Site Information – Hayden on the Hudson

Location

Hayden on the Hudson
4455 Douglas Avenue
Bronx, New York 10471

Site Contact

Kevin May
Project Engineer
Aegis Energy Services Inc.
55 Jackson St., Holyoke, MA 10603
413-536-1156
kmay@aegisenergyservices.com

Attendees

CDH Energy Corp. (CDH)	Aegis
Jeremy Wade	Kevin May
Christopher Doty	Sean Pringle

Overview

CDH was on site 4/6/2016 to install and commission the instrumentation on the 100 kW Cogen Unit at Hayden on the Hudson at 4455 Douglas Avenue, Bronx, NY.

The main purpose of the site visit was to:

- Install and commission the M&V instrumentation
- Establish communications with the CDH servers and M&V system

M&V Instrumentation Installation

CDH provided the data logger and enclosure. Aegis provided and installed the power and gas meters. Aegis installed the CDH enclosure and performed wire pulls from the power meter and BTU meter locations to the CDH enclosure and provided 120V power. CDH terminated

wiring to the data logger. The M&V enclosure was located in the boiler room with the cogen unit, the useful heat recovery BTU meter, parasitic power meter, and gas meter. The cogen power meter is located in the parking garage and building power meter is located inside the Beckwith protective relay enclosure in the Electric Meter room. The following table shows the data points being measured by the M&V system.

Monitored Data Points

Logger Channel	Data Point	Description	Eng Units	Instrument / Transducer	Output
MB-001	WB	Total Facility Power	kWh	Veris E51	Modbus RS-485
MB-002	WT	Gross Generator Power Output	kWh	Veris H-8035-300	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	cf	ConEd Meter w/ Pulse	Pulse
MB-004	FHW1	Recovered Heat loop Flow	gpm	Badger Series 380	Modbus RS-485
MB-004	THW1	Recovered Heat Loop - Supply Temp.	ºF	Badger Series 380	Modbus RS-485
IN-2	THW2	Recovered Heat Loop - Temp. After HX1 (DHW)	ºF	Veris 10k Type II Thermistor	Resistance
IN-3	THW3	Recovered Heat Loop - Temp. After HX2 (Space Heating)	ºF	Veris 10k Type II Thermistor	Resistance
MB-004	THW4	Recovered Heat Loop - Return Temp.	ºF	Veris 10k Type II Thermistor	Resistance
MB-005	FHW2	Dump Radiator Loop Flow	gpm	Badger Series 380	Modbus RS-485
MB-005	THW5	Dump Radiator Loop - Temp. After HX4	ºF	Badger Series 380	Modbus RS-485
MB-005	THW6	Dump Radiator Loop - Temp. After Dump Radiator	ºF	Badger Series 380	Modbus RS-485
IN-4	IVFD	Dump Radiator Current	Amps	Veris H921	4 - 20 mA
-	QR	Rejected Heat Recovery	Mbtu/h	-	Calculated
-	QDHW	DHW Heat Recovery	Mbtu/h	-	Calculated
-	QSH	Space Heating Heat Recovery	Mbtu/h	-	Calculated
-	QP	Pool Heating Heat Recovery	Mbtu/h	-	Calculated
-	QU	Total Useful Heat Recovery	Mbtu/h	-	Calculated

M&V Communications

IP information has been provided to CDH for the data logger. This will allow CDH to access the data logger remotely.

IP Address:	75.99.215.139 port 4081
Netmask:	255.255.255.248
Gateway:	75.99.215.137
Primary DNS:	167.206.112.138
Secondary DNS:	167.206.7.4

Verification Data

Flows

FHW1 was verified during the site visit on 4/6/16. The data below confirms the flow meter reading.

FHW1 (gpm)

	Badger BTU Meter	Ultrasonic Flow Meter	% Diff
	55.0	52.8	4.0%
	55.3	53.1	3.9%
	55.1	52.6	4.5%
	54.9	53.5	2.6%
	55.3	52.8	4.5%
	55.1	52.9	3.9%
	55.1	52.6	4.5%
	55.4	52.6	5.0%
	55.1	52.8	4.2%
	55.0	52.5	4.6%
avg	55.1	52.8	4.2%

Pipe and Sensor Specs

2” Type L Copper	
Sensor Spacing	1.164 in
OD	2.125 in
Thickness	0.070 in

FHW2 was not verified due to a signal error on the ultrasonic flow meter, which is most often caused by air and/or debris in the pipe. The pump on the Dump Radiator Loop was off and had to be run in hand. It was reported that the pump hadn’t run very much since being installed.

Temperatures

Stand alone temperature sensors were installed on the main cogen supply loop, in order to break out the individual useful heat loads being supplied by the cogen. The table below show the verification measurements obtained at each temperature sensor location.

THW2 (˚F)

	Fluke	Veris	% Diff
	66.7	65.6	1.6%
	65.9	65.1	1.2%
	65.7	64.9	1.2%
avg	66.1	65.2	1.4%

THW3 (˚F)

	Fluke	Veris	% Diff
	69.1	69.3	-0.3%
	68.3	68.3	0.0%
	67.5	67.5	0.0%
avg	68.3	68.4	-0.1%

CCP Panel and Parasitic Power

The current for the CCP panel that contains all the parasitic power loads is measured with an analog CT. Below are the measurements with the two VFDs on at 40% and 100%.

