# Times Square Apartments

255 West 43rd Street

New York, NY 10036

## Site Contact

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### Overview

CDH was on site 3/14/2017 to install a datalogger, terminate sensor wiring, setup communications, and verify installed metering. Data collection begins.

### M&V Instrumentation Installation

CDH provided the data logger and enclosure, 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 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-002 | WT1 | Gross Generator #1 Power Output | kWh | Veris H-8035-300 | Modbus RS-485 |
| MB-003 | WT2 | Gross Generator #2 Power Output | kWh | Veris H-8035-300 | Modbus RS-485 |
| MB-005 | WB1 | Total Facility Power - Service #1 | kWh | Veris E51 | Modbus RS-485 |
| MB-006 | WB2 | Total Facility Power - Service #2 (1 of 2) | kWh | Veris E51 | Modbus RS-485 |
| MB-007 | WB3 | Total Facility Power - Service #3 (2 of 2) | kWh | Veris E51 | Modbus RS-485 |
| MB-001 | 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-004 | 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-004 | THW2 | Recovered Heat Loop - Temp. after HX1 | $^{o}$F | Badger Series 380 | Modbus RS-485 |
| MB-004 | 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: | 72.43.119.212:4081 |
| Internal IP: | 10.0.22.141 |
| Netmask: | 255.255.255.0 |
| Gateway: | 10.0.22.1 |
| DNS #1: | 8.8.8.8 |
| DNS #2: | 8.8.4.4 |
| MAC Address: | 00:1E:C6:00:27:29 |

## Procedure

- Power data was verified by comparing the engine controller displayed power to the Veris H8035 power measurement displayed on the Obvius data logger.
- 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 – March 14, 2017

Generator Power:

| | Obvius (kW) | Cogen Display (kW) |
|---|---|---|
| **WT** | 58.7 | 60 |
| | 58 | 59.9 |
| *Avg:* | 58.0 | 59.9 |

Recovered Heat Loop Flow:

| | Obvius (gpm) | Portaflow Meter (gpm) |
|---|---|---|
| **FHW** | 67.0 | 62.8 |
| | 67.7 | 63.0 |
| | 67.6 | 62.8 |

| Portaflow Ultrasonic Flow Meter Configuration | |
|---|---|
| Sensor Spacing | 1.526 in |
| OD | 2.625 in |
| Thickness | 0.080 in |
| 2.5 in Type L Copper | |

Flow measured by the BTU meter was higher than what was measured by the Portaflow meter. The ratio shown below in the Corrected Loop Flow formula was applied to assure that accurate heat recovery and thermal efficiencies are calculated.

*Corrected Loop Flow = FHW / (67.3/62.9)*

System Temperatures:

| | Obvius (°F) | Gauge (°F) |
|---|---|---|
| **THW1** | 168.5 | 170.0 |
| | 170.0 | 167.9 |
| *Avg:* | 169.3 | 169.0 |
| **THW2** | 153.0 | 154.0 |
| | 153.0 | 154.0 |
| *Avg:* | 153.0 | 154.0 |
| **THW3** | 153.0 | 154.0 |
| | 153.0 | 154.0 |
| *Avg:* | 153.0 | 154.0 |

Gas Use and Electrical Efficiency:

| Two Aegen PowerVerter PV100 | | |
|---|---|---|
| **Unit** | **Obvius** | **Aegis Rating** |
| **Load** | 29% | 100% |
| **CFM** | 12 | 31 |
| **CFH** | 720 | 1860 |
| **kW** | 58 | 200 |
| **Elec Eff** | 27% | 28% |

