Patrick E Gorman Housing

1381 Linden Blvd,

Brooklyn, NY 11212

Site Contact

Kevin May

Project Engineer

Aegis Energy Services Inc.

55 Jackson St, Holyoke MA, 01040

413-536-1156

Kmay@aegisenergyservices.com

Generation:

Two (2) Agenco PowerVerter 100

Overview

CDH was on site 4/26/2017 to install a datalogger, terminate sensor wiring, install a temperature sensor, setup communications, and verify installed metering. Data collection begins.

Issues to be Addressed

1) The initial Romet RM3000 gas meter had issues, so a Romet RM2000 was temporarily installed. This needs to be replaced because the maximum possible gas for the system cannot be measured (1220 scfh per unit, 2440 scfh total).

M&V Instrumentation Installation

CDH provided the data logger and enclosure, supplemental temperature sensor, dump radiator current sensor, and necessary wire pulls. Aegis provided and installed the power, gas, and Btu meters. Aegis installed the CDH enclosure, supplied 120V power, and provided communications. The cogen system, including all HX's, metering, and the CDH panel are located in the basement boiler and electrical room. The following table shows the data points measured by the M&V system.

Monitored Data Points

Logger Channel	Data Point	Description	Eng Units	Instrument / Transducer	Output
MB-001	WT1	Gross Generator #1 Power Output	kWh	Veris H-8035-300	Modbus RS-485
MB-002	WT2	Gross Generator #2 Power Output	kWh	Veris H-8035-300	Modbus RS-485
MB-005	WB	Total Facility Power	kWh	Veris E5002A	Modbus RS-485
MB-003	WP	Parasitic Loads	kWh	Veris H-8035-100	Modbus RS-485
-	WG	Net Power Output	kWh	-	Calculated
IN-1	FG	Cogen Gas Consumption (Generator 1 & 2)	cf	Romet RM3000	Pulse
MB-010	FHW	Recovered Heat loop Flow	gpm	Badger Series 380	Modbus RS-485
IN-2	THW1	Recovered Heat Loop - Supply Temp.	^{o}F	Veris 10k Type II Thermistor (insertion)	Resistance
MB-010	THW2	Recovered Heat Loop - Temp. after HX1	^{o}F	Badger Series 380	Modbus RS-485
MB-010	THW3	Recovered Heat Loop - Return Temp. (Dump Radiator)	^{o}F	Badger Series 380	Modbus RS-485
IN-3	IVFD	Dump Radiator Current	Amps	Veris H921	4 - 20 mA
-	QR	Rejected Heat Recovery	Mbtu/h	-	Calculated
MB-004	QU	Total Useful Heat Recovery	Mbtu/h	-	Calculated

IP Information

External IP:	71.244.81.250:4081
Internal IP:	10.0.26.141
Netmask:	255.255.255.0
Gateway:	10.0.26.1
DNS #1:	8.8.8.8
DNS #2:	8.8.4.4
MAC Address:	00:1E:C6:00:28:06

Procedure

- The generators were not running during the site visit, so power and gas use could not be verified.
- Hot water loop flow was verified by comparing the Badger 380 flow reading on the Obvius to measurements taken using a portable Portaflow ultrasonic flowmeter.
- Temperatures were verified by comparing Obvius readings (Badger 380 and supplied insertion temperature sensor) to the readings on temperature gauges built into the system.

Verification Data – April 25, 2017

Recovered Heat Loop Flow:

	Obvius (gpm)	Portaflow Meter (gpm)
FHW	78.8	79.6
	78.8	80.1
	78.9	80.6
Avg:	*78.8*	*79.9*

Portaflow Ultrasonic Flow Meter Configuration	
Sensor Spacing	1.526
OD	2.625
Thickness	0.08
2.5 in Type L Copper	