IVFD @ 40% (A)

	Fluke	Veris CT	% Diff
	13.0	12.6	3.1%
	13.0	12.7	2.3%
	13.2	12.8	3.0%
	13.2	12.8	3.0%
avg	13.1	12.7	2.9%

IVFD @ 100% (A)

	Fluke	Veris CT	% Diff
	21.9	19.8	9.6%
	21.8	19.6	10.1%
	21.7	19.6	9.7%
avg	21.8	19.7	9.8%

	Power (kW)	Power Factor
Phase A	1.14	0.85
Phase B	0.49	0.88
Phase C	1.35	0.84

*VFD1 - 23 Hz, VFD2 - 30.8 Hz

	Power (kW)	Power Factor
Phase A	2.00	0.82
Phase B	2.10	0.83
Phase C	2.30	0.82

*VFD1 - 58.0 Hz, VFD2 - 58.0 Hz

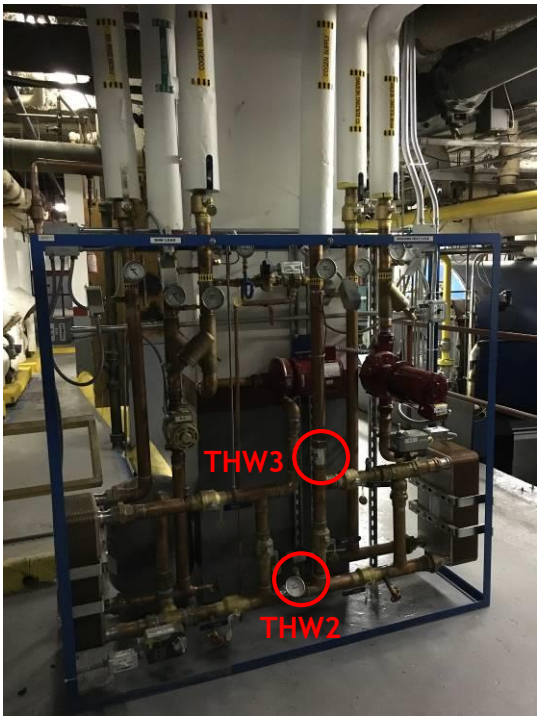
Site Photos

100 kW Cogen Unit

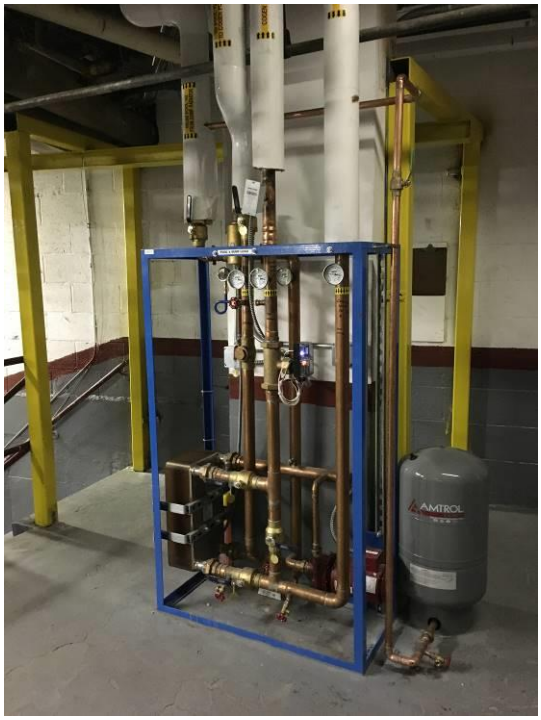
Gas Meter

CDH Monitoring Enclosure w/ Obvius Data Logger

HW Loop BTU Meter (In Boiler Room)

