



WATAUGA COUNTY DEPARTMENT OF SANITATION

336 Landfill Road
Boone, North Carolina 28607
(828) 264-5305
TDD 1-800-735-2962
Voice 1-800-735-8262

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SOLID WASTE SECTION
ASHEVILLE REGIONAL OFFICE

April 13, 2010

Allen Gaither
NCDENR - Asheville Regional Office
Division of Waste Management – Solid Waste Section
2090 US 70 Highway
Swannanoa, NC 28778

Dear Mr. Gaither:

Attached is detailed information about the Watauga County Landfill Gas to Energy Project. I have included information on all aspects of the project. The County is very excited about moving this project forward and providing a model for other communities with small landfills to follow.

My contact information is:

Lisa Doty
828-2685-4852 office
828-773-7675 cell
lisa.doty@watgov.org

Should you need further information, please let me know.

Sincerely,

Lisa Doty, LFG Project Manager
Watauga County Sanitation Department

CC: JV Potter, Director of Watauga County Sanitation Department
Margaret Love, NCDENR – Division of Air Quality

SUMMARY OF WATAUGA COUNTY LANDFILL GAS PROJECT

For many years, Watauga County has been trying to put a landfill gas project in place to make use of the energy created from the existing methane gas collection system. A request for proposals was sent out to environmental / energy management organizations to install a system to use the landfill gas to generate electricity. Recently the Watauga County Commissioners approved \$200,000 to move the project forward.

Watauga County will be working with Appalachian State University Energy Center (project management, research and heat exchange design and installation), Blue Ridge Electric Membership Corporation (connection to grid and electricity use), Tucker Engineering (switchgear design and installation), KSD Enterprises (engine design and installation), Carlson Environmental Consultants (gas line installation, connections to engines) and US Buildings (building design and installation). Following is specific information about each aspect of the project.

BENEFITS OF WATAUGA COUNTY LANDFILL GAS PROJECT

Benefits of Blower Flare System in Place

- 1374 tons of CO₂ reduced per year.
- CO₂ reduction is equivalent to taking 2168 cars off of the road or planting 2690 acres of pine forest.
- Eliminated methane migration hazard.

Benefits of Generating Electricity with Landfill Gas

- Until now, the County has not made use of energy being flared off (approximately 1.67 million kwh/year). This is enough energy to provide electricity for 140 homes.
- Further reduction of greenhouse gases equal to taking 177 cars off of the road or planting 220 acres of pine forest.
- Sustainable or "green" energy production.
- Energy independence, we need every source that is available.
- Project would create 2-3 part-time jobs.
- Waste heat will be used to heat the maintenance shop and water for county car wash bay.
- Pilot project that other counties with similar size landfills could use as a model.
- ASU Energy Center will benefit greatly from research on project.

COUNTY/BREMCO PARTNERSHIP

Currently, the Sanitation Department pays approximately \$36,000/year in electric charges for all of the buildings at the old landfill location (recycling/baling facility, transfer station, scale house and maintenance shop). The installation of the landfill gas generators would save the County the electric charge fee, although we would still pay a basic usage fee of approximately \$4,200/year. Revenue from BREMCO to the County for the excess electricity generated would be approximately \$85,000/year. BREMCO also will benefit by using the electricity generated to help meet their Renewable Energy Portfolio Standard. BREMCO will make the connection from the engines/switchgear to the grid.

GAS TRANSMISSION LINE –CARLSON ENVIRONMENTAL

(See attached diagram for gas line location.)

Carlson Environmental Consultants, PC (CEC) will install a below grade landfill gas (LFG) transmission pipeline from the blower/flare station (BFS) location to the maintenance facility. A condensate trap (CT) will be required due to the topography of the proposed route. CEC has also included a field fabricated 12-inch CT and secondary isolation vessel to facilitate condensate removal.

The 6-inch HDPE transmission line will be installed with a minimum cover of 12-inches along the gravel road passing the old maintenance facility and the animal shelter. Excavated material will be used to backfill and grade the pipe using backhoe compaction. Sand bedding will be used as-needed in the event that rocks or other unsuitable material make up the majority of the backfill material. The pipeline will be terminated near the proposed electricity generation equipment location with a 4-inch flange connection and blind flange or connected to the engine system inlet.

During construction activities, survey information will be collected with a mapping grade Global Positioning System (GPS) unit at various locations such as tees, road crossings, turns, straight runs, and CT-3. This information will be used to provide State Plane coordinates for inclusion into the Watauga County Landfill As-built drawing. The horizontal accuracy of the survey information will be 2.5 feet or better.

Work will be performed in OSHA Level D protection and in accordance with the SWANA Landfill Gas Division Health and Safety Task Force, "A Compilation of Landfill Gas Laboratory and Field Practices and Procedures", dated March, 1992.

The proposed route of the transmission line lies outside of the waste footprint but should any waste be discovered during excavation, CEC will provide and load a waste container. Cover material displaced from pipeline backfill will be spread out on the surface in the area of each excavation. Grassy areas will be seeded, fertilized, and covered with straw.

ENGINES – KSD ENTERPRISES

(See attached spec sheet for detailed information on generators.)

Two generators and the switchgear will be located in a pre-fabricated metal building that will be located behind the new Maintenance Shop. The engines are GM 8.1 liter Vortec V-8 and include basic controller, block heater, battery charger, silencer, electronic governor, 80% rated MLCB, run relay with a three year warranty except for damage caused by unanticipated contaminants in the LFG. The KSD fuel system will accommodate low quality fuel. The generator output is 480 Volt 3 Phase, Prime rating, 78/98 kW/KVA, 117 Amps when fueled by Natural Gas.

