Guemes Island Ferry Replacement
Electrical Power Load Analysis

PREPARED FOR: **Skagit County** Mt Vernon, Washington			BY: JMG
Glosten 1201 WESTERN AVENUE, SUITE 200 SEATTLE, WASHINGTON 98101-2953 T 206.624.7850 GLOSTEN.COM			CHECKED: JMR
			APPROVED: MSM
DOCUMENT: 17097.02-300-01	REVISION: P0	FILE: 17097.02	DATE: 23-Sep-2020

SUMMARY

1. The purpose of this electrical load analysis is to evaluate the total electric plant loads associated with several different operations of the replacement ferry concept.
2. The primary source of energy for the vessel under normal operations is shore-side electrical power. Battery banks are charged once per round trip. Stored energy is then distributed via inverters to propulsion motors and ship service loads while the ferry operates.
3. The "No Charging" load case represents contingency operations using only the Auxiliary generator, including powering the shoreside ramps from the vessel. This shows the minimum available propulsion power in the event that shore charging is unavailable. Additional power would be available from the batteries, with extra dock time required to recharge the batteries between trips.
4. The "Emergency" load case shows the ship service loading associated with setting all demand factors to 1. This demonstrates the emergency ability to supply all connected loads simultaneously, as would be required by 46 CFR 112.05-5(a) for vessels inspected under other subchapters
5. This electric plant is designed to meet the requirements of 46 CFR § 183. In particular, all loads specified by §183.310 (a)(1) can be powered by either of the two battery banks via two separate DC/AC inverters.
6. In consideration of the small number of loads and limited crewing, ship service inverters are sized for the total "utilized load," rather than considering demand factors and sizing for the limiting load scenario.
7. This load analysis includes margins for design uncertainty and a service life allowance to accomodate future growth.
8. The summer and winter load cases are similar using current HVAC load estimates. Both cases are presented in this load analysis.
9. Shore power is available at 480V and 60 amps. The load analysis indicates that the electrical demand does not exceed the available power.

GENERAL NOTES

1. This document has been developed from information in References 1-4.
2. Definitions and acronyms
   - DF: Demand Factor, defined as the fraction of time that the load is operational in an operational profile.
   - ekW: Electrical kilowatts
   - FLA: Full Load Amperes
   - HP: Horsepower
   - kVA: Kilo Volt-Amperes
   - UF: Utilization Factor, the fraction of the connected load rating that is utilized during normal operation.
   - V: Voltage
   - Φ: Number of phases
3. Calculation procedure: Profile Load = Connected x Utilization Factor x Demand Factor / Efficiency*
   *Efficiency only included when circuit load is supplied through power conversion equipment
4. DC bus and propulsion motor voltages are TBD.

REFERENCES

1. GLOSTEN, 17097.02-300-02, VESSEL ELECTRICAL ONE LINE
2. GLOSTEN, 17097.02, REQUEST FOR INFORMATION - VESSEL ELECTRICAL SYSTEM
3. GLOSTEN, 17097.02, REQUEST FOR INFORMATION - SHORE ELECTRICAL SYSTEM
4. GLOSTEN, 17097.02, REQUEST FOR INFORMATION - AUTOMATIC SHORE CONNECTION SYSTEM

REVISIONS SUMMARY

REV.	DESCRIPTION	DATE	APPROVED
P0	Initial Release		

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Electrical Power Load Analysis	REVISION:	P0	CHECKED: JMR
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PANEL:	**1H (#1 Main DC SWBD)**
LOCATION:	**Switchboard Room**

LOAD DATA													LOAD DATA INFORMATION			LOAD PROFILES													
Circuit No. or SWBS	Load Description	V	Φ	HP	FLA	Power Factor	Connected		UF	Eff.	Utilized		Load Notes	Rev.	Load Confidence	Load Data Source	Transit - Summer			Transit - Winter			Shore Power (Moored)			No Charging			Emergency		
							ekW	kVA			ekW	kVA					DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA
1H-1	3S (480VAC Aux Panel)	480	3		240	0.84	167	200		97%	118	141	Via inverter & 690/480 transformer					19	22		18	20		9	10		89	110		40	46
1H-2	#1 Propulsion Motor Drive	690	3		628	1.	750	750	0.93	98.5%	708	708	Assumes end #1 aft, 80% case, 70/30 propulsion split			RFI	1.	708	708	1	708	708	0	0	0	0.4	283	283	1.0	708	708
	Propulsion design margin										7	7						7	7		7	7									
	Propulsion service life allowance										0	0																			
	Auxiliary design margin										12	12						12	12		12	12		12	12		12	12			
	Auxiliary service life allowance										6	6						6	6		6	6		6	6		6	6			
		Totals					917	950			851	874						752	754		751	753		26	28		390	411		748	754

	POWER SOURCES	PF		ekW	kVA
	Battery Bank #1	1		800	800
	Battery Bank #2	1		800	800
	Aux Generator	0.8		565	706
	Total Ship Power			2165	2306

MARGINS		Design	Service Life	Total Margin (kw)
Propulsion Power		1%	0%	10
Auxiliaries		10%	5%	27

	POWER SOURCE LOADING		ekW	kVA	Configuration	Transit - Summer	Transit - Winter	Shore Power (Moored	No Charging	Emergency
	Normal Operations - Split Bus									
	Battery Bank #1		800	800		94%	94%			94%
	Battery Bank #2		800	800		40%	40%			46%
	Backup Operations - one bank offline									
	Battery Bank + Aux Generator		1365	1506.25		78%	79%			81%
	Backup Operations - shore charging unavailable									
	Aux Generator		565	706.25	Total propulsion power limited to 405kw without discharging battery.				93%	

	SHORE POWER		ekW	kVA		Transit - Summer	Transit - Winter	Shore Power (Moored	No Charging	Emergency
	Input Capacity		288	288	Based on 60A/480VAC			15%		

	Ship Service Inverter Sizing		ekW	kVA		Transit - Summer	Transit - Winter	Shore Power (Moored	No Charging	Emergency
	3S		120	140	Based on utilized portion of connected load	15%	14%		76%	32%
	2S		70	70	Based on utilized portion of connected load	29%	27%	13%	29%	58%

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PANEL:	**2H (#1 Main DC SWBD)**
LOCATION:	**Switchboard Room**

LOAD DATA													LOAD DATA INFORMATION			LOAD PROFILES														
Circuit No. or SWBS	Load Description	V	Φ	HP	FLA	Power Factor	Connected		UF	Eff.	Utilized		Load Notes	Rev.	Load Confidence	Load Data Source	Transit - Summer			Transit - Winter			Shore Power (Moored)			No Charging			Emergency		
							ekW	kVA			ekW	kVA					DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA
2H-1	2S (#2 208VAC Swbd)	208	3		324	1	100	107		97%	65	71	Via inverter & 690/208 transformer					11	13		17	18		15	16	1.	11	13		56	61
2H-2	#1 Propulsion Motor Drive	690	3		628	1	750	750	0.4	98.5%	305	305	Assumes end #1 aft, 80% case, 70/30 propulsion split			RFI	1.	305	305	1.	305	305	0.	0	0	0.4	122	122	1.0	305	305
	Propulsion design margin										3																				
	Propulsion service life allowance										0																				
	Auxilary design margin										6																				
	Auxilary service life allowance										3																				
		Totals					850	857			382	375						315	317		322	323		15	16		133	134		360	366

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PANEL:	**3S (480VAC Aux Panel)**	FED FROM:	**1H-1**
LOCATION:	**Switchboard Room**	FEEDER CABLE:	**(2)3C-3/0**

LOAD DATA													LOAD DATA INFORMATION			LOAD PROFILES													
Circuit No.	Load Description	V	Φ	HP	FLA	Power Factor	Connected		UF	Eff.	Utilized		Load Notes	Rev.	Load Confidence	Load Data Source	Transit - Summer			Transit - Winter			Shore Power (Moored)			No Charging			Emergency		
							ekW	kVA			ekW	kVA					DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA
3S-1	Feeder Disconnect (Inverter/Transformer)	480	3		241	1	200	200			-	-	Sized for utilized load plus spares		1	This Sheet															
3S-2	1S (#1 208VAC Swbd)	480	3		87	1	65	73		0.97	46	51			(N/A)	(N/A)		18	21		17	20		8	10		18	21		36	42
3S-3	Shore Power	480	3		60	1	40	50	0.		-	-			3	EPLA															
3S-4	Aux Ramp Power (End 1)	480	3		50	1	33	42	1.		33	42	RFI		2	RFI										1.	33	42			
3S-5	Aux Ramp Power (End 1)	480	3		50	1	33	42	1.		33	42	RFI		2	RFI										1.	33	42			
3S-6	Generator Combustion Supply Blower (510-01)	480	3	1.9	3	0.8	1.9	2.4	1.		1.9	2.4			3	HVAC Dwg										1.	2	2	1.	2	2
3S-7	Spare	480	3		25	1	17	21																							
3S-8	Spare	480	3		25	1	17	21																							
		Totals					167	200			114	137						18	21		17	20		8	10		87	107		38	45

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PANEL:	**1S (#1 208VAC Swbd)**	FED FROM:	**3S-2**
LOCATION:	**Switchboard Room**	FEEDER CABLE:	**3C-1/0 and (2)3C-1/0 (transformer pri/sec)**

LOAD DATA													LOAD DATA INFORMATION			LOAD PROFILES													
Circuit No.	Load Description	V	Φ	HP	FLA	Power Factor	Connected		UF	Eff.	Utilized		Load Notes	Rev.	Load Confidence	Load Data Source	Transit - Summer			Transit - Winter			Shore Power (Moored)			No Charging			Emergency		
							ekW	kVA			ekW	kVA					DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA
1S-1	1S-2S Bus Tie	208	3		278	1.	100.0	100.0	1.		100.00	100.00																			
1S-2	Bilge Pump	208	3	5	16.7	0.8	4.8	6.0	1.		4.8	6.0			3	Eq List	0.	0.	0.	0.	0.	0.	0.1	0.5	0.6	0.	0.	0.	1.	4.8	6.
1S-3	#1 Freshwater Pump	208	3	2.5	7.5	0.8	2.2	2.7	1.		2.2	2.7			1	250gpm/30'TDH	1.	2.2	2.7	1.	2.2	2.7	1.	2.2	2.7	1.	2.2	2.7	1.	2.2	2.7
1S-4	P1 - Up. Dk 208-120 Panel	208	3		78	0.98	27.6	28.1			13.0	11.6			1	-		7.7	8.1		8.3	8.8		2.6	2.8		9.	9.4		11.3	11.8
1S-5	#1 Thruster Steering Motor (Primary)	208	3		24.3	0.8	7.0	8.8	1.		7.0	8.8			2	Veth Proposal	0.2	1.4	1.8	0.2	1.4	1.8	0.	0.	0.	0.2	1.4	1.8	1.	7.	8.8
1S-6	#1 Thruster Steering Motor (Backup)	208	3		24.3	0.8	7.0	8.8	1.		7.0	8.8			2	Veth Proposal	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1S-7	#1 Thruster Lube Oil Pump	208	3		3.5	0.8	1.0	1.3	1.		1.0	1.3			2	Veth Proposal	1.	1.	1.3	1.	1.	1.3	0.	0.	0.	1.	1.	1.3	1.	1.	1.3
1S-8	#1 Thruster Lube Oil Filter/Separator	208	1		1.1	0.8	0.2	0.2	1.		0.2	0.2			2	CJC Datasheet	1.	0.2	0.2	1.	0.2	0.2	0.	0.	0.	1.	0.2	0.2	1.	0.2	0.2
1S-9	Battery Room 1 AC	208	1		30.	0.8	5.0	6.3	1.		5.0	6.3			2	HVAC Dwg	0.8	4.	5.	0.4	2.	2.5	0.2	1.	1.3	0.8	4.	5.	1.	5.	6.3
1S-10	Battery Room 1 Heater (510-13)	208	1		11.1	1.	2.3	2.3	1.		2.3	2.3			3	HVAC Dwg	0.	0.	0.	0.5	1.2	1.2	0.7	1.6	1.6	0.	0.	0.	1.	2.3	2.3
1S-11	Generator Room Supply Blower (510-05)	120	1		3.	0.8	0.3	0.4	1.		0.29	0.36			3	510-01	1.	0.	0.	1.	0.	0.	1.	0.	0.	1.	0.	0.	1.	0.	0.
1S-12	Drive Room 1 Exhaust Fan (510-02)	120	1		0.2	0.8	0.02	0.02	1.		0.0	0.0			1	510-02	1.	0.	0.	1.	0.	0.	1.	0.	0.	1.	0.	0.	1.	0.	0.
1S-13	Battery Room 2 Exhaust Fan (510-06)	120	1		0.6	0.8	0.06	0.07	1.		0.1	0.1	Used only in emergency		1	510-02													1.	0.06	0.07
1S-14	SSDG Block and generator heater	120	1		12.5	1.	1.5	1.5	1.		1.5	1.5			3	Quote	0.8	1.2	1.2	0.4	0.6	0.6	0.2	0.3	0.3	0.	0.	0.	1.	1.5	1.5
1S-15	Spare	208	1		15.	1.	3.1	3.1			0.00	0.00																			
1S-16	Spare	208	1		15.	1.	3.1	3.1			0.00	0.00																			
		Totals					65	73			44	50						18	20		17	19		8	9		18	20		35	41

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PANEL:	**2S (#2 208VAC Swbd)**	FED FROM:	**2H-1**
LOCATION:	**Switchboard Room**	FEEDER CABLE:	**(2)3C-4/0**

LOAD DATA													LOAD DATA INFORMATION			LOAD PROFILES													
Circuit No.	Load Description	V	Φ	HP	FLA	Power Factor	Connected		UF	Eff.	Utilized		Load Notes	Rev.	Load Confidence	Load Data Source	Transit - Summer			Transit - Winter			Shore Power (Moored)			No Charging			Emergency		
							ekW	kVA			ekW	kVA					DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA
2S-1	Feeder Disconnect (Inverter/Transformer)	208	3		291.5	1.	105	105			-	-			(N/A)	This Sheet														
2S-2	Fire Pump	208	3	5	16.7	0.8	4.8	6.0	1.		4.8	6.0			3	Eq List	0.	0.	0.	0.	0.	0.	0.1	0.5	0.6	0.	0.	0.	1.	4.8	6.
2S-3	P2 - Hold Dk 208-120 Panel	208	3		59.6	0.99	21.3	21.5			11.3	10.0				N/A		1.5	1.6		5.	5.		6.5	6.6		1.5	1.6		9.6	9.8
2S-4	P4 - Main Dk 208-120 Panel	208	3		62.6	1.	22.5	22.5			11.4	11.4				N/A		1.2	1.2		5.8	5.8		6.7	6.7		1.2	1.2		11.4	11.4
2S-5	#2 Freshwater Pump	208	3	2.5	7.5	0.8	2.2	2.7	1.		2.2	2.7	Standby		1	Same as 1S	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	2.2	2.7
2S-6	#2 Thruster Steering Motor (Primary)	208	3		24.3	0.8	7.0	8.8	1.		7.0	8.8			3	Veth Proposal	0.2	1.4	1.8	0.2	1.4	1.8	0.	0.	0.	0.2	1.4	1.8	1.	7.	8.8
2S-7	#2 Thruster Steering Motor (Backup)	208	3		24.3	0.8	7.0	8.8	1.		7.0	8.8			3	Veth Proposal	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2S-8	#2 Thruster Lube Oil Pump	208	3		3.5	0.8	1.0	1.3	1.		1.0	1.3			3	Veth Proposal	1.	1.	1.3	1.	1.	1.3	0.	0.	0.	1.	1.	1.3	1.	1.	1.3
2S-9	#2 Thruster Lube Oil Filter/Separator	208	1		1.1	0.8	0.2	0.2	1.		0.2	0.2			3	CJC Datasheet	1.	0.2	0.2	1.	0.2	0.2	0.	0.	0.	1.	0.2	0.2	1.	0.2	0.2
2S-10	Battery Room 2 AC	208	1		30.0	0.8	5.0	6.3	1.		5.0	6.3			1	See notes	0.8	4.	5.	0.4	2.	2.5	0.2	1.	1.3	0.8	4.	5.	1.	5.	6.3
2S-11	Potable Water Pump	208	1	0.75	7.6	0.8	1.3	1.6	0.7		0.9	1.1			3	533 Dwg	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.1	0.1	0.1	1.	0.9	1.1
2S-12	Hot Water Heater	208	1		58	1.	12.	12.	1.		12.0	12.0			1	533 Dwg	0.1	1.2	1.2	0.1	1.2	1.2	0.	0.	0.	0.1	1.2	1.2	1.	12.	12.
2S-13	Spare	208	1		15.	1.	3.1	3.1			0.00	0.00																			
2S-14	Spare	208	1		15.	1.	3.1	3.1			0.00	0.00																			
2S-15	Spare	208	1		15.	1.	3.1	3.1			0.00	0.00																			
2S-16	Spare	208	1		15.	1.	3.1	3.1			0.00	0.00																			
		Totals					97	104			63	68						11	12		17	18		15	15		11	12		54	59

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PANEL:	**P1 - Up. Dk 208-120 Panel**	FED FROM:	**1S-4**
LOCATION:	**Upper Deck Electrical Room**	FEEDER CABLE:	**3C-1 AWG**

LOAD DATA													LOAD DATA INFORMATION			LOAD PROFILES													
Circuit No.	Load Description	V	Φ	HP	FLA	Power Factor	Connected		UF	Eff.	Utilized		Load Notes	Rev.	Load Confidence	Load Data Source	Transit - Summer			Transit - Winter			Shore Power (Moored)			No Charging			Emergency		
							ekW	kVA			ekW	kVA					DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA
P1-1	Pilot House Heater (510-13)	208	1		11.1	1.	2.3	2.3	1.		2.3	2.3			3	HVAC Dwg	0.	0.	0.	0.5	1.2	1.2	0.7	1.6	1.6	0.	0.	0.	1.	2.3	2.3
P1-2	Crew Lounge Heater (510-13)	208	1		11.1	1.	2.3	2.3	1.		2.3	2.3			3	HVAC Dwg	0.	0.	0.	0.5	1.2	1.2	0.7	1.6	1.6	0.	0.	0.	1.	2.3	2.3
P1-3	Pilothouse lights	120	1		2.	1.	0.2	0.2	1.		0.2	0.2			1	Estimate	1.	0.24	0.2	1.	0.2	0.2	0.3	0.1	0.1	1.	0.2	0.2	1.	0.2	0.2
P1-4	Upper deck interior lights	120	1		2.	1.	0.2	0.2	1.		0.2	0.2			1	Estimate	1.	0.24	0.2	1.	0.2	0.2	0.3	0.1	0.1	1.	0.2	0.2	1.	0.2	0.2
P1-5	Main deck interior lights	120	1		2.	1.	0.2	0.2	1.		0.2	0.2			1	Estimate	1.	0.24	0.2	1.	0.2	0.2	0.3	0.1	0.1	1.	0.2	0.2	1.	0.2	0.2
P1-6	Exterior flood lights	120	1		10.	1.	1.2	1.2	1.		1.2	1.2			1	Estimate	1.	1.2	1.2	1.	1.2	1.2	0.3	0.4	0.4	1.	1.2	1.2	1.	1.2	1.2
P1-7	Navigation lights	120	1		2.	1.	0.2	0.2	1.		0.2	0.2			1	Estimate	1.	0.2	0.2	1.	0.2	0.2	0.3	0.1	0.1	1.	0.2	0.2	1.	0.2	0.2
P1-8	Pilothouse window wipers	120	1	0.5	9.8	0.8	0.9	1.1	1.		0.9	1.1			1	Estimate	1.	0.9	1.1	1.	0.9	1.1	0.1	0.1	0.1	1.	0.9	1.1	1.	0.9	1.1
P1-9	Searchlight	120	1		4.2	0.8	0.4	0.5	1.		0.4	0.5			1	Estimate	1.	0.4	0.5	1.	0.4	0.5	0.1	0.	0.1	1.	0.4	0.5	1.	0.4	0.5
P1-10	Depth Sounder	120	1		2.	1.	0.2	0.2	1.		0.2	0.2			1	Estimate	1.	0.2	0.2	1.	0.2	0.2	0.1	0.	0.	1.	0.2	0.2	1.	0.2	0.2
P1-11	Pilothouse Receptacles	120	1		30.	1.	3.6	3.6	0.2		0.7	0.7			1	Estimate	0.3	0.2	0.2	0.3	0.2	0.2	0.	0.	0.	0.3	0.2	0.2	1.	0.7	0.7
P1-12	Upper Deck Crew Lounge Receptacles	120	1		30.	1.	3.6	3.6	0.2		0.7	0.7			1	Estimate	0.3	0.2	0.2	0.3	0.2	0.2	0.	0.	0.	0.3	0.2	0.2	1.	0.7	0.7
P1-13	Crew Lounge Glove Dryer	120	1		5.	1.	0.6	0.6	1.		0.6	0.6			1	Estimate	0.	0.	0.	0.5	0.3	0.3	0.2	0.1	0.1	0.	0.	0.	1.	0.6	0.6
P1-14	Coffee Maker	120	1		1.	1.	0.1	0.1	1.		0.1	0.1			1	Estimate	1.	0.1	0.1	1.	0.1	0.1	0.1	0.	0.	1.	0.1	0.1	1.	0.1	0.1
P1-15	Pilothouse Electronics Supply Fan	120	1	0.25	5.8	0.8	0.5	0.7	1.		0.5	0.7			1	Estimate	1.	0.5	0.7	1.	0.5	0.7	1.	0.5	0.7	1.	0.5	0.7	1.	0.5	0.7
P1-16	Pilothouse 24VDC System/UPS	120	1		22.7	1.	2.7	2.7		0.95	2.9	1.0				N/A		1.2	1.2		1.2	1.2		0.7	0.7		1.2	1.2		1.2	1.2
P1-17	Pilothouse AC/Heater Unit (510-11)	120	1		15.3	1.	1.8	1.8	1.		1.84	1.84	Dual Modes		3	HVAC Dwg	0.8	1.5	1.5	0.8	1.5	1.5	0.2	0.4	0.4	0.8	1.5	1.5	1.	1.8	1.8
P1-18	Upper Deck Exhaust Fan (510-03)	120	1		0.7	0.8	0.1	0.1	1.		0.1	0.1			1	HVAC Dwg	1.	0.1	0.1	1.	0.1	0.1	1.	0.1	0.1	1.	0.1	0.1	1.	0.1	0.1
P1-19	Pilothouse window defroster (510-12)	120	1		15.4	1.	1.8	1.8	1.		1.85	1.85			3	HVAC Dwg	0.1	0.2	0.2	0.3	0.6	0.6	0.	0.	0.	0.8	1.5	1.5	1.	1.8	1.8
P1-20	Spare	120	1		15.	1.	1.8	1.8			0.00	0.00																			
P1-21	Spare	120	1		15.	1.	1.8	1.8			0.00	0.00																			
P1-22	Spare	120	1		15.	1.	1.8	1.8			0.00	0.00																			
P1-23	Spare	120	1		15.	1.	1.8	1.8			0.00	0.00																			
P1-24	Spare	120	1		15.	1.	1.8	1.8			0.00	0.00																			
		Totals					28	28			13	12						8	8		8	9		3	3		9	9		11	12

Guemes Island Ferry Replacement	FILE:	17097.02	BY: JMG
Electrical Power Load Analysis	REVISION:	P0	CHECKED: JMR
	DATE:	9/23/2020	APPROVED: MSM
	DOCUMENT:	17097.02-300-01	

PANEL:	**P2 - Hold Dk 208-120 Panel**	FED FROM:	**2S-5**
LOCATION:	**Switchboard Room**	FEEDER CABLE:	**3C-14 AWG**

LOAD DATA													LOAD DATA INFORMATION			LOAD PROFILES													
Circuit No.	Load Description	V	Φ	HP	FLA	Power Factor	Connected		UF	Eff.	Utilized		Load Notes	Rev.	Load Confidence	Load Data Source	Transit - Summer			Transit - Winter			Shore Power (Moored)			No Charging			Emergency		
							ekW	kVA			ekW	kVA					DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA
P2-1	Battery Room 2 Heater (510-13)	208	1		11.1	1.	2.3	2.3	1.		2.3	2.3			3	HVAC Dwg	0.	0.	0.	0.5	1.2	1.2	0.7	1.6	1.6	0.	0.	0.	1.	2.3	2.3
P2-2	Generator Room Heater (510-13)	208	1		11.1	1.	2.3	2.3	1.		2.3	2.3			3	HVAC Dwg	0.	0.	0.	0.5	1.2	1.2	0.7	1.6	1.6	0.	0.	0.	1.	2.3	2.3
P2-3	Switchboard Room Heater (510-13)	208	1		11.1	1.	2.3	2.3	1.		2.3	2.3			3	HVAC Dwg	0.	0.	0.	0.5	1.2	1.2	0.7	1.6	1.6	0.	0.	0.	1.	2.3	2.3
P2-4	End 1 Propulsion Motor Space Heater	208	1		1.	1.	0.2	0.2	1.		0.2	0.2			2	Veth Quote							1.	0.2	0.2						
P2-5	End 2 Propulsion Motor Space Heater	208	1		1.	1.	0.2	0.2	1.		0.2	0.2			2	Veth Quote							1.	0.2	0.2						
P2-6	Hold Level Receptacles	120	1		30.	1.	3.6	3.6	0.2		0.7	0.7			1	Estimate	0.3	0.2	0.2	0.3	0.2	0.2	0.	0.	0.	0.3	0.2	0.2	1.	0.7	0.7
P2-7	Hold Deck 24VDC System/UPS	120	1		19.6	1.	2.4	2.4		0.95	2.5	1.0			(N/A)	N/A		1.2	1.2		1.2	1.2		1.2	1.2		1.2	1.2		1.2	1.2
P2-8	Drive Room 2 Exhaust Fan (510-02)	120	1		0.2	0.8	0.02	0.02	1.		0.0	0.0			1	HVAC Dwg	1.	0.	0.	1.	0.	0.	1.	0.	0.	1.	0.	0.	1.	0.	0.
P2-9	Void 1 Exhaust Fan (510-02)	120	1		0.2	0.8	0.0	0.0	1.		0.0	0.0			1	HVAC Dwg	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02
P2-10	Void 2 Exhaust Fan (510-04)	120	1		0.6	0.8	0.1	0.1	1.		0.1	0.1			1	HVAC Dwg	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.1	0.1
P2-11	Void 3 & Battery Room 2 Exhaust Fan (510-05)	120	1		3.	0.8	0.3	0.4	1.		0.3	0.4			1	HVAC Dwg	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.3	0.4
P2-12	Void 4 Exhaust Fan (510-04)	120	1		0.6	0.8	0.1	0.1	1.		0.1	0.1			1	HVAC Dwg	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.1	0.1
P2-13	Void 5 Exhaust Fan (510-02)	120	1		0.2	0.8	0.0	0.0	1.		0.0	0.0			1	HVAC Dwg	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02
P2-14	Fwd Battery Room Exhaust Fan (510-02)	120	1		0.2	0.8	0.0	0.0	1.		0.0	0.0			1	HVAC Dwg	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02
P2-15	Switchboard Room Exhaust Fan (510-05)	120	1		3.	0.8	0.3	0.4	1.		0.3	0.4			1	HVAC Dwg	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.3	0.4
P2-16	Battery Room 1 Exhaust Fan (510-06)	120	1		0.6	0.8	0.06	0.07	1.		0.1	0.1	Used only in emergency		1	HVAC Dwg													1.	0.06	0.07
P2-17	Spare	120	1		15.	1.	1.8	1.8			0.00	0.00																			
P2-18	Spare	120	1		15.	1.	1.8	1.8			0.00	0.00																			
P2-19	Spare	120	1		15.	1.	1.8	1.8			0.00	0.00																			
P2-20	Spare	120	1		15.	1.	1.8	1.8			0.00	0.00																			
		Totals					21	21			11	10						2	2		5	5		7	7		2	2		10	10

Guemes Island Ferry Replacement	FILE:	17097.02	BY: JMG
Electrical Power Load Analysis	REVISION:	P0	CHECKED: JMR
	DATE:	9/23/2020	APPROVED: MSM
	DOCUMENT:	17097.02-300-01	

PANEL:	**P4 - Main Dk 208-120 Panel**	FED FROM:	**2S-11**
LOCATION:	**Switchboard Room**	FEEDER CABLE:	**2C-14 AWG**

LOAD DATA													LOAD DATA INFORMATION			LOAD PROFILES													
Circuit No.	Load Description	V	Φ	HP	FLA	Power Factor	Connected		UF	Eff.	Utilized		Load Notes	Rev.	Load Confidence	Load Data Source	Transit - Summer			Transit - Winter			Shore Power (Moored)			No Charging			Emergency		
							ekW	kVA			ekW	kVA					DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA
P4-1	Crew Day Room Heater (510-13)	208	1		11.1	1.	2.3	2.3	1.		2.3	2.3			3	HVAC Dwg	0.	0.	0.	0.5	1.2	1.2	0.7	1.6	1.6	0.	0.	0.	1.	2.3	2.3
P4-2	Passenger Lounge Heater (510-13)	208	1		11.1	1.	2.3	2.3	1.		2.3	2.3			3	HVAC Dwg	0.	0.	0.	0.5	1.2	1.2	0.7	1.6	1.6	0.	0.	0.	1.	2.3	2.3
P4-3	Passenger Lounge Heater (510-13)	208	1		11.1	1.	2.3	2.3	1.		2.3	2.3			3	HVAC Dwg	0.	0.	0.	0.5	1.2	1.2	0.7	1.6	1.6	0.	0.	0.	1.	2.3	2.3
P4-4	Passenger Lounge Heater (510-13)	208	1		11.1	1.	2.3	2.3	1.		2.3	2.3			3	HVAC Dwg	0.	0.	0.	0.5	1.2	1.2	0.7	1.6	1.6	0.	0.	0.	1.	2.3	2.3
P4-5	Passenger Lounge Exhaust Fan (510-02)	120	1		0.2	0.8	0.	0.	1.		0.02	0.02			3	HVAC Dwg	1.	0.	0.	1.	0.	0.	1.	0.	0.	1.	0.	0.	1.	0.	0.
P4-6	Crew Day Room Receptacles	120	1		30.	1.	3.6	3.6	0.2		0.7	0.7			1	Estimate	0.3	0.2	0.2	0.3	0.2	0.2	0.	0.	0.	0.3	0.2	0.2	1.	0.7	0.7
P4-7	Passenger Lounge Receptacles	120	1		30.	1.	3.6	3.6	0.2		0.7	0.7			1	Estimate	0.3	0.2	0.2	0.3	0.2	0.2	0.	0.	0.	0.3	0.2	0.2	1.	0.7	0.7
P4-8	Upper deck lights interior lights	120	1		2.	1.	0.2	0.2	1.		0.24	0.24			1	Estimate	1.	0.24	0.24	1.	0.24	0.24	0.3	0.07	0.07	1.	0.24	0.24	1.	0.24	0.24
P4-9	Exterior flood lights	120	1		2.	1.	0.2	0.2	1.		0.2	0.2			1	Estimate	1.	0.2	0.2	1.	0.2	0.2	0.3	0.1	0.1	1.	0.2	0.2	1.	0.2	0.2
P4-10	Main deck interior lights	120	1		2.	1.	0.2	0.2	1.		0.2	0.2			1	Estimate	1.	0.2	0.2	1.	0.2	0.2	0.3	0.1	0.1	1.	0.2	0.2	1.	0.2	0.2
P4-11	Spare	120	1		15.	1.	1.8	1.8			0.00	0.00																			
P4-12	Spare	120	1		15.	1.	1.8	1.8			0.00	0.00																			
P4-13	Spare	120	1		15.	1.	1.8	1.8			0.00	0.00																			
	Totals						23	23			11	11						1	1		6	6		7	7		1	1		11	11

Guemes Island Ferry Replacement	FILE:	17097.02	BY: JMG
Electrical Power Load Analysis	REVISION:	P0	CHECKED: JMR
	DATE:	9/23/2020	APPROVED: MSM
	DOCUMENT:	17097.02-300-01	

PANEL:	**D1 (24VDC Pilothouse Power)**	FED FROM:	**P1-16**
LOCATION:	**Upper Deck**	FEEDER CABLE:	**2C-10 AWG**

LOAD DATA													LOAD DATA INFORMATION			LOAD PROFILES													
Circuit No.	Load Description	V	Φ	HP	FLA	Power Factor	Connected		UF	Eff.	Utilized		Load Notes	Rev.	Load Confidence	Load Data Source	Transit - Summer			Transit - Winter			Shore Power (Moored)			No Charging			Emergency		
							ekW	kVA			ekW	kVA					DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA
D1-1	Feeder from UPS	24	1		100	1.	2.40	2.40			-	-			2	This Sheet														
D1-2	Backup Feed from D2	24	1		50	1.	1.20	1.20			-	-			2	This Sheet														
D1-3	Compass Light	24	1		1.	1.	0.02	0.02	1.		0.0	0.0			1	Prelim	1.	0.02	0.02	1.	0.02	0.02	0.1	0.	0.	1.	0.02	0.02	1.	0.02	0.02
D1-4	Pilothouse Display Monitor No. 1	24	1		3.6	1.	0.09	0.09	1.		0.1	0.1			1	Prelim	1.	0.09	0.09	1.	0.09	0.09	0.1	0.01	0.01	1.	0.09	0.09	1.	0.09	0.09
D1-5	Pilothouse Display Monitor No. 2	24	1		3.6	1.	0.09	0.09	1.		0.1	0.1			1	Prelim	1.	0.09	0.09	1.	0.09	0.09	0.1	0.01	0.01	1.	0.09	0.09	1.	0.09	0.09
D1-6	Navigation Lights	24	1		1.7	1.	0.04	0.04	1.		0.0	0.0			1	Prelim	1.	0.04	0.04	1.	0.04	0.04	0.1	0.	0.	1.	0.04	0.04	1.	0.04	0.04
D1-7	Satellite Compass	24	1		0.5	1.	0.01	0.01	1.		0.0	0.0			1	Prelim	1.	0.01	0.01	1.	0.01	0.01	0.1	0.	0.	1.	0.01	0.01	1.	0.01	0.01
D1-8	Navnet Black Box	24	1		5.4	1.	0.13	0.13	1.		0.1	0.1			1	Prelim	1.	0.13	0.13	1.	0.13	0.13	0.1	0.01	0.01	1.	0.13	0.13	1.	0.13	0.13
D1-9	AIS	24	1		3.3	1.	0.08	0.08	1.		0.1	0.1			1	Prelim	1.	0.08	0.08	1.	0.08	0.08	0.1	0.01	0.01	1.	0.08	0.08	1.	0.08	0.08
D1-10	Weather System	24	1		1.	1.	0.02	0.02	1.		0.0	0.0			1	Prelim	1.	0.02	0.02	1.	0.02	0.02	0.1	0.	0.	1.	0.02	0.02	1.	0.02	0.02
D1-11	Fire Detection System	24	1		1.	1.	0.02	0.02	1.		0.0	0.0			1	Prelim	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02
D1-12	Alarm And Monitoring System	24	1		4.	1.	0.10	0.10	1.		0.1	0.1			1	Prelim	1.	0.1	0.1	1.	0.1	0.1	1.	0.1	0.1	1.	0.1	0.1	1.	0.1	0.1
D1-13	General Alarm And Public Address System	24	1		5.4	1.	0.13	0.13	1.		0.1	0.1			1	Prelim	1.	0.13	0.13	1.	0.13	0.13	1.	0.13	0.13	1.	0.13	0.13	1.	0.13	0.13
D1-14	Ship's Whistle Solenoid Valve	24	1		1.	1.	0.02	0.02	1.		0.0	0.0			1	Prelim	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02
D1-15	Radar	24	1		12.	1.	0.29	0.29	1.		0.3	0.3			1	Prelim	1.	0.29	0.29	1.	0.29	0.29	1.	0.29	0.29	1.	0.29	0.29	1.	0.29	0.29
D1-16	Engine And Ventilation Shutdown System	24	1		1.	1.	0.02	0.02	1.		0.0	0.0			1	Prelim	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02
D1-17	Magnetic Compass	12	1		0.01	1.	0.	0.	1.		0.0	0.0			1	Prelim	1.	0.	0.	1.	0.	0.	1.	0.	0.	1.	0.	0.	1.	0.	0.
D1-18	Loud Hailer	12	1		2.6	1.	0.03	0.03	1.		0.0	0.0			1	Prelim	1.	0.03	0.03	1.	0.03	0.03	1.	0.03	0.03	1.	0.03	0.03	1.	0.03	0.03
D1-19	VHF Radios No. 1	12	1		2.6	1.	0.03	0.03	1.		0.0	0.0			1	Prelim	1.	0.03	0.03	1.	0.03	0.03	1.	0.03	0.03	1.	0.03	0.03	1.	0.03	0.03
D1-20	VHF Radios No. 2	12	1		2.6	1.	0.03	0.03	1.		0.0	0.0			1	Prelim	1.	0.03	0.03	1.	0.03	0.03	1.	0.03	0.03	1.	0.03	0.03	1.	0.03	0.03
D1-21	Spare	24	1		5.0	1.	0.12	0.12																							
D1-22	Backup supply to D2	24	1		50	1.	1.20	1.20	1.		1.20	1.20			2	D2 EPLA															
D1-23	Spare	24	1		5.0	1.	0.12	0.12																							
D1-24	Spare	24	1		5.0	1.	0.12	0.12																							
		Totals					2.7	2.7			2.4	2.4						1.2	1.2		1.2	1.2		0.7	0.7		1.2	1.2		1.2	1.2