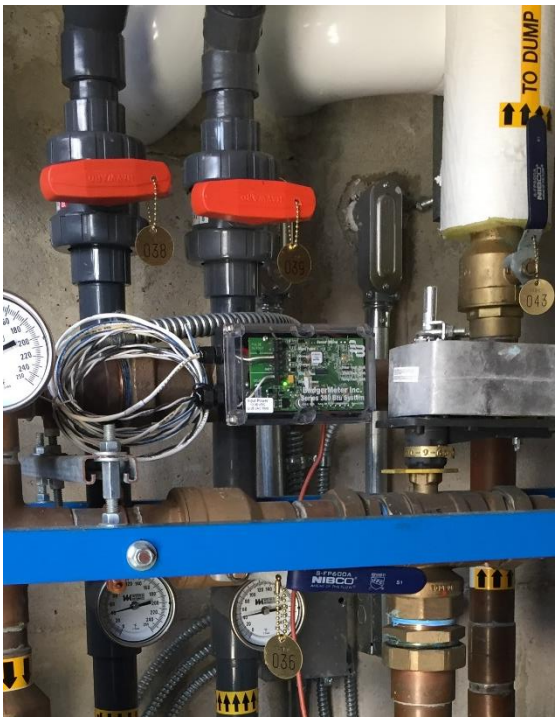


DHW Load & Building Heat Load Skid

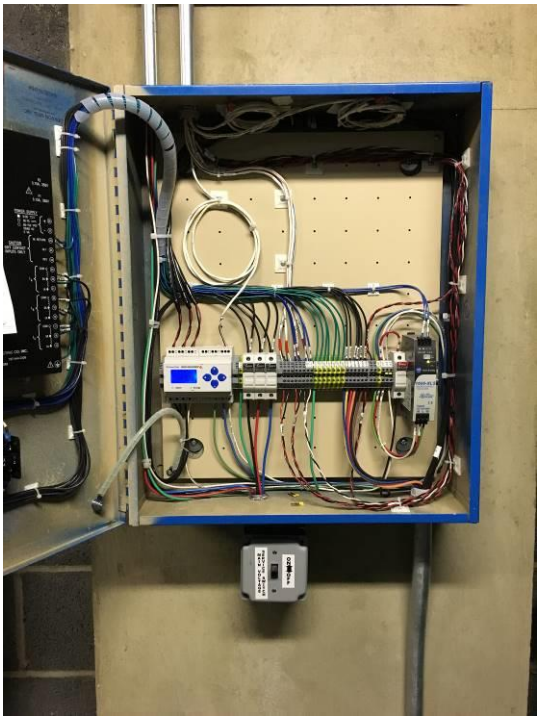


Pool & Dump Load Skid with HW BTU Meter

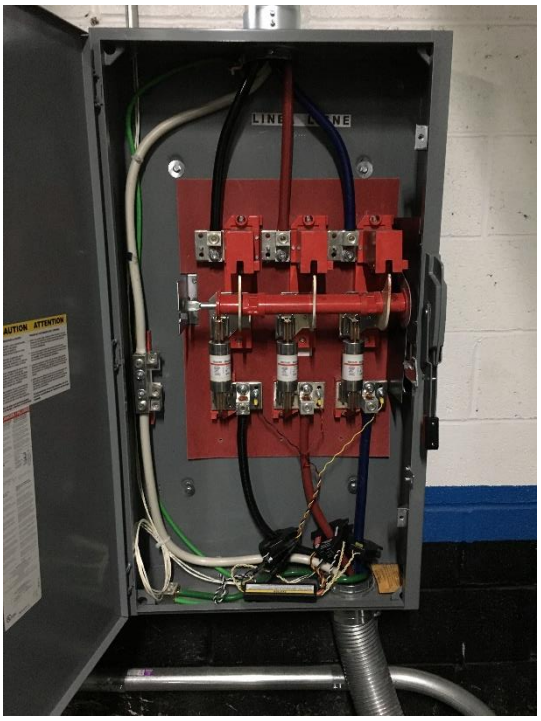
Pool & Dump Skid in Pool Shed with BTU Meter



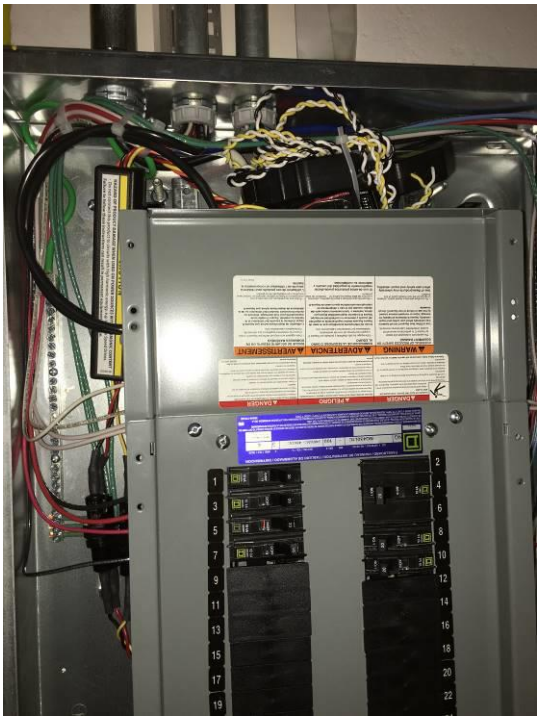
Dumped Heat Load BTU Meter



Veris E50 for Building Power in Beckwith



Veris 8035 Power Meter for Cogen Power



Veris 8035 Power Meter for Parasitic Power

CCP Panel with VFDs and Veris H921 Analog CT

PUMP SCHEDULE						
PUMP NO.	SERVICE	FLOW	HEAD	H.P	PHASE	MODEL
P-1	COGEN MODULE	22 GPM	70 FT	3/4	3	BELL & GOSSETT SERIES 1535 3S3T
P-1A	COGEN MODULE	22 GPM	70 FT	3/4	3	BELL & GOSSETT SERIES 1535 3S3T
P-2	DHW LOOP	35 GPM	28 FT	2/5	1	BELL & GOSSETT PL-55B
P-3	SPACE HEATING LOOP	35 GPM	33 FT	3/4	3	BELL & GOSSETT SERIES 60 613T
P-4	HEAT DISSIPATION LOOP	35 GPM	50 FT	3/4	3	BELL & GOSSETT SERIES 1535 3S3T