SWITCHGEAR – TUCKER ENGINEERING

Richard Tucker with Tucker Engineering Associates has designed the switchgear for the LFG project. The components of the switchgear are: outside safety disconnect, inside 3ph circuit breaker panel, two (2) 3ph protective breakers, inside (2) 3ph motor contactors to join/disconnect from Grid, inside one (1) ph 277 V breaker for inside 277 V lighting, inside one (1) ph 277 V breaker for inside breaker panel for control circuits, inside breaker panel for inside control circuits and general purpose receptacles, inside step down transformer 277 - 120/240 V and Woodward easYgen controls.

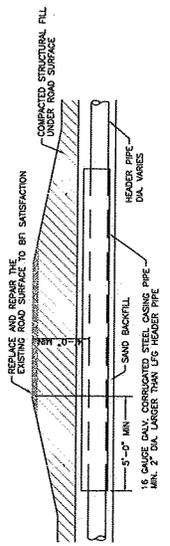
GENERATOR BUILDING – US BUILDINGS

(See attached blueprint.)

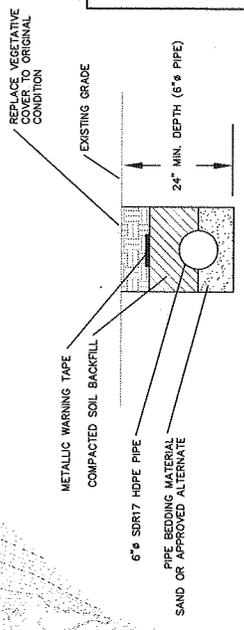
US Buildings has designed the building that will house the generators and also are pouring the concrete pad. The building is located behind the Maintenance Shop. The building is designed for three generators – two for electricity production and an extra pad for testing and research purposes. Only two generators will be used on a permanent basis.

HEAT EXCHANGE – APPALACHIAN STATE UNIVERSITY

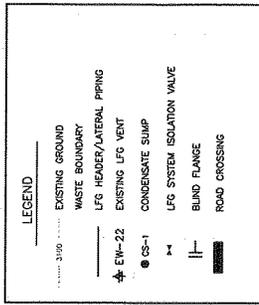
The Technology Department of Appalachian State University is designing a heat exchange system to utilize the waste heat from the generators to supplement the heat used in the maintenance shop and the car wash bay. The County could save approximately \$5,000 in propane costs/year with the installation of the heat exchange.



