002

REV: B

FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC

CAD FILE NAME: VACA-1-HT-021-0001
LAST UPDATE: 03/17/08



LEGEND

	WATER OR STEAM
	FUEL
	AIR
	FLUE GAS
	BITUMEN
F	TEMPERATURE, ^F
P	PRESSURE, PSIA
W	MASS FLOW, LBM/HR
H	ENTHALPY, BTU/LBM
KWe	POWER, KILOWATTS ELECTRICAL
GPM	GALLONS PER MINUTE

SYSTEM PERFORMANCE SUMMARY

DRY BULB TEMPERATURE:	105.6
RELATIVE HUMIDITY:	11%
GAS TURBINE GROSS OUTPUT (PER UNIT):	185.9 MW
STEAM TURBINE GROSS OUTPUT:	117.6 MW
PLANT GROSS OUTPUT:	569.4 MW
AUX. POWER LOAD LOSSES:	12.0 MW
PLANT NET OUTPUT:	557.4 MW
NET PLANT HEAT RATE:	6174 BTU/kWH

NOTE

1. FUEL HEATING VALUE = 21515 BTU/LB LHV
2. FUEL GAS HHV/LHV = 1.1093
3. MAKEUP FLOW NOT DEPICTED

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH. SPECI	LEAD DISC ENGINEER	PROJ ENGR MANAGER	PROJECT MANAGER
B	6/12/08	FOR INFORMATION	DG	MP		SB		MP	SB
A	03/17/08	FOR INFORMATION	KW	MP		SB		MP	SB

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: K. WALDRON
CHECKED BY:
LEAD DESIGNER:
ENGINEER/TECH SPECIALIST: S. BRADY
PROJECT ENGINEERING MANAGER: M. PELLETIER
PROJECT MANAGER: S. BLUE

PROFESSIONAL ENGINEER'S SEAL

Zero Harm — Leadership No Incidents Safe Behavior

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

WorleyParsons resources & energy

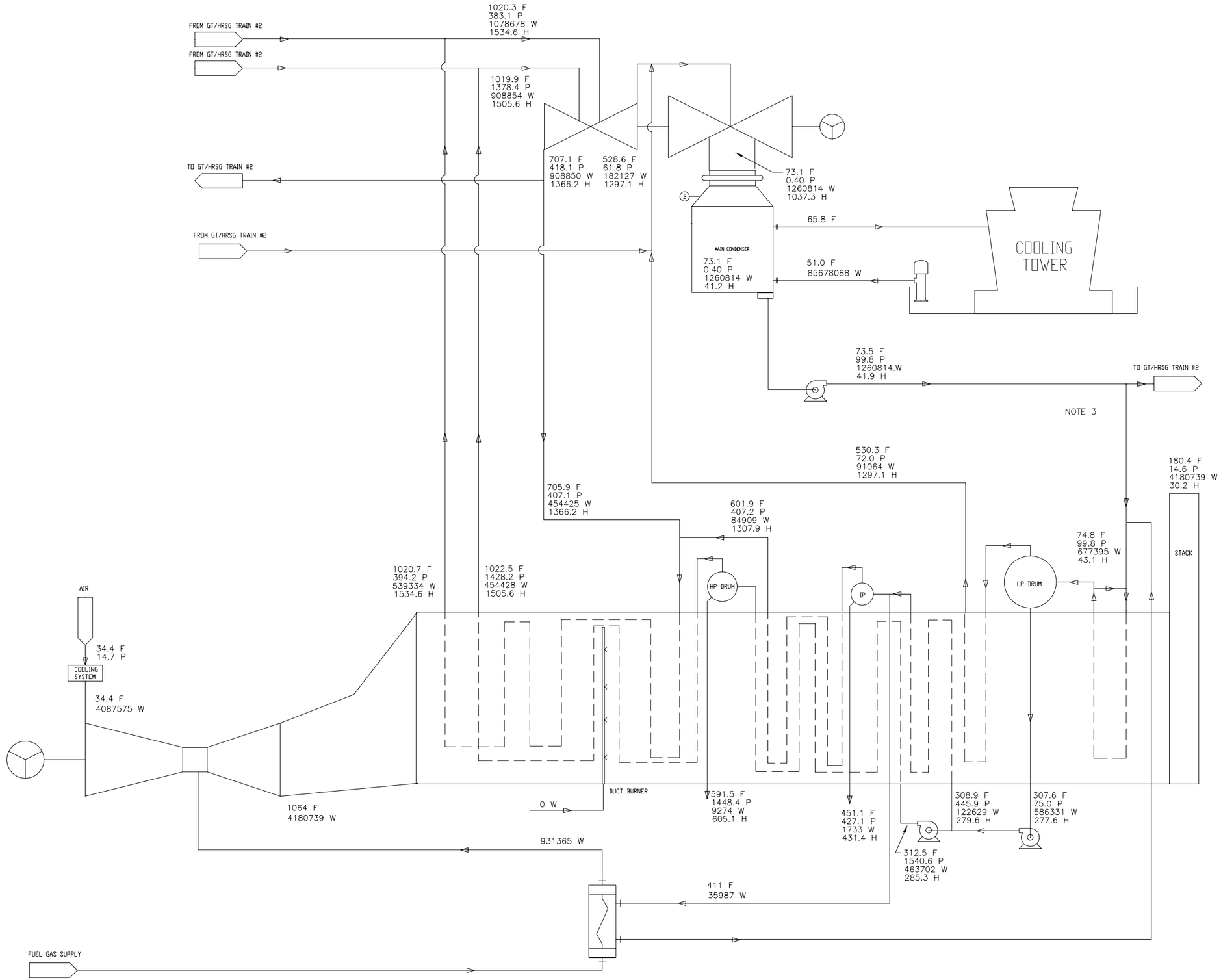
CLIENT/PROJECT TITLE
COMPETITIVE POWER VENTURES
VACAVILLE PROJECT

PROCESS FLOW DIAGRAM
HEAT BALANCE
2X1 SIEMENS 5000F COMBINED CYCLE,
SUMMER MAX, UNFIRED

SCALE: NONE
DRAWING SIZE: ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.: VACA-1-HT-021-0003
REV: B

FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC

CAD FILE NAME: VACA-1-HT-021-0001
LAST UPDATE: 03/17/08



LEGEND

———	WATER OR STEAM
●—●—	FUEL
— · —	AIR
———	FLUE GAS
—— ——	BITUMEN
F	TEMPERATURE, ^F
P	PRESSURE, PSIA
W	MASS FLOW, LBM/HR
H	ENTHALPY, BTU/LBM
KWe	POWER, KILOWATTS ELECTRICAL
GPM	GALLONS PER MINUTE

SYSTEM PERFORMANCE SUMMARY

DRY BULB TEMPERATURE:	34.4
RELATIVE HUMIDITY:	56%
GAS TURBINE GROSS OUTPUT (PER UNIT):	211.7 MW
STEAM TURBINE GROSS OUTPUT:	203.3 MW
PLANT GROSS OUTPUT:	626.8 MW
AUX. POWER LOAD LOSSES:	12.0 MW
PLANT NET OUTPUT:	614.8 MW
NET PLANT HEAT RATE:	6183 BTU/kWH

NOTE

1. FUEL HEATING VALUE = 21515 BTU/LB LHV
2. FUEL GAS HHV/LHV = 1.1093
3. MAKEUP FLOW NOT DEPICTED

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH SPEC	LEAD DISC ENGINEER	PROJ ENGR MANAGER	PROJECT MANAGER
B	6/12/08	FOR INFORMATION	DG	MP		SB		MP	SB
A	03/17/08	FOR INFORMATION	KW	MP		SB		MP	SB

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

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

ORIGINATING PERSONNEL

DRAWN BY: K. WALDRON
CHECKED BY:
LEAD DESIGNER:
ENGINEER/TECH SPECIALIST: S. BRADY
PROJECT ENGINEERING MANAGER: M. PELLETIER
PROJECT MANAGER: S. BLUE