CONTROL VALVE SCHEDULE						
VALVE NO.	SERVICE	FLOW TYPE	SIZE	VOLTAGE	VALVE MODEL	ACTUATOR
V-1	DHW HEATING LOOP	PROPORTIONAL	2"	24 V	SCHNEIDER VS2313-526-9-62	MS40-7043M MODULATING
V-2	COGEN SELECTOR VALVE	ON/OFF	2"	24 V	SCHNEIDER VA2313-526-9-64	MA40-7043M ON/OFF
V-3	SPACE HEATING	PROPORTIONAL	2"	24 V	SCHNEIDER VS2313-526-9-62	MS40-7043M MODULATING
V-4	POOL	PROPORTIONAL	2"	24 V	SCHNEIDER VS2313-526-9-62	MS40-7043M MODULATING
V-5	DUMP	PROPORTIONAL	2"	24 V	SCHNEIDER VA2313-526-9-63	MA40-7043M MODULATING

GLYCOL FEED SYSTEM GF-1	
UNIT NO	GF-1
SERVICE	HOT WATER
TANK CAPACITY (GALLONS)	6
FLUID TYPE	40% P.G.
ELECTRICAL	120V/1PH/60 HZ
MANUFACTURER	AXIOM INDUSTRIES
MODEL	MF200-S

EXPANSION TANK ET-1	
DESIGN MANUFACTURER	AMTROL OR EQUAL
DESIGN BASE MODEL	SX-40V
ORIENTATION	VERTICAL
TOTAL VOLUME	20 GAL
ACCEPTANCE VOLUME	11.3 GALLONS
AIR CHARGE	35 PSI
DIAMETER	15 INCHES
HEIGHT	33 INCHES

DHW STORAGE TANK SCHEDULE (HWT-1,2)	
DESIGN MANUFACTURER	RECO USA
WEIGHT	1500 LBS
CAPACITY	250 GALLONS
ORIENTATION	VERTICAL
LINING	CEMENT
DIAMTER	30"
LENGTH	78"
MODEL	V3078
MANWAY	12" X 16"
MAX OPERATING PRESSURE	200 PSI
RELIEF VALVE	WATTS 40XL-4-150

HEAT EXCHANGERS HX-1		
DESIGN MANUFACTURER	API HEAT TRANSFER	
MODEL	SBM7M-60	
TYPE	BRAZED PLATE	
MATERIAL	COPPER	
SERVICE	DHW	
SIDE	HOT	COLD
FLUID TYPE	WATER	WATER
FLUID FLOW	30 GPM	35 GPM
TEMPERATURE IN	225 DEG F	171 DEG F
TEMPERATURE OUT	176 DEG F	207 DEG F
PRESSURE DROP	0.91 PSI	1.55 PSI
INLET SIZE	2" NPT	2" NPT

HEAT EXCHANGERS HX-2		
DESIGN MANUFACTURER	API HEAT TRANSFER	
MODEL	SBM7M-60	
TYPE	BRAZED PLATE	
MATERIAL	COPPER	
SERVICE	SPACE HEATING	
SIDE	HOT	COLD
FLUID TYPE	WATER	WATER
FLUID FLOW	30 GPM	35 GPM
TEMPERATURE IN	225 DEG F	171 DEG F
TEMPERATURE OUT	176 DEG F	207 DEG F
PRESSURE DROP	0.91 PSI	1.55 PSI
INLET SIZE	2" NPT	2" NPT

COGENERATION SCHEDULE	
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
MA GAS BOARD APPROVAL #	G1-04-06-12
DIMENSIONS	51"W X 101"L X 51"H