ROAD CROSSING DETAIL
NOT TO SCALE

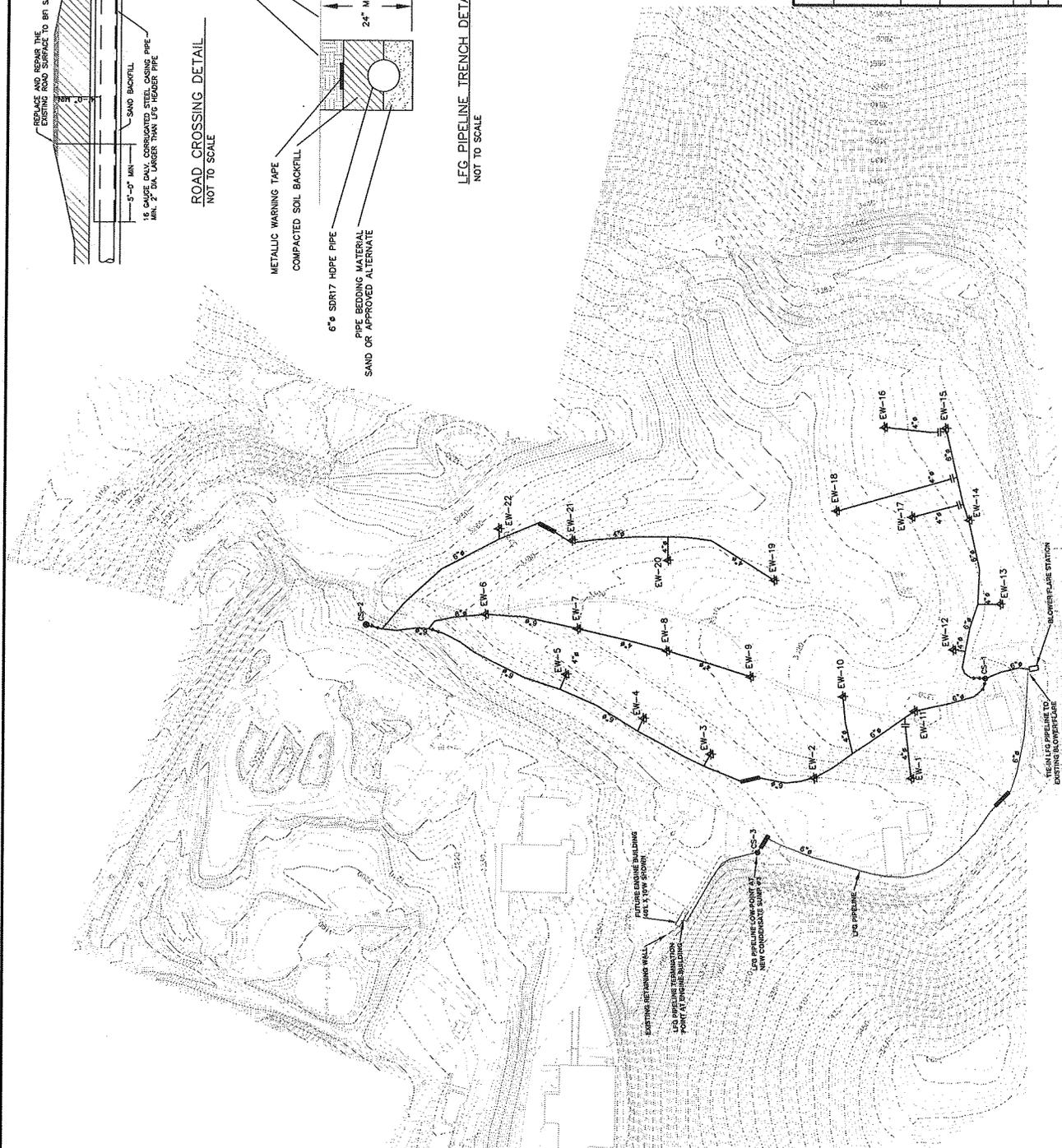


LFG PIPELINE TRENCH DETAIL
NOT TO SCALE



NOTES:

- EXISTING LANDFILL SITE CONDITIONS AND HISTORICAL INFORMATION PROVIDED BY WATAUGA COUNTY, NORTH CAROLINA.
- EXISTING LANDFILL TOPOGRAPHY PROVIDED BY DARRIN ADEN ASSOCIATES AS TAKEN FROM AERIAL SURVEYS BY J.H. BELL, P.C. DATED JUNE 1982, FEBRUARY 1984, AND JANUARY 23, 1984, INCLUDING TOPOGRAPHY OF EXISTING CAPPED LANDFILL BY WESTERN CAROLINA SURVEYORS, INC. DATED OCTOBER 1982, AND TOPOGRAPHY OF EXISTING UNCAPPED LANDFILL AND MAPPING DATED OCTOBER 31, 1997, AND TOPOGRAPHY OF BUILDING SITE AREAS BY DARRIN ADEN ASSOCIATES DATED MARCH 2004.
- LANDFILL GAS COLLECTION SYSTEM INSTALLED BY MOORE ENVIRONMENTAL, INC. IN PHASES BEGINNING IN DECEMBER 2004 AND ENDING IN JUNE 2005. SURVEY DATA ON LFG COLLECTION SYSTEM PROVIDED BY MOORE ENVIRONMENTAL, INC. AND BASED ON MAPPING DATED 6/8/05 AND 6/16/05. A TEMPORARY BLOWER/AIR FLOW CONTROL DEVICE WAS INSTALLED BY MOORE ENVIRONMENTAL IN JANUARY 2005. A PERMANENT PANEL BLOWER/BLOWER/AIR FLOW CONTROL DEVICE WAS INSTALLED IN UNLESS OTHERWISE NOTED. LFG LATERALS ARE 4-INCH DIAMETER.
- LFG PIPELINE ALIGNMENT AND ACTUAL LOCATIONS OF NEW FEATURES SHOWN ON THIS PLAN SHEET ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS AT THE TIME OF CONSTRUCTION.



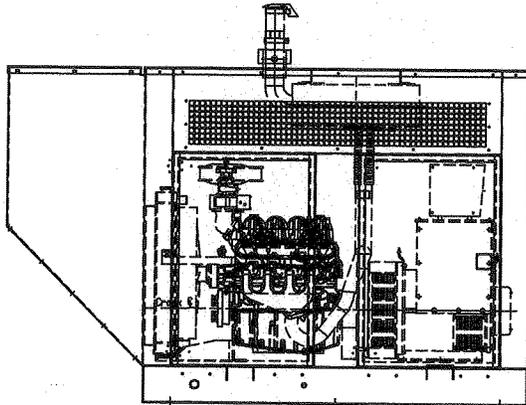
DRAFT - FOR PLANNING PURPOSES

DRAWING TITLE:	LFG PIPELINE PLAN SHEET
PROJECT:	LANDFILL GAS-TO-ENERGY PROJECT WATAUGA COUNTY LANDFILL BOONE, NORTH CAROLINA
CLIENT:	WATAUGA COUNTY, NC
CARLSON ENVIRONMENTAL CONSULTANTS, PC	
<small>805 SOUTH MAIN STREET BOONE, NORTH CAROLINA 28612 (704) 285-9765 FAX (704) 285-9755</small>	
SCALE	1" = 100'
DATE	MARCH 2010
CDC PROJECT NO.	J1-200421-00
DWG. LFQTE 2010	REV. 0
SHEET 1 OF 1	

TAYLOR® POWER SYSTEMS

Model: GS100

Ratings Range:



DRAWING DEPICTS UNIT WITH OPTIONAL EQUIPMENT

Features

- Single source responsibility for the generator set and accessories.
- Prototype and production tested to insure one step load acceptance per NFPA 110.
- Two year limited warranty on generator sets and accessories.
- Unit conforms to CSA, NEMA, EGSA, ANSI and other standards.
- Microprocessor based control system providing digital metering and monitoring.
- Heavy duty 4 cycle industrial engine for reliability and fuel efficiency.
- Brushless rotating field generator with class H insulation.
- Heavy duty steel base with integral vibration isolators.

	50Hz	60Hz
Standby: kw	74 - 80	82 - 100
kva	93 - 100	103 - 125
Prime: kw	62 - 72	71 - 91
kva	78 - 90	89 - 114

Generator	Voltage	PH	Hz	LP / NAT. GAS 125°C Rise Standby Rating		LP / NAT. GAS 105°C Rise Prime Rating	
				kW/kVA	Amps	kW/kVA	Amps
				UCI274C311			
	277/480	3	60	100/125	150	90/113	136
	139/240	3	60	100/125	300	90/113	272
	254/440	3	60	94/118	155	85/106	139
	127/220	3	60	94/118	310	85/106	278
	240/416	3	60	90/113	157	78/98	136
	120/208	3	60	90/113	314	78/98	272
	120/240	3	60	90/113	272	78/98	236
	219/380	3	60	82/103	156	78/98	135
	120/240	1	60	67.5/67.5	281	58.5/58.5	244
	254/440	3	50	74/93	122	62/78	102
	127/220	3	50	74/93	244	62/78	204
	120/208	3	50	80/100	278	67/84	233
	240/415	3	50	80/100	139	67/84	117
	219/380	3	50	80/100	152	67/84	128
	110/190	3	50	80/100	304	67/84	255
	110/220	1	50	60/60	273	50/50	227
UCI274D311							
	277/480	3	60	100/125	150	91/114	137
	139/240	3	60	100/125	300	91/114	274
	254/440	3	60	100/125	164	91/114	150
	127/220	3	60	100/125	328	91/114	299
	240/416	3	60	100/125	173	91/114	158
	120/208	3	60	100/125	347	91/114	316
	120/240	3	60	100/125	301	91/114	294
	219/380	3	60	96/120	182	88/110	167
	120/240	1	60	79/79	329	72/72	300
	254/440	3	50	80/100	131	72/90	118
	127/220	3	50	80/100	262	72/90	236
	120/208	3	50	80/100	278	72/90	250
	240/415	3	50	80/100	139	72/90	125
	219/380	3	50	80/100	152	72/90	137
	110/190	3	50	80/100	304	72/90	273
	110/220	1	50	68/68	309	60/60	273
UCI274C06	120/240	1	60	90/90	375	75/75	313
UCI274D06	120/240	1	60	100/100	417	88/88	367

RATINGS: All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor.

STANDBY RATINGS: Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. Ratings are in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271.

PRIME POWER RATINGS: Prime power ratings apply to installations where utility power is unavailable or unreliable. At varying load the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528/1, overload power in accordance with ISO-3046/1, BS5514, AS2789, and DIN 6271. For limited running time and base load ratings consult the factory. The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

GENERAL GUIDELINES FOR DERATION: Altitude: Derate 0.5% per 100m (328 ft.) elevation above 1000m (3279 ft.)
Temperature: Derate 1.0% per 10°C (18°F) temperature above 40°C (104°F).

APPLICATION DATA

Engine	60 Hz	50 Hz
Engine Specifications		
Manufacturer	General Motors	
Engine: model, type	Industrial Powertrain Vortec 8.1 L, 4-Cycle Natural Aspiration V-8	
Cylinder arrangement	8.1 (496)	
Displacement, L (Cu. in.)	108 x 111 (4.25 x 4.37)	
Bore and stroke, mm (in.)	9.1:1	
Compression ratio	399 (1311)	332 (1092)
Piston speed, m/mm. (ft./min.)	5, Alum. Lead Silicon Alloy	
Main bearing: qty., type	1800	1500
Rated rpm	121 (162)	99 (133)
Max. power at rated rpm, kW (HP)	Cast Iron	
Cylinder head material	Strutless Flat Top, Hypereutectic Cast Alum.	
Piston type and material	Cast Nodular Undercut Rolled Fillet	
Crankshaft material	Int. - A193 Exh. Inconel Electronic Isochronous ±0.5% Field-Convertible Dry	
Valve (exhaust) material		
Governor type		
Frequency regulation, no-load to full-load		
Frequency regulation, steady state		
Frequency		
Air cleaner type, all models		

Exhaust	60 Hz	50 Hz
Exhaust System		
Exhaust manifold type	Dry	
Exhaust flow at rated kW, m ³ /min. (cfm)	20.8 (735)	15.3 (540)
Exhaust temperature at rated kW, dry exhaust, °C (°F)	677 (1250)	
Maximum allowable back pressure, kPa (in. Hg)	10.2 (3.0)	
Exhaust outlet size at engine hookup, mm (in.)	89 (3.5) OD	

Lubrication

Lubricating System	60 Hz	50 Hz
Type	Full Pressure	
Oil pan capacity, L (qt.)	7.6 (8.0)	
Oil pan capacity with filter, L (qt.)	8.0 (8.5)	
Oil filter: quantity, type	1, Cartridge	

Cooling	60 Hz	50 Hz
Radiator System		
Ambient temperature, °C (°F)	50(122)	
Engine jacket water capacity, L (gal.)	10.0 (2.6)	
Radiator system capacity, including engine, L (gal.)	25.7 (6.8)	
Engine jacket water flow, Lpm (gpm)	125 (33)	102 (27)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	73 (4140)	60 (3430)
Water pump type	Centrifugal	
Fan diameter, including blades, mm (in.)	599 (23.6)	
Fan, kWm (HP)	6.7 (9.0)	3.7 (5.0)
Max. restriction of cooling air, intake and discharge side of radiator, kPa (in. H ₂ O)	0.125 (0.5)	

CONTROL PANEL

The DGC-2020 Digital Genset Controller provides integrated engine-genset control, protection, and metering in a single package. Microprocessor based technology allows for exact measurement, setpoint adjustment, and timing functions. Front panel controls and indicators enable quick and simple DGC-2020 operation. A wide temperature-range liquid crystal display (LCD) with backlighting can be viewed under a wide range of ambient light and temperature conditions.

Features

- Generator Metering
- Engine Metering
- Genset Control
- Engine Protection
- Generator Protection (27, 59, 810, 81U)
- SAE J1939 Engine ECU communications
- Multilingual capability
- Remote RS-485 communications for Optional RDP-110 Remote Annunciator
- Extremely rugged, fully encapsulated design
- 16 programmable contact inputs
- 7 contact outputs: (3) 30 A dc contacts (4) programmable 2 A dc rated contacts
- Wide Ambient Temperature Range
- Modbus Communications with RS-485
- Battery Backup for Real Time Clock
- LCD Heater allows for use of DGC-2020 in temp. down to -40°C
- UL recognized, CSA certified, CE approved
- HALT (Highly Accelerated Life Tests) tested
- IP 54 Front Panel rating with integrated gasket
- NFPA 110 Level Compatible

Options

- Additional (8) Programmable 2 A dc contacts
- Remote Dial-out and Dial-in capability with Internal Modem
- Enhanced Generator Protection 51 and 47

Engine Electrical

Engine Electrical System	60 Hz	50 Hz
Ignition system	Individual Coil Near Plug Ignition	
Battery charging alternator:		
Ground (negative/positive)	Negative	
Volts (DC)	12	
Ampere rating	70	
Starter motor rated (DC)	12	
Battery, recommended cold cranking amps (CCA):		
Qty., rating for -18°C (0°F)	1	630
Battery voltage (DC)	12	

Fuel	60 Hz	50 Hz
Fuel System		
Fuel type	LPG or Natural Gas Fuel	
Fuel supply line inlet	1 1/4" NPTF	
Natural gas/LPG fuel supply pressure, measured at the generator set fuel inlet after any fuel system equipment accessories, kPa (in. H ₂ O)	1.74-2.74 (7.0-11.0)	
Fuel Composition Limits *	Nat. Gas	LP Gas
Methane, % by volume	90min.	—
Ethane, % by volume	4.0max.	—
Propane, % by volume	1.0 max.	85min.
Propene, % by volume	0.1 max.	5.0 max.
C ₄ and higher, % by volume	0.3 max.	2.5 max.
Sulfur, ppm mass	25 max.	
Lower heating value, kJ/m ³ (Btu/ft ³), min.	26.6 (890)	67.5 (2260)

* Fuels with other compositions may be acceptable. If your fuel is outside the listed specifications, contact your local distributor for further analysis and advice.

Operation Requirements

Air Requirements	60 Hz	50 Hz
Radiator-cooled cooling air, m ³ /min. (scfm) *	198 (7000)	153 (5400)
Combustion air, m ³ /min. (cfm)	7.1 (250)	5.1 (180)
Heat rejected to ambient air:		
Engine, kW (Btu/min.)	47.6 (2710)	36.9 (2100)
Alternator, kW (Btu/min.)	13.7 (780)	12.0 (680)

* Air density = 1.20 kg/m³ (0.075 lbm/ft³).

Fuel Consumption

Natural Gas, m ³ /hr. (cfm) at % load	Standby Rating		Prime Rating	
	60Hz	50Hz	60Hz	50Hz
100%	33.0 (1164)	28.3 (1001)	30.2 (1065)	26.0 (918)
75%	25.3 (893)	21.9 (773)	24.1 (852)	20.2 (713)
50%	21.1 (745)	15.6 (552)	19.7 (694)	14.6 (517)
25%	13.2 (466)	10.2 (359)	12.6 (447)	9.8 (344)
LP Gas, m ³ /hr. (cfm) at % load	Standby	Rating	Prime	Rating
	60Hz	50Hz	60Hz	50Hz
100%	14.5 (511)	11.2 (396)	13.4 (472)	10.3 (362)
75%	11.4 (403)	8.6 (302)	10.7 (377)	8.0 (282)
50%	8.7 (306)	6.4 (227)	8.1 (285)	6.1 (215)
25%	5.5 (195)	4.5 (158)	5.3 (187)	4.3 (151)

GENERATOR SPECIFICATIONS

STANDARDS

UC224 and UC274 industrial generators meet the requirements of BS5000, VDE0530, UTE5100, NEMA MG1-22, CEMA, IEC34-1, CSA22.2 AND AS1359.

EXCITATION SYSTEMS

SX440 & SX460 AVRs

With these self-excited systems the main stator provides power via the automatic voltage regulator (AVR) to the exciter stator. The high efficiency semiconductors of the (AVR) ensure positive build up from initial low levels of residual voltage.

The exciter rotor output is fed to the main rotor through a three phase full wave bridge rectifier. The rectifier is protected by a surge suppressor against surges caused, for example, by short circuit or out of phase paralleling. The SX440 will support a range of electronic accessories, including a 'droop' Current Transformer (CT) to permit parallel operation with other ac generators.

MX341 AVR

This sophisticated AVR is incorporated into the permanent magnet generator (PMG) system, and is fitted as an option on industrial generators.

The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has built-in protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.

The two phase average voltage sensed MX341 provides voltage regulation of $\pm 1.0\%$. If three phase sensing is required with the PMG system the MX321 AVR must be used. We recommend three phase sensing for applications with greatly unbalanced or highly non-linear loads. An engine relief load acceptance feature can enable full load to be applied to the generator in a single step.

MX321 AVR

The most sophisticated of all our AVRs combines all the features of the MX341 with, additionally, three phase rms sensing, for improved regulation ($\pm 0.5\%$) and performance. Over voltage protection is built-in and short circuit current level adjustment is an optional facility.

INSULATION / IMPREGNATION

The insulation system is Class 'H'.