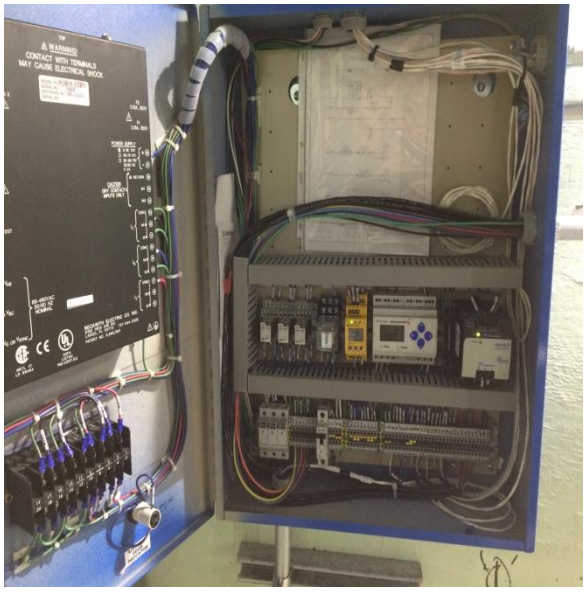
## Site Photos


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

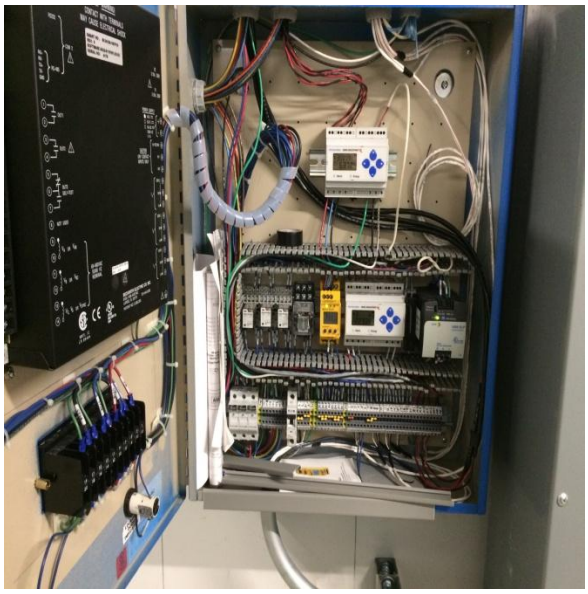

Aegen PowerVerter 100 kW cogen unit #2 located in the boiler room.


Romet RM3000 gas meter (FG) for both cogen units 1 & 2


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



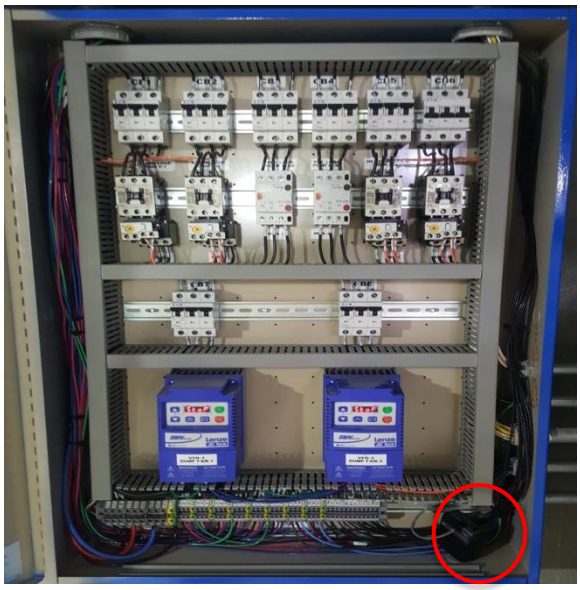
Veris E51 total facility power meter (WB1) in Beckwith panel in electrical room adjacent to boiler room.



Veris E51 total facility power meter (WB2,WB3) in Beckwith panel located in the old electrical room adjacent to boiler room.


Gross generator power meter (WT1,WT2) located in cogen disconects through the double doors on the left side of the electrical room adjacent to the boiler room.


Parasitic power (WP) measured from sub-basement distribution panel CG located through double doors on the left side of the electrical room adjacent to the boiler room.