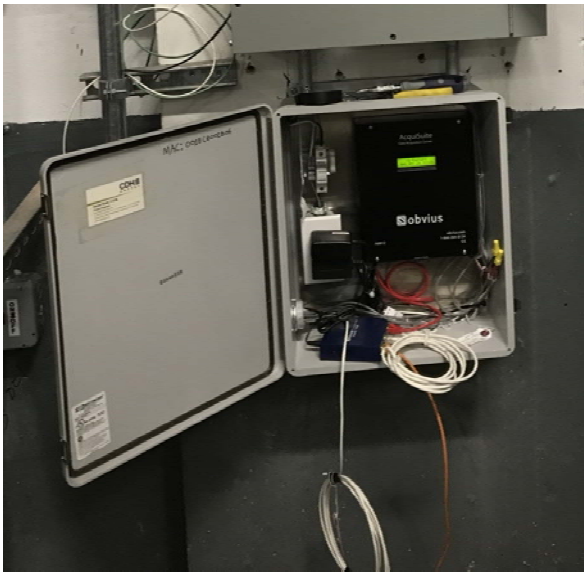
System Temperatures

	Obvius (°F)	Gauge (°F)
THW1	117.8	117.0
	117.6	117.0
Avg:	117.7	117.0
THW2	117.3	117.0
	117.8	117.0
Avg:	117.6	117.0
THW3	118.2	117.0
	118.2	117.0
Avg:	118.2	117.0

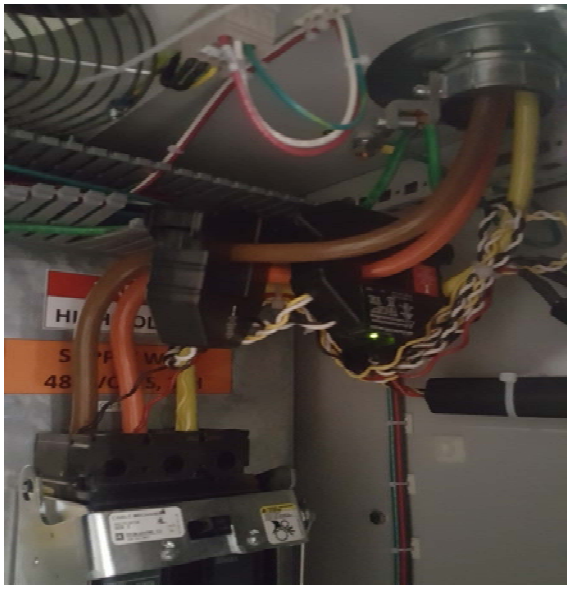
Site Photos

Aegen PowerVerter 100 kW cogen unit #1 located in the boiler room.

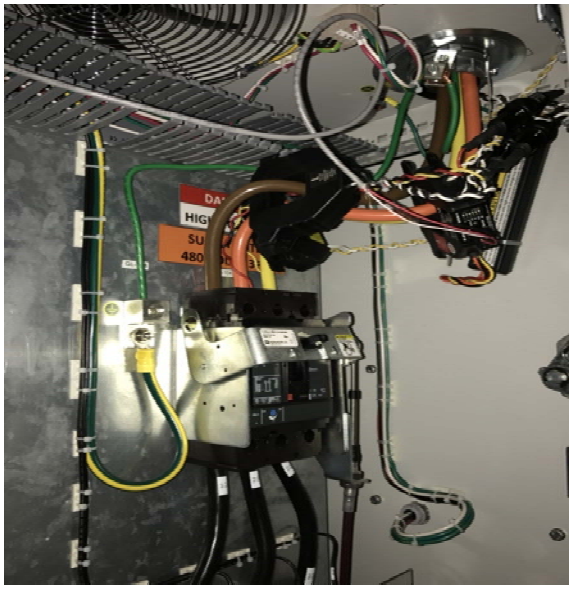
Aegen PowerVerter 100 kW cogen unit #2 located in the boiler room.



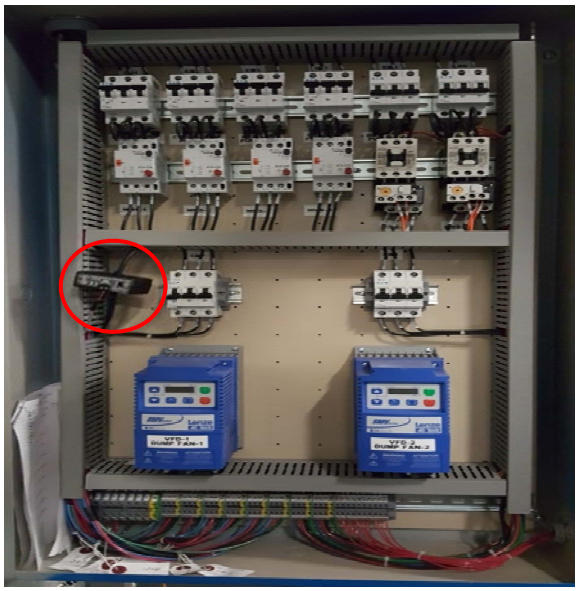
CDH panel containing data logger and CDH network switch located in the boiler room.