All wound components are impregnated with materials and processes designed specifically to provide protection against the harsh environments encountered in generator applications. Varnishes and resins are selected and developed to provide the high build required for static windings and the high mechanical strength required for rotating components.

WINDINGS & ELECTRICAL PERFORMANCE

All generator stators are wound to 2/3 pitch. This eliminates triplen (3rd, 9th, 15th...) harmonics on the voltage waveform and is found to be the optimum design for trouble-free supply of non linear loads. The 2/3 pitch design avoids excessive neutral currents, sometimes seen with higher winding pitches, when in parallel with the mains.

A fully connected damper winding reduces oscillations during paralleling. This winding, with 2/3 pitch and carefully selected pole and tooth designs, ensures very low waveform distortion.

TELEPHONE INTERFERENCE

THF (as defined by BS4999 Part 40) is better than 2%. TIF (as defined by ASA C50.12) is better than 50.

RADIO INTERFERENCE

The absence of brushgear and the high quality AVR ensure low levels of interference with radio transmissions.

Additional RFI suppression may be supplied if required.

ENCLOSURE

IP22 (NEMA 1) is standard for all industrial generators Protection to IP23 (60 degrees from vertical) is available as an option at reduced ratings (5% derate).

Inlet air filters are available as an option on all generators, at reduced ratings (5% derate).

SHAFT

All generator rotors are dynamically balanced to better than BS6861: Part 1 Grade 2.5 for minimum vibration in operation.

QUALITY ASSURANCE

Generators are manufactured using production procedures having a quality assurance level to BS EN (ISO9001).

STANDARD FEATURES AND ACCESSORIES

Standard Features

- Heavy duty steel base
- Vibration isolators
- Oil drain valve with extension
- Flex exhaust connector
- Battery rack
- Battery cables
- Water jacket heater
- Owners manual
- Electronic Isochronous Governor

Accessories

- Generator strip heater
- Line circuit breaker
- DGC-2020 Enhanced generator protection
- DGC-2020 Internal Modem
- DGC-2020 Programmable Aux. Contacts qty. (8) 2Adc
- Surface Mount Remote Annunciator
- Flush Mount Remote Annunciator
- Analog Auto-Start Control Panel

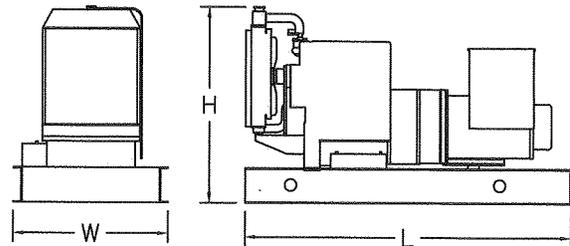
Accessories

- Exhaust silencer
- Silencer mounting kit for enclosure
- Weather enclosure
- Sound attenuated enclosure
- Flexible fuel lines
- Oil pan heater
- Battery
- Battery heater
- Battery charger
- PMG exciter

WEIGHTS AND DIMENSIONS **GS100**

Overall Size, L x W x H, in.: (84" x 46" x 53")

Weight (wet): 2200 Lbs.

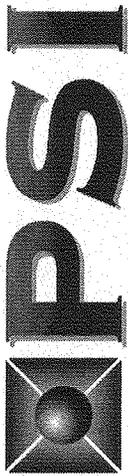


Note: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

DISTRIBUTED BY:

TAYLOR
POWER SYSTEMS

461 Hwy. 49S
Richland, Mississippi 39218
Phone (601)-932-5674
Toll Free 1-800-367-7639
FAX (601)-932-4028
Web Site www.taylorpower.com



POWER SOLUTIONS, INC.

655 Wheat Lane – Wood Dale, IL 60191
 630.350.9400 (M) – 630.350.9900 (F)
www.psiengines.com – info@psiengines.com

PSI 2009 Stationary 60 Hz Emergency "Stand-by" 1" Certified Power Generation Rating Data

Engine	Speed RPM	Freq Hz	Fuel	Duty Cycle	Flywheel power ³		Fan loss		Generator Loss		Electrical Rating ⁴		Certification Spec	THC+NOx (g/KW-hr)	CO (g/KW-hr)	bsfc ⁵ (g/kW-hr)	Catalyst	
					HP	KW	HP	KW	Efficiency	HP	KW	HP						KW
1.6L	1800	60	LP	Emergency	27.5	20.5	2	1.5	87%	3.6	2.7	22.0	16.4	40 CFR Part 60 / 90	8.2	39.16	256.2	No
1.6L	1800	60	NG	Emergency	25.0	18.6	2	1.5	87%	3.3	2.4	19.8	14.7	40 CFR Part 60 / 90	6.89	33.7	243.6	No
1.6L	3600	60	LP	Emergency	56.5	42.1	3	2.2	87%	7.3	5.5	46.1	34.4	40 CFR Part 60 / 90	9.14	44.84	266.1	No
1.6L	3600	60	NG	Emergency	52.5	39.1	3	2.2	87%	6.8	5.1	42.7	31.8	40 CFR Part 60 / 90	6.6	37.44	250.8	No
3.0L	1800	60	LP	Emergency	51.5	38.4	3	2.2	87%	6.7	5.0	41.8	31.2	40 CFR Part 60 / 90	9.93	32.66	265.0	No
3.0L	1800	60	NG	Emergency	50.8	37.9	3	2.2	87%	6.6	4.9	41.2	30.7	40 CFR Part 60 / 90	7.22	29.47	255.9	No
4.3L	1800	60	LP	Emergency	71.4	53.2	4.5	3.4	90%	7.1	5.3	59.8	44.6	40 CFR Part 60 / 90	8.17	32.02	234.1	No
4.3L	1800	60	NG	Emergency	66.5	49.6	4.5	3.4	90%	6.7	5.0	55.4	41.3	40 CFR Part 60 / 90	7.03	21.96	225.7	No
5.0L	1800	60	LP	Emergency	88.3	65.8	4.5	3.4	90%	8.8	6.6	74.9	55.9	40 CFR Part 60 / 90	8.68	39.68	246.2	No
5.0L	1800	60	NG	Emergency	83.4	62.2	4.5	3.4	90%	8.3	6.2	70.6	52.6	40 CFR Part 60 / 90	7.72	31.57	238.6	No
5.7L	1800	60	LP	Emergency	113.2	84.4	4.5	3.4	90%	11.3	8.4	97.3	72.6	40 CFR Part 60 / 90	9.66	29.61	232.1	No
5.7L	1800	60	NG	Emergency	104.7	78.1	4.5	3.4	90%	10.5	7.8	89.7	66.9	40 CFR Part 60 / 90	7.72	26.73	229.4	No
8.1L	1800	60	LP	Emergency	164.4	122.6	8.5	6.3	92%	13.2	9.8	142.8	106.5	40 CFR Part 60 & 1048	0.1	0.59	224.0	Yes
8.1L	1800	60	NG	Emergency	155.2	115.7	8.5	6.3	92%	12.4	9.3	134.2	100.1	40 CFR Part 60 & 1048	0.17	0.23	222.8	Yes
8.1L T	1800	60	LP	Emergency	178.9	133.4	11.5	8.6	92%	14.3	10.7	153.1	114.2	40 CFR Part 60 & 1048	0.343	0.175	-	Yes
8.1L T	1800	60	NG	Emergency	202.0	150.6	11.5	8.6	92%	16.2	12.1	174.3	130.0	40 CFR Part 60 & 1048	0.166	0.417	-	Yes
8.1L CAC	1800	60	LP	Emergency	199.0	148.4	14	10.4	92%	15.9	11.9	169.1	126.1	40 CFR Part 60 & 1048	0.343	0.175	243.8	Yes
8.1L CAC	1800	60	NG	Emergency	238.0	177.5	14	10.4	92%	19.0	14.2	205.0	152.8	40 CFR Part 60 & 1048	0.166	0.417	221.5	Yes

¹Standby and overload ratings based on ISO3046. Continuous ratings based on ISO 8528.

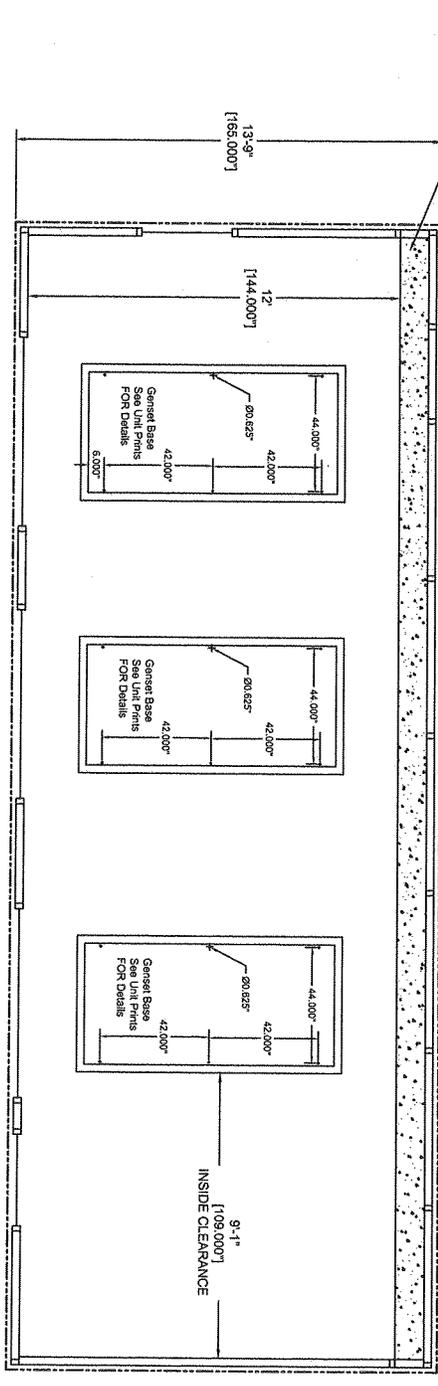
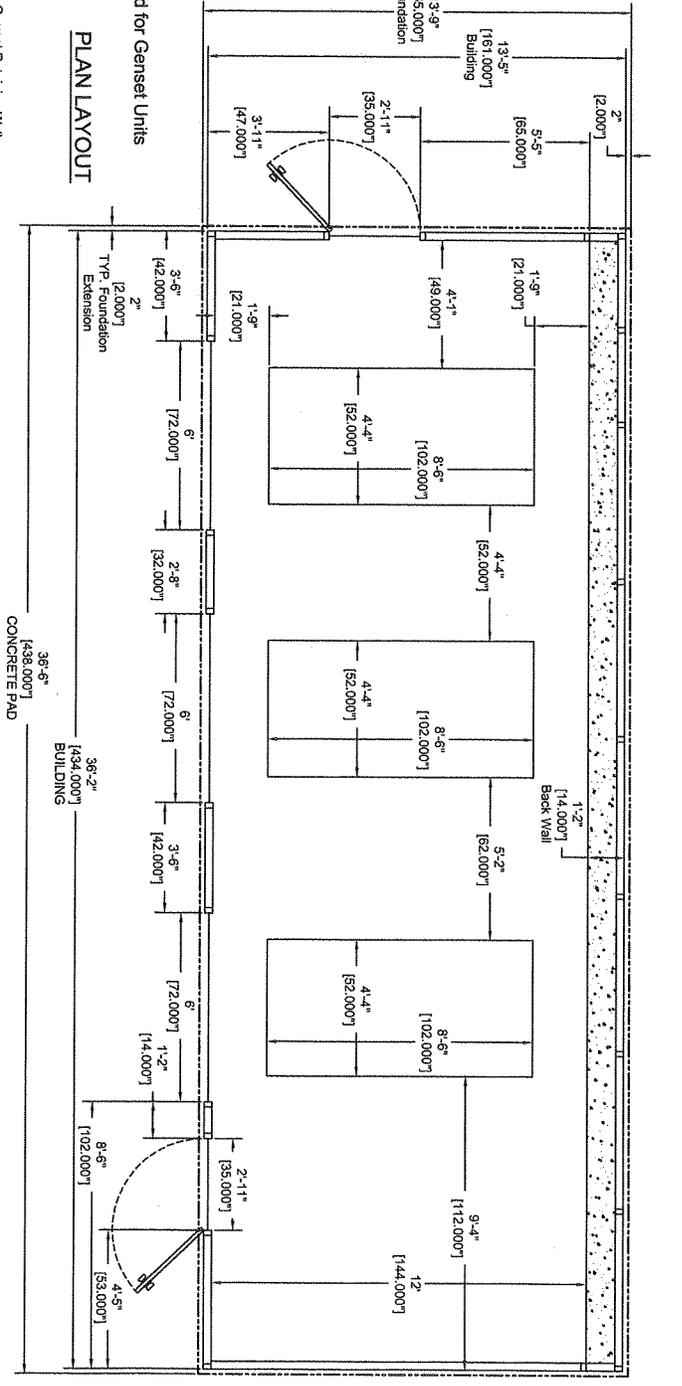
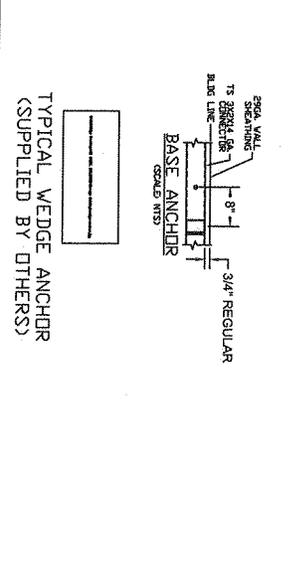
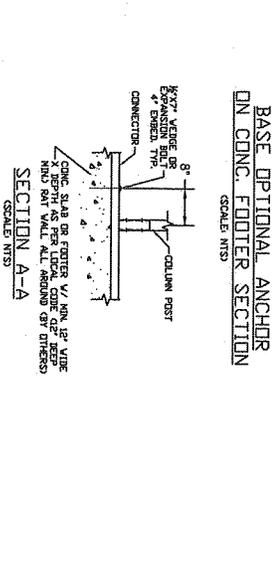
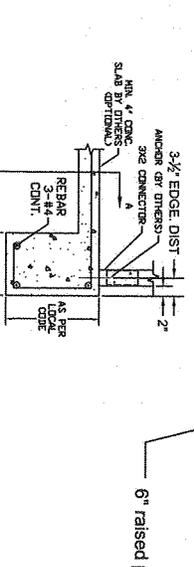
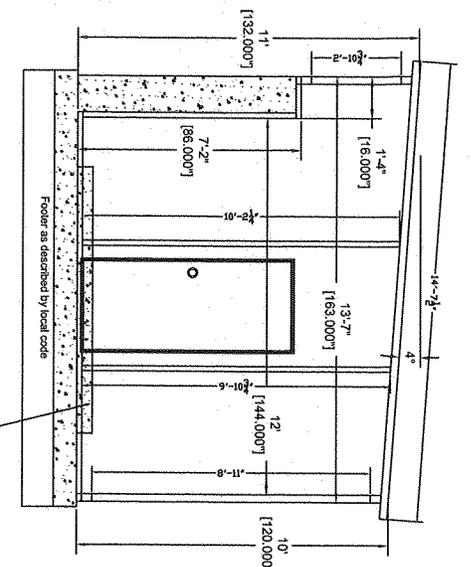
²All ratings are gross flywheel horsepower corrected to 77°F at an altitude of 328feet with no cooling fan or alternator losses using heating value for NG of 1015 BTU/SCF.

³Production tolerances in engines and installed components can account for power variations of +/- 5%. Altitude, temperature and excessive exhaust and intake restrictions should be applied to power calculations.

⁴Electrical ratings are an estimated based on assumed fan and generator losses and may vary depending on actual equipment losses.

⁵Bsfc is based on 100% gross flywheel power rating and does not include fan or generator losses.

Power Solutions, Inc.
 655 Wheat Lane – Wood Dale, IL 60191
 630.350.9400 (M) – 630.350.9900 (F)
www.psiengines.com – info@psiengines.com



CUSTOMER:	<i>Watauga Project</i>		MODEL:	<i>Special 10' x 10' x 36'</i>	
ADDRESS:			TITLE:	FOUNDATION RECOMMENDATION	
PG. NO.:	11-XXX	CHK. BY:	JLR	ISSN BY:	AC
DRAWING NO.:	<i>85-1072-F</i>		DATE:	04-05-10	
			Steel Building Garages		