PROFESSIONAL ENGINEER'S SEAL

Zero Harm — Leadership, No Incidents, Safe Behavior

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

WorleyParsons resources & energy

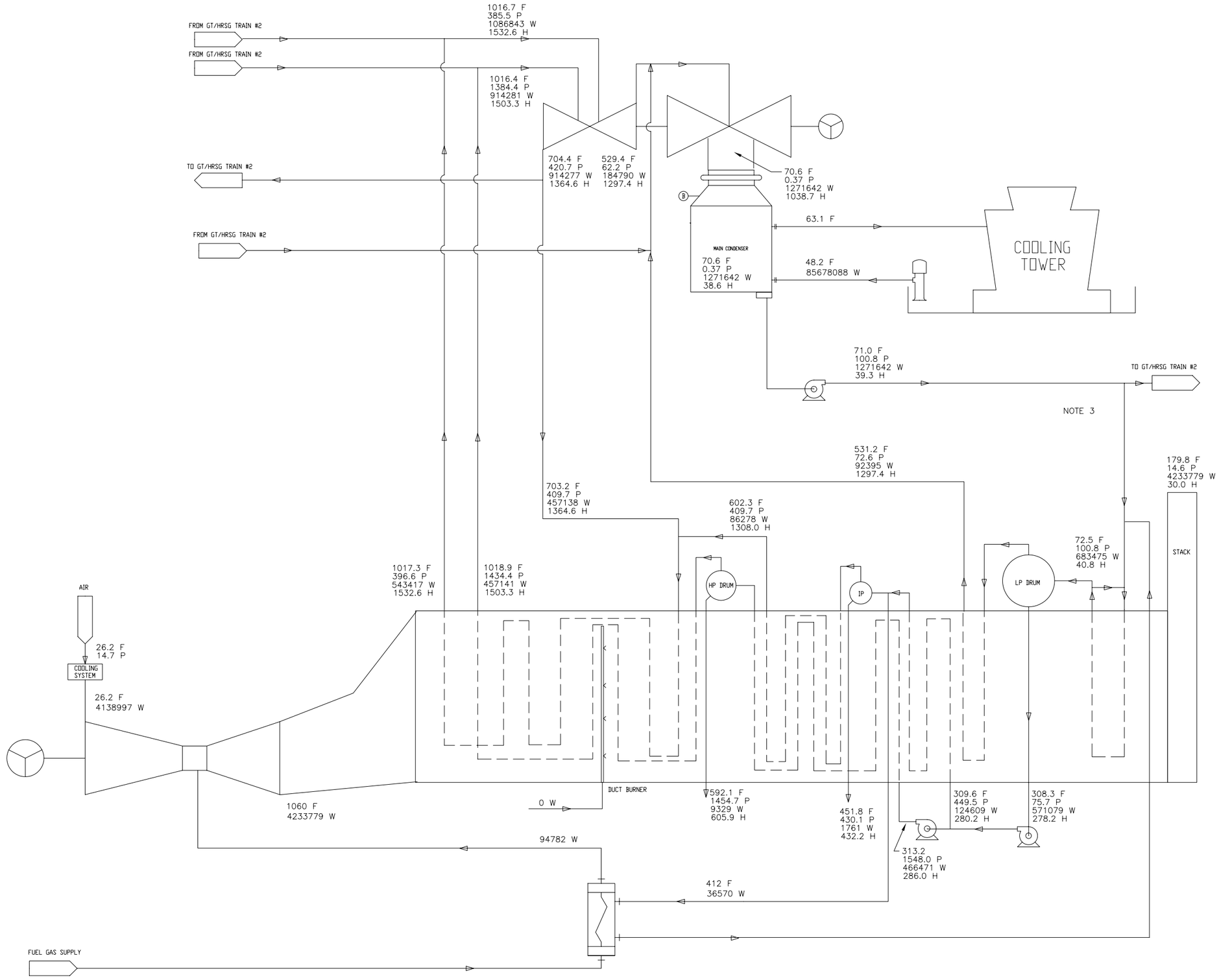
CLIENT/PROJECT TITLE
COMPETITIVE POWER VENTURES
VACAVILLE PROJECT

PROCESS FLOW DIAGRAM
HEAT BALANCE
2X1 SIEMENS 5000F COMBINED CYCLE,
WINTER TYPICAL, UNFIRED

SCALE: NONE
DRAWING SIZE: ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.: VACA-1-HT-021-0004
REV: B

FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC

CAD FILE NAME: VACA-1-HT-021-0001
LAST UPDATE: 03/17/08



LEGEND

———	WATER OR STEAM
—●—●—	FUEL
— · —	AIR
———	FLUE GAS
—— ——	BITUMEN
F	TEMPERATURE, ^F
P	PRESSURE, PSIA
W	MASS FLOW, LBM/HR
H	ENTHALPY, BTU/LBM
KWe	POWER, KILOWATTS ELECTRICAL
GPM	GALLONS PER MINUTE

SYSTEM PERFORMANCE SUMMARY

DRY BULB TEMPERATURE:	26.2
RELATIVE HUMIDITY:	81%
GAS TURBINE GROSS OUTPUT (PER UNIT):	216.2 MW
STEAM TURBINE GROSS OUTPUT:	204.3 MW
PLANT GROSS OUTPUT:	636.7 MW
AUX. POWER LOAD LOSSES:	12.0 MW
PLANT NET OUTPUT:	624.7 MW
NET PLANT HEAT RATE:	6190 BTU/kWH

NOTE

1. FUEL HEATING VALUE = 21515 BTU/LB LHV
2. FUEL GAS HHV/LHV = 1.1093
3. MAKEUP FLOW NOT DEPICTED

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH SPEC	LEAD DISC ENGINEER	PROJ ENGR MANAGER	PROJECT MANAGER
B	6/12/08	FOR INFORMATION	DG	MP		SB		MP	SB
A	03/17/08	FOR INFORMATION	KW	MP		SB		MP	SB

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

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

ORIGINATING PERSONNEL

DRAWN BY: K. WALDRON

CHECKED BY:

LEAD DESIGNER:

ENGINEER/TECH SPECIALIST: S. BRADY

PROJECT ENGINEERING MANAGER: M. PELLETIER

PROJECT MANAGER: S. BLUE

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

COMPETITIVE POWER VENTURES

VACAVILLE PROJECT

PROCESS FLOW DIAGRAM
HEAT BALANCE
2X1 SIEMENS 5000F COMBINED CYCLE,
WINTER MIN., UNFIRED

SCALE: NONE

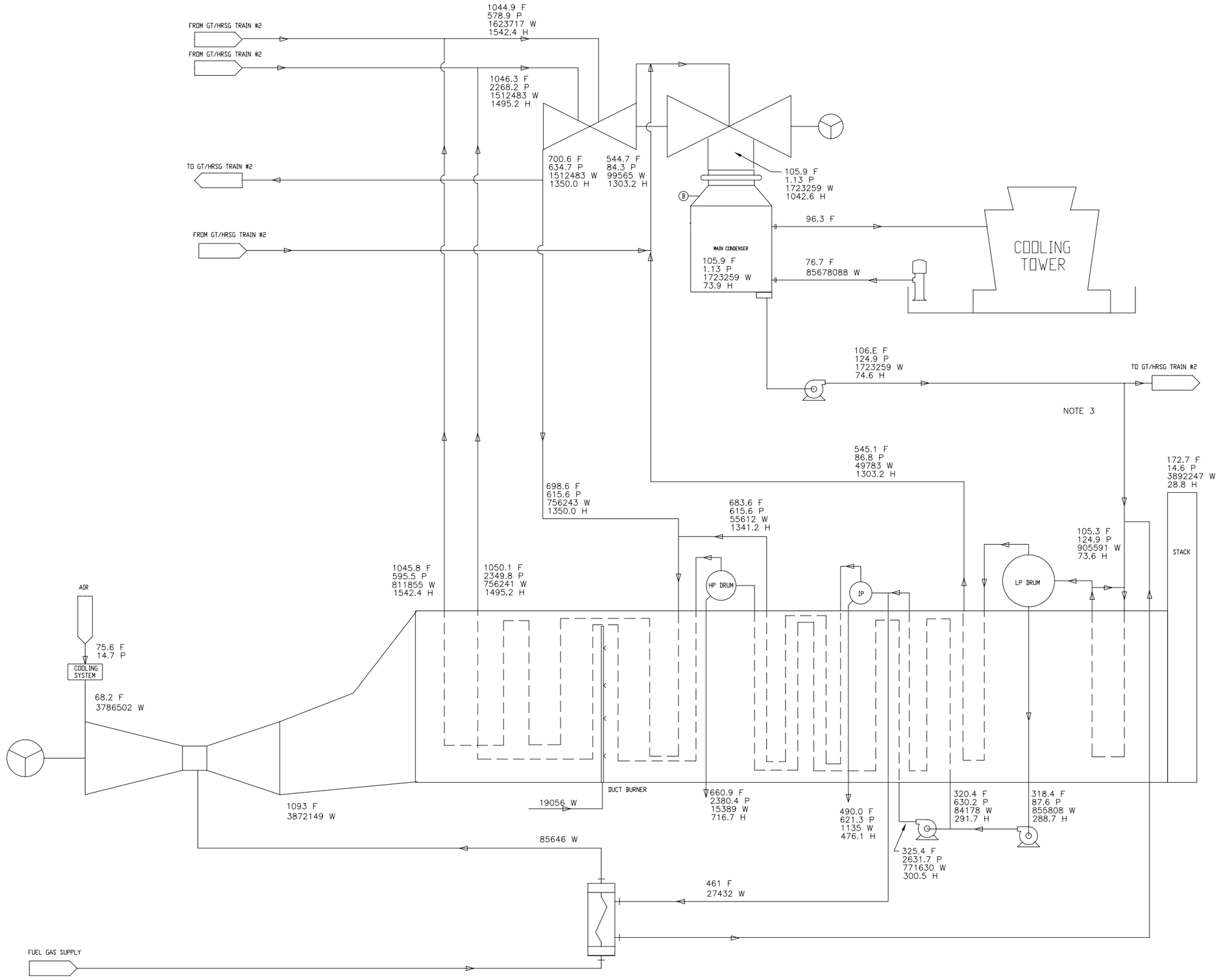
DRAWING SIZE: ARCH D (24" x 36")