Cogen unit #1 gross generator power meter (WT1) located in inverver #1 in the boiler room.



Cogen unit #2 gross generator power meter (WT2) located in inverver #2 in the boiler room.

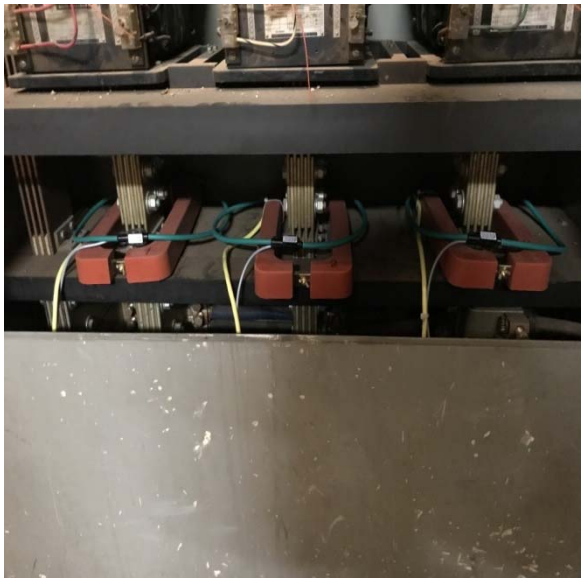


Veris H921 dump radiator fan current sensor (IVFD) located in Aeigis cogen control panel.

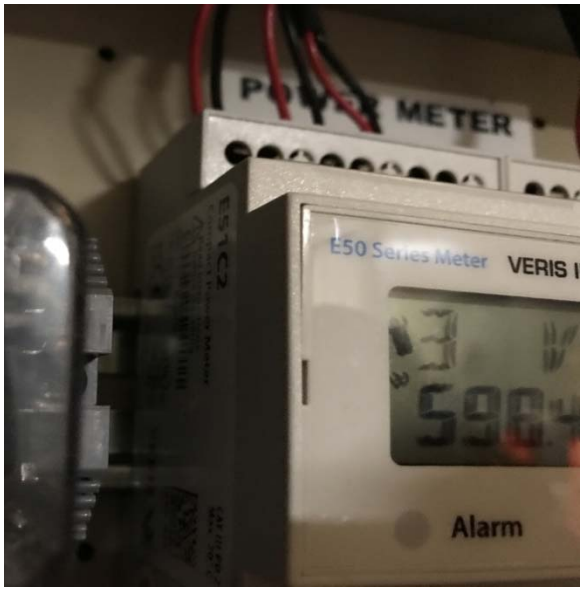
Parasitic Power Meter (WP) installed SBDP-CG distribution panel. Located above the CDH panel in the boiler room.

Badger 380 BTU meter on Dump Radiator skid across HX2 (THW2, THW3, FHW) located in the boiler room.

Veris 10K Type II Thermistor (THW1) on DHW skid before HX1 located in boiler room.



Rope CT's in the building's main distribution panel measuring total facility power (WB) located in electrical room across from the boiler room.



Veris E5002A total facility power meter (WB) in Beckwith panel in the electric room across from the boiler room.

PUMP SCHEDULE						
PUMP NO.	SERVICE	FLOW	HEAD	H.P	PHASE	MODEL
P-1,2	COGEN MODULE	22 GPM	70 FT	3/4	3	BELL & GOSSETT SERIES 1535 353T
P-3a,3b	COGEN PRIMARY LOOP (PARALLEL)	75 GPM	60 FT	3/4	3	BELL & GOSSETT SERIES 1535 353T
P-4	DHW LOOP	75 GPM	25 FT	3/4	3	BELL & GOSSETT SERIES 60-611B
P-5	DUMP RADIATOR LOOP	75 GPM	25 FT	1	3	BELL & GOSSETT SERIES 60-616T

CONTROL VALVE SCHEDULE						
VALVE NO.	SERVICE	FLOW TYPE	SIZE	VOLTAGE	VALVE MODEL	ACTUATOR
V-1	DHW LOOP	MIXING	2"	24 V	UR3F-B-F-B-M-1	MS40-7043M MODULATING
V-2	DHW BOILER SELECTOR	A OR B	2"	24 V	UR3F-D-F-B-M-1	MA40-7043M ON/OFF