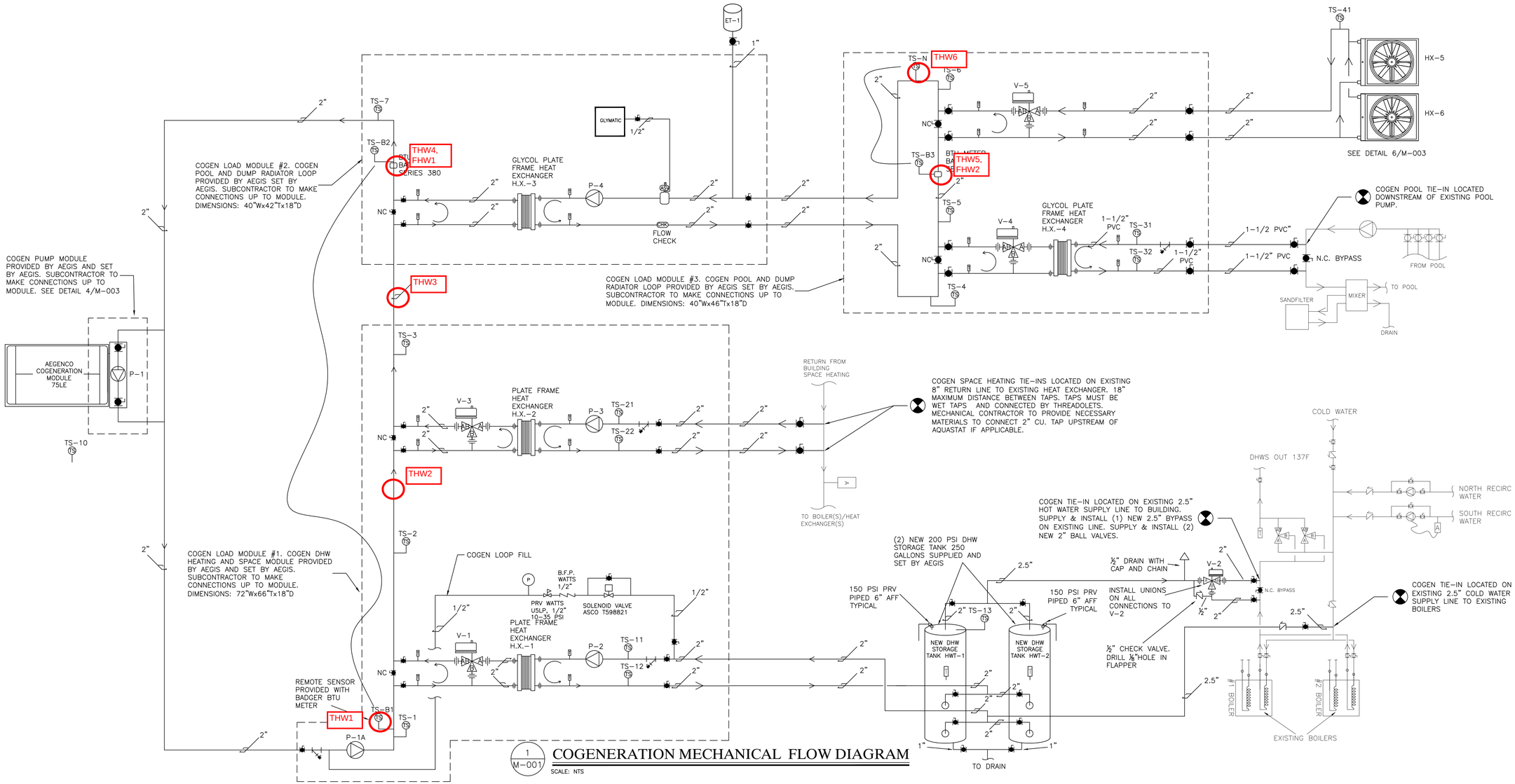
TEMPERATURE SENSOR SCHEDULE			
TS NO.	SERVICE	MODEL	WELL TYPE
TS-1	COGEN SUPPLY	MAMAC TE-703-C-5A	AT-225
TS-2	COGEN LOOP LEAVING H.X.-1	MAMAC TE-703-C-5A	AT-225
TS-3	COGEN LOOP LEAVING H.X.-2	MAMAC TE-703-C-5A	AT-225
TS-4	COGEN LOOP POOL & DUMP SUPPLY	MAMAC TE-703-C-5A	AT-225
TS-5	COGEN LOOP LEAVING H.X.-4	MAMAC TE-703-C-5A	AT-225
TS-6	COGEN LOOP LEAVING DUMP	MAMAC TE-703-C-5A	AT-225
TS-7	COGEN RETURN	MAMAC TE-703-C-5A	AT-225
TS-11	DHW ENTERING H.X.-1	MAMAC TE-703-C-5A	AT-225
TS-12	DHW LEAVING H.X.-1	MAMAC TE-703-C-5A	AT-225
TS-13	DHW ZONE 1 STORAGE TANK	MAMAC TE-703-C-5A	AT-225
TS-21	SPACE HEATING ENTERING H.X.-2	MAMAC TE-703-C-5A	AT-225
TS-22	SPACE HEAT LEAVING H.X.-2	MAMAC TE-703-C-5A	AT-225
TS-31	POOL ENTERING DUMP RADIATOR	MAMAC TE-703-C-5A	AT-225
TS-32	POOL LEAVING DUMP RADIATOR	MAMAC TE-703-C-5A	AT-225
TS-41	DUMP LOOP LEAVING DUMP RADIATOR	MAMAC TE-703-C-5A	AT-225
TS-10	OUTSIDE AIR	MAMAC TE-205-F-5	AT-225
TS-B1	COGEN SUPPLY BTU	BADGER 380	AT-225
TS-B2	COGEN USEFUL BTU	BADGER 380	N/A
TS-B3	COGEN SUPPLY BTU	BADGER 380	N/A
TS-N	COGEN USEFUL BTU	BADGER 380	AT-225

HEAT EXCHANGERS HX-3		
DESIGN MANUFACTURER	API HEAT TRANSFER	
MODEL	SBM7M-60	
TYPE	BRAZED PLATE	
MATERIAL	COPPER	
SERVICE	POOL/DUMP	
SIDE	HOT	COLD
FLUID TYPE	WATER	40% P.G.
FLUID FLOW	30 GPM	35 GPM
TEMPERATURE IN	225 DEG F	171 DEG F
TEMPERATURE OUT	176 DEG F	207 DEG F
PRESSURE DROP	0.91 PSI	1.55 PSI
INLET SIZE	2" NPT	2" NPT