WORLEYPARSONS DWG. NO.: VACA-1-HT-021-0005

REV: B

FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC

CAD FILE NAME: VACA-1-HT-021-0001
LAST UPDATE: 03/17/08



LEGEND

———	WATER OR STEAM
●—●—	FUEL
— · —	AIR
———	FLUE GAS
—— ——	BITUMEN
F	TEMPERATURE, ^F
P	PRESSURE, PSIA
W	MASS FLOW, LBM/HR
H	ENTHALPY, BTU/LBM
KWe	POWER, KILOWATTS ELECTRICAL
GPM	GALLONS PER MINUTE

SYSTEM PERFORMANCE SUMMARY

DRY BULB TEMPERATURE:	75.6
RELATIVE HUMIDITY:	64%
GAS TURBINE GROSS OUTPUT (PER UNIT):	188.9 MW
STEAM TURBINE GROSS OUTPUT:	303.6 MW
PLANT GROSS OUTPUT:	681.4 MW
AUX. POWER LOAD LOSSES:	15.0 MW
PLANT NET OUTPUT:	666.4 MW
NET PLANT HEAT RATE:	6474 BTU/kWH

NOTE

1. FUEL HEATING VALUE = 21515 BTU/LB LHV
2. FUEL GAS HHV/LHV = 1.1093
3. MAKEUP FLOW NOT DEPICTED

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH SPEC.	LEAD DISC ENGINEER	PROJ. ENGR MANAGER	PROJECT MANAGER
B	6/12/08	FOR INFORMATION	DG	MP		SB		MP	SB
A	03/17/08	FOR INFORMATION	KW	MP		SB		MP	SB

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

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

ORIGINATING PERSONNEL

DRAWN BY: K. WALDRON
CHECKED BY:
LEAD DESIGNER:
ENGINEER/TECH SPECIALIST: S. BRADY
PROJECT ENGINEERING MANAGER: M. PELLETIER
PROJECT MANAGER: S. BLUE

PROFESSIONAL ENGINEER'S SEAL

Zero Harm — Leadership, No Incidents, Safe Behavior

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

WorleyParsons resources & energy

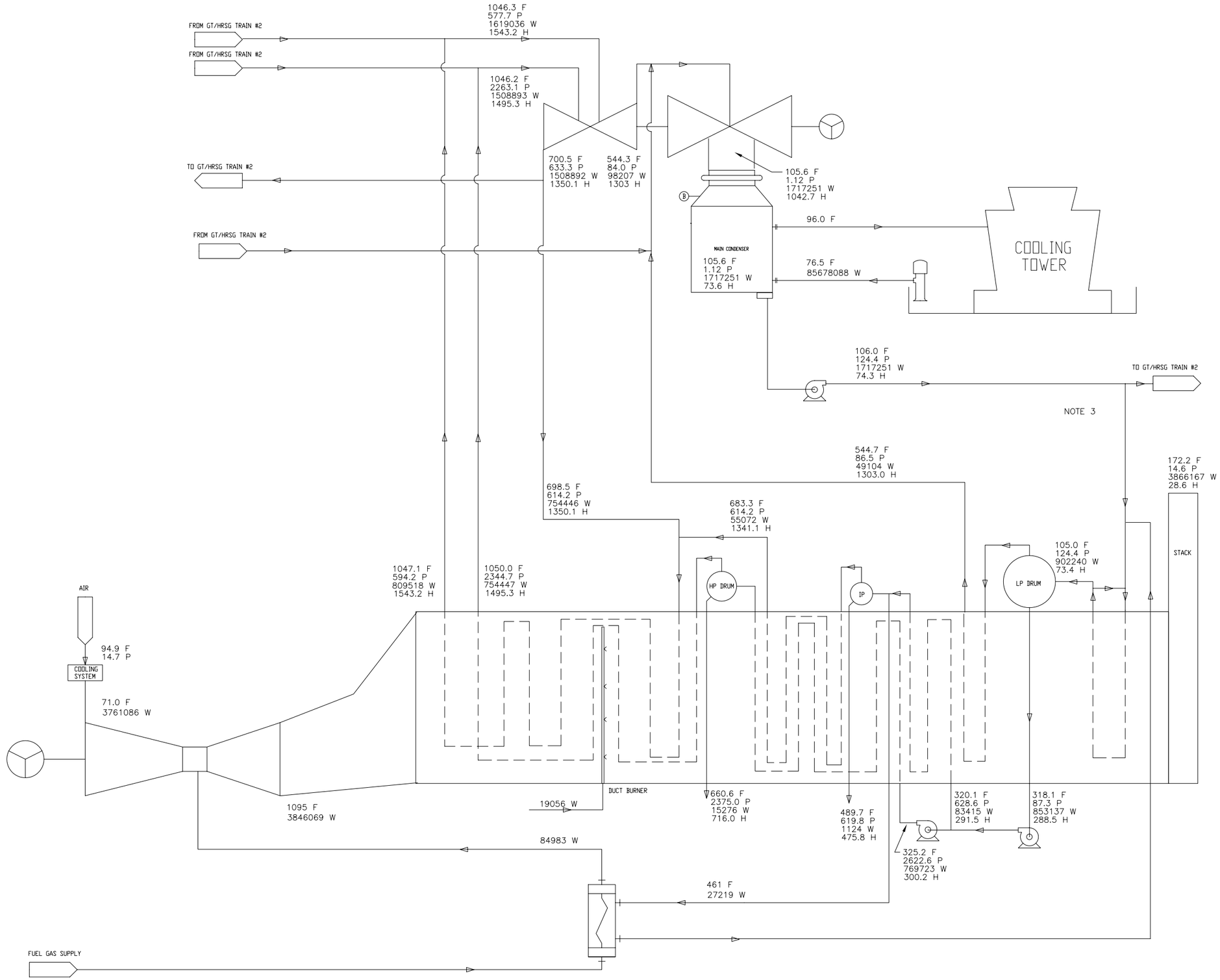
CLIENT/PROJECT TITLE
COMPETITIVE POWER VENTURES
VACAVILLE PROJECT

PROCESS FLOW DIAGRAM
HEAT BALANCE
2X1 SIEMENS 5000F COMBINED CYCLE,
ANNUAL AVERAGE, FIRED

SCALE: NONE
DRAWING SIZE: ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.: VACA-1-HT-021-0006
REV: B

FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC

CAD FILE NAME: VACA-1-HT-021-0001
LAST UPDATE: 03/17/08



LEGEND

———	WATER OR STEAM
●—●—	FUEL
— · —	AIR
———	FLUE GAS
———	BITUMEN
F	TEMPERATURE, ^F
P	PRESSURE, PSIA
W	MASS FLOW, LBM/HR
H	ENTHALPY, BTU/LBM
KWe	POWER, KILOWATTS ELECTRICAL
GPM	GALLONS PER MINUTE

SYSTEM PERFORMANCE SUMMARY

DRY BULB TEMPERATURE:	94.9
RELATIVE HUMIDITY:	22%
GAS TURBINE GROSS OUTPUT (PER UNIT):	187.0 MW
STEAM TURBINE GROSS OUTPUT:	303.0 MW
PLANT GROSS OUTPUT:	677.0 MW
AUX. POWER LOAD LOSSES:	15.0 MW
PLANT NET OUTPUT:	662.0 MW
NET PLANT HEAT RATE:	6477 BTU/kWH

NOTE

1. FUEL HEATING VALUE = 21515 BTU/LB LHV
2. FUEL GAS HHV/LHV = 1.1093
3. MAKEUP FLOW NOT DEPICTED

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH SPEC.	LEAD DISC ENGINEER	PROJ. ENGR. MANAGER	PROJECT MANAGER
B	6/12/08	FOR INFORMATION	DG	MP		SB		MP	SB
A	03/17/08	FOR INFORMATION	KW	MP		SB		MP	SB