EXPANSION TANK ET-1,2	
DESIGN MANUFACTURER	AMTROL OR EQUAL
DESIGN BASE MODEL	SX-30V
ORIENTATION	VERTICAL
TOTAL VOLUME	14 GAL
ACCEPTANCE VOLUME	11.3 GALLONS
AIR CHARGE	17 PSI
DIAMETER	15 INCHES
HEIGHT	25 INCHES

INSULATION TABLE				
LOAD	PIPE SIZE	PIPE MATERIAL	MAX PIPE TEMP	INSULATION THICKNESS
COGEN LOOP	2"-2.5"	COPPER	200°F	2"
DUCTWORK	ANY	DUCT	160°F	1"
EXHAUST	4"	SCHEDULE 40	250°F	1"
HEAT DISSIPATION	2.5"	SCHEDULE 40	180°F	1"

HEAT EXCHANGERS HX-1		
DESIGN MANUFACTURER	API HEAT TRANSFER	
MODEL	SB7M-60	
TYPE	BRAZED PLATE	
MATERIAL	COPPER/316 STAINLESS	
SERVICE	DHW LOOP	
SIDE	HOT	COLD
FLUID TYPE	WATER	WATER
FLUID FLOW	75 GPM	75 GPM
TEMPERATURE IN	210 DEG F	160 DEG F
TEMPERATURE OUT	170 DEG F	200 DEG F
PRESSURE DROP	3.06 PSI	3.06 PSI
INLET SIZE	2" NPT	2" NPT

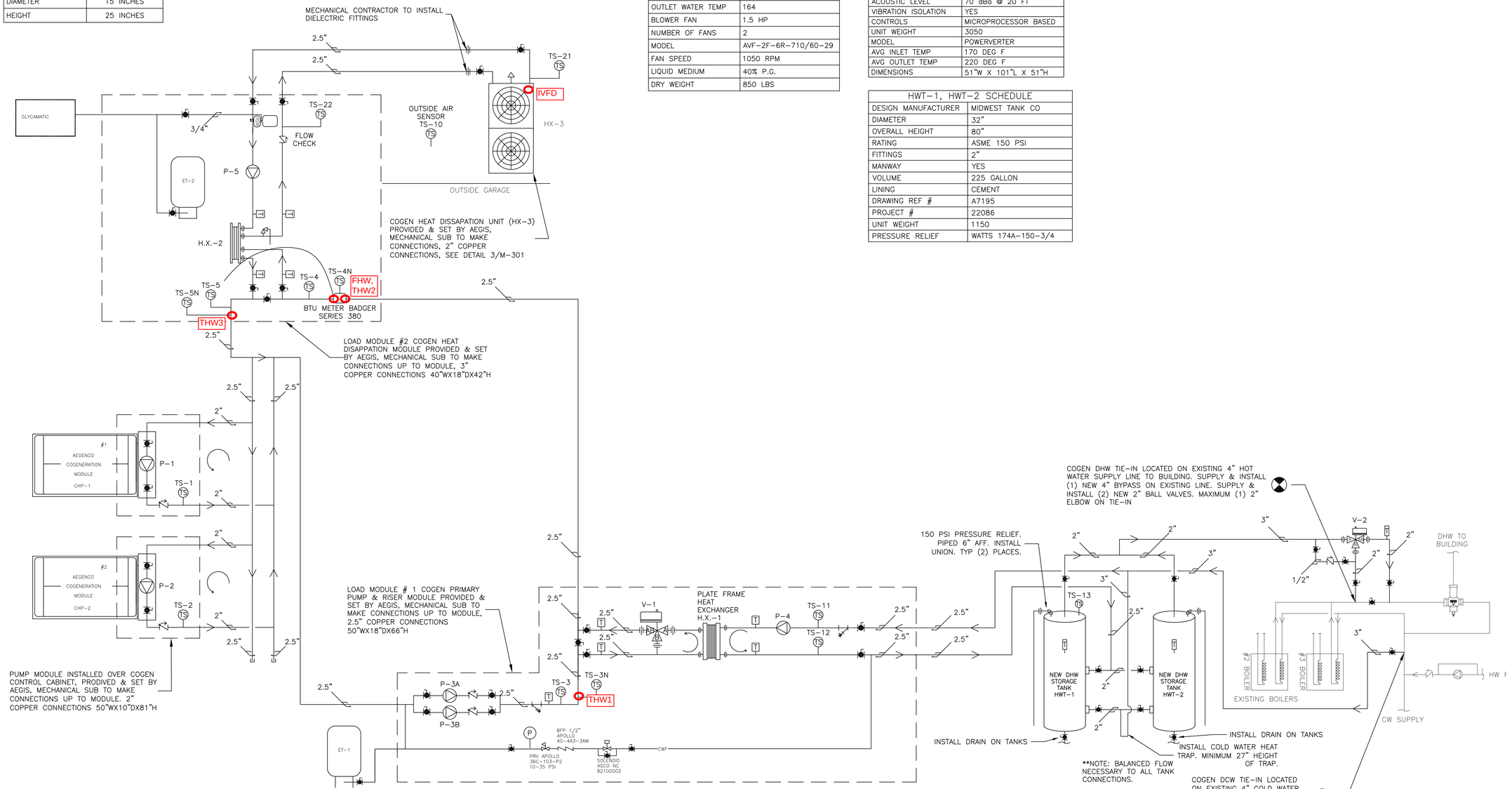
HEAT EXCHANGERS HX-2		
DESIGN MANUFACTURER	API HEAT TRANSFER	
MODEL	SBM7M-60	
TYPE	BRAZED PLATE	
MATERIAL	COPPER/316 STAINLESS	
SERVICE	HEAT DISSAPATION	
SIDE	HOT	COLD
FLUID TYPE	WATER	40% PG
FLUID FLOW	75 GPM	75 GPM
TEMPERATURE IN	210 DEG F	120 DEG F
TEMPERATURE OUT	172 DEG F	175 DEG F
PRESSURE DROP	3.06 PSI	3.2 PSI
INLET SIZE	2" NPT	2" NPT

TEMPERATURE SENSOR SCHEDULE			
TS NO.	SERVICE	MODEL	WELL TYPE
TS-1	COGEN 1 SUPPLY	MAMAC TE-703-C-5A	AT-225
TS-2	COGEN 2 SUPPLY	MAMAC TE-703-C-5A	AT-225
TS-3	COGEN LOOP SUPPLY	MAMAC TE-703-C-5A	AT-225
TS-4	COGEN LOOP DHW TO DUMP	MAMAC TE-703-C-5A	AT-225
TS-5	COGEN LOOP RETURN	MAMAC TE-703-C-5A	AT-225
TS-11	DHW ENTERING HX	MAMAC TE-703-C-5A	AT-225
TS-12	DHW LEAVING HX	MAMAC TE-703-C-5A	AT-225
TS-13	DHW TANK TEMP	MAMAC TE-703-C-5A	AT-225
TS-21	DUMP ENTERING HX (AT RADIATOR)	MAMAC TE-703-C-5A	AT-225
TS-22	DUMP LEAVING HX	MAMAC TE-703-C-5A	AT-225
TS-3N	(NYSERDA) COGEN SUPPLY	VERIS T1DB1D0	N/A
TS-4N	(NYSERDA) LOADS TO DUMP	BADGER 380	N/A
TS-5N	(NYSERDA) COGEN RETURN)	BADGER 380	N/A

HEAT DISSIPATION HX-3	
DESIGN MANUFACTURER	DRY COOLERS INC.
SERVICE	HEAT DISSIPATION
FLOW RATE	75 GPM
GROSS HEAT LOAD	1,149 MBH
INLET WATER TEMP	197 DEG F
OUTLET WATER TEMP	164
BLOWER FAN	1.5 HP
NUMBER OF FANS	2
MODEL	AVF-2F-6R-710/60-29
FAN SPEED	1050 RPM
LIQUID MEDIUM	40% P.G.
DRY WEIGHT	850 LBS

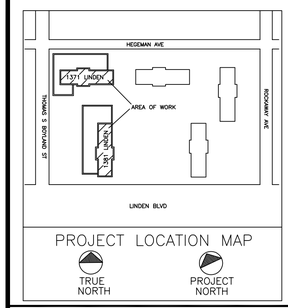
COGENERATION SCHEDULE (TYPE 2 UNITS)	
DESIGN MANUFACTURER	AEGENCO
FUEL	NATURAL GAS
FUEL INPUT	1230 SCFH
THERMAL OUTPUT	642,000 BTU/HR
ELECTRICAL OUTPUT	100 KW
GENERATION TYPE	SYNCHRONOUS
ACOUSTIC LEVEL	70 dBa @ 20 FT
VIBRATION ISOLATION	YES
CONTROLS	MICROPROCESSOR BASED
UNIT WEIGHT	3050
MODEL	POWERVERTER
AVG INLET TEMP	170 DEG F
AVG OUTLET TEMP	220 DEG F
DIMENSIONS	51"W X 101"L X 51"H