HEAT EXCHANGER HX-4		
DESIGN MANUFACTURER	API HEAT TRANSFER	
MODEL	SB4-50	
TYPE	BRAZED PLATE	
MATERIAL	316/NICKEL	
SERVICE	POOL HEAT	
SIDE	HOT	COLD
FLUID TYPE	40% P.G.	WATER
FLUID FLOW	30 GPM	20 GPM
TEMPERATURE IN	220 DEG F	75 F
TEMPERATURE OUT	173 F	139 F
PRESSURE DROP	4.57 PSI	2.29 PSI
INLET SIZE	1" NPT	1" NPT

DUMP RADIATOR HX-5, HX-6	
DESIGN MANUFACTURER	IEA OR EQUAL
SERVICE	HEAT DISSIPATION
FLOW RATE	35 GPM
GROSS HEAT LOAD	500 MBH
INLET WATER TEMP	197 DEG F
OUTLET WATER TEMP	158
BLOWER FAN	1 HP
NUMBER OF FANS	2
MODEL	HCR-M28-01-08-S XX
FAN SPEED	880 RPM
METIUM	40% P.G.

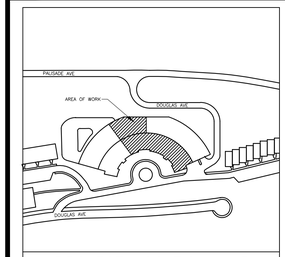
NOTES:
1. ALL PIPE TO BE COPPER "L" UNLESS OTHERWISE NOTED
2. COGEN HEAT DISSIPATION LOOP TO BE 40% PROP. GLYCOL. ALL FILLING OF GLYCOL LOOP BY AEGIS.
3. CONTRACTOR SHALL PROTECT FROM HARM AND MAINTAIN ALL EXISTING EQUIPMENT, PLANT, FACILITY, ETC. TO REMAIN.



1 / M-001 COGENERATION MECHANICAL FLOW DIAGRAM

SCALE: NTS

NO.	DATE	REVISION DESCRIPTION
1	6/5/15	STORAGE TANK PRESSURE



PROJECT LOCATION MAP

TRUE NORTH

PROJECT NORTH

CLIENT:

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FAX: 413-536-1104
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ALL DRAWINGS ARE TO BE READ NOT SCALED.

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PROJECT

HAYDEN ON THE HUDSON
COGENERATION PROJECT
4455 DOUGLAS AVE
BRONX NY 10471

DRAWING TITLE:

