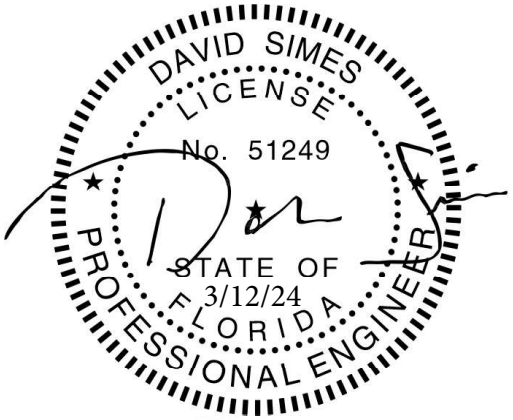
ENGINEERING STUDY FOR GADSDEN COUNTY EMERGENCY SHELTER

HCA Florida Gadsden Emergency Facility
Quincy, Florida



FINAL SUBMITTAL

3/12/2024

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1. Introduction.

Gadsden County, Florida has identified a requirement for a new Special Needs Storm Shelter for use during hurricanes and other natural disasters. HCA Florida Gadsden Emergency Facility (formally Gadsden County Hospital) in Quincy has been identified as the potential site for this future shelter. As a result, the County contracted with AE Engineering, Incorporated who in-turn hired Simes & Rosch Engineering to evaluate the adequacy of existing mechanical, electrical and plumbing (MEP) systems at the emergency facility for use as a special needs shelter. This report will investigate the relevant criteria, existing conditions, and required MEP upgrades for the shelter. Note that the adequacy of the structure itself will be evaluated by others and is not included in the scope of this study.

The original hospital was designed and built in the early 1980s. With the exception of approximately 16,800 square feet of patient care wings and adjacent core that make up the proposed area for the shelter, the facility was upgraded in approximately 2009, including new 480 Volt electrical distribution and generator systems conforming to NEC Article 517 and a new chilled water HVAC system with air cooled chillers. The proposed area for the shelter was gutted with most of the interior partition walls, drop ceilings, flooring, power, lighting, and plumbing fixtures removed (Photo 1 shows a typical wing). This study assumes that the three wings will be dedicated to people with special needs and the core would be used for administrative personnel, kitchen area, equipment rooms, storage, etc. (See Sheet A1, Overall Plan in the drawings). Sheet A2, shows a preliminary concept for typical wing with cots, nursing stations, restrooms, and storage rooms as previously designed for the County by local Architect, Joel Sampson. Per discussions, the shelter will also be used for other purposes throughout the year (i.e. potentially a senior center, conference center, etc), which have not been finalized. Ideally, the design will also support these other uses.

Note that the configuration, sizing, and cost data of MEP systems below are preliminary and may change as the design matures.

2. Criteria.

Florida Building Code (FBC) Chapter 423, Storm Shelters, covers requirements for storm shelters. FBC Chapter 423 calls out 2020 ICC 500, Standard for the Design and Construction of Storm Shelters, and FBC Chapter 16, Structural Design as the main source of detailed criteria for storm shelters. Chapter 7 of ICC 500 covers specific MEP system features for hurricane storm shelters, including ventilation, the number of private water closets and lavatories, drinking water, rainfall drainage, lighting, and standby power. Note that the standby power system for the shelter is required to power the standby lighting and any mechanical ventilation and shall have a capacity for at least 24 hours.

Chapter 64-3, Special Needs Shelter, of the Florida Administrative Code calls out the Florida Department of Health Guidelines for Special Needs Shelters (2016 Edition) as the source of specific requirements for Special Needs Shelters. Per the guidelines, a person with special needs is defined as someone who during periods of evacuation or emergency, requires sheltering assistance, due to physical impairment, mental impairment, cognitive impairment, or sensory disabilities. Along with the other requirements for a typical storm shelter, the special needs shelter shall have "backup generator power to provide electricity during a power failure sufficient to support life sustaining equipment for the anticipated demand".

3. Mechanical Systems.

On June 06, 2023, personnel from AE Engineering and Simes & Rosch visited the site to survey the condition and configuration of the existing heating, ventilation and cooling (HVAC) systems as described below:

a. HVAC Systems.

(1) Existing HVAC Systems. The existing HVAC systems include air-cooled chillers, heating hot water boilers, associated chilled water and hot water pumps, central station air handling units (AHU's), fan coil units, packaged terminal heat pumps (PTHP"S) and exhaust fans. The HVAC systems were renovated in approximately 2009 and the chillers, boilers and AHU's were replaced at this time. The 2009 renovation was limited to the area that the hospital occupies and did not include renovations to the wings that are intended to be used for the new shelter. There are 2 air-cooled chillers sized at 110 Tons each and approximately 9 central station AHU's that serve the facility. The central station AHU"S serve critical parts of the hospital like operating and other medical procedural rooms. The patient rooms are served by PTH'S. The existing HVAC systems are in good condition but are essentially already separated from the wings for the shelter and are not recommended for use for the shelter. These systems are also not served by the emergency generator and are not intended to be provided with emergency power.

(2) Shelter HVAC Requirements. ICC 500 Section 703.6 requires mechanical ventilation systems for occupancies greater than 50 people. The required ventilation rate is 5 CFM per person and the ventilation system must be on standby power. It should be noted that the Florida mechanical code also requires 0.06 CFM/SF of ventilation air so this will be included in the ventilation calculations. The county requires that all HVAC systems serving the shelter be on standby power.

(3) Shelter Ventilation System. To comply with the ventilation requirements, it is recommended that a dedicated outdoor air system be provided for the shelter. Preliminary sizing for this system is 1,700 CFM. Since this is a 100% outside air system, the unit must incorporate an energy recovery wheel. This system will

provide ventilation air to the wings and central core area. The energy recovery wheel will provide significant energy savings and will reduce the required cooling capacity to approximately 7.5 Tons. This will be a direct expansion type unit and will not be connected to the existing chilled water system. This unit will be served by the standby generator. This unit will require a new mechanical room space for the air handling unit. The ideal location for this AHU will be in the NW corner of the core area adjacent to the west wing. The condensing unit section is intended to be located to the south of the west wing. See Drawing M1 for proposed layout.

(4) Shelter Wings HVAC Systems. The existing wings were served by a total of 36 PTHP's. It is recommended that this same approach be used. The existing PTHP's are in various states of disrepair so it is recommended that all 36 existing PTHP's be replaced with new units. These units will be served by the standby generator.

(5) Shelter Core Area HVAC System. The central core area is recommended to be served by a dedicated direct expansion VAV split-system heat pump. This unit has an estimated capacity of 10 Tons. The air handling unit will be located in the proposed new mechanical room and the outdoor unit will be located adjacent to the DOAS-1 condensing unit. This unit will be served by the standby generator.

4. Plumbing Systems.

a. Domestic Water Systems.

(1) Shelter Plumbing Requirements. ICC 500 Table 703.3 requires one water closet per 50 people and that water closets must be private. Lavatories are not required. Section 703.4 requires 1 gallon of drinking water per occupant. The proposed new plumbing systems for the shelter wings is shown in the concept drawing sheet A2 that was discussed in the introduction. Each side of each wing would be provided with a new toilet room for a total of 6 new toilet rooms. Each toilet room would be provided with a water closet, lavatory, and shower. All toilet rooms would be ADA accessible. New plumbing systems for the core area would be determined based on the specific architectural layout for the core area.

(2) Domestic Cold Water. The shelter area is currently served by the domestic cold-water system that serves the hospital. The existing system is sufficient in size capacity to serve the shelter and unless there is a specific requirement by the county to provide a separate domestic water service to the shelter, it is recommended that the shelter remain connected to the existing domestic cold-water system. If desired, a meter could be added to the cold-water piping serving the shelter. This meter could be used to domestic water monitor consumption by the shelter if necessary to calculate the water cost of the shelter.

(3) Domestic Hot Water. The shelter area is currently served by the domestic hot water system that serves the hospital. The existing system is sufficient in size and capacity to serve the shelter. If desired, a new dedicated domestic water heater could be provided to serve the shelter. This water heater would be installed in the proposed new mechanical room.

b. Sanitary Systems.

(1) The shelter area is currently connected to the existing hospital sanitary system. The existing sanitary system is sufficient in size capacity to serve the shelter and there is no need to provide a dedicated sanitary service for the hospital. It is recommended that the new and existing sanitary systems in the shelter be connected to the existing sanitary system.

5. Electrical Systems.

a. Power.

(1) Existing Electrical Distribution System. As mentioned in the introduction, with the exception of the wings and core that make up the proposed area for the shelter, the facility electrical distribution system was upgraded in approximately 2009 (see Partial Existing Single Line Diagram, Sheet E3). A pad-mount utility transformer (see Photo 2) feeds a 2,000 Amp, 480Y/277 Volt main Switchboard 'MSB' in the main electrical room that in turn, feeds normal power panelboards throughout the building. Switchboard 'MSB' also feeds a hospital style Type 1 Essential Electrical System as defined by NEC Article 517 (via three automatic transfer switches). The essential power system is also fed by a 500 KiloWatt (KW), 480Y/277 Volt diesel emergency generator with a 2,500-gallon sub-base tank, weatherproof enclosure and a concrete barrier wall for protection. All of this equipment appears to be in excellent condition. Note that if the existing electrical distribution system was used for the shelter, it is anticipated that the Florida Agency for Healthcare Administration (AHCA) will not allow the shelter to use the existing transfer switches given that it does not fall under the allowable electrical loads for essential power systems as defined by NFPA 99, Healthcare Facilities. Also, the existing generator appears to be fully loaded without the shelter (see Generator load calculations in the attachments). Given this and the fact that the County wants to keep the electrical service separate from the emergency facility for billing purposes, a new electrical service and meter would be provided for the shelter as described below.

(2) Electrical Service for the Shelter. Based on preliminary load data, a new 600 Amp, 480 Volt underground service lateral would be provided from the existing pad-mounted 480Y/277V utility transformer to new service equipment for the shelter include a CT enclosure and meter and a new 600 Amp, 480 Volt three pole

enclosed circuit breaker in a NEMA 3R enclosure. A 600 Amp, 480 Volt feeder would be routed to a new 600 Amp, 480 Volt Panel 'MDP' via a new service-rated 600 Amp, 480 Volt, four pole automatic transfer switch that will allow automatic transfer to a new generator described below.

(3) New Generator for Shelter. The SpecSizer generator sizing program from Caterpillar was used to evaluate the proposed loads on the new generator (see SpecSizer report in the calculations). The estimated load for the new shelter is 244 KVA. Note that per discussions, this estimated load for the shelter includes the new HVAC system described above. Based on the fact that the existing generator appears to be fully loaded and the shelter is not part of the emergency care facility, which falls under the Florida Agency for HealthCare Administration (AHCA), the standby power for the shelter will be kept separate from the hospital essential power system described above. A new separate 300 KW diesel generator with 150 mph rated aluminum enclosure and a 72 hour subbase tank is recommended for the shelter.

(4) Electrical Distribution for Shelter. 600 Amp, 480 Volt Panel 'MDP', located in the core, will feed all 277 Volt lighting in the shelter, as well as 480 Volt HVAC equipment (see Electrical Plan, Sheet E1 for preliminary location). Panel 'MDP' will also feed new 600 Amp, 208Y/120 Volt Panel 'SLDP' (via a 150 KVA dry transformer) that will provide power to 225 Amp, 208Y/120 Volt Panel'SL4' (also located in the core) and 225 Amp Panels 'SL1' through 'SL3', located in the wings. These panels will feed all 120 and 208 Volt loads, including receptacles for medical equipment (i.e oxygen concentrators), the exhaust fans, telecommunications, and fire alarm panel. See panel schedules on Sheet E2 and new single line diagram on Sheet E3 for more information.

b. *Lighting.* Most of the original lighting in the area of the proposed shelter has been removed. New energy efficient, recessed 2' x 4' LED light fixtures will be provided throughout the shelter. The light fixtures will have minimum color rendering index (CRI) of 80 and a color temperature rating of 4,000K. Light fixtures in the corridors and along the path of egress will be provided with 90-minute emergency batteries. Exterior light fixtures will consist of photocell controlled, full cutoff LED wall pack fixtures to replace the existing fixtures.