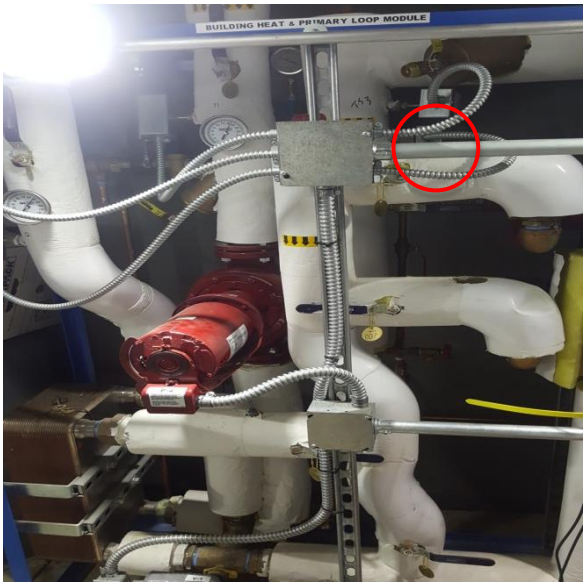


Veris H921 dump radiator current sensor (IVFD) located in Aeigis cogen control panel.

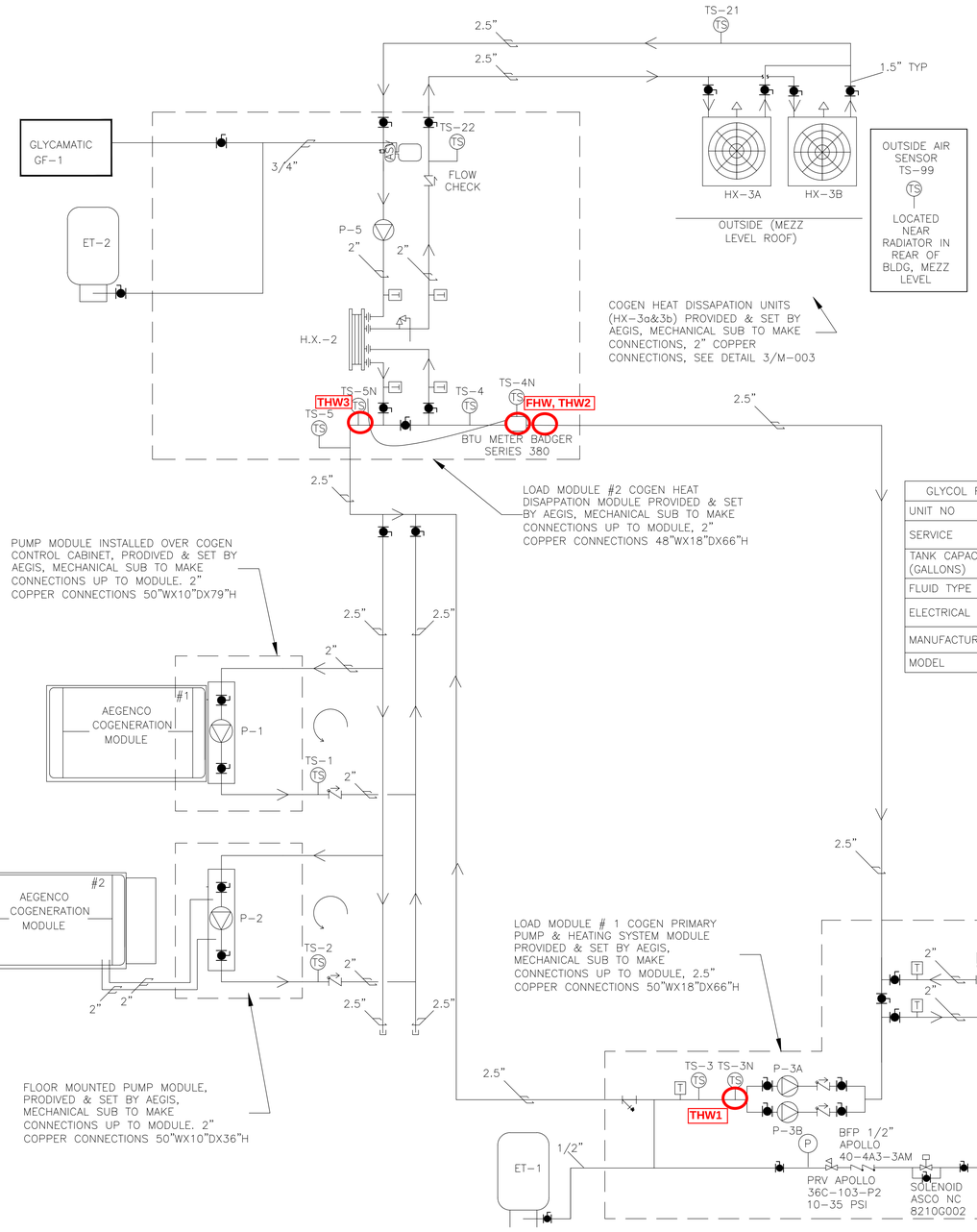

Dump Radiator Skid – Located in Boiler Room

Left – BTU meter and temp. sensor after DHW HX1 (THW2)

Right – BTU temp. sensor after dump radiator HX2 (FHW ,THW3)




Veris 10k Type II Thermistor (THW1) on DHW skid before HX1




NOTES:
- ALL TYPE L COPPER UNLESS OTHERWISE NOTED
- ALL TRANSITIONS FROM COPPER TO STEEL PIPING TO HAVE PROPER DIELECTRIC UNIONS

1 M-001 COGENERATION MECHANICAL FLOW DIAGRAM

SCALE: NTS

| PUMP SCHEDULE | | | | | | |
|---|---|---|---|---|---|---|
| PUMP NO. | SERVICE | FLOW | HEAD | PUMP H.P. | PHASE | PUMP MODEL |
| P-1,2 | COGEN CIRC PUMP | 25 GPM | 70 FT | 3/4 HP | 3 PH | BELL & GOSSETT SERIES 1535 353T |
| P-3a,3b | COGEN PRIMARY LOOP (PARALLEL) | 75 GPM | 70 FT | 1-1/2 HP | 3 PH | BELL & GOSSETT SERIES 1535 355T |
| P-4 | SPACE LOOP | 75 GPM | 25 FT | 1 HP | 3 PH | BELL & GOSSETT SERIES 60-619T |
| P-5 | DUMP RADIATOR LOOP | 75 GPM | 25 FT | 1 HP | 3 PH | BELL & GOSSETT SERIES 60-616T |

| CONTROL VALVE SCHEDULE | | | | | | |
|---|---|---|---|---|---|---|
| VALVE NO. | SERVICE | FLOW TYPE | SIZE | VOLTAGE | VALVE MODEL | ACTUATOR |
| V-1 | SPACE HEATING | MIXING | 2" | 24 V | SCHNEIDER VS2313-526-9-64 | MS40-7043M MODULATING |

| PLATE HEAT EXCHANGER H.X.-1 | | |
|---|---|---|
| DESIGN MANUFACTURER | API HEAT TRANSFER | |
| MODEL | SBM7M-60 | |
| TYPE | BRAZED PLATE | |
| MATERIAL | COPPER/316 STAINLESS | |
| SERVICE | BOILER HEATING | |
| SIDE | HOT | COLD |
| FLUID TYPE | WATER | WATER |
| FLUID FLOW | 75 GPM | 75 GPM |
| TEMP IN | 210 F | 159 F |
| TEMP OUT | 172 F | 197 F |
| PRESSURE DROP | 3.22 PSI | 3.12 PSI |
| INLET SIZE | 2" NPT | 2" NPT |

| PLATE HEAT EXCHANGER H.X.-2 | | |
|---|---|---|
| DESIGN MANUFACTURER | API HEAT TRANSFER | |
| MODEL | SBM7M-60 | |
| TYPE | BRAZED PLATE | |
| MATERIAL | COPPER/316 STAINLESS | |
| SERVICE | DUMP | |
| SIDE | HOT | COLD |
| FLUID TYPE | WATER | 40% PG |
| FLUID FLOW | 75 GPM | 75 GPM |
| TEMP IN | 210 F | 159 F |
| TEMP OUT | 172 F | 197 F |
| PRESSURE DROP | 3.22 PSI | 3.12 PSI |
| INLET SIZE | 2" NPT | 2" NPT |

| 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 | 35 PSI |
| DIAMETER | 15 INCHES |
| HEIGHT | 25 INCHES |

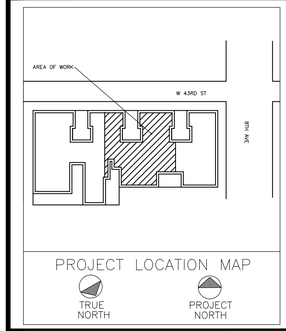
| AIR COOLED RADIATOR H.X.-3a & 3b | |
|---|---|
| DESIGN MANUFACTURER | IEA OR EQUAL |
| FLOW RATE | 75 GPM |
| GROSS HEAT LOAD | 1,312 MBH |
| INLET WATER TEMP | 197 DEG F |
| OUTLET WATER TEMP | 1164 DEG F |
| BLOWER FAN | 2 HP |
| NUMBER OF FANS | 2 |
| DESIGN BASE MODEL | HCR M35-02-04-SXX |
| FAN SPEED | 1160 RPM |
| MEDIUM | 60% WATER / 40% P.G. |

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

| TEMPERATURE SENSOR SCHEDULE | | | |
|---|---|---|---|
| TS NO. | SERVICE | SENSOR MODEL NO. | 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 | MAIN LOOP - SUPPLY TO SPACE | MAMAC TE-703-C-5A | AT-225 |
| TS-4 | MAIN LOOP - SUPPLY TO HEAT DISAPPATION | MAMAC TE-703-C-5A | AT-225 |
| TS-5 | MAIN LOOP - RETURN | MAMAC TE-703-C-5A | AT-225 |
| TS-11 | SPACE LOOP- ENTERING HX1 | MAMAC TE-703-C-5A | **AT-225** |
| TS-12 | SPACE LOOP - LEAVING HX1 | MAMAC TE-703-C-5A | AT-225 |
| TS-13 | DHW STORAGE TEMP | MAMAC TE-703-C-5A | AT-225 |
| TS-21 | DUMP LOOP - ENTERING HX2 (AT RADIATOR) | MAMAC TE-703-D-5A | AT-225 |
| TS-22 | DUMP LOOP - LEAVING HX2 | MAMAC TE-703-C-5A | AT-225 |
| TS-99 | OUTSIDE AIR TEMP | MAMAC TE-703-F-5 | |
| TS-3N | (NYSERDA) COGEN SUPPLY | VERIS TIDB10 | AT-225 |
| TS-4N | (NYSERDA) LOADS TO DUMP | BADGER 380 | BTU METER |
| TS-5N | (NYSERDA) COGEN RETURN | BADGER 380 | AT-225 |

| COGENERATION SCHEDULE (TYP 2 UNITS) | |
|---|---|
| DESIGN MANUFACTURER | AEGENCO |
| FUEL | NATURAL GAS |
| FUEL INPUT | 1240 SCFH |
| GAS PRESSURE | 10-14" WC |
| THERMAL OUTPUT | 697 MBH |
| ELECTRICAL OUTPUT | 100 KW |
| POWER GENERATOR | SYNCHRONOUS/INVERTER |
| VOLTAGE | 277/480 3PH |
| ACOUSTIC LEVEL | 72dba @ 20ft |
| VIBRATION ISOLATION | YES |
| CONTROLS | MICROPROCESSOR BASED |
| UNIT WEIGHT | 3050 LBS |
| MODEL | POWERVERTER 100 |
| AVG INLET TEMP | 170 DEG F |
| AVG OUTLET TEMP | 220 DEG F |
| DIMENSIONS | 46"W x 96"L x 49"H |

| NO. | DATE | REVISION DESCRIPTION |
|---|---|---|
| 1 | 5/5/16 | MINOR ELECTRICAL CHANGES |
| 2 | 7/6/16 | MINOR ELECTRICAL CHANGES |

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PROJECT

TIMES SQUARE
DG PROJECT - 200 KW
255 W 43RD ST
MANHATTAN, NY 10036

DRAWING TITLE:

MECHANICAL SCHEDULES, FLOW DIAGRAM

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| DRN BY: | SP | DATE: | |
| CKD BY: | AD | DATE: | |
| FINAL CKD BY: | AD | DATE: | |
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| DWG No. | PAGE 3 OF 12 | | |

M-001.02

PROJECT NO.
60-603

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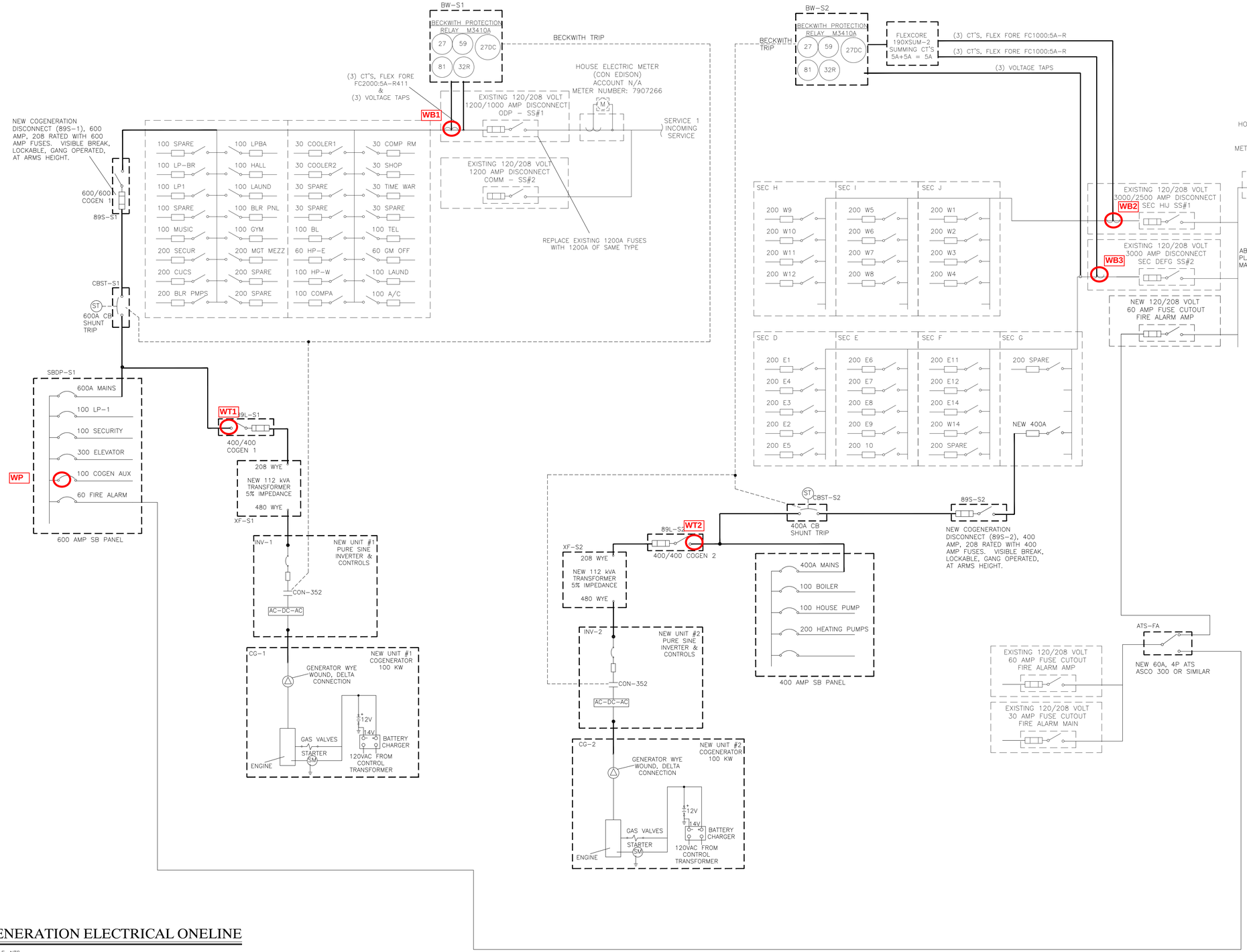


1 E.004 COGENERATION ELECTRICAL ONELINE

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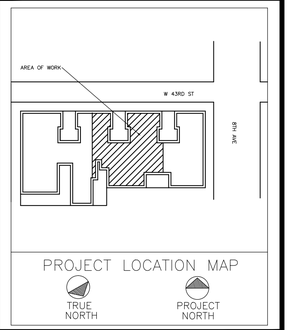


PROJECT LOCATION MAP

TRUE NORTH

PROJECT NORTH

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DRAWING TITLE:

ELECTRICAL ONELINE DIARGRAM

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| CKD BY: | AD | DATE: | |
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E-004.02

PROJECT NO.