HWT-1, HWT-2 SCHEDULE	
DESIGN MANUFACTURER	MIDWEST TANK CO
DIAMETER	32"
OVERALL HEIGHT	80"
RATING	ASME 150 PSI
FITTINGS	2"
MANWAY	YES
VOLUME	225 GALLON
LINING	CEMENT
DRAWING REF #	A7195
PROJECT #	22086
UNIT WEIGHT	1150
PRESSURE RELIEF	WATTS 174A-150-3/4



1 M-101 MECHANICAL FLOW DIAGRAM
SCALE: NTS

REV	REVISION DESCRIPTION	DATE



CLIENT:

AEGIS ENERGY SERVICES, INC
55 JACKSON STREET
HOLYOKE, MA 01040
TEL.: 413-536-1156
FAX: 413-536-1104
ATTN: KEVIN MAY

ALL DRAWINGS ARE TO BE READ NOT SCALED.

PREPARED BY:

BECKER ENGINEERING, PC
777 SUNRISE HIGHWAY, SUITE 300, LYNBROOK,NY 11563
PHONE: (516) 561-5922 FAX: (516) 823-0219 EMAIL: SUPPORT@BEPC.US
WEB: WWW.BEPC.US

PROJECT

PATRICK GORMAN HOUSING COGENERATION PROJECT
1371-1381 LINDEN BLVD
BROOKLYN, NY 11212

DRAWING TITLE:

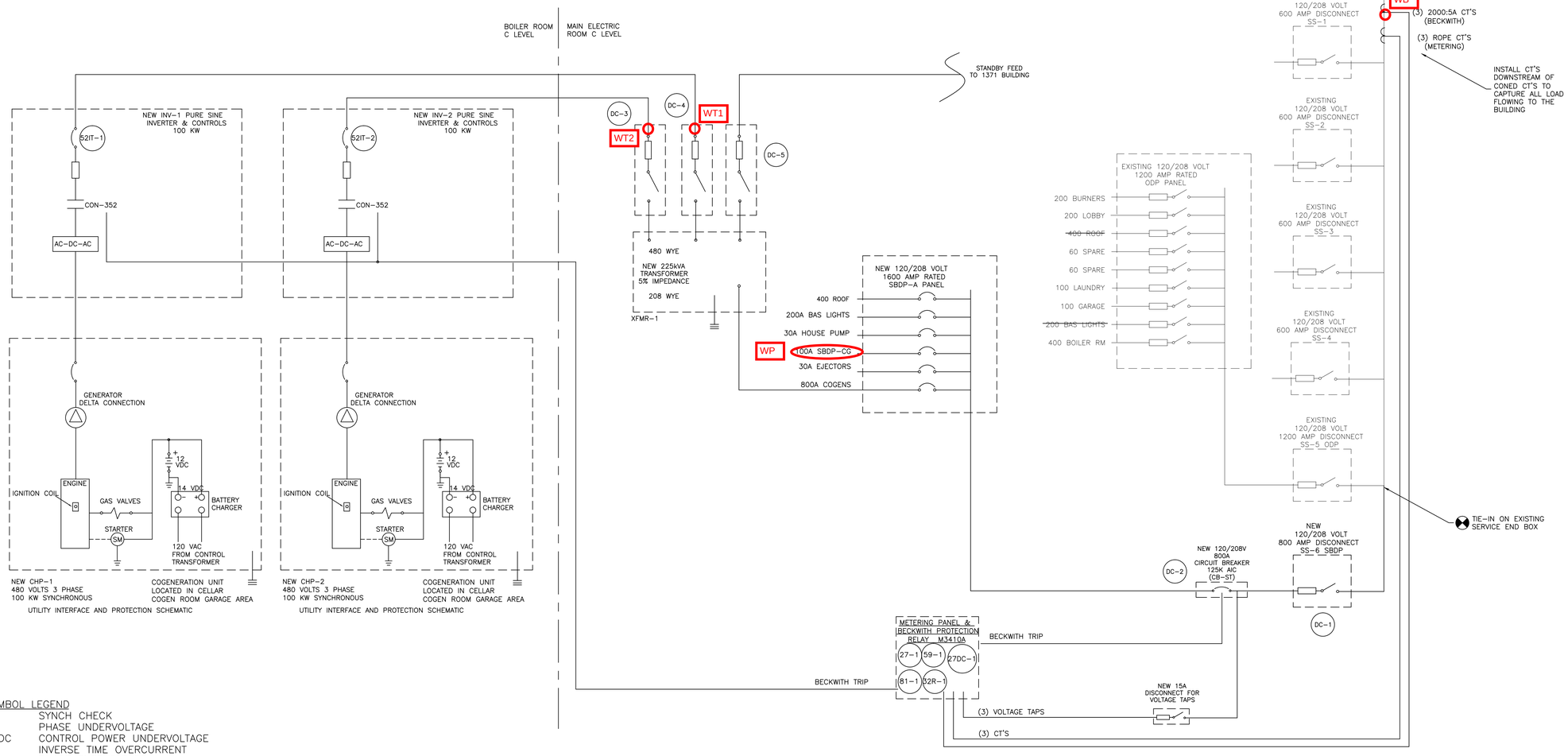
MECHANICAL FLOW DIAGRAM

DESIGN BY:	KM	DATE:	8/30/16
DRN BY:	KM	DATE:	12/19/16
CKD BY:	RRH	DATE:	12/14/16
FINAL CKD BY:	JB	DATE:	12/14/16
SCALE:	AS NOTED	DATE:	
DWG No.		PAGE 3 OF 13	

M-101.00

PROJECT NO.
60-366

B-SCAN:



SYMBOL LEGEND

25	SYNCH CHECK
27	PHASE UNDERVOLTAGE
27DC	CONTROL POWER UNDERVOLTAGE
51	INVERSE TIME OVERCURRENT
59	PHASE OVERVOLTAGE
81	OVER/UNDER FREQUENCY
32R	REVERSE POWER
52IT	INTERTIE BREAKER
89L	COGEN DISCONNECT

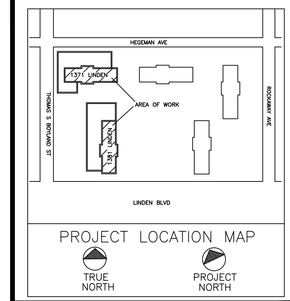
PROTECTIVE RELAY SETPOINTS

27DC/1,2	(9V DC) NO DELAY
27-1/1,2	(-50 TO -88%) 2 SEC (120 CYCLE) DELAY
27-2/1,2	(-50%) 0.16 SEC (9 CYCLE) DELAY
59-1/1,2	(+110 TO 120%) 1 SEC (60 CYCLE) DELAY
59-2/1,2	(+120%) 0.16 SEC (9 CYCLE) DELAY
81U/1,2	(<59.3 Hz) 0.16 SEC (9 CYCLE) DELAY
81O/1,2	(>60.5 Hz) 0.16 SEC (9 CYCLE) DELAY
32R-1/1,2	(+0.02 PU) (IMPORT) 2.0 SEC (120 CYCLE) DELAY
32R-2/1,2	(-0.02 PU) (EXPORT) 0.16 SEC (9 CYCLE) DELAY

1 / E-201 1381 ELECTRICAL ONELINE

SCALE: NTS

REV	REVISION DESCRIPTION	DATE



CLIENT:

AEGIS ENERGY SERVICES, INC
55 JACKSON STREET
HOLYOKE, MA 01040
TEL.: 413-536-1156
FAX: 413-536-1104
ATTN: KEVIN MAY

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PROPRIETARY STATEMENT:

PREPARED BY:

BECKER ENGINEERING, PC
777 SUNRISE HIGHWAY, SUITE 300,
LYNBROOK,NY 11563
PHONE: (516) 561-5922 FAX: (516) 823-0219 EMAIL: SUPPORT@BEPC.US
WEB: WWW.BEPC.US

PROJECT

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COGENERATION PROJECT
1371-1381 LINDEN BLVD
BROOKLYN, NY 11212

DRAWING TITLE:

1381 ELECTRICAL ONE LINE DIAGRAM

DESIGN BY:	KM	DATE:	8/30/16
DRN BY:	KM	DATE:	12/19/16
CKD BY:	RRH	DATE:	12/14/16
FINAL CKD BY:	JB	DATE:	12/14/16
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