Lighting Control. To increase energy efficiency, a lighting control system consisting of occupancy sensors and time controls will be provided where appropriate and as required by the 2023 Florida Energy Code.

c. *Telecommunications.* Telecommunications Systems will be provided per EIA/TIA and the County's standards. Per discussions, the telecommunication systems will be kept separate from the existing system for the emergency facility. Details are as follows:

(1) Telecommunications Outside Plant. 2-4" telecom service conduits (one with 4-1" innerducts) will be provided from the property line to a new IT room in the core. See Telecommunications Riser Diagram, Sheet E5, for more information.

(2) Telecommunications Inside Plant. A wall-mounted telecommunications rack with Category 6 patch panels will be provided (active equipment by Owner). Standard workstation outlets consisting of two Cat 6 jacks will be provided in offices and at the nurse's stations per EIA/TIA standards. A 4" x 4" box with conduit routed above the ceiling will be provided for each workstation outlet. Horizontal Category 6 cabling will be supported by J Hooks above the ceiling. Approximately eight network drops and related power will be provided for wireless access points (WAPs) throughout the shelter.

(3) Telecommunication Grounding. Telecommunications grounding will be provided per IEEE Emerald Book, latest edition, and TIA/EIA standards with all grounding pathways and conductors labeled in accordance with TIA/EIA 606-A. A main 18"x 4"x 1/4" copper grounding bar will be provided in the telecom room. A #6 AWG insulated grounding conductor will be provided from the grounding bar to each equipment cabinet.

(4) Cable TV (CATV) System. The point of connection for the CATV system will be a new handhole located five feet outside the building. A (4) inch conduit will be provided from the handhole to the CATV distribution board located in the new telecommunications room. Service entrance cable will be provided by the local CATV provider. RG-6 and RG-11 cabling will be provided throughout the facility (based on CATV outlet locations provided by the County).

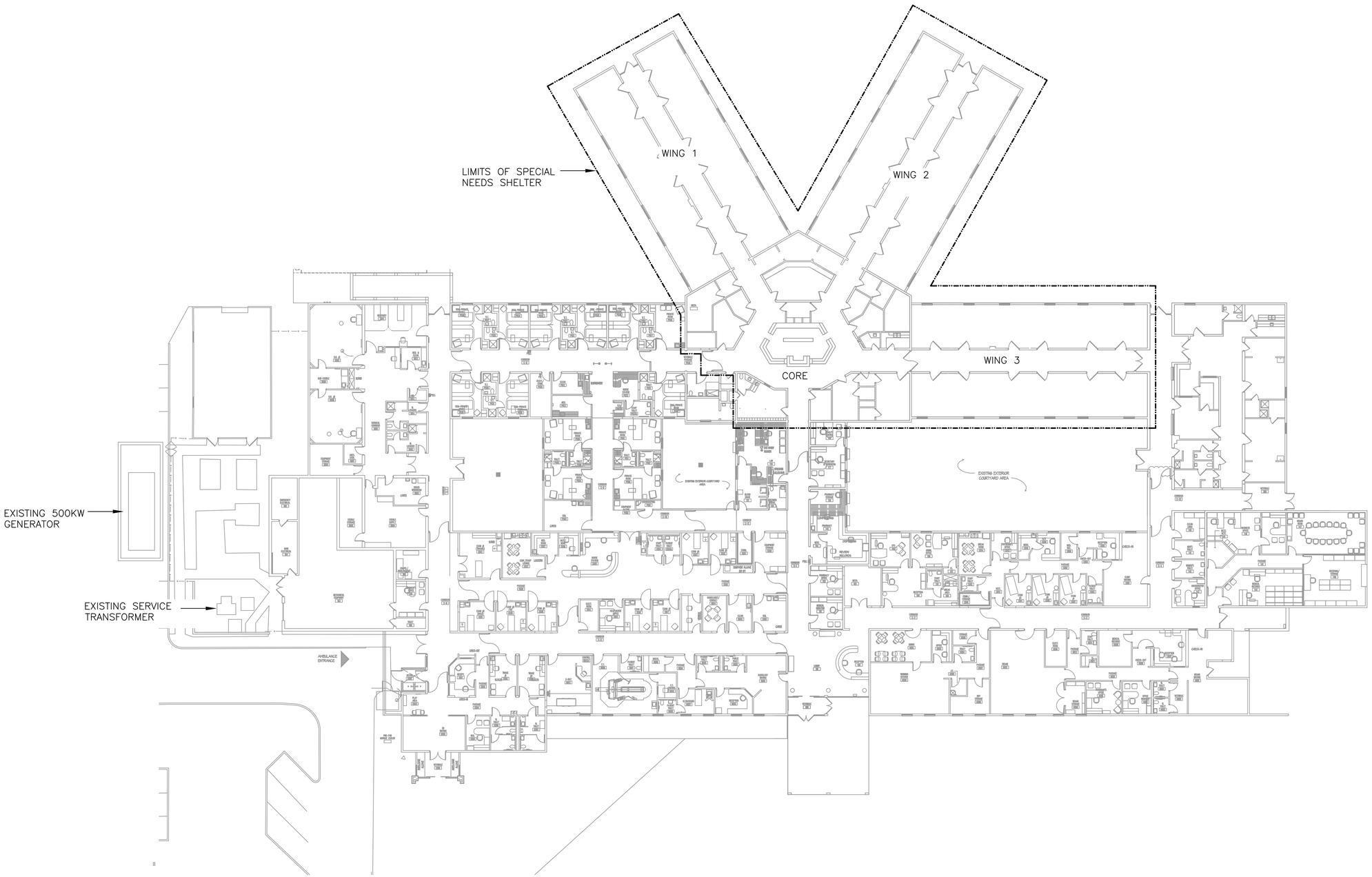
d. *Security Systems.* Boxes, raceways, and power will be provided for intrusion detection, access control, and closed-circuit television (CCTV) systems throughout the shelter based on security systems selected by the County.

e. *Fire Alarm.* The existing abated area that will be used for the shelter is fed by limited fire alarm devices as part of the fire alarm for the facility. A new separate addressable fire alarm system will be provided for the shelter. The fire alarm panel will be located in the electrical room in the core with an annunciator at the manager's office in the core.

6. Conclusions and Recommendations.

New independent mechanical and electrical systems should be provided for the shelter as described above. An assessment of the structure should be completed before a final decision is made on the viability of this facility for use as a special needs shelter.

DRAWINGS



OVERALL PLAN

1" = 20'

0 20' 40'

SCALE: 1" = 20'

STUDY DRAWING - NOT FOR CONSTRUCTION

Simes & Rosch, LLC
CONSULTING ENGINEERS
7411 Fullerton Street, Suite 250
Jacksonville, FL 32256
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S&R ENGINEERING
FL Cert. of Auth. 8107

OVERALL PLAN

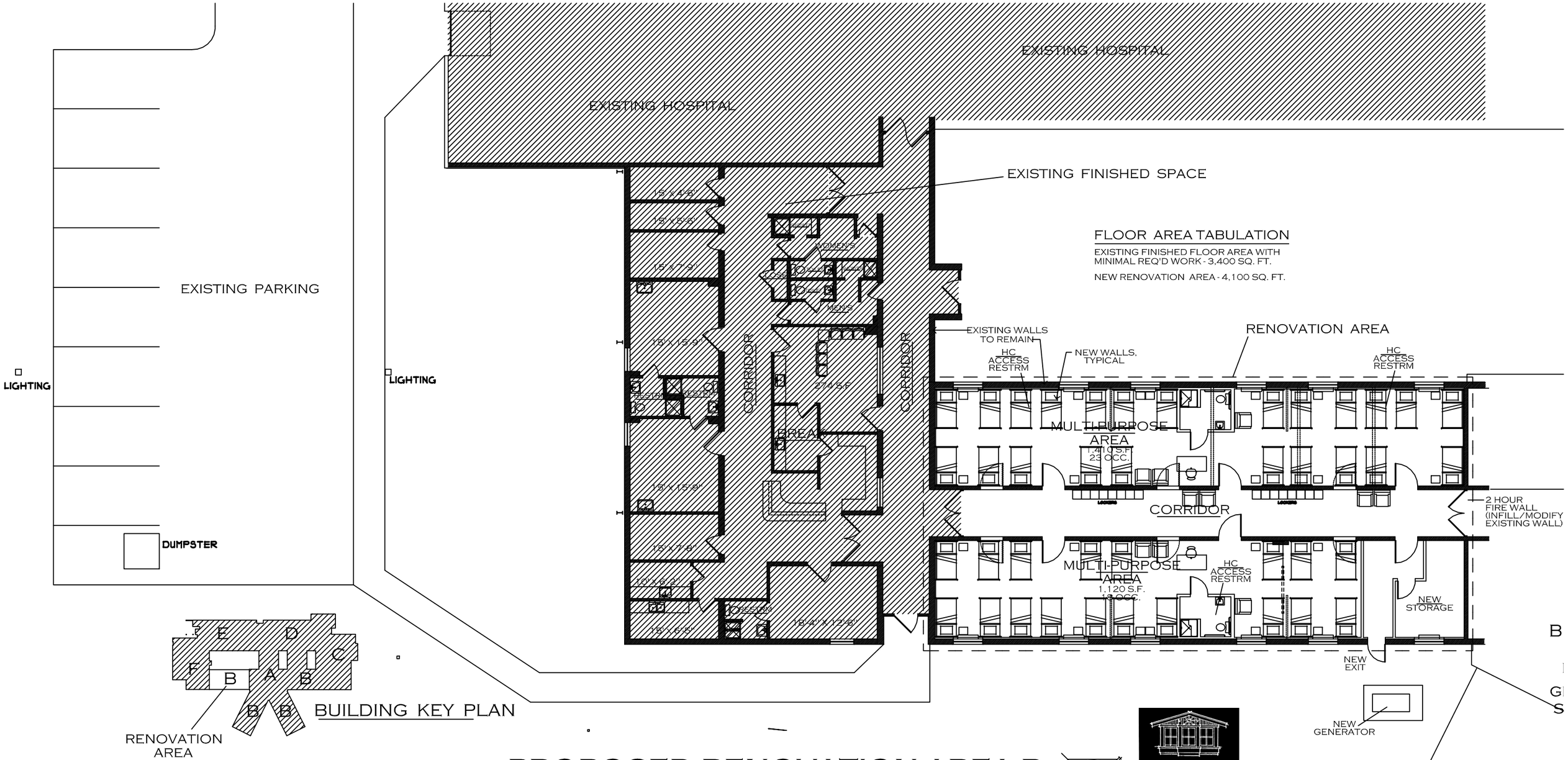
STUDY FOR GADSDEN COUNTY
SPECIAL NEEDS EMERGENCY SHELTER

23186 BLUE STAR HWY

QUINCY, FLORIDA

REVISIONS

JOB NO.	2328501
FILENAME	
DATE	01/09/24
DRAWN BY	
CHECKED BY	
DRAWING NO.	A1



PROPOSED RENOVATION AREA B

SCALE : 1/16"=1'-0"

OCCUPANCY CLASSIFICATION - INSTITUTIONAL GROUP I-2

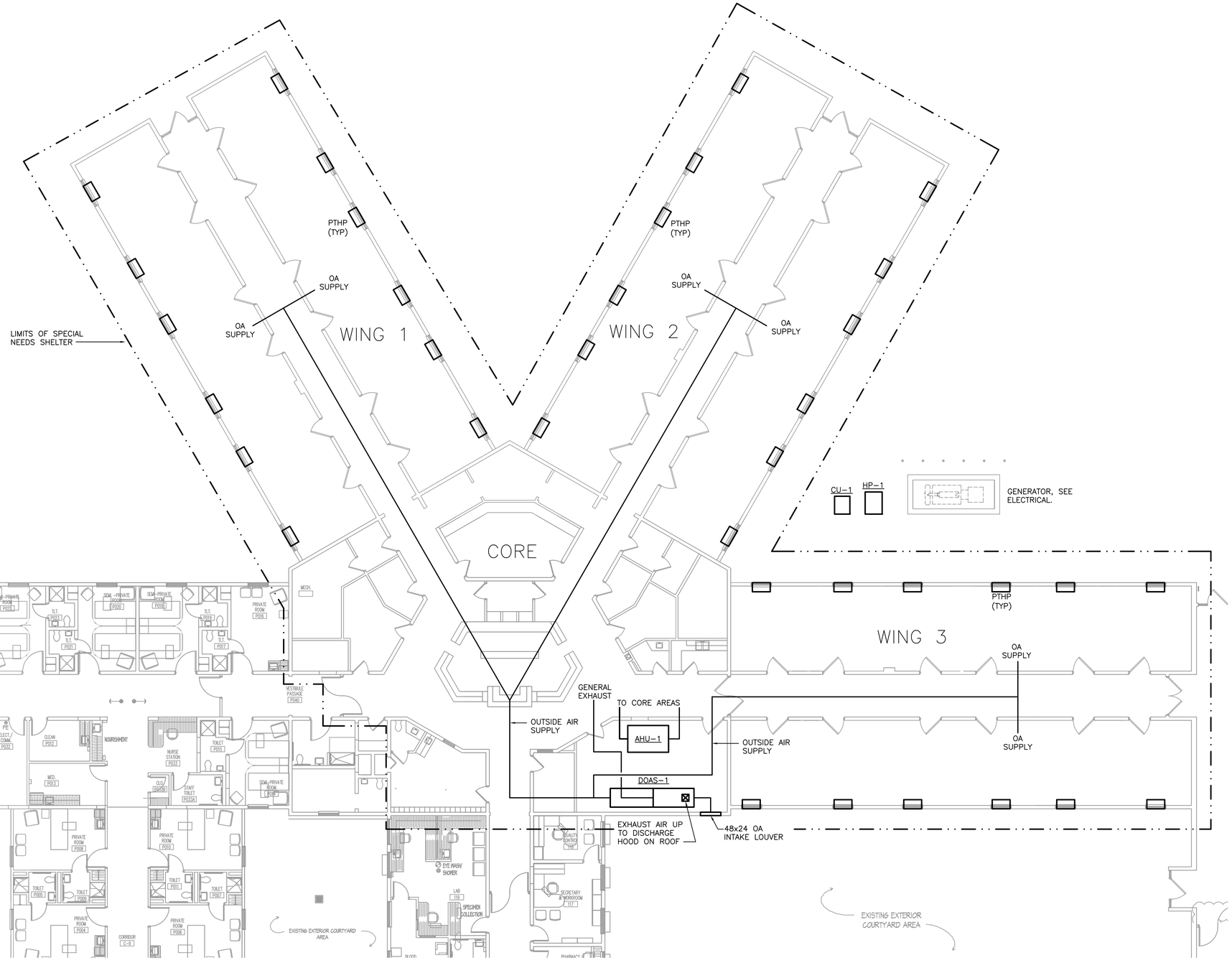
NORTH

JOEL SAMPSON ARCHITECT

212 NORTH ADAMS ST
QUINCY, FLORIDA 32351
FLA LIC NO AA26000893

RENOVATIONS AT GADSDEN COMMUNITY HOSPITAL BUILDING
FOR
GADSDEN SPECIAL NEEDS SHELTER
GADSDEN COUNTY BOARD OF COUNTY COMMISSIONERS

A2



MECHANICAL PLAN

1 / M1 SCALE: 3/32" = 1'-0"

STUDY DRAWING - NOT FOR CONSTRUCTION

0 10' 20'

SCALE: 3/32" = 1'-0"

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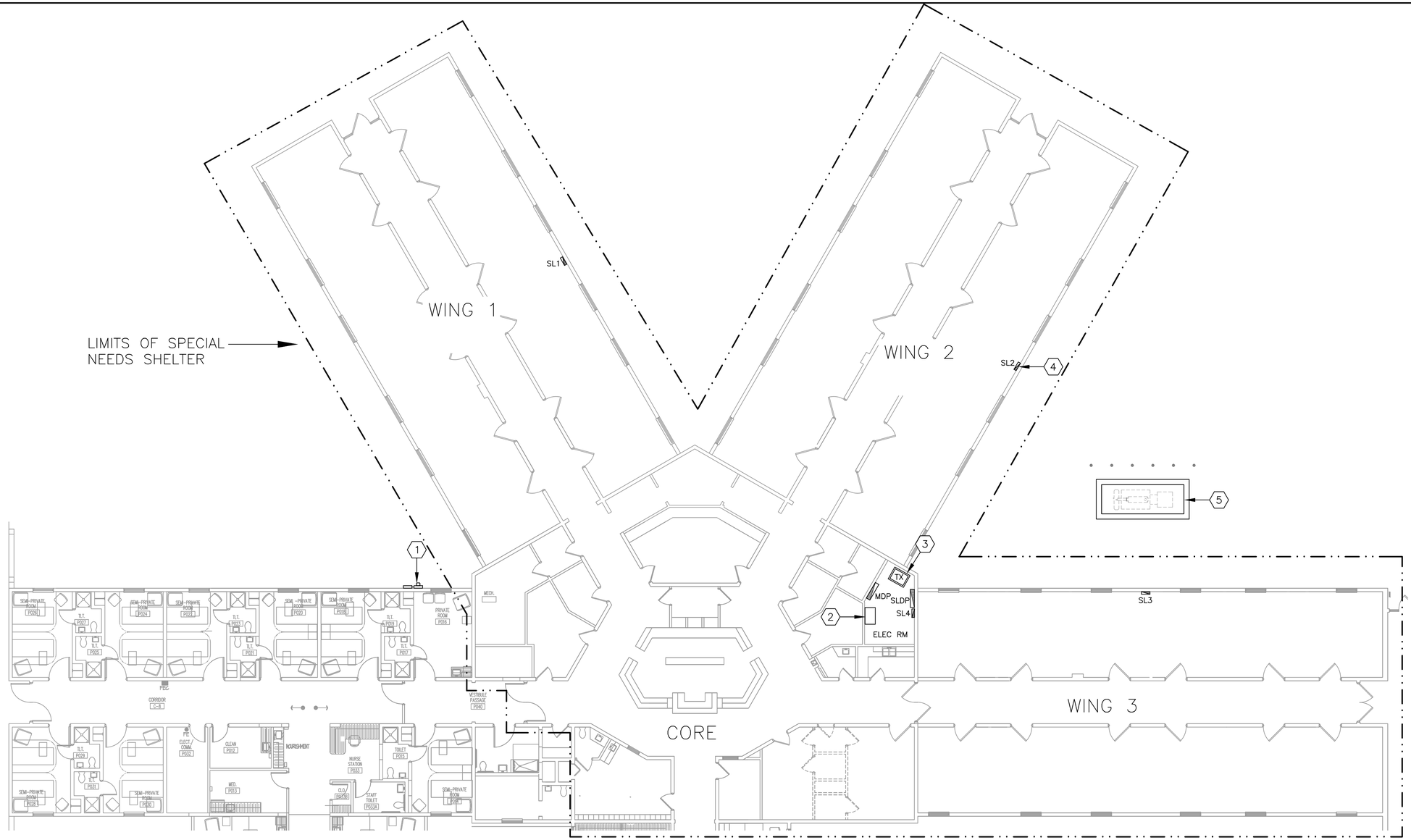
MECHANICAL PLAN

STUDY FOR GADSDEN COUNTY
SPECIAL NEEDS EMERGENCY SHELTER

23186 BLUE STAR HWY
QUINCY, FLORIDA

REVISIONS

JOB NO.	2328501
FILENAME	
DATE	01/09/24
DRAWN BY	
CHECKED BY	
DRAWING NO.	M1



ELECTRICAL PLAN

3/32" = 1'

0 10' 20'

SCALE: 3/32" = 1'-0"

SPECIFIC NOTES:

1. PROVIDE SERVICE EQUIPMENT INCLUDING CT METER SOCKET AND ENCLOSURE AND 600A, 480V, 3 POLE ENCLOSED CIRCUIT BREAKER IN NEMA 3R ENCLOSURE. CONFIRM LOCATION.
2. PROVIDE 600A, 480V, 4 POLE, U.L. 1008 COMPLIANT AUTOMATIC TRANSFER SWITCH (ATS) WITH BYPASS, WITH A 65K SYMMETRICAL AMPS SHORT CIRCUIT RATING. CONFIRM LOCATION. BASIS OF DESIGN FOR THE TRANSFER SWITCH IS ASCO 4000 AUTOMATIC TRANSFER SWITCH. **IMPORTANT:** MAINTAIN ALL REQUIRED WORKING CLEARANCES FOR SWITCH. PROVIDE SEPARATE CONDUITS AND CABLING FOR CONTROL CIRCUITS AND REMOTE ANNUNCIATOR (NOT SHOWN).
3. PROVIDE 150 KVA, 480 – 208Y/277V DRY TRANSFORMER 'TX–S'.
4. PROVIDE 225A, 208Y/120V PANEL PER PANEL SCHEDULE ON SHEET E1. CONFIRM EXACT LOCATION (TYP. OF 4).
5. PROVIDE A NEW 300KW / 375KVA, 480Y/277 VOLT DIESEL GENERATOR WITH 150 MPH RATED ALUMINUM ENCLOSURE AND 72 HOUR SUB–BASE TANK. CONFIRM LOCATION.

STUDY DRAWING - NOT FOR CONSTRUCTION

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ELECTRICAL PLAN

STUDY FOR GADSDEN COUNTY
SPECIAL NEEDS EMERGENCY SHELTER

23186 BLUE STAR HWY

QUINCY, FLORIDA

REVISIONS

JOB NO.	2328501
FILENAME	
DATE	01/09/24
DRAWN BY	
CHECKED BY	
DRAWING NO.	E1

LOCATION: ELEC RM
FED BY: ATS–S

PANEL - MDP

TYPE: SURFACE MT, NEMA 1
MAIN CB: MLO FRAME:
VOLTAGE: 480 /277V, 3PH, 4 WIRE

MAIN BUS RATING: 600A
TYPE: BOLT–ON
MINIMUM AIC: 65K

DEVICE NO.	DEVICE AMPS TRIP	DEVICE POLES	BRANCH CIRCUIT WIRE	GRND	COND. (IN)	NOTES	SERVING	PHASE LOAD (KVA) A	B	C	BRANCH CIRCUIT SERVING	NOTES	COND. (IN)	GRND	WIRE	DEVICE POLES	DEVICE AMPS TRIP	DEVICE NO.
1	20	1	12	12	1/2		LTS, CORR	2.8			3.9			CU–1		1	12	12	3	30	2
3	20	1	12	12	1/2		LTS, WING		2.8			3.9		" "							4
5	20	1	12	12	1/2		LTS, WING			2.8			3.9	" "							6
7	20	1	12	12	1/2		LTS, WING	2.8			2.2			DOAS–1		3/4	12	12	3	15	8
9	20	1					SPARE					2.2		" "							10
11	20	1					SPARE						2.2	" "							12
13	20	1	12	12	1/2		LTS, PERIMETER	0.4			4.7			HP–1		1	10	10	3	35	14
15							SPACE					4.7		" "							16
17							SPACE						4.7	" "							18
19							SPACE				2.3			AHU–1		3/34	12	12	3	15	20
21							SPACE					2.3		" "							22
23							SPACE						2.3	" "							24
25							SPACE				6.7			DUCT HEATER		3/4	10	10	3	30	26
27							SPACE					6.7		" "							28
29							SPACE						6.7	" "							30
31							MISC LOADS	17.0						SPACE							32
33							" "		17.0					SPACE							34
35							" "			17.0				SPACE							36
37	225	3					PANEL 'SLDP' (VIA TX–S)	42.5						SPD					3	30	38
39							" "		38.1					" "							40
41							" "			38.8				" "							42

* NOTE:

65.5 57.9 58.6 19.8 19.8 19.8

TOTAL CONNECTED LOAD: 241.5 KVA
TOTAL DEMAND LOAD: 244.4 KVA

LOCATION: ELEC RM
FED BY: TX–S

PANEL - SLDP

TYPE: SURFACE MT, NEMA 1
MAIN CB: 500A FRAME: 600A
VOLTAGE: 208 /120V, 3PH, 4 WIRE

MAIN BUS RATING: 400A
TYPE: BOLT–ON
MINIMUM AIC: 42K

DEVICE NO.	DEVICE AMPS TRIP	DEVICE POLES	BRANCH CIRCUIT WIRE	GRND	COND. (IN)	NOTES	SERVING	PHASE LOAD (KVA) A	B	C	BRANCH CIRCUIT SERVING	NOTES	COND. (IN)	GRND	WIRE	DEVICE POLES	DEVICE AMPS TRIP	DEVICE NO.
1	150	3					PANEL 'SL1'	9.4			11.1			PANEL 'SL3'					3	150	2
3							" "		6.1			10.7		" "							4
5							" "			8.5			10.1	" "							6
7	150	3					PANEL 'SL2'	11.1			11.1			PANEL 'SL4'					3	150	8
9							" "		10.7			10.7		" "							10
11							" "			10.1			10.1	" "							12
13																					14
15																					16
17																					18
19																					20
21																					22
23																					24
25														SPD					3	30	26
27														" "							28
29														" "							30

* NOTE:

20.4 16.8 18.6 22.1 21.3 20.2

TOTAL CONNECTED LOAD: 119.4 KVA
TOTAL DEMAND LOAD: 119.4 KVA

LOCATION: ELEC RM, CORE
FED BY: PNL SLDP

PANEL - SL1

TYPE: SURFACE MT, NEMA 1
MAIN CB: FRAME:
VOLTAGE: 208 /120V, 3PH, 4 WIRE

MAIN BUS RATING: 225A
TYPE: BOLT–ON
MINIMUM AIC: 22K

DEVICE NO.	DEVICE AMPS TRIP	DEVICE POLES	BRANCH CIRCUIT WIRE	GRND	COND. (IN)	NOTES	SERVING	PHASE LOAD (KVA) A	B	C	BRANCH CIRCUIT SERVING	NOTES	COND. (IN)	GRND	WIRE	DEVICE POLES	DEVICE AMPS TRIP	DEVICE NO.
1	20	1	12	12	1/2		RECP	1.2			0.3			EXHAUST FAN		1/2	12	1	1	15	2
3	20	1	12	12	1/2		RECP		1.2					SPARE							4
5	20	1	12	12	1/2		RECP			1.2				SPARE							6
7	20	1	12	12	1/2		RECP	1.2						SPARE							8
9	20	1	12	12	1/2		RECP		1.2					SPACE							10
11	20	1	12	12	1/2		RECP			1.2				SPACE							12
13	20	1	12	12	1/2		RECP	1.2						SPACE							14
15	20	1	12	12	1/2		SPARE		1.2					SPACE							16
17	20	1	12	12	1/2		REFRIG			1.2				SPACE							18
19	20	1	12	12	1/2		REFRIG	1.2						SPACE							20
21	20	1	12	12	1/2		FREEZER		1.2					SPACE							22
23	20	1	12	12	1/2		FREEZER			1.2				SPACE							24
25	20	1	12	12	1/2		MICROWAVE	1.0						SPACE							26
27	20	1	12	12	1/2		MICROWAVE		1.0					SPACE							28
29	20	1	12	12	1/2		MICROWAVE			1.0				SPACE							30
31	20	1	12	12	1/2		MICROWAVE	1.0						SPACE							32
33							SPACE							SPACE							34
35							SPACE							SPACE							36
37							SPACE							SPACE							38
39	20	1	12	12	1/2		EWC							SPACE							40
41	30	2	10	10	3/4		WATER HEATER			2.3				SPACE							42
43							" "	2.3						SPACE							44
45							SPACE							SPACE							46
47							SPACE							SPACE							48
49							SPACE							SPD					3	30	50
51	20	1	1	12	1/2		TELECOM BOARD		0.3					" "							52
53	20	1	12	12	1/2		FIRE ALARM SYS			0.4				" "							54

* NOTE:

9.1 6.1 8.5 0.3 0.0 0.0

TOTAL CONNECTED LOAD: 23.9 KVA
TOTAL DEMAND LOAD: 23.9 KVA

LOCATION: ELEC RM, WEST WING
FED BY: PNL SLDP

PANEL - SL2

TYPE: SURFACE MT, NEMA 1
MAIN CB: FRAME:
VOLTAGE: 208 /120V, 3PH, 4 WIRE

MAIN BUS RATING: 225A
TYPE: BOLT–ON
MINIMUM AIC: 22K

DEVICE NO.	DEVICE AMPS TRIP	DEVICE POLES	BRANCH CIRCUIT WIRE	GRND	COND. (IN)	NOTES	SERVING	PHASE LOAD (KVA) A	B	C	BRANCH CIRCUIT SERVING	NOTES	COND. (IN)	GRND	WIRE	DEVICE POLES	DEVICE AMPS TRIP	DEVICE NO.
1	20	1	12	12	1/2		RECP, SPECIAL NEEDS	1.2			0.5			PTHP 2A		1/2	1	12	2	15	2
3	20	1	12	12	1/2		RECP, SPECIAL NEEDS		1.2			0.5		" "							4
5	20	1	12	12	1/2		RECP, SPECIAL NEEDS			1.2			0.5	PTHP 2B		1/2	1	12	2	15	6
7	20	1	12	12	1/2		RECP, SPECIAL NEEDS	1.2			0.5			" "							8
9	20	1	12	12	1/2		RECP, SPECIAL NEEDS		1.2			0.5		PTHP 2C		1/2	1	12	2	15	10
11	20	1	12	12	1/2		RECP, SPECIAL NEEDS			1.2			0.5	" "							12
13	20	1	12	12	1/2		RECP, SPECIAL NEEDS	1.2			0.5			PTHP 2D		1/2	1	12	2	15	14
15	20	1	12	12	1/2		RECP, SPECIAL NEEDS		1.2			0.5		" "							16
17	20	1	12	12	1/2		RECP, SPECIAL NEEDS			1.2			0.5	PTHP 2E		1/2	1	12	2	15	18
19	20	1	12	12	1/2		RECP, SPECIAL NEEDS	1.2			0.5			" "							20
21	20	1	12	12	1/2		RECP, SPECIAL NEEDS		1.2			0.5		PTHP 2F		1/2	1	12	2	15	22
23	20	1	12	12	1/2		RECP, SPECIAL NEEDS			1.2			0.5	" "							24
25	20	1	12	12	1/2		RECP	0.5			0.5			PTHP 2G		1/2	1	12	2	15	26
27	20	1	12	12	1/2		RECP		0.5			0.5		" "							28
29	20	1	12	12	1/2		RECP			0.5			0.5	PTHP 2H		1/2	1	12	2	15	30
31	20	1	12	12	1/2		RECP	0.5			0.5			" "							32
33	20	1	12	12	1/2		RECP		0.5			0.5		PTHP 2I		1/2	1	12	2	15	34
35	20	1	12	12	1/2		RECP			0.5			0.5	" "							36
37	20	1	12	12	1/2		RECP	0.5			0.5			PTHP 2J		1/2	1	12	2	15	38
39	20	1	12	12	1/2		RECP		0.5			0.5		" "							40
41	20	1	12	12	1/2		SPARE						0.5	PTHP 2K		1/2	1	12	2	15	42
43	15	1	12	12	1/2		EX FAN(1/8 HP)	0.4			0.5			" "							44
45							SPACE					0.5		PTHP 2L		1/2	1	12	2	15	46
47							SPACE						0.5	" "							48
49							SPACE							SPD					3	30	50
51							SPACE							" "							52
53							SPACE							" "							54

6.8 6.4 5.9 4.2 4.2 4.2

TOTAL CONNECTED LOAD: 31.8 KVA
TOTAL DEMAND LOAD: 31.8 KVA

LOCATION: ELEC RM, EAST WING
FED BY: PNL SLDP

PANEL - SL3

TYPE: SURFACE MT, NEMA 1
MAIN CB: FRAME:
VOLTAGE: 208 /120V, 3PH, 4 WIRE

MAIN BUS RATING: 225A
TYPE: BOLT–ON
MINIMUM AIC: 22K

DEVICE NO.	DEVICE AMPS TRIP	DEVICE POLES	BRANCH CIRCUIT WIRE	GRND	COND. (IN)	NOTES	SERVING	PHASE LOAD (KVA) A	B	C	BRANCH CIRCUIT SERVING	NOTES	COND. (IN)	GRND	WIRE	DEVICE POLES	DEVICE AMPS TRIP	DEVICE NO.
1	20	1	12	12	1/2		RECP, SPECIAL NEEDS	1.2			0.5			PTHP 3A		1/2	1	12	2	15	2
3	20	1	12	12	1/2		RECP, SPECIAL NEEDS		1.2			0.5		" "							4
5	20	1	12	12	1/2		RECP, SPECIAL NEEDS			1.2			0.5	PTHP 2B		1/2	1	12	2	15	6
7	20	1	12	12	1/2		RECP, SPECIAL NEEDS	1.2			0.5			" "							8
9	20	1	12	12	1/2		RECP, SPECIAL NEEDS		1.2			0.5		PTHP 3C		1/2	1	12	2	15	10
11	20	1	12	12	1/2		RECP, SPECIAL NEEDS			1.2			0.5	" "							12
13	20	1	12	12	1/2		RECP, SPECIAL NEEDS	1.2			0.5			PTHP 3D		1/2	1	12	2	15	14
15	20	1	12	12	1/2		RECP, SPECIAL NEEDS		1.2			0.5		" "							16
17	20	1	12	12	1/2		RECP, SPECIAL NEEDS			1.2			0.5	PTHP 3E		1/2	1	12	2	15	18
19	20	1	12	12	1/2		RECP, SPECIAL NEEDS	1.2			0.5			" "							20
21	20	1	12	12	1/2		RECP, SPECIAL NEEDS		1.2			0.5		PTHP 3F		1/2	1	12	2	15	22
23	20	1	12	12	1/2		RECP, SPECIAL NEEDS			1.2			0.5	" "							24
25	20	1	12	12	1/2		RECP	0.5			0.5			PTHP 3G		1/2	1	12	2	15	26
27	20	1	12	12	1/2		RECP		0.5			0.5		" "							28
29	20	1	12	12	1/2		RECP			0.5			0.5	PTHP 3H		1/2	1	12	2	15	30
31	20	1	12	12	1/2		RECP	0.5			0.5			" "							32
33	20	1	12	12	1/2		RECP		0.5			0.5		PTHP 3I		1/2	1	12	2	15	34
35	20	1	12	12	1/2		RECP			0.5			0.5	" "							36
37	20	1	12	12	1/2		RECP	0.5			0.5			PTHP 3J		1/2	1	12	2	15	38
39	20	1	12	12	1/2		RECP		0.5			0.5		" "							40
41	20	1	12	12	1/2		SPARE						0.5	PTHP 3K		1/2	1	12	2	15	42
43	15	1	12	12	1/2		EX FAN(1/8 HP)	0.4			0.5			" "							44
45							SPACE					0.5		PTHP 3L		1/2	1	12	2	15	46
47							SPACE						0.5	" "							48
49							SPACE							SPD					3	30	50
51							SPACE							" "							52
53							SPACE							" "							54

6.8 6.4 5.9 4.2 4.2 4.2

TOTAL CONNECTED LOAD: 31.8 KVA
TOTAL DEMAND LOAD: 31.8 KVA

LOCATION: ELEC RM, WING B
FED BY: PNL SLDP

PANEL - SL4

TYPE: SURFACE MT, NEMA 1
MAIN CB: FRAME:
VOLTAGE: 208 /120V, 3PH, 4 WIRE

MAIN BUS RATING: 225A
TYPE: BOLT–ON
MINIMUM AIC: 22K

DEVICE NO.	DEVICE AMPS TRIP	DEVICE POLES	BRANCH CIRCUIT WIRE	GRND	COND. (IN)	NOTES	SERVING	PHASE LOAD (KVA) A	B	C	BRANCH CIRCUIT SERVING	NOTES	COND. (IN)	GRND	WIRE	DEVICE POLES	DEVICE AMPS TRIP	DEVICE NO.
1	20	1	12	12	1/2		RECP, SPECIAL NEEDS	1.2			0.5			PTHP 4A		1/2	1	12	2	15	2
3	20	1	12	12	1/2		RECP, SPECIAL NEEDS		1.2			0.5		" "							4
5	20	1	12	12	1/2		RECP, SPECIAL NEEDS			1.2			0.5	PTHP 4B		1/2	1	12	2	15	6
7	20	1	12	12	1/2		RECP, SPECIAL NEEDS	1.2			0.5			" "							8
9	20	1	12	12	1/2		RECP, SPECIAL NEEDS		1.2			0.5		PTHP 4C		1/2	1	12	2	15	10
11	20	1	12	12	1/2		RECP, SPECIAL NEEDS			1.2			0.5	" "							12
13	20	1	12	12	1/2		RECP, SPECIAL NEEDS	1.2			0.5			PTHP 4D		1/2	1	12	2	15	14
15	20	1	12	12	1/2		RECP, SPECIAL NEEDS		1.2			0.5		" "							16
17	20	1	12	12	1/2		RECP, SPECIAL NEEDS			1.2			0.5	PTHP 4E		1/2	1	12	2	15	18
19	20	1	12	12	1/2		RECP, SPECIAL NEEDS	1.2			0.5			" "							20
21	20	1	12	12	1/2		RECP, SPECIAL NEEDS		1.2			0.5		PTHP 4F		1/2	1	12	2	15	22
23	20	1	12	12	1/2		RECP, SPECIAL NEEDS			1.2			0.5	" "							24
25	20	1	12	12	1/2		RECP	0.5			0.5			PTHP 4G		1/2	1	12	2	15	26
27	20	1	12	12	1/2		RECP		0.5			0.5		" "							28
29	20	1	12	12	1/2		RECP			0.5			0.5	PTHP 4H		1/2	1	12	2	15	30
31	20	1	12	12	1/2		RECP	0.5			0.5			" "							32
33	20	1	12	12	1/2		RECP		0.5			0.5		PTHP 4I		1/2	1	12	2	15	34
35	20	1	12	12	1/2		RECP			0.5			0.5	" "							36
37	20	1	12	12	1/2		RECP	0.5			0.5			PTHP 4J		1/2	1	12	2	15	38
39	20	1	12	12	1/2		RECP		0.5			0.5		" "							40
41	20	1	12	12	1/2		SPARE						0.5	PTHP 4K		1/2	1	12	2	15	42
43	15	1	12	12	1/2		EX FAN(1/8 HP)	0.4			0.5			" "							44
45							SPACE					0.5		PTHP 4L		1/2	1	12	2	15	46
47							SPACE						0.5	" "							48
49							SPACE							SPD					3	30	50
51							SPACE							" "							52
53							SPACE							" "							54

6.8 6.4 5.9 4.2 4.2 4.2

TOTAL CONNECTED LOAD: 31.8 KVA
TOTAL DEMAND LOAD: 31.8 KVA

STUDY DRAWING - NOT FOR CONSTRUCTION

Simes & Rosch, LLC
CONSULTING ENGINEERS
7411 Fullerton Street, Suite 250
Jacksonville, FL 32256
Ph: (904) 260-3031 Fax: (904) 260-9273
S&R ENGINEERING
FL Cert. of Auth. 8107

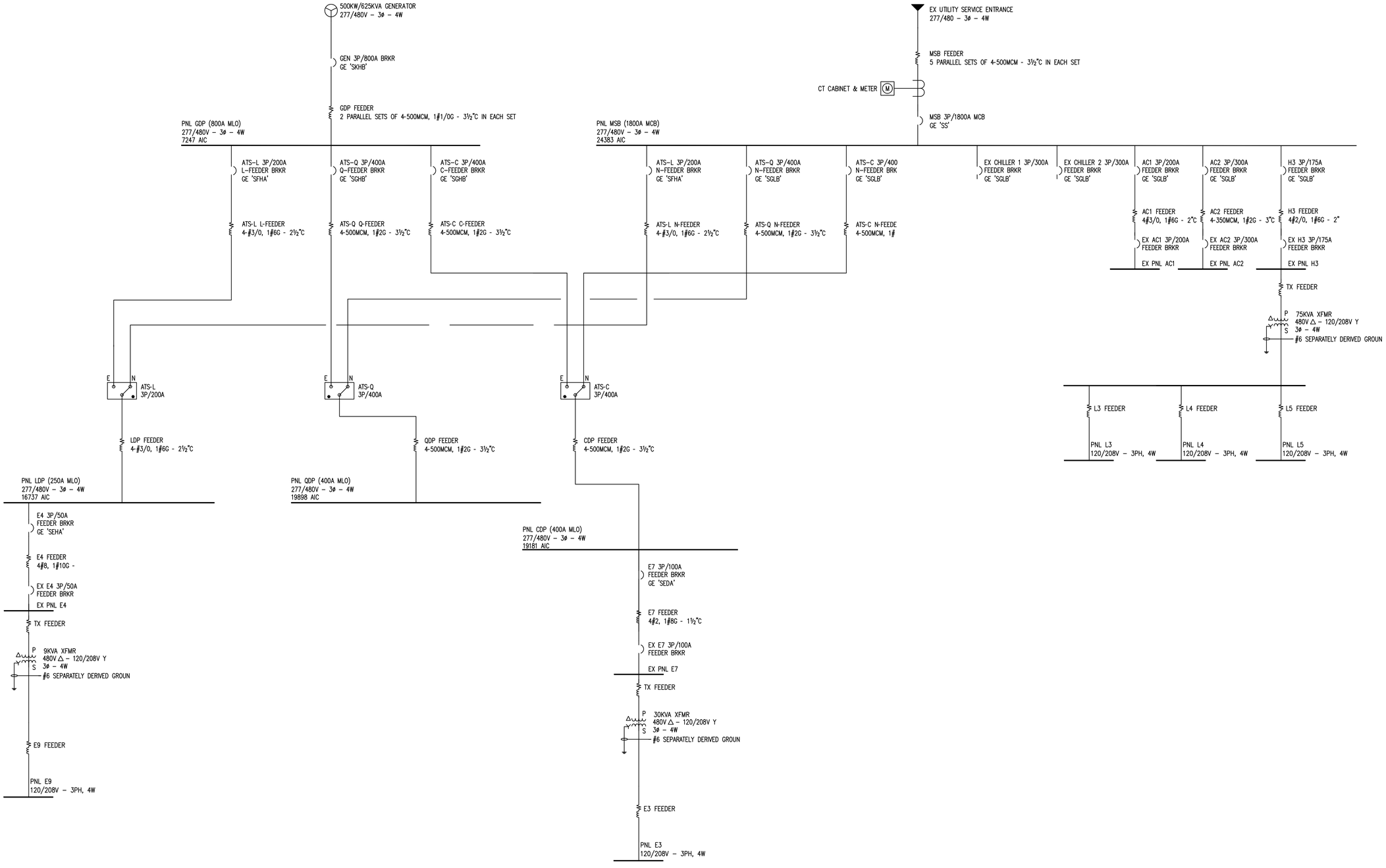
ELECTRICAL SCHEDULES

STUDY FOR GADSDEN COUNTY
SPECIAL NEEDS EMERGENCY SHELTER

23186 BLUE STAR HWY
QUINCY, FLORIDA

REVISIONS

JOB NO. 2328501
FILENAME
DATE 01/09/24
DRAWN BY
CHECKED BY
DRAWING NO. E2



PARTIAL EXISTING SINGLE LINE DIAGRAM
EMERGENCY FACILTY

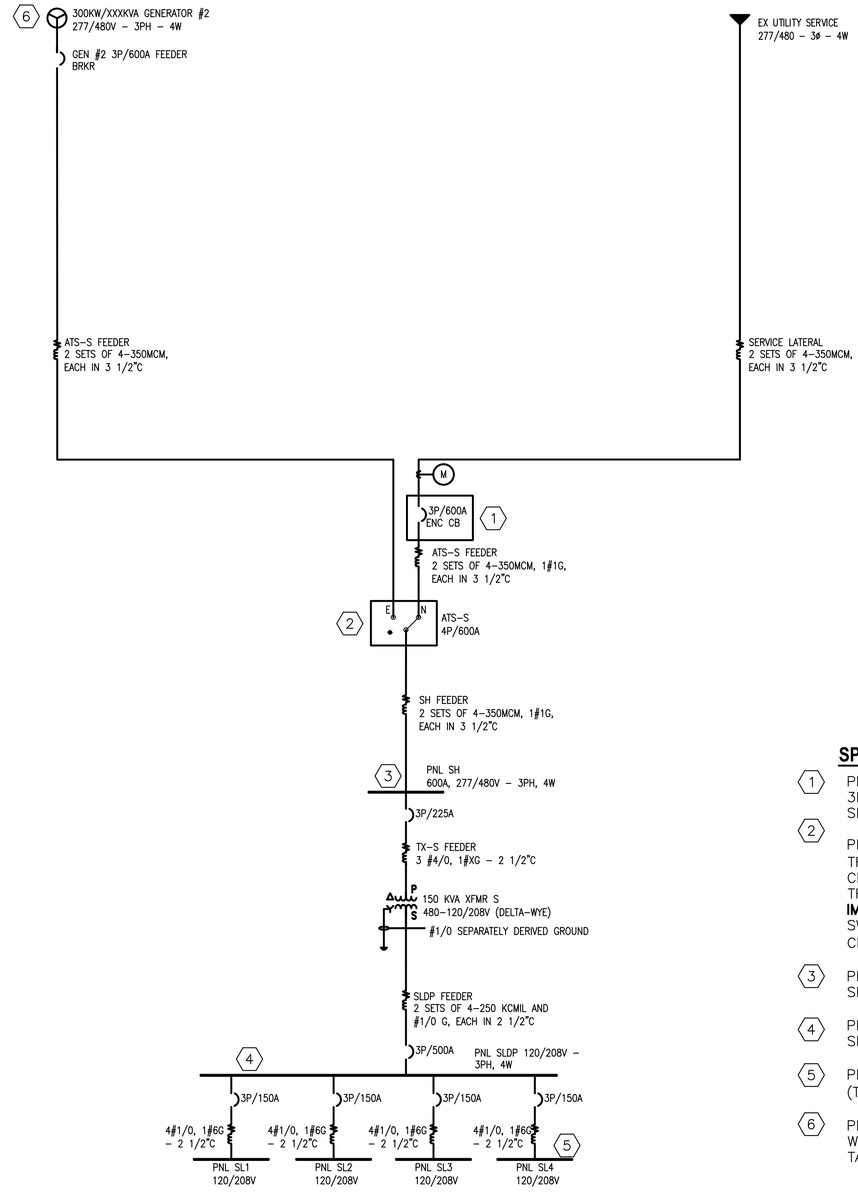
STUDY DRAWING - NOT FOR CONSTRUCTION

Simes & Rosch, LLC
CONSULTING ENGINEERS
7411 Fullerton Street, Suite 250
Jacksonville, FL 32256
Ph: (904) 260-3031 Fax: (904) 260-9273
S&R ENGINEERING
FL Cert. of Auth. 8107

PARTIAL EX. SINGLE LINE DIAGRAM, EM FACILITY
STUDY FOR GADSDEN COUNTY
SPECIAL NEEDS EMERGENCY SHELTER
23186 BLUE STAR HWY
QUINCY, FLORIDA

REVISIONS

JOB NO.	2328501
FILENAME	
DATE	01/09/24
DRAWN BY	
CHECKED BY	
DRAWING NO.	E3



SPECIFIC NOTES:

1. PROVIDE 600A, 480V, 3 POLE ENCLOSED CIRCUIT BREAKER IN A NEMA 3R ENCLOSURE AND CT METER SOCKET AND ENCLOSURE. BREAKER SHALL BE SERVICE–RATED.
2. PROVIDE 600A, 480V, 4 POLE, U.L. 1008 COMPLIANT AUTOMATIC TRANSFER SWITCH (ATS) WITH A 65K SYMMETRICAL AMPS SHORT CIRCUIT RATING. CONFIRM LOCATION. BASIS OF DESIGN FOR THE TRANSFER SWITCH IS ASCO 4000 AUTOMATIC TRANSFER SWITCH. **IMPORTANT:** MAINTAIN ALL REQUIRED WORKING CLEARANCES FOR SWITCH. PROVIDE SEPARATE CONDUITS AND CABLING FOR CONTROL CIRCUITS AND REMOTE ANNUNCIATOR (NOT SHOWN).
3. PROVIDE 600A, 480Y/277V PANEL 'MDP' PER PANEL SCHEDULE ON SHEET E1.
4. PROVIDE 600A, 208Y/120V PANEL 'SLDP' PER PANEL SCHEDULE ON SHEET E1.
5. PROVIDE 225A, 208Y/120V PANEL PER PANEL SCHEDULE ON SHEET E1 (TYP. OF 4).
6. PROVIDE A NEW 300KW / 375KVA, 480Y/277 VOLT DIESEL GENERATOR WITH 150 MPH RATED ALUMINUM ENCLOSURE AND 72 HOUR SUB–BASE TANK.

SINGLE LINE DIAGRAM, SHELTER

STUDY DRAWING - NOT FOR CONSTRUCTION

Simes & Rosch, LLC
CONSULTING ENGINEERS
7411 Fullerton Street, Suite 250
Jacksonville, FL 32256
Ph: (904) 260-3031 Fax: (904) 260-9273
S&R ENGINEERING
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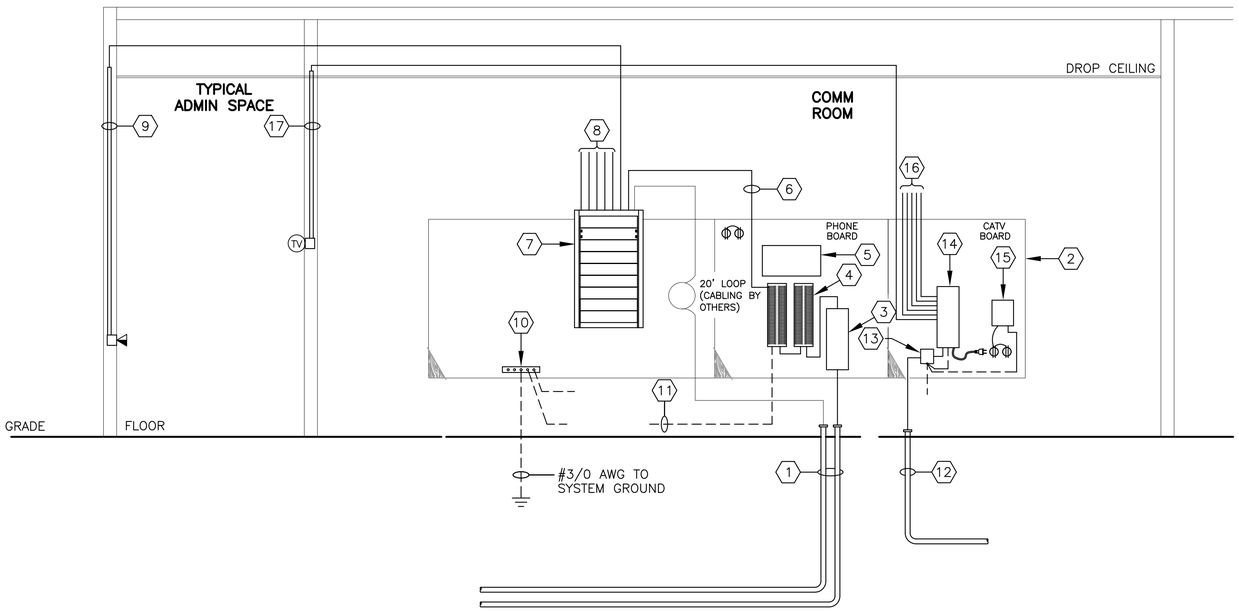
SINGLE LINE DIAGRAM, SHELTER
STUDY FOR GADSDEN COUNTY
SPECIAL NEEDS EMERGENCY SHELTER
23186 BLUE STAR HWY
QUINCY, FLORIDA

REVISIONS

JOB NO.	2328501
FILENAME	
DATE	01/09/24
DRAWN BY	
CHECKED BY	
DRAWING NO.	E4

GENERAL NOTES:

1. ALL WORK SHALL CONFORM TO THE GADSDEN COUNTY INFORMATION TECHNOLOGY STANDARDS AND GUIDELINES, WHICH TAKES PRECEDENCE OVER THESE DESIGN DOCUMENTS.



TELECOMMUNICATIONS RISER DIAGRAM (XX / EX.X)

SCALE: NTS

SPECIFIC NOTES:

1. PROVIDE 2–4" CONDUITS WITH PULLWIRE VOICE AND DATA. STUB UP AT PHONEBOARD. PROVIDE 4–1" INNERDUCT WITH PULLWIRE IN ONE OF THE CONDUITS FOR FIBER (FIBER PROVIDED BY OTHERS).
2. PROVIDE 4'X8'X3/4" A–C GRADE PLYWOOD BACKBOARD PAINTED WITH FIRE RESISTANT PAINT TO MATCH WALL. BACKBOARD SHALL BE USED FOR TELECOMMUNICATIONS AND CATV DISTRIBUTION EQUIPMENT.
3. PROVIDE BUILDING ENTRANCE PROTECTOR WITH SURGE SUPPRESSION.
4. PROVIDE PUNCH–DOWN BLOCKS AS NECESSARY TO ACCOMMODATE DISTRIBUTION WIRING.
5. OWNER PROVIDED PHONE SYSTEM EQUIPMENT.
6. PROVIDE MULTIPLE PAIR CAT 3 COPPER VOICE FEEDER CABLE TO DISTRIBUTION RACKS AND TERMINATE ON RJ–45 CAT 6 PATCH PANELS.
7. PROVIDE 19" WALL–MOUNT RACK FOR CUSTOMER PROVIDED ACTIVE EQUIPMENT. PROVIDE 48 PORT RJ–45 CAT 6 PATCH PANELS AS NECESSARY TO TERMINATE ALL COPPER PAIRS AND HORIZONTAL CABLING.
8. PROVIDE HORIZONTAL CAT 6 CABLING TO WORKSTATION OUTLETS.
9. PROVIDE 1" CONDUIT IN WALL FOR VOICE AND DATA CABLING. STUB UP 6" ABOVE CEILING AND PROVIDE INSULATED BUSHING.
10. PROVIDE COPPER TELECOMMUNICATIONS GROUNDING BAR.
11. PROVIDE #6 AWG COPPER GROUND WIRE FROM THE GROUND TERMINAL TO THE GROUNDING BAR (TYP.).
12. PROVIDE 4" CONDUIT FOR CABLE TV CABLING FROM POINT OF CONNECTION 5' OUTSIDE OF BUILDING TO CATV BACKBOARD IN ELECTRICAL ROOM. SERVICE CABLING IS PROVIDED BY OTHERS.
13. PROVIDE COAXIAL CABLE SURGE PROTECTOR WITH TYPE "F" CONNECTORS.
14. PROVIDE BACKBOARD MOUNTED BROADBAND DISTRIBUTION AMPLIFIER. SIZE OF AMPLIFIER TO BE DETERMINED BY CATV SYSTEM CONTRACTOR.
15. PROVIDE 120V, 15A, LINE VOLTAGE SURGE ARRESTER.
16. PROVIDE RG–6 CABLING PER SPECIFICATIONS FOR CATV.
17. PROVIDE 3/4" CONDUIT IN WALL FOR CATV CABLING. STUB UP 6" ABOVE CEILING AND PROVIDE INSULATED BUSHING.

STUDY DRAWING - NOT FOR CONSTRUCTION

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TELECOMMUNICATIONS RISER DIAGRAM
STUDY FOR GADSDEN COUNTY
SPECIAL NEEDS EMERGENCY SHELTER
23186 BLUE STAR HWY
QUINCY, FLORIDA

REVISIONS

JOB NO.	2328501
FILENAME	
DATE	01/09/24
DRAWN BY	
CHECKED BY	
DRAWING NO.	E5

PRELIMINARY COST DATA

	MEP COST ESTIMATE	DATE PREPARED 11-Jan-24	SHEET 1 OF 2
CUSTOMER: **GADSDEN COUNTY**	CONSTRUCTION CONTRACT NO.		IDENTIFICATION NO.
PROJECT TITLE **ENGINEERING STUDY, SPECIAL NEEDS SHELTER**	ESTIMATED BY DAVE SIMES AND ART HILL		CATEGORY CODE
	STATUS OF DESIGN ___ 35% ___ 100% ___ FINAL ___ OTHER		JOB ORDER NO.

ITEM DESCRIPTION	QUANTITY		MATERIAL COST		LABOR COST		ENGINEERING ESTIMATE	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
ELECTRICAL:								
300 KW GENERATOR, ATS, AND ACCESSORIES	1	LS	$288,000.00	$288,000.00	$35,000.00	$35,000.00	$323,000.00	$323,000.00
ELECTRICAL DISTRIBUTION	16000	SF	$13.00	$208,000.00	$11.00	$176,000.00	$24.00	$384,000.00
LIGHTING, 2' x 4' LED FIXTURES	200	EA	$245.00	$49,000.00	$150.00	$30,000.00	$395.00	$79,000.00
TELECOMMUNICATIONS	1	LS	$12,000.00	$12,000.00	$18,000.00	$18,000.00	$30,000.00	$30,000.00
FIRE ALARM SYSTEM	1	LS	$19,000.00	$19,000.00	$24,000.00	$24,000.00	$43,000.00	$43,000.00
SECURITY SYSTEMS (RACEWAY AND BOXES ONLY)	1	LS	$3,900.00	$3,900.00	$4,500.00	$4,500.00	$8,400.00	$8,400.00
MECHANICAL:								
DOAS-1 & CU-1	1	EA	$55,000.00	$55,000.00	$40,000.00	$40,000.00	$95,000.00	$95,000.00
AHU-1 &HP-1	1	EA	$38,000.00	$38,000.00	$35,000.00	$35,000.00	$73,000.00	$73,000.00
PTHP'S	36	EA	$2,000.00	$72,000.00	$1,000.00	$36,000.00	$3,000.00	$108,000.00
DUCTWORK & AIR DISTRIBUTION	1	LS	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$40,000.00	$40,000.00
PLUMBING:	1	LS	$20,000.00	$20,000.00	$40,000.00	$40,000.00	$60,000.00	$60,000.00
SUBTOTAL:				$784,900.00		$458,500.00		$1,243,400.00

	MEP COST ESTIMATE	DATE PREPARED 14-May-09	SHEET 2 OF 2
CUSTOMER: **GADSDEN COUNTY**	CONSTRUCTION CONTRACT NO.		IDENTIFICATION NO.
	ESTIMATED BY		CATEGORY CODE
PROJECT TITLE **ENGINEERING STUDY, SPECIAL NEEDS SHELTER**	STATUS OF DESIGN ___ 35% ___ 100% ___ FINAL ___ OTHER		JOB ORDER NO.

ITEM DESCRIPTION	QUANTITY		MATERIAL COST		LABOR COST		ENGINEERING ESTIMATE	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
SUBTOTAL FIRST PAGE:				$784,900.00		$458,500.00		$1,243,400.00
SALES TAX 7%				$54,943.00				$54,943.00
LABOR TAX, INSURANCE, FRINGE 35%						$160,475.00		$160,475.00
SUBTOTAL								$1,458,818.00
PROFIT & OVERHEAD 10%								$145,881.80
SUBTOTAL								$1,604,699.80
CONTINGENCY @ 10 PERCENT:								$160,469.98
GRAND TOTAL:								**$1,765,170**

PHOTOS

Photo 1, Typical Wing

Photo 2, Typical Corridor

Photo 3, Existing Air Cooled Chillers

Photo 4, Existing Utility Pad-Mount Transformer and CT Meter

Photo 5, Existing Main Switchboard ‘MSB’

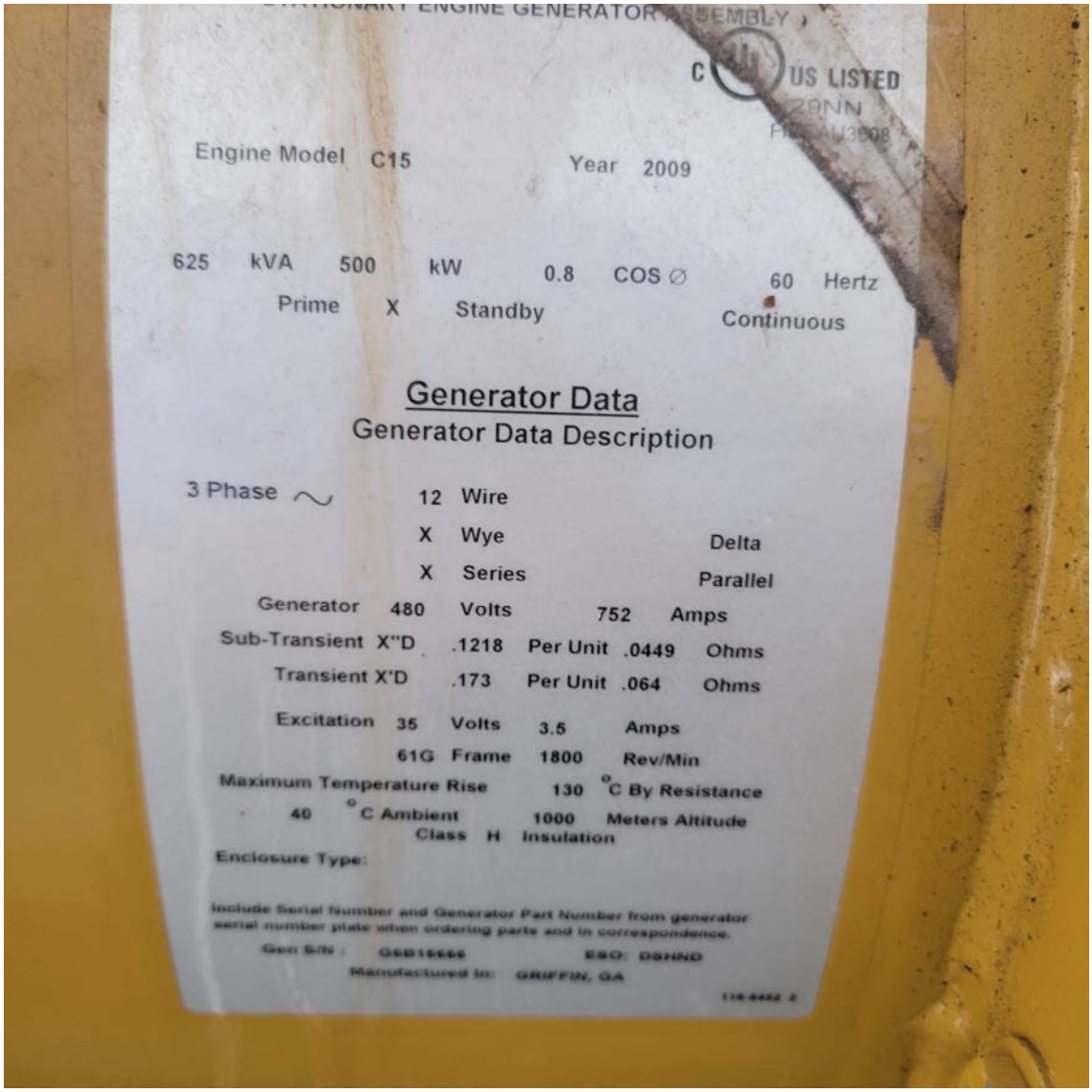


Photo 6, Existing Generator Alternator Nameplate

CALCULATIONS

PRELIMINARY GENERATOR SIZING REPORT, EXISTING GENERATOR

Project Sizing Report

Sizing Id	11026404	Electricity Supply	60 Hz 480/277 V
Project Name	Gadsden County Emergency Shelter	Connection	STAR
Customer Name	AE Engineering	Max. Ambient Temperature	77.0 F
Region	U.S.	Altitude	278.0 Ft. A.S.L
Prepared By	Adam Stone	Humidity	30%
Modified Date	5-Jan-2024	Project Description	

Load Analysis Summary

Max Transient Load Step	294.5 SkVA / 283.5 SkW
Peak Transient Load Step	548.8 SkVA / 529.1 SkW
Final Running Load	511.5 kVA / 504.0 kW / 0.99 PF
Max Running Non Linear Load	184.1 RkVA
Selection Criteria	Step 2 Peak SkW requirements
Project THDI	41.88%

Generator Set

Engine Model	(1) of C18	Nameplate Rating	550.0 ekW / 687.5 kVA / 0.8 PF
Package Model	D550GC	Site Output Rating	550 ekW / 687.5 kVA
Voltage Regulator and Slope	D350 2:1 slope;	Rating Type	Standby
Feature Code	C18DE7A	Open / Enclosure	Open
Fuel	Diesel	UL Listed	UL Listed
Sizing Methodology	Conventional	Capacity Used	91.6%
Project THDV	11.09%	Generator Set Type	Stationary

Engine

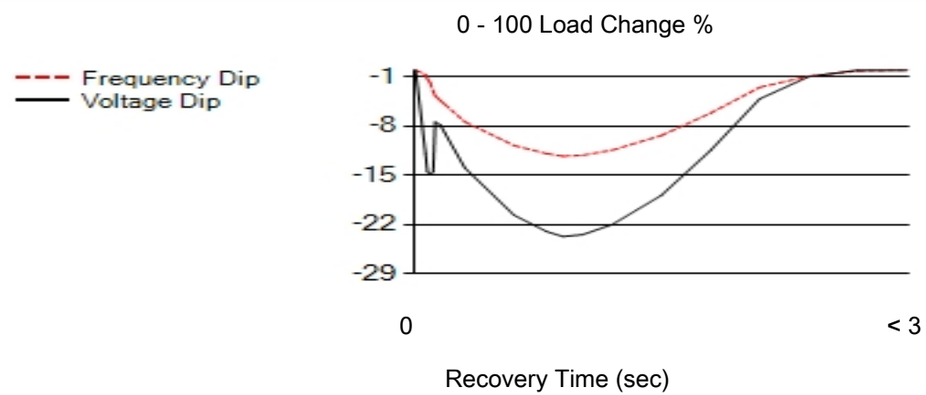
Make/Model	C18	Emissions / Certifications	EPA ESE
Aspiration	TA	Governor	ELEC
Cylinder Configuration	INLINE - 6	Aftercooler Type	ATAAC
Speed	1800 RPM	Displacement	1,106 Cubic Inch / 18 Liter

Engine Performance Number	DM8517	Bore	145
Fuel Consumption at 100% Load	39.4 gph	Stroke	183
Alternator			
Alternator Type/Frame Size	SR500 / M3173L41	Insulation Class	H
Alternator Winding Pitch	0.6667	Temperature Rise	130 C
Excitation/Winding Type	SE / RANDOM	Number Of Poles	4
Alternator Arrangement Number	6263799	Number of Leads	6
Subtransient Reactance X"d	0.0988	Rated Amps	826.9

**** See your Caterpillar dealer and/or Spec Sheet for technical information.

***** Package Power Tolerance: +/- 5%

Block Load(Only) Transient Response *			
Load Change %	FDip %	VDip %	Recovery Time (sec)
0 - 25	<5%	<5%	< 3
0 - 50	<5%	8.1	< 3
0 - 75	7.7	14.5	< 3
0 - 100	12.3	23.7	< 3



Transient Performance

Block Load (only) Transient Response values are at factory conditions with a resistive load. This information is representative of a typical Cat generator set, but is not guaranteed. Generator set block load capabilities at site conditions may vary from factory transient response test results due to site altitude, site ambient, and engine to engine variation.

Load Report

Project Name	Gadsden County Emergency Shelter	Electricity Supply	60 Hz 480/277 V
Customer Name	AE Engineering	Rating Type	Standby
Region	U.S.	Max. Ambient Temperature	77.0 F
Prepared By	Adam Stone	Altitude	278.0 Ft. A.S.L
Modified Date	5-Jan-2024	Humidity	30%
Engine Model	(1) of C18	Nameplate Rating	550.0 ekW / 687.5 kVA / 0.8 PF

Load Details		Permitted		Predicted		Transient Inrush		Running		Resultant Peak		Cumulative Running	
Load Step	Load Description	FDip	VDip	FDip	VDip	SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW
Step 1													
1.1	1x161.00 kVA - Resistive Load - ATS-C: Resistive, 3-Phase	30%	30%			161.0	161.0	161.0	161.0				
1.2	2x15.00 HP - PUMP-3 (P3), PUMP-4 (P4): NEMA, Centrifugal Pump, Soft Starter, 300% Current Limit, Intermittent , 29.1 THDI%	30%	30%			90.9	43.6	30.3	25.1				
1.3	1x78.90 kVA - CT R009: Resistive, 3-Phase	30%	30%			78.9	78.9	78.9	78.9				
	Step 1 Total	30%	30%	<5%	8.3%	294.5	283.5	265.6	265.0				
	Total Through Step 1									299.8	290.1	265.6	265.0
Step 2													
2.1	1x53.10 kVA - X-RAY R012: Resistive, 3-Phase	30%	30%			53.1	53.1	53.1	53.1				
2.2	2x5.00 HP - PUMP-5 (P5), PUMP-6 (P6): NEMA, Centrifugal Pump, Soft Starter, 300% Current Limit, Intermittent , 29.1 THDI%	30%	30%			33.7	19.2	11.2	8.9				
2.3	1x16.60 kVA - Lighting Load - ATS-C: LED Lighting, Distr. 3-Phase, Starting Power Factor: 0.75, Running Power Factor: 0.9 , 60.7 THDI%	30%	30%			19.9	14.9	16.6	14.9				
2.4	1x15.50 kVA - Lighting Load - ATS-L: LED Lighting, Distr. 3-Phase, Starting Power Factor: 0.75, Running Power Factor: 0.9 , 60.7 THDI%	30%	30%			18.6	14.0	15.5	14.0				

2.5	1x2.50 kVA - Resistive Load - ATS-L: Resistive, 3-Phase	30%	30%			2.5	2.5	2.5	2.5				
2.6	1x1.60 kVA - Resistive Load - ATS-Q: Resistive, 3-Phase	30%	30%			1.6	1.6	1.6	1.6				
2.7	1x71,652.00 BTU - RTU-1: NEMA, 3-Phase Air Conditioning, VFD, 110% Current Limit, Intermittent, Single Operating Point, 6 Pulse , 29.1 THDI%	20%	20%			0.7	0.7	7.2	6.5				
2.8	1x60,392.00 BTU - AHU-2: NEMA, 3-Phase Air Conditioning, VFD, 110% Current Limit, Intermittent, Single Operating Point, 6 Pulse , 29.1 THDI%	20%	20%			0.6	0.5	6.1	5.5				
2.9	1x113.61 BTU - AHU-1: NEMA, 3-Phase Air Conditioning, VFD, 110% Current Limit, Intermittent, Single Operating Point, 6 Pulse , 29.1 THDI%	20%	20%			0.0	0.0	0.0	0.0				
2.10	1x78.90 kW - MAC-1: Medical Load, 50 Imaging mA, 15 Imaging kV , 46.7 THDI%	10%	10%			83.1	78.9	83.1	78.9				
2.11	1x53.10 kW - MVP-1: Medical Load, 50 Imaging mA, 15 Imaging kV , 46.7 THDI%	10%	10%			55.9	53.1	55.9	53.1				
	Step 2 Total	10%	10%	<5%	7.0%	257.5	238.5	511.5	504.0				
	Total Through Step 2									530.5	517.0	511.5	504.0
Intermittent Step													
3.1	1x15.00 HP - PUMP-3 (P3), PUMP-4 (P4): NEMA, Centrifugal Pump, Soft Starter, 300% Current Limit, Intermittent , 29.1 THDI%	30%	30%			45.4	21.8	15.1	12.6				
3.2	1x15.00 HP - PUMP-3 (P3), PUMP-4 (P4): NEMA, Centrifugal Pump, Soft Starter, 300% Current Limit, Intermittent , 29.1 THDI%	30%	30%			45.4	21.8	15.1	12.6				
	Step 3 Total	10%	10%	<5%	<5%	90.9	43.6	539.3	529.2				
	Total Through Step 3									548.8	554.2	511.5	504.0
Load Analysis Summary : Generator set meets site requirements													
						Maximum Step				Maximum Peak		Final Running	
						SkVA	SkW			SkVA	SkW	kVA	kW
						294.5	283.5			548.8	529.1	511.5	504.0

Engine Room Tools Summary

Project Name	Gadsden County Emergency Shelter	Electricity Supply	60 Hz 480/277 V
Customer Name	AE Engineering	Rating Type	Standby
Region	U.S.	Max. Ambient Temperature	77.0 F
Prepared By	Adam Stone	Altitude	278.0 Ft. A.S.L
Modified Date	5-Jan-2024	Humidity	30%
Engine Model	(1) of C18	Nameplate Rating	550.0 ekW / 687.5 kVA / 0.8 PF

Fuel Tank Summary

Running Hours	hr	Fuel Tank Size	72 Hours
Oversize Factor	%	Usable Capacity	
Fuel Consumption @ 100% Load	39.40 US gal/hr		

Radiator Duct and Room Fresh Air Louver Designer Summary

Duct Dimensions from Radiator Side (Length)	98.62 in	Combustion Airflow	1,634.88 ft^3/min
Duct Dimensions from Radiator Side (Width)	73.43 in	Minimum Louver Area	0.22 ft^2
Heat Radiation from Engine & Alternator	105.34 kW	Temp Rise	15.44 Deg. F
Engine & Alternator Airflow	24,851.00 ft^3/min	Radiator Duct Area	0.11 ft^2

Exhaust Back Pressure Summary

Total Straight Pipe Length	0 ft	Exhaust Gas Flow	4,552.05 ft^3/min
Total Number Of 90 Deg Long Radius Elbow	0	Muffler Pressure Drop	
Total Number Of 90 Deg Short Radius Elbow	0	Pressure Drop in Exhaust	0.00 psi
Total Number Of 45 Deg Elbow	0	Max Allowable Pressure Drop	
Minimum Exhaust Pipe Diameter	Data coming soon		
Stack Temperature	969.08 Deg. F		
Gas Density	0.03 lb/ft^3		

Disclaimer: These engine room design calculations are intended for general information and guidance purpose only. A professional engineer, licensed in the appropriate field of engineering, should be consulted for a formal evaluation. Caterpillar disclaims all representations and warranties of any kind and shall have no liability in law or equity for damages consequential or otherwise arising from the use of these calculations.

PRELIMINARY GENERATOR SIZING REPORT, SHELTER GENERATOR

Project Sizing Report

Sizing Id	11027152	Electricity Supply	60 Hz 480/277 V
Project Name	Gadsden County Emergency Shelter - New Load Only	Connection	STAR
Customer Name	AE Engineering	Max. Ambient Temperature	77.0 F
Region	U.S.	Altitude	278.0 Ft. A.S.L
Prepared By	Adam Stone	Humidity	30%
Modified Date	4-Jan-2024	Project Description	

Load Analysis Summary

Max Transient Load Step	190.0 SkVA / 190.0 SkW
Peak Transient Load Step	334.1 SkVA / 277.0 SkW
Final Running Load	235.7 kVA / 232.0 kW / 0.98 PF
Max Running Non Linear Load	11.6 RkVA
Selection Criteria	Step 2 Peak SkW requirements
Project THDI	60.72%

Generator Set

Engine Model	(1) of C9	Nameplate Rating	300.0 ekW / 375.0 kVA / 0.8 PF
Package Model	D300GC	Site Output Rating	300 ekW / 375 kVA
Voltage Regulator and Slope	D350 2:1 slope;	Rating Type	Standby
Feature Code	C09DE61	Open / Enclosure	Open
Fuel	Diesel	UL Listed	UL Listed
Sizing Methodology	Conventional	Capacity Used	77.3%
Project THDV	3.74%	Generator Set Type	Stationary

Engine

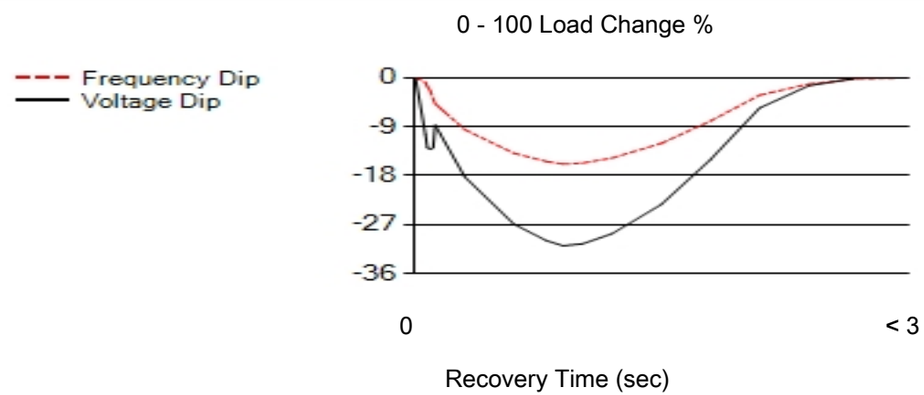
Make/Model	C9	Emissions / Certifications	EPA ESE
Aspiration	TA	Governor	ELEC
Cylinder Configuration	INLINE - 6	Aftercooler Type	ATAAC
Speed	1800 RPM	Displacement	537 Cubic Inch / 9 Liter

Engine Performance Number	DM8168	Bore	112
Fuel Consumption at 100% Load	22.4 gph	Stroke	149
Alternator			
Alternator Type/Frame Size	SR500 / M2774L4	Insulation Class	H
Alternator Winding Pitch	0.6667	Temperature Rise	105 C
Excitation/Winding Type	SE / RANDOM	Number Of Poles	4
Alternator Arrangement Number	5652322	Number of Leads	12
Subtransient Reactance X"d	0.0993	Rated Amps	451.1

**** See your Caterpillar dealer and/or Spec Sheet for technical information.

***** Package Power Tolerance: +/- 5%

Block Load(Only) Transient Response *			
Load Change %	FDip %	VDip %	Recovery Time (sec)
0 - 25	<5%	5.5	< 3
0 - 50	6.8	12.8	< 3
0 - 75	11.2	21.7	< 3
0 - 100	15.8	30.9	< 3



Transient Performance

Block Load (only) Transient Response values are at factory conditions with a resistive load. This information is representative of a typical Cat generator set, but is not guaranteed. Generator set block load capabilities at site conditions may vary from factory transient response test results due to site altitude, site ambient, and engine to engine variation.

Load Report

Project Name	Gadsden County Emergency Shelter - New Load Only	Electricity Supply	60 Hz 480/277 V
Customer Name	AE Engineering	Rating Type	Standby
Region	U.S.	Max. Ambient Temperature	77.0 F
Prepared By	Adam Stone	Altitude	278.0 Ft. A.S.L
Modified Date	4-Jan-2024	Humidity	30%
Engine Model	(1) of C9	Nameplate Rating	300.0 ekW / 375.0 kVA / 0.8 PF

Load Details		Permitted		Predicted		Transient Inrush		Running		Resultant Peak		Cumulative Running	
Load Step	Load Description	FDip	VDip	FDip	VDip	SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW
Step 1													
1.1	1x190.00 kVA - Resistive Load: Resistive, 3-Phase	30%	30%			190.0	190.0	190.0	190.0				
	Step 1 Total	30%	30%	9.1%	17.4%	190.0	190.0	190.0	190.0				
	Total Through Step 1									190.0	190.0	190.0	190.0
Step 2													
2.1	12x2.04 Amps - (New) Heat Pump - A Phase: NEMA, Single Phase Air Conditioning, Line 1-2, Intermittent	30%	30%			53.7	43.5	11.8	10.0				
2.2	12x2.04 Amps - (New) Heat Pump - B Phase: NEMA, Single Phase Air Conditioning, Line 2-3, Intermittent	30%	30%			53.7	43.5	11.8	10.0				
	Step 2 Total	30%	30%	<5%	6.5%	161.0	87.0	220.7	210.0				
	Total Through Step 2									334.1	277.0	220.7	210.0
Step 3													
3.1	12x2.04 Amps - (New) Heat Pump - C Phase: NEMA, Single Phase Air Conditioning, Line 1-3, Intermittent	30%	30%			53.7	43.5	11.8	10.0				

3.2	1x11.60 kVA - Lighting Load: LED Lighting, Distr. 3-Phase, Starting Power Factor: 0.75, Running Power Factor: 0.9 , 60.7 THDI%	30%	30%			13.9	10.4	11.6	10.4				
3.3	4x0.25 HP - Exhaust Fan: NEMA, Single Phase Motor, Cap. Start/Ind. Run, Line 1-2, Loaded	30%	30%			13.6	10.8	2.4	1.6				
	Step 3 Total	30%	30%	<5%	<5%	120.8	64.7	235.7	232.0				
	Total Through Step 3									304.8	274.7	235.7	232.0
Intermittent Step													
4.1	1x2.04 Amps - (New) Heat Pump - C Phase: NEMA, Single Phase Air Conditioning, Line 1-3, Intermittent	30%	30%			4.5	3.6	1.0	0.8				
4.2	1x2.04 Amps - (New) Heat Pump - C Phase: NEMA, Single Phase Air Conditioning, Line 1-3, Intermittent	30%	30%			4.5	3.6	1.0	0.8				
4.3	1x2.04 Amps - (New) Heat Pump - C Phase: NEMA, Single Phase Air Conditioning, Line 1-3, Intermittent	30%	30%			4.5	3.6	1.0	0.8				
4.4	1x2.04 Amps - (New) Heat Pump - C Phase: NEMA, Single Phase Air Conditioning, Line 1-3, Intermittent	30%	30%			4.5	3.6	1.0	0.8				
4.5	1x2.04 Amps - (New) Heat Pump - C Phase: NEMA, Single Phase Air Conditioning, Line 1-3, Intermittent	30%	30%			4.5	3.6	1.0	0.8				
4.6	1x2.04 Amps - (New) Heat Pump - C Phase: NEMA, Single Phase Air Conditioning, Line 1-3, Intermittent	30%	30%			4.5	3.6	1.0	0.8				
4.7	1x2.04 Amps - (New) Heat Pump - C Phase: NEMA, Single Phase Air Conditioning, Line 1-3, Intermittent	30%	30%			4.5	3.6	1.0	0.8				

4.8	1x2.04 Amps - (New) Heat Pump - C Phase: NEMA, Single Phase Air Conditioning, Line 1-3, Intermittent	30%	30%			4.5	3.6	1.0	0.8				
	Step 4 Total	30%	30%	<5%	<5%	62.0	29.0	245.1	238.7				
	Total Through Step 4									280.1	261.0	235.7	232.0
Load Analysis Summary : Generator set meets site requirements													
						Maximum Step				Maximum Peak		Final Running	
						SkVA	SkW			SkVA	SkW	kVA	kW
						190.0	190.0			334.1	277.0	235.7	232.0

Engine Room Tools Summary

Project Name	Gadsden County Emergency Shelter - New Load Only	Electricity Supply	60 Hz 480/277 V
Customer Name	AE Engineering	Rating Type	Standby
Region	U.S.	Max. Ambient Temperature	77.0 F
Prepared By	Adam Stone	Altitude	278.0 Ft. A.S.L
Modified Date	4-Jan-2024	Humidity	30%
Engine Model	(1) of C9	Nameplate Rating	300.0 ekW / 375.0 kVA / 0.8 PF

Fuel Tank Summary

Running Hours	hr	Fuel Tank Size	Data coming soon
Oversize Factor	%	Usable Capacity	Data coming soon
Fuel Consumption @ 100% Load	22.43 US gal/hr		

Radiator Duct and Room Fresh Air Louver Designer Summary

Duct Dimensions from Radiator Side (Length)	93.73 in	Combustion Airflow	916.61 ft^3/min
Duct Dimensions from Radiator Side (Width)	56.69 in	Minimum Louver Area	0.22 ft^2
Heat Radiation from Engine & Alternator	42.22 kW	Temp Rise	7.09 Deg. F
Engine & Alternator Airflow	21,180.00 ft^3/min	Radiator Duct Area	0.11 ft^2

Exhaust Back Pressure Summary

Total Straight Pipe Length	0 ft	Exhaust Gas Flow	2,461.22 ft^3/min
Total Number Of 90 Deg Long Radius Elbow	0	Muffler Pressure Drop	Data coming soon
Total Number Of 90 Deg Short Radius Elbow	0	Pressure Drop in Exhaust	0.00 psi
Total Number Of 45 Deg Elbow	0	Max Allowable Pressure Drop	Data coming soon
Minimum Exhaust Pipe Diameter	Data coming soon		
Stack Temperature	927.19 Deg. F		
Gas Density	0.03 lb/ft^3		

Disclaimer: These engine room design calculations are intended for general information and guidance purpose only. A professional engineer, licensed in the appropriate field of engineering, should be consulted for a formal evaluation. Caterpillar disclaims all representations and warranties of any kind and shall have no liability in law or equity for damages consequential or otherwise arising from the use of these calculations.