60-603

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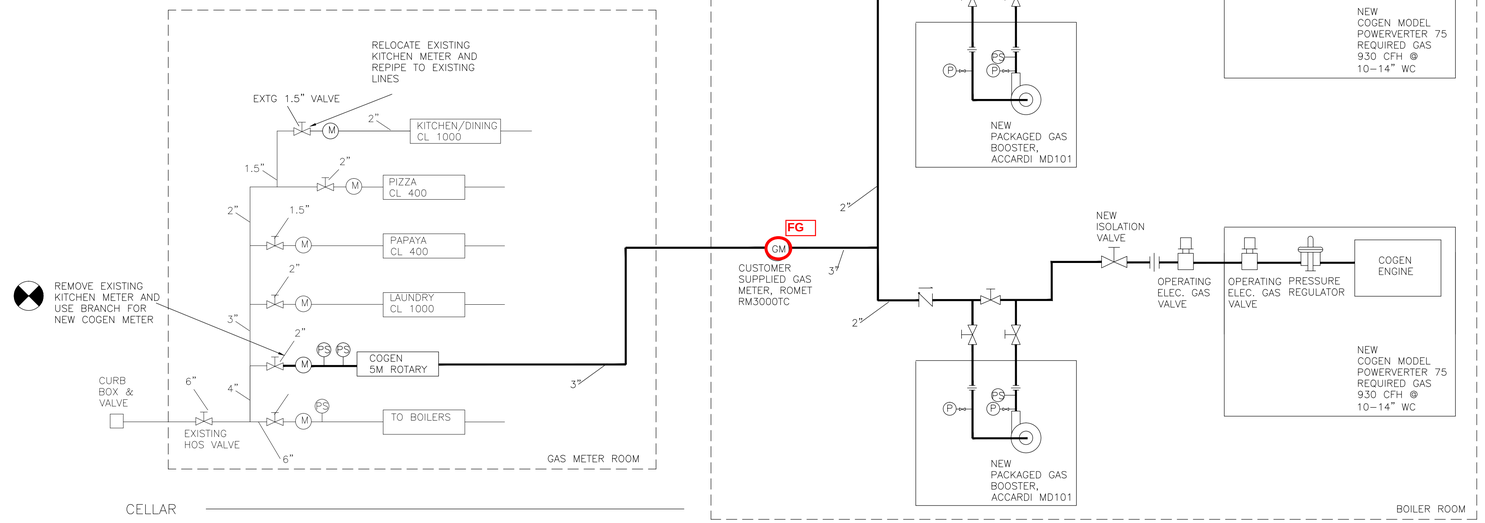


1 P.002

## COGENERATION GAS RISER DIAGRAM

SCALE: NTS

| NO. | DATE | REVISION DESCRIPTION |
|---|---|---|
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| 2 | 7/6/16 | MINOR ELECTRICAL CHANGES |
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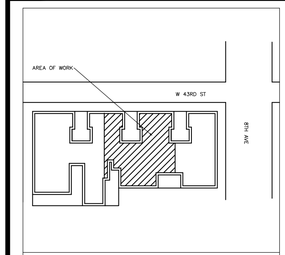


PROJECT LOCATION MAP

TRUE NORTH

PROJECT NORTH

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DG PROJECT - 200 KW
255 W 43RD ST
MANHATTAN, NY 10036

DRAWING TITLE:

GAS RISER DIAGRAM

| | | | |
|---|---|---|---|
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| DRN BY: | SP | DATE: | |
| CKD BY: | AD | DATE: | |
| FINAL CKD BY: | AD | DATE: | |
| SCALE: | AS NOTED | DATE: | |
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