Guemes Island Ferry Replacement	FILE:	17097.02	BY: JMG
Electrical Power Load Analysis	REVISION:	P0	CHECKED: JMR
	DATE:	9/23/2020	APPROVED: MSM
	DOCUMENT:	17097.02-300-01	

PANEL:	**D2 (24VDC Hold Deck Power)**	FED FROM:	**P2-7**
LOCATION:	**Switchboard Room**	FEEDER CABLE:	**2C-12 AWG**

LOAD DATA													LOAD DATA INFORMATION			LOAD PROFILES													
Circuit No.	Load Description	V	Φ	HP	FLA	Power Factor	Connected		UF	Eff.	Utilized		Load Notes	Rev.	Load Confidence	Load Data Source	Transit - Summer			Transit - Winter			Shore Power (Moored)			No Charging			Emergency		
							ekW	kVA			ekW	kVA					DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA	DF	ekW	kVA
D2-1	Feeder from UPS	24	1		100.	1.	2.4	2.4			-	-			2	This Sheet														
D2-2	Backup Feed from D1	24	1		50.	1.	1.2	1.2			-	-			2	This Sheet														
D2-3	Aux Gen Battery Charger	24	1		1.	1.	0.02	0.02	1.		0.02	0.02			1	Prelim	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02	1.	0.02	0.02
D2-4	BMS #1	24	1		3.6	1.	0.09	0.09	1.		0.09	0.09			1	Prelim	1.	0.09	0.09	1.	0.09	0.09	1.	0.09	0.09	1.	0.09	0.09	1.	0.09	0.09
D2-5	BMS #2	24	1		3.6	1.	0.09	0.09	1.		0.09	0.09			1	Prelim	1.	0.09	0.09	1.	0.09	0.09	1.	0.09	0.09	1.	0.09	0.09	1.	0.09	0.09
D2-6	Propulsion Control/Power Managementequipment	24	1		40.0	1.	1.0	1.0	1.		0.96	0.96			1	Estimate	1.	0.96	0.96	1.	0.96	0.96	1.	0.96	0.96	1.	0.96	0.96	1.	0.96	0.96
D2-7	Backup supply to D1	24	1		50.	1.	1.2	1.2	1.		1.20	1.20			2	D2 EPLA														
D2-8	Spare	24	1		5	1.	0.12	0.12																						
D2-9	Spare	24	1		5	1.	0.12	0.12																						
D2-10	Spare	24	1		5	1.	0.12	0.12																						
D2-11	Spare	24	1		5	1.	0.12	0.12																						
D2-12	Spare	24	1		5	1.	0.12	0.12																						
		Totals					3.0	3.0			2.4	2.4						1.16	1.16		1.16	1.16		1.16	1.16		1.16	1.16		1.16	1.16