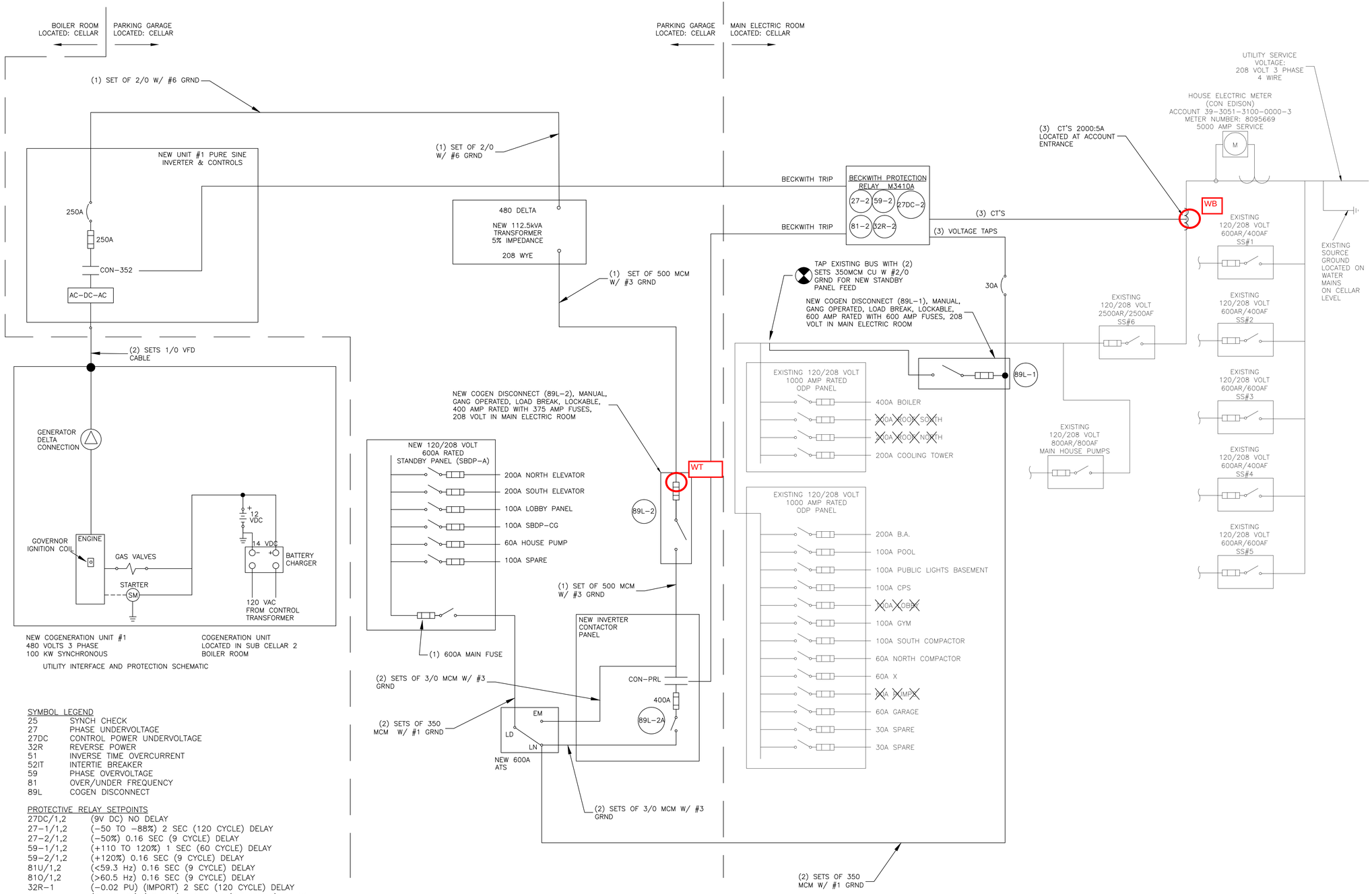
COGENERATION MECHANICAL FLOW DIAGRAM

DESIGN BY:	KM	DATE:	3/10/15
DRN BY:	KM	DATE:	12/9/15
CKD BY:	AD	DATE:	5/20/15
FINAL CKD BY:	JCB	DATE:	5/20/15
SCALE:	AS NOTED	DATE:	
DWG No.	PAGE 3 OF 11		

M-001.01

PROJECT NO.
60-214

B-SCAN:



SYMBOL LEGEND

25	SYNCH CHECK
27	PHASE UNDERVOLTAGE
27DC	CONTROL POWER UNDERVOLTAGE
32R	REVERSE POWER
51	INVERSE TIME OVERCURRENT
52IT	INTERTIE BREAKER
59	PHASE OVERVOLTAGE
81	OVER/UNDER FREQUENCY
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	(-0.02 PU) (IMPORT) 2 SEC (120 CYCLE) DELAY
32R-2	(+0.02 PU) (EXPORT) 0.16 SEC (9.6 CYCLE) DELAY

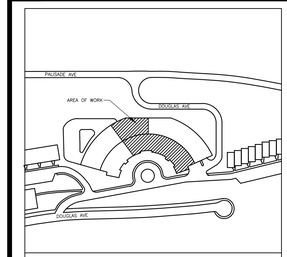
UTILITY INTERFACE AND PROTECTION SCHEMATIC

16
E-003

COGENERATION ONE LINE DIAGRAM

SCALE: NTS

NO.	DATE	REVISION DESCRIPTION
1	6/5/15	EQUIPMENT LOCATION CHANGE



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BEPC

PROJECT

HAYDEN ON THE HUDSON
COGENERATION PROJECT
4455 DOUGLAS AVE
BRONX NY 10471

DRAWING TITLE:

ONE-LINE DIAGRAM

DESIGN BY:	KM	DATE:	3/10/15
DRN BY:	KM	DATE:	12/9/15
CKD BY:	AD	DATE:	5/20/15
FINAL CKD BY:	JCB	DATE:	5/20/15
SCALE:	AS NOTED	DATE:	
DWG No.		PAGE 12 OF 11	