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L.DE

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L.DE

ORIGINATING PERSONNEL

DRAWN BY: K. WALDRON
CHECKED BY:
LEAD DESIGNER:
ENGINEER/TECH SPECIALIST: S. BRADY
PROJECT ENGINEERING MANAGER: M. PELLETIER
PROJECT MANAGER: S. BLUE

PROFESSIONAL ENGINEER'S SEAL

Zero Harm — Leadership, No incidents, Safe Behavior

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

WorleyParsons resources & energy

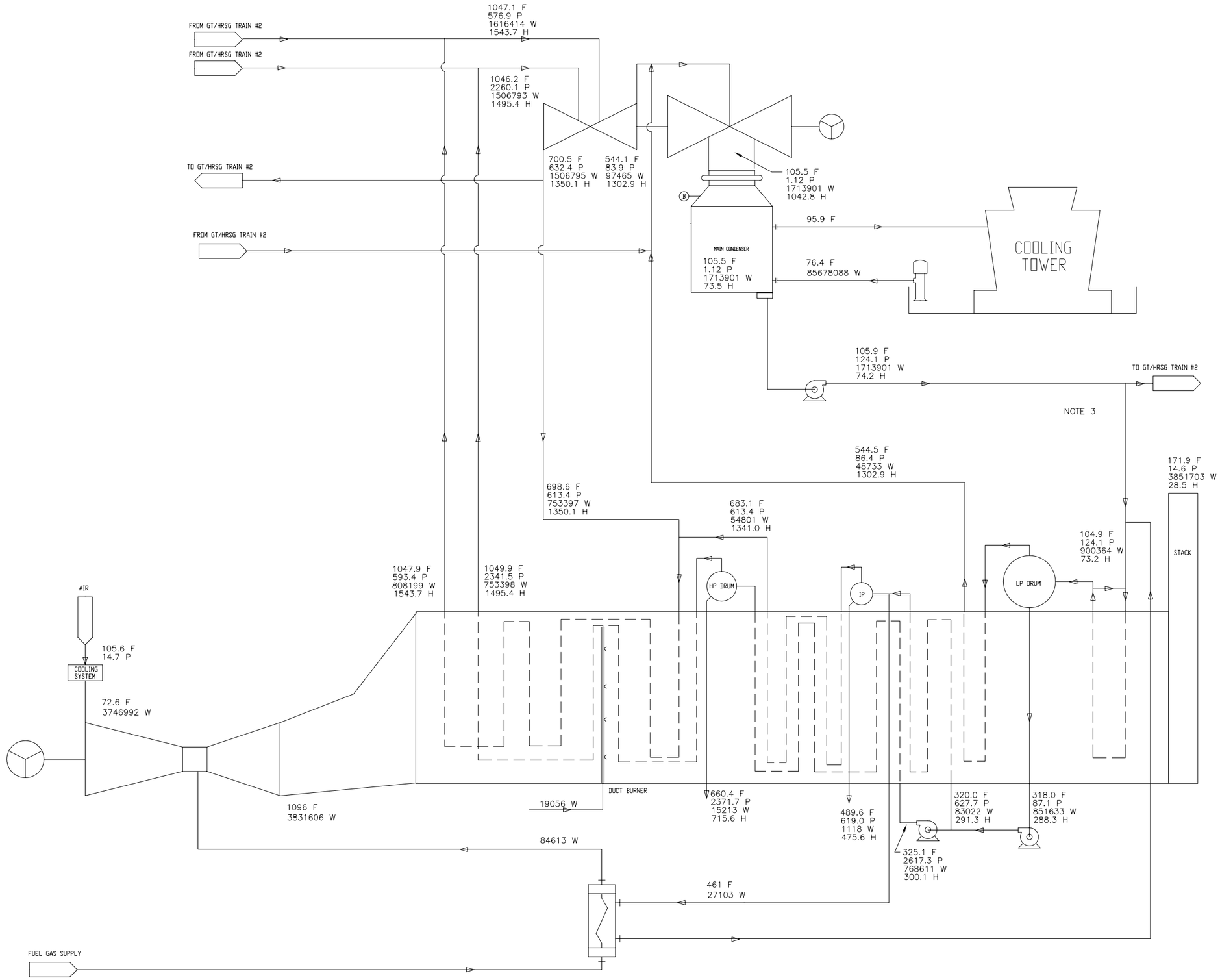
CLIENT/PROJECT TITLE
COMPETITIVE POWER VENTURES
VACAVILLE PROJECT

PROCESS FLOW DIAGRAM
HEAT BALANCE
2X1 SIEMENS 5000F COMBINED CYCLE,
SUMMER TYPICAL, FIRED

SCALE: NONE
DRAWING SIZE: ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.: VACA-1-HT-021-0007
REV: B

FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC

CAD FILE NAME: VACA-1-HT-021-0001
LAST UPDATE: 03/17/08



LEGEND

———	WATER OR STEAM
—●—●—	FUEL
— · —	AIR
———	FLUE GAS
———	BITUMEN
F	TEMPERATURE, ^F
P	PRESSURE, PSIA
W	MASS FLOW, LBM/HR
H	ENTHALPY, BTU/LBM
KWe	POWER, KILOWATTS ELECTRICAL
GPM	GALLONS PER MINUTE

SYSTEM PERFORMANCE SUMMARY

DRY BULB TEMPERATURE:	105.6
RELATIVE HUMIDITY:	11%
GAS TURBINE GROSS OUTPUT (PER UNIT):	185.9 MW
STEAM TURBINE GROSS OUTPUT:	302.7 MW
PLANT GROSS OUTPUT:	674.5 MW
AUX. POWER LOAD LOSSES:	15.0 MW
PLANT NET OUTPUT:	659.5 MW
NET PLANT HEAT RATE:	6478 BTU/kWH

NOTE

1. FUEL HEATING VALUE = 21515 BTU/LB LHV
2. FUEL GAS HHV/LHV = 1.1093
3. MAKEUP FLOW NOT DEPICTED

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH SPEC	LEAD DISC ENGINEER	PROJ ENGR MANAGER	PROJECT MANAGER
B	6/12/08	FOR INFORMATION	DG	MP		SB		MP	SB
A	03/17/08	FOR INFORMATION	KW	MP		SB		MP	SB

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

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

ORIGINATING PERSONNEL

DRAWN BY: K. WALDRON
CHECKED BY:
LEAD DESIGNER:
ENGINEER/TECH SPECIALIST: S. BRADY
PROJECT ENGINEERING MANAGER: M. PELLETIER
PROJECT MANAGER: S. BLUE

PROFESSIONAL ENGINEER'S SEAL

Zero Harm — Leadership, No incidents, Safe Behavior

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

WorleyParsons resources & energy

CLIENT/PROJECT TITLE
COMPETITIVE POWER VENTURES
VACAVILLE PROJECT

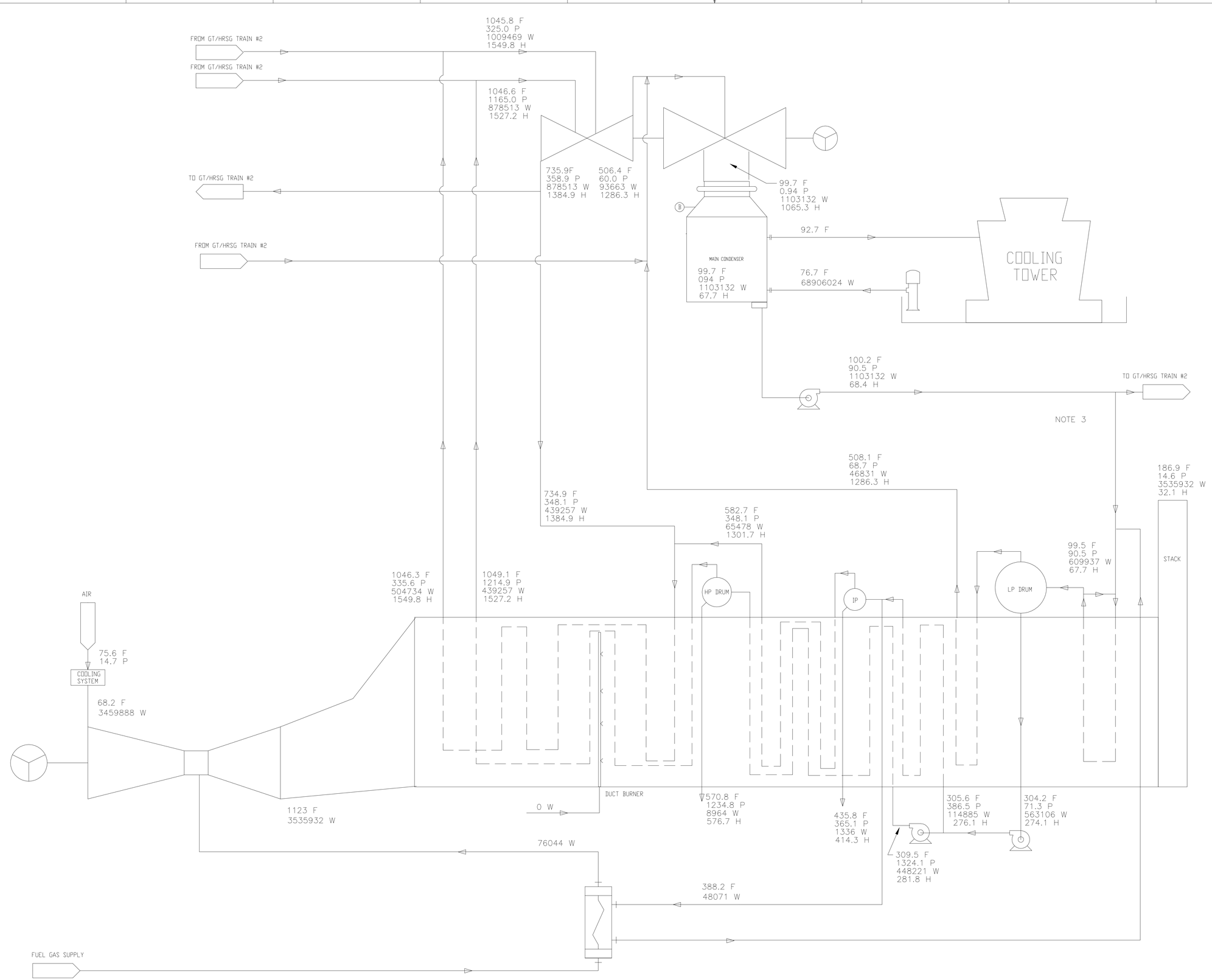
PROCESS FLOW DIAGRAM
HEAT BALANCE
2X1 SIEMENS 5000F COMBINED CYCLE,
SUMMER MAX., FIRED

SCALE: NONE
DRAWING SIZE: ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.: VACA-1-HT-021-0008
REV: B

FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC

CAD FILE NAME: VACA-1-HT-021-0001
LAST UPDATE: 03/17/08

Heat Balance Diagrams
General Electric 7FA



LEGEND

	WATER OR STEAM
	FUEL
	AIR
	FLUE GAS
	BITUMEN
F	TEMPERATURE, ^F
P	PRESSURE, PSIA
W	MASS FLOW, LBM/HR
H	ENTHALPY, BTU/LBM
KWe	POWER, KILOWATTS ELECTRICAL
GPM	GALLONS PER MINUTE

SYSTEM PERFORMANCE SUMMARY

DRY BULB TEMPERATURE:	75.6
RELATIVE HUMIDITY:	64%
GAS TURBINE GROSS OUTPUT (PER UNIT):	164.7 MW
STEAM TURBINE GROSS OUTPUT:	182.3 MW
PLANT GROSS OUTPUT:	511.7 MW
AUX. POWER LOAD LOSSES:	11.0 MW
PLANT NET OUTPUT:	500.7 MW
NET PLANT HEAT RATE (LHV):	6196 BTU/kWH

NOTE

1. FUEL HEATING VALUE = 21515 BTU/LB LHV
2. FUEL GAS HHV/LHV = 1.1093
3. MAKEUP FLOW NOT DEPICTED

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH. SPEC.	LEAD ELEC. ENGINEER	PROJ. ENGR MANAGER	PROJECT MANAGER
A	7/22/08	FOR INFORMATION	DP	MP		SB		MP	SB

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

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

ORIGINATING PERSONNEL

DRAWN BY: K. WALDRON
CHECKED BY:
LEAD DESIGNER:
ENGINEER/TECH SPECIALIST: S. BRADY
PROJECT ENGINEERING MANAGER: M. PELLETIER
PROJECT MANAGER: S. BLUE

PROFESSIONAL ENGINEER'S SEAL

Zero Harm — Leadership, No incidents, Safe Behavior

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

WorleyParsons resources & energy

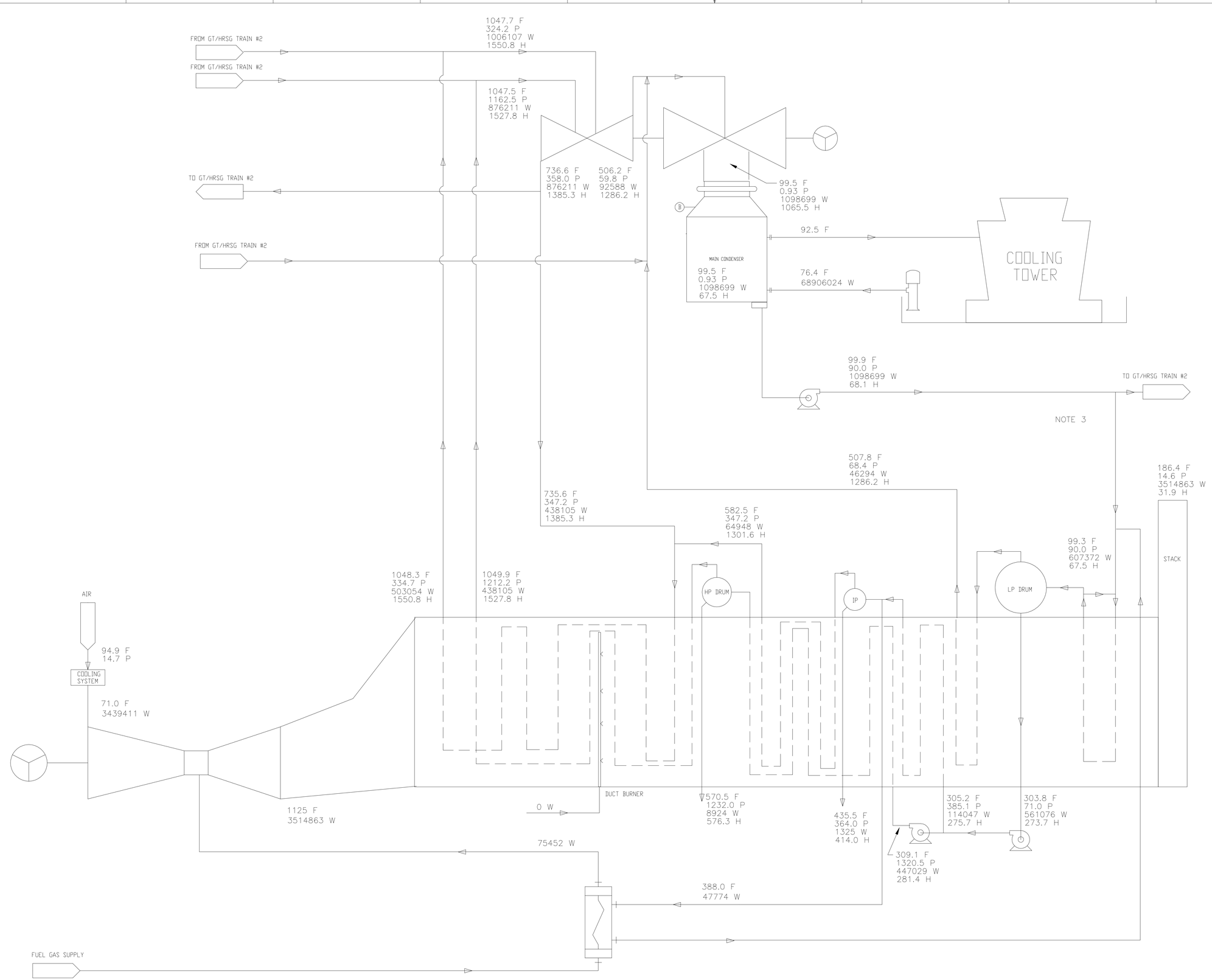
CLIENT/PROJECT TITLE
COMPETITIVE POWER VENTURES
VACAVILLE PROJECT

PROCESS FLOW DIAGRAM
HEAT BALANCE
2X1 GE 7FA COMBINED CYCLE,
ANNUAL AVERAGE, UNFIRED

SCALE: NONE
DRAWING SIZE: ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.: VACA-1-HT-021-1001
REV: A

FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC

CAD FILE NAME: VACA-1-HT-021-1001
LAST UPDATE: 07/22/08



LEGEND

	WATER OR STEAM
	FUEL
	AIR
	FLUE GAS
	BITUMEN
F	TEMPERATURE, ^F
P	PRESSURE, PSIA
W	MASS FLOW, LBM/HR
H	ENTHALPY, BTU/LBM
KWe	POWER, KILOWATTS ELECTRICAL
GPM	GALLONS PER MINUTE

SYSTEM PERFORMANCE SUMMARY

DRY BULB TEMPERATURE:	94.9
RELATIVE HUMIDITY:	22%
GAS TURBINE GROSS OUTPUT (PER UNIT):	162.9 MW
STEAM TURBINE GROSS OUTPUT:	182.0 MW
PLANT GROSS OUTPUT:	507.8 MW
AUX. POWER LOAD LOSSES:	11.0 MW
PLANT NET OUTPUT:	496.8 MW
NET PLANT HEAT RATE (LHV):	6197 BTU/kWH

NOTE

1. FUEL HEATING VALUE = 21515 BTU/LB LHV
2. FUEL GAS HHV/LHV = 1.1093
3. MAKEUP FLOW NOT DEPICTED

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH. SPEC.	ELECTRICAL ENGINEER	PROJ. ENGR MANAGER	PROJECT MANAGER
A	7/22/08	FOR INFORMATION	DP	MP		SB		MP	SB

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

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

ORIGINATING PERSONNEL

DRAWN BY: K. WALDRON
CHECKED BY:
LEAD DESIGNER:
ENGINEER/TECH SPECIALIST: S. BRADY
PROJECT ENGINEERING MANAGER: M. PELLETIER
PROJECT MANAGER: S. BLUE

PROFESSIONAL ENGINEER'S SEAL

Zero Harm — Leadership, No incidents, Safe Behavior

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

WorleyParsons resources & energy

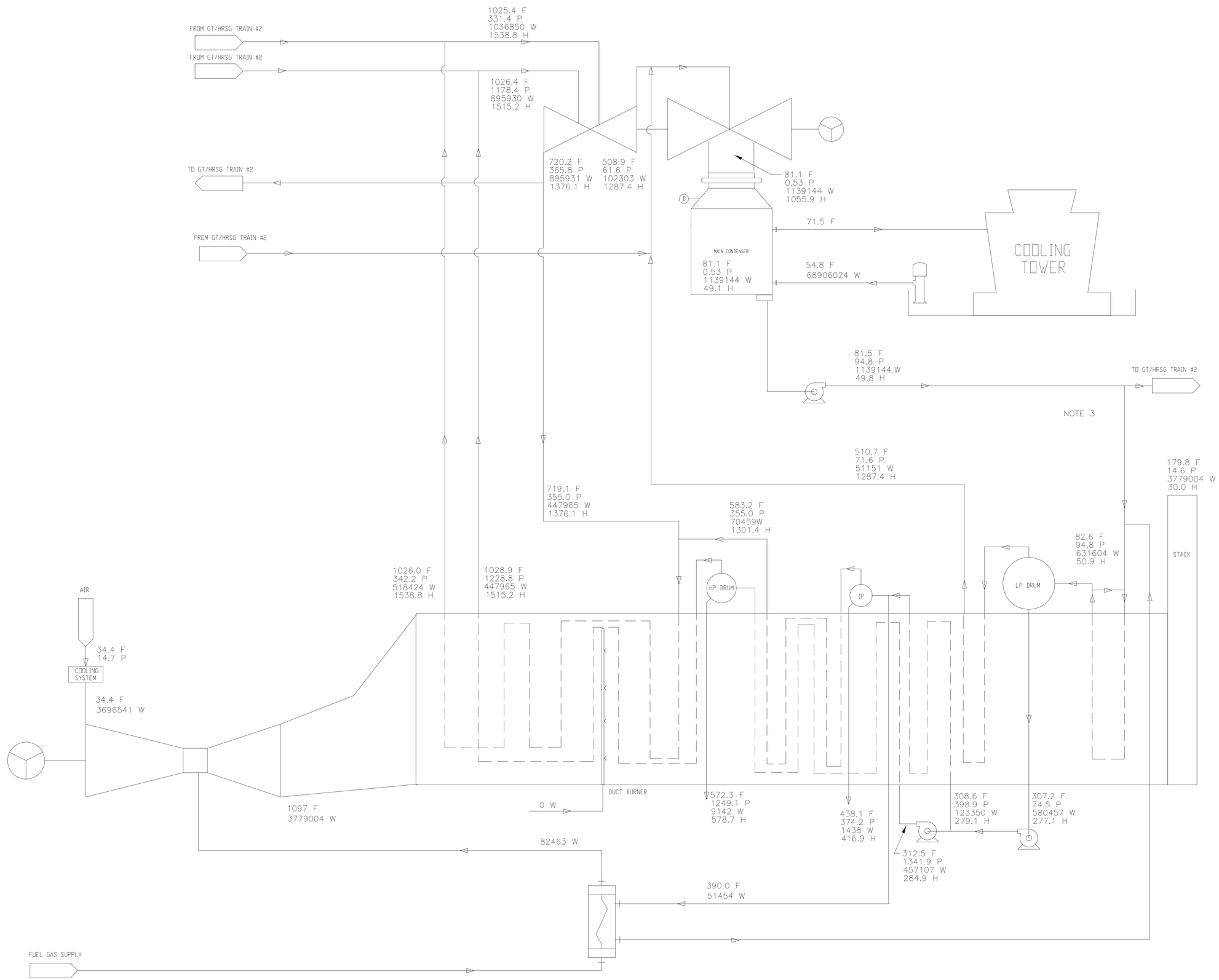
CLIENT/PROJECT TITLE
COMPETITIVE POWER VENTURES
VACAVILLE PROJECT

PROCESS FLOW DIAGRAM
HEAT BALANCE
2X1 GE 7FA COMBINED CYCLE,
SUMMER TYPICAL, UNFIRED

SCALE: NONE
DRAWING SIZE: ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.: VACA-1-HT-021-1002
REV: A

FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC

CAD FILE NAME: VACA-1-HT-021-1002
LAST UPDATE: 07/22/08



LEGEND

	WATER OR STEAM
	FUEL
	AIR
	FLUE GAS
	BITUMEN
F	TEMPERATURE, ^F
P	PRESSURE, PSIA
W	MASS FLOW, LBM/HR
H	ENTHALPY, BTU/LBM
KWe	POWER, KILOWATTS ELECTRICAL
GPM	GALLONS PER MINUTE

SYSTEM PERFORMANCE SUMMARY

DRY BULB TEMPERATURE:	34.4
RELATIVE HUMIDITY:	56%
GAS TURBINE GROSS OUTPUT (PER UNIT):	183.1 MW
STEAM TURBINE GROSS OUTPUT:	186.4 MW
PLANT GROSS OUTPUT:	552.5 MW
AUX. POWER LOAD LOSSES:	11.0 MW
PLANT NET OUTPUT:	541.5 MW
NET PLANT HEAT RATE (LHV):	6213 BTU/kWH

NOTE

1. FUEL HEATING VALUE = 21515 BTU/LB LHV
2. FUEL GAS HHV/LHV = 1.1093
3. MAKEUP FLOW NOT DEPICTED

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/TECH. SPEC	LEAD DISC ENGINEER	PROJ ENGR MANAGER	PROJECT MANAGER
A	7/22/08	FOR INFORMATION	DP	MP		SB		MP	SB

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: K. WALDRON
CHECKED BY:
LEAD DESIGNER:
ENGINEER/TECH SPECIALIST: S. BRADY
PROJECT ENGINEERING MANAGER: M. PELLETIER
PROJECT MANAGER: S. BLUE

PROFESSIONAL ENGINEER'S SEAL

Zero Harm — Leadership, No Incidents, Safe Behavior

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

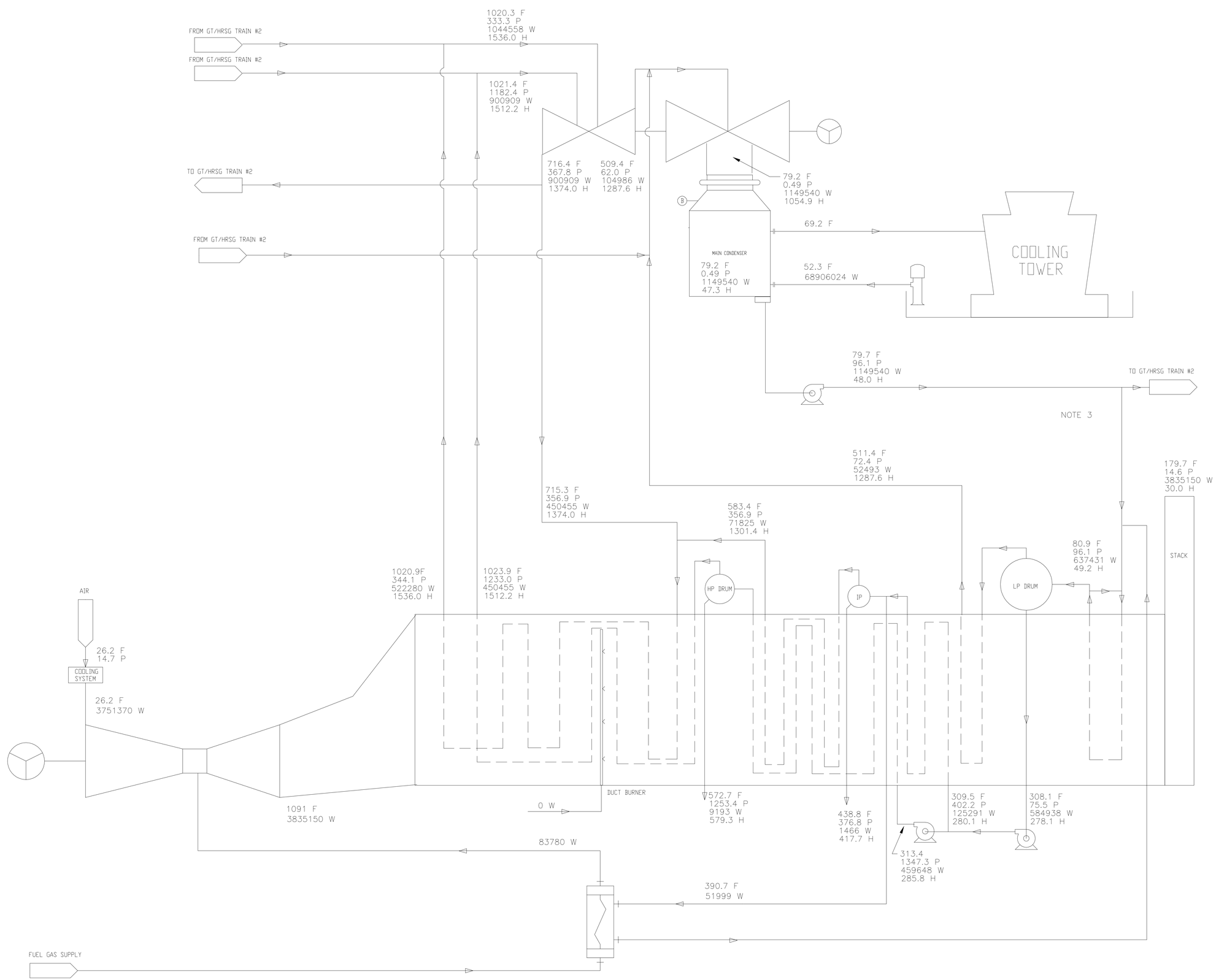
WorleyParsons resources & energy

CLIENT/PROJECT TITLE
COMPETITIVE POWER VENTURES
VACAVILLE PROJECT

PROCESS FLOW DIAGRAM
HEAT BALANCE
2X1 GE 7FA COMBINED CYCLE,
WINTER TYPICAL, UNFIRED

SCALE: NONE
DRAWING SIZE: ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.: VACA-1-HT-021-1004
REV: A

CAD FILE NAME: VACA-1-HT-021-1004
LAST UPDATE: 07/22/08



LEGEND

	WATER OR STEAM
	FUEL
	AIR
	FLUE GAS
	BITUMEN
F	TEMPERATURE, ^F
P	PRESSURE, PSIA
W	MASS FLOW, LBM/HR
H	ENTHALPY, BTU/LBM
KWe	POWER, KILOWATTS ELECTRICAL
GPM	GALLONS PER MINUTE

SYSTEM PERFORMANCE SUMMARY

DRY BULB TEMPERATURE:	26.2
RELATIVE HUMIDITY:	81%
GAS TURBINE GROSS OUTPUT (PER UNIT):	186.6 MW
STEAM TURBINE GROSS OUTPUT:	187.1 MW
PLANT GROSS OUTPUT:	560.3 MW
AUX. POWER LOAD LOSSES:	11.0 MW
PLANT NET OUTPUT:	549.3 MW
NET PLANT HEAT RATE (LHV):	6223 BTU/kWH

NOTE

1. FUEL HEATING VALUE = 21515 BTU/LB LHV
2. FUEL GAS HHV/LHV = 1.1093
3. MAKEUP FLOW NOT DEPICTED

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH. SPEC.	LEAD ELEC. ENGINEER	PROJ. ENGR MANAGER	PROJECT MANAGER
A	7/22/08	FOR INFORMATION	DP	MP		SB		MP	SB

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

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

ORIGINATING PERSONNEL

DRAWN BY: K. WALDRON
CHECKED BY:
LEAD DESIGNER:
ENGINEER/TECH SPECIALIST: S. BRADY
PROJECT ENGINEERING MANAGER: M. PELLETIER
PROJECT MANAGER: S. BLUE

PROFESSIONAL ENGINEER'S SEAL

Zero Harm — Leadership, No incidents, Safe Behavior

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

WorleyParsons resources & energy

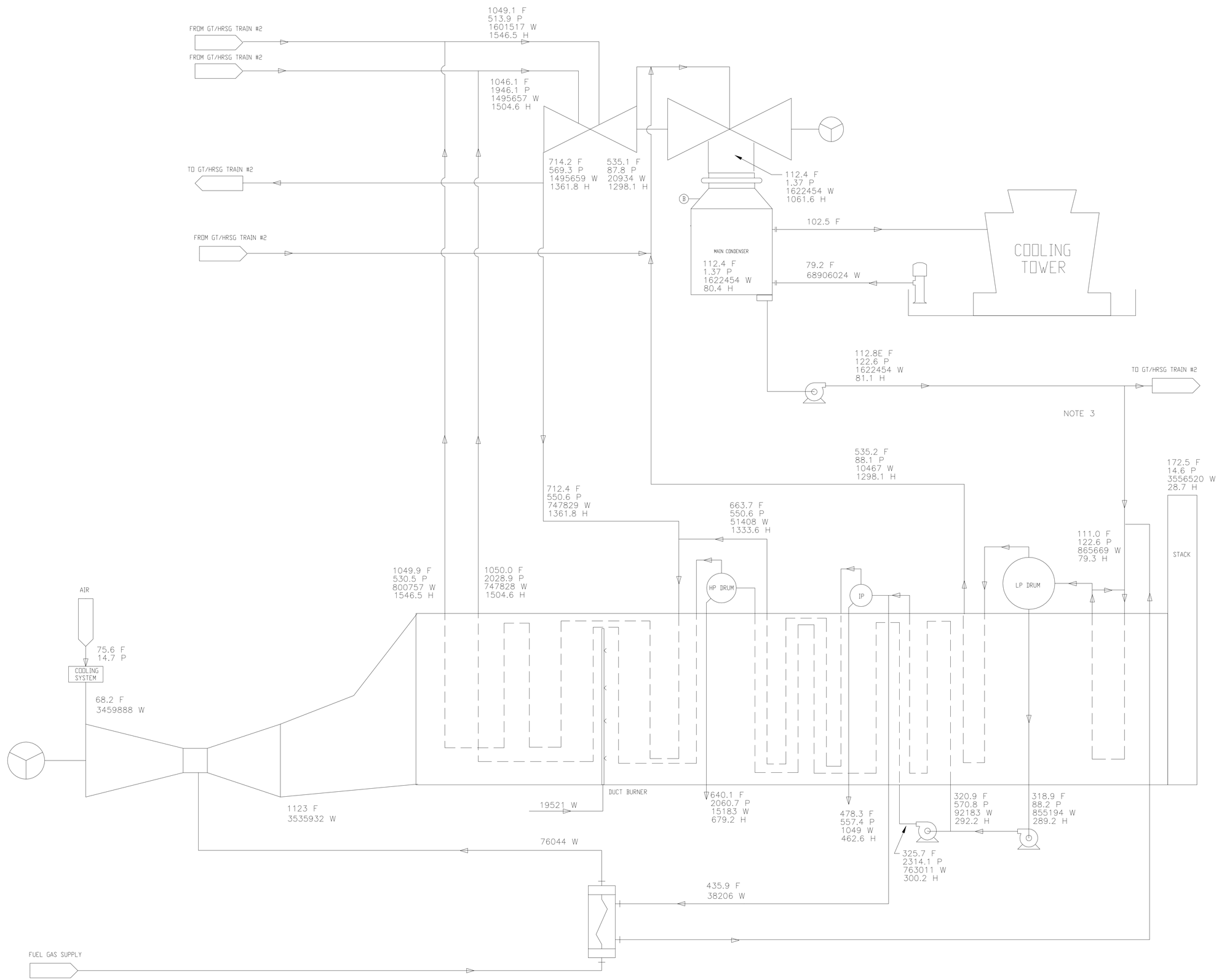
CLIENT/PROJECT TITLE
COMPETITIVE POWER VENTURES
VACAVILLE PROJECT

PROCESS FLOW DIAGRAM
HEAT BALANCE
2X1 GE 7FA COMBINED CYCLE,
WINTER MIN., UNFIRED

SCALE: NONE
DRAWING SIZE: ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.: VACA-1-HT-021-1005
REV: A

FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC

CAD FILE NAME: VACA-1-HT-021-1005
LAST UPDATE: 07/22/08



LEGEND

	WATER OR STEAM
	FUEL
	AIR
	FLUE GAS
	BITUMEN
F	TEMPERATURE, ^F
P	PRESSURE, PSIA
W	MASS FLOW, LBM/HR
H	ENTHALPY, BTU/LBM
KWe	POWER, KILOWATTS ELECTRICAL
GPM	GALLONS PER MINUTE

SYSTEM PERFORMANCE SUMMARY

DRY BULB TEMPERATURE:	75.6
RELATIVE HUMIDITY:	64%
GAS TURBINE GROSS OUTPUT (PER UNIT):	164.7 MW
STEAM TURBINE GROSS OUTPUT:	285.8 MW
PLANT GROSS OUTPUT:	615.2 MW
AUX. POWER LOAD LOSSES:	14.0 MW
PLANT NET OUTPUT:	601.2 MW
NET PLANT HEAT RATE (LHV):	6558 BTU/kWH

NOTE

1. FUEL HEATING VALUE = 21515 BTU/LB LHV
2. FUEL GAS HHV/LHV = 1.1093
3. MAKEUP FLOW NOT DEPICTED

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH. SPEC.	ELECTRICAL ENGINEER	PROJ. ENGR MANAGER	PROJECT MANAGER
A	7/22/08	FOR INFORMATION	DP	MP		SB		MP	SB

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

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

ORIGINATING PERSONNEL

DRAWN BY: K. WALDRON
CHECKED BY:
LEAD DESIGNER:
ENGINEER/TECH SPECIALIST: S. BRADY
PROJECT ENGINEERING MANAGER: M. PELLETIER
PROJECT MANAGER: S. BLUE

PROFESSIONAL ENGINEER'S SEAL

Zero Harm — Leadership, No incidents, Safe Behavior

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

WorleyParsons resources & energy

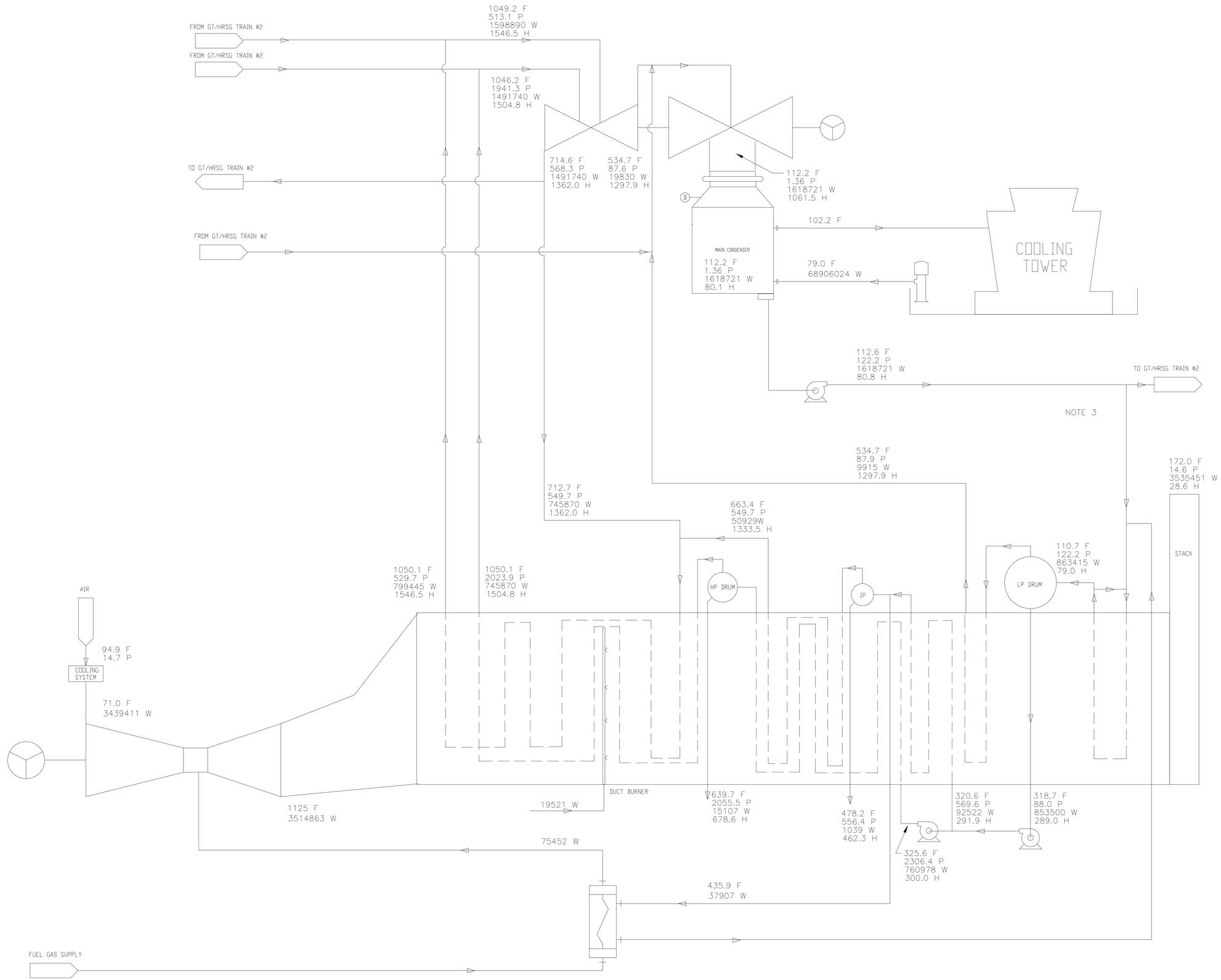
CLIENT/PROJECT TITLE
COMPETITIVE POWER VENTURES
VACAVILLE PROJECT

PROCESS FLOW DIAGRAM
HEAT BALANCE
2X1 GE 7FA COMBINED CYCLE,
ANNUAL AVERAGE, FIRED

SCALE: NONE
DRAWING SIZE: ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.: VACA-1-HT-021-1006
REV: A

FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC

CAD FILE NAME: VACA-1-HT-021-0001
LAST UPDATE: 03/17/08



LEGEND

	WATER OR STEAM
	FUEL
	AIR
	FLUE GAS
	BITUMEN
F	TEMPERATURE, ^F
P	PRESSURE, PSIA
W	MASS FLOW, LBM/HR
H	ENTHALPY, BTU/LBM
KWe	POWER, KILOWATTS ELECTRICAL
GPM	GALLONS PER MINUTE

SYSTEM PERFORMANCE SUMMARY

DRY BULB TEMPERATURE:	94.9
RELATIVE HUMIDITY:	22%
GAS TURBINE GROSS OUTPUT (PER UNIT):	162.9 MW
STEAM TURBINE GROSS OUTPUT:	285.3 MW
PLANT GROSS OUTPUT:	611.1 MW
AUX. POWER LOAD LOSSES:	14.0 MW
PLANT NET OUTPUT:	597.1 MW
NET PLANT HEAT RATE:	6563 BTU/kWH

NOTE

1. FUEL HEATING VALUE = 21515 BTU/LB LHV
2. FUEL GAS HHV/LHV = 1.1093
3. MAKEUP FLOW NOT DEPICTED

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH. SPEC.	ELECTRICAL ENGINEER	PROJ. ENGR MANAGER	PROJECT MANAGER
A	07/22/08	FOR INFORMATION	DP	MP		SB		MP	SB

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

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ORIGINATING PERSONNEL

DRAWN BY: K. WALDRON

CHECKED BY:

LEAD DESIGNER:

ENGINEER/TECH SPECIALIST: S. BRADY

PROJECT ENGINEERING MANAGER: M. PELLETIER

PROJECT MANAGER: S. BLUE

PROFESSIONAL ENGINEER'S SEAL

Zero Harm — Leadership, No incidents, Safe Behavior

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

WorleyParsons resources & energy

CLIENT/PROJECT TITLE
COMPETITIVE POWER VENTURES
VACAVILLE PROJECT

PROCESS FLOW DIAGRAM
HEAT BALANCE
2X1 GE 7FA COMBINED CYCLE,
SUMMER TYPICAL, FIRED

SCALE: NONE
DRAWING SIZE: ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.: VACA-1-HT-021-1007
REV: A

FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC

CAD FILE NAME: VACA-1-HT-021-1007
LAST UPDATE: 07/22/08