E-003.01

PROJECT NO. 60-214

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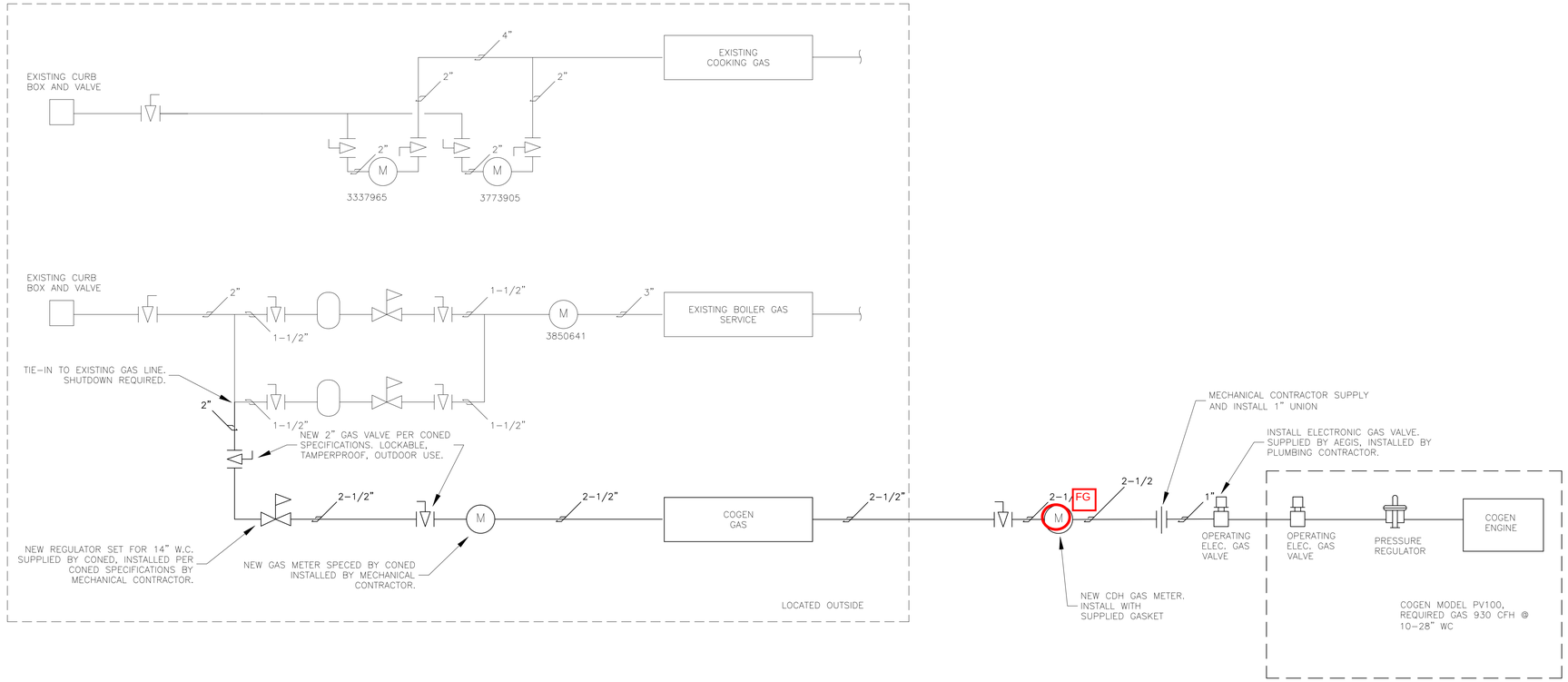
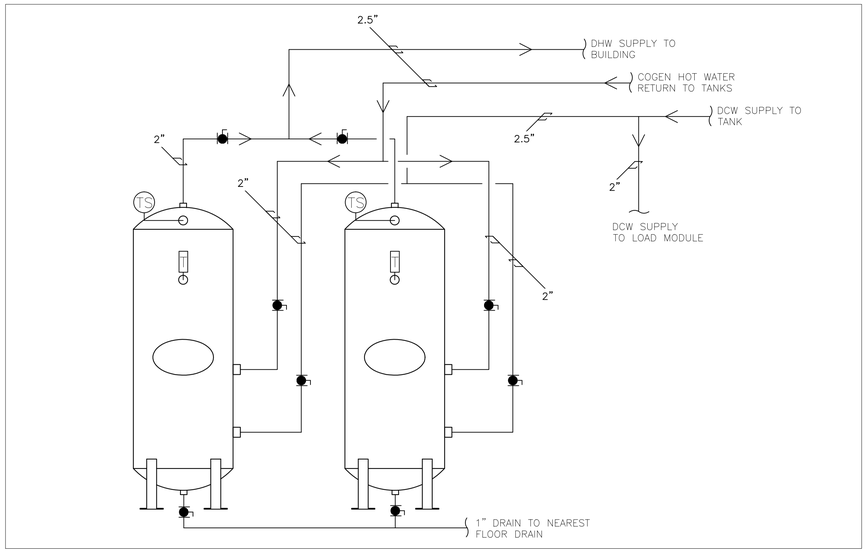


10 P-002

COGENERATION GAS RISER DIAGRAM

SCALE: NTS



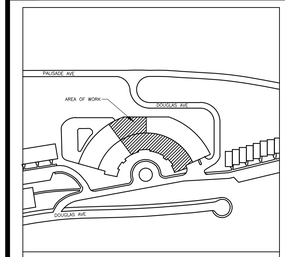
11 P-002

DOMESTIC WATER DUAL STORAGE TANK CONNECTION DETAIL

SCALE: NTS

NOTE:
1. BALANCED FLOW ON TANK HEADERS NECESSARY

NO.	DATE	REVISION DESCRIPTION



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PROJECT

HAYDEN ON THE HUDSON
COGENERATION PROJECT
4455 DOUGLAS AVE
BRONX NY 10471

DRAWING TITLE:

GAS RISER DIAGRAM & STORAGE TANK DETAIL

DESIGN BY:	KM	DATE:	3/10/15
DRN BY:	KM	DATE:	12/9/15
CKD BY:	AD	DATE:	5/20/15
FINAL CKD BY:	JCB	DATE:	5/20/15
SCALE:	AS NOTED	DATE:	
DWG No.		PAGE 7 OF 11	

P-002.00

PROJECT NO. 60-214

B-SCAN: