
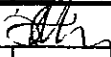


DESIGN CALCULATION COVER SHEET								
Project	Detailed Design on Port Reactivation Project in La Union Province			Project Code	JC1N004/2N001			
Section	4D-Ventitation & Air-Conditioning			Calc. File No.				
Sub-Section	4D01-Administration Building			Calc. Index No.				
Subject: Air Conditioning Design Calculation								
Calculation Objective:								
To calculate the Thermal Load in each area, in order to determine the number of Fan Coil Units and in each area.								
<u>References, Calculation Notes and Comments</u>								
Thermal loads are calculated by computed based analisys.								
Rev	Prepared		No. of Pages	Checked		Reviewed		Superseded by Calc No.
	by	Date		by	Date	by	Date	
O	M. Garcia	Feb/26/2002	14	H. Mori	Aug/13/02	<i>[Signature]</i>	14 Aug 02	
A	<i>[Signature]</i>			<i>[Signature]</i>				
B								
C								

Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.	
Section	4D- VENTILATION AND AIR-CONDITIONING	Calc. Index No.	
Subject	THERMAL LOAD CALCULATION-ADMINISTRATION BLD.	Page No. 01	Rev.
Design Conditions:			References/ Notes
Thermic load calculation chart for air-conditioning is based in UIT ARI Standard 530-56. Parameters are obtained from ASHRAE Tables			
ABBREVIATIONS:			
DB:	Dry Bulb Temperature		
WB:	Wet Bulb Temperature		
%HR:	Relative humidity		
gr./lb.:	Grains/pound of dry air (Specific humidity)		
N Total:	North Wall Area		
E Total:	East Wall Area		
S Total:	South Wall Area		
O Total:	West Wall Area		
N Glass:	North Windows		
E Glass:	East Windows		
S Glass:	South Windows		
O Glass:	West Windows		
CFM/person	Cubic feet per minute/person		
CFM/Sq Ft	Cubic feet per minute/square feet		
N Factor:	Sensible factor North		
E Factor:	Sensible factor East		
S Factor:	Sensible factor South		
O Factor:	Sensible factor West		
Wall Factor:	Heat Gain factor through walls		
Partition Factor:	Heat Gain factor through partitions		
Ceiling Factor:	Heat Gain factor through ceiling		
False ceiling Factor:	Heat Gain factor through false ceiling		
Floor Factor:	Heat Gain factor through floor		
People Sensible Heat:	People sensible heat gain		
People Latent Heat:	People latent heat gain		
Light Watts:	Heat produced by lights		
Motor HP:	Heat produced by motors		
Appliances:	Heat produced by electrical appliances		
dif. Db:	Dry Bulb difference between inside and outside air		
dif. Gr/lb:	Specific Humidity difference between inside and outside air		
		Prepared by 	Checked by 
		M. Garcia	Feb/26/2002
		H. Mori	Aug/13/02

Project	Detailed Design on Port Reactivation Project in La Union			Calc. File No.				
Section	4D- VENTILATION AND AIR-CONDITIONING			Calc. Index No.				
Subject	THERMAL LOAD CALCULATION-ADMINISTRATION BLD.			Page No. 02	Rev.			
					References/ Notes			
THERMAL LOAD ESTIMATION								
Project	PUERTO LA UNION		Building	Port Administration Building				
Made by	M. Garcia		Area	First-Floor				
DESIGN CONDITIONS:								
Conditions	DB	WB	%RH	DP	GRLB	Enthalpy	Latitude	3° N
Exterior	90.00	78.00			126.00		Temp range	20 °F
Interior	72.00		65.00		84.00		Peak load	
Difference	18.00				62.00			
Area size	8,778.85 Sq Ft x		10.00 ceiling height		= 87,788.54 Cu Ft			
Glass, Direct Sunlight								
ITEM	Area (Sq Ft)	Shadow Coefficient	Gain	=	BTUH	Cooling	Heating	
Glass (N)	85.50	0.60	36.02			1,847.94		
Glass (S)	472.80	0.60	72.58			20,616.89		
Glass (E)	167.80	0.60	216.45			21,792.17		
Glass (O)	48.42	0.60	216.45			6,288.30		
					Sub Total	50,545.30		
Transmission Through Glass								
ITEM	Area (Sq Ft)	Shadow Coefficient	Gain	=	BTUH	Cooling	Heating	
Glass (N)	85.50	1.04	15.50			1,378.26		
Glass (S)	472.80	1.04	15.50			7,624.54		
Glass (E)	167.80	1.04	13.20			2,303.56		
Glass (O)	48.42	1.04	21.00			1,057.49		
					Subtotal	12,360.85		
Transmission Through Roof and Walls								
ITEM	Net Area (Sq Ft)	U Coefficient	Equivalent Temperature	=	BTUH	Cooling	Heating	
Wall (N)	1270.26	0.34	10.00			4,318.88		
Wall (S)	882.96	0.34	14.00			4,202.89		
Wall (E)	606.92	0.34	17.00			3,508.00		
Wall (O)	726.30	0.34	20.00			4,938.84		
Roof	8778.85	0.14	66.00			68,826.22		
					Subtotal	85,794.83		
Other Gains per Transmission								
ITEM	Net Area (Sq Ft)	U Coefficient	Equivalent Temperature	=	BTUH	Cooling	Heating	
Partition Wall						0.00		
Ceiling						0.00		
Floor						0.00		
					Subtotal	0.00		
Internal Sensible Heat								
ITEM	Description	Quantity	Factor	=	BTUH	Cooling	Heating	
People		60.00	205.00			12,300.00		
People			195.00			0.00		
Lighting	Flourescent	6,000.00	4.35			26,100.00		
Lighting	Incandescent		3.40			0.00		
Motors	Less than 3HP		3,600.00			0.00		
Motors	More than 3HP		3,000.00			0.00		
Electric Appliances			3.40			0.00		
					Subtotal	187,100.98		
					F.S. 5%	9,355.05		
					GRAND TOTAL	196,456.03		
Prepared by			Checked by					
M. Garcia			H. Mori		Aug/13/02			
			Feb/26/2002					

Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.	
Section	4D- VENTILATION AND AIR-CONDITIONING	Calc. Index No.	
Subject	THERMAL LOAD CALCULATION-ADMINISTRATION BLD.	Page No. 03	Rev.
			References/ Notes
Internal Latent Heat			
ITEM	Description	Quantity	Factor = BTUH Cooling
People		50.00	205.00 = 12,800.00
People			205.00 = 0.00
Electric Appliances		6,000.00	3.40 = 20,400.00
Steam			1,050.00 = 0.00
Steam Transfer			
			Sub-Total Latent Heat = 32,700.00
			F.S. 2.5% = 817.50
			Total Latent Heat = 33,517.50
Ventilation & Infiltration			
Number of People	60.00	x	7.50 cfm x person = 450.00 CFM CA
Room Volume	87,786.54		
			1,463.14 CFM CA
Sensible	1,463.14 CFM CA	x	18.00 delta T x 1.08 = 28,443.49
Latent	1,463.14 CFM CA	x	62.00 GR/LB x 0.68 = 61,686.08
TOTALS			
1. Sensible			28,443.49 BTUH
2. Latent			61,686.08 BTUH
3. Total Heat			90,129.57 BTUH
4. External Heat			0.00 BTUH
5. Heat Grand Total			90,129.57 BTUH
6. A/C Tons			26.68 TONS
7. Sensible Heat Factor			SHF = 0.85
8. Dry Bulb Internal Temperature			72.00 FF
9. Dry Bulb Supply Air Temperature			63.00 FF
10. Supply Air Temperature Gain			9.00 Delta T
Total Air Supply (CFM)			20,211.63 CFM
Prepared by		M. Garcia	Feb/26/2002
Checked by		H. Mori	Aug/13/02

Project	Detailed Design on Port Reactivation Project in La Union		Calc. File No.	
Section	4D- VENTILATION AND AIR-CONDITIONING		Calc. Index No.	
Subject	THERMAL LOAD CALCULATION-ADMINISTRATION BLD.		Page No. 04	Rev.
				References/ Notes
THERMAL LOAD ESTIMATION				
Project	PUERTO LA UNION		Building	Port Administration Building
Made by	M. Garcia		Area	Second Floor
DESIGN CONDITIONS				
Conditions	DB	WB	%RH	DP
Exterior	90.00	78.00		
Interior	72.00		55.00	
Difference	18.00			
				GR/LB
				126.00
				Enthalpy
				64.00
				62.00
Area size	9,295.26 Sq Ft x		10-00 ceiling height	92,952.58 Cu Ft
Glass Direct Sunlight				
ITEM	Area (Sq Ft)	Shadow Coefficient	Gain	=
Glass (N)	624.60	0.89	36.02	BTUH
Glass (S)	1,180.80	0.88	72.68	Cooling
Glass (E)	661.15	0.60	216.45	Heating
Glass (O)	47.56	0.60	216.45	6,176.61
			Sub Total	56,152.59
Transmission Through Glass				
ITEM	Area (Sq Ft)	Shadow Coefficient	Gain	=
Glass (N)	624.60	1.00	13.50	BTUH
Glass (S)	1,180.80	1.00	13.50	Cooling
Glass (E)	661.15	1.04	13.20	Heating
Glass (O)	47.56	1.04	21.00	1,036.71
			Subtotal	26,319.72
Transmission Through Roof and Walls				
ITEM	Net Area (Sq Ft)	"U" Coefficient	Equivalent Temperature	=
Wall (N)	537.48	0.80	19.00	BTUH
Wall (S)	581.76	0.80	12.00	Cooling
Wall (E)	708.57	0.34	17.00	Heating
Wall (O)	727.16	0.34	20.00	4,095.53
Roof	9,295.26	0.34	46.00	4,944.69
Roof				59,861.46
			Subtotal	1,000
			Subtotal	70,563.38
Other Gains per Transmission				
ITEM	Net Area (Sq Ft)	"U" Coefficient	Equivalent Temperature	=
Partition Wall				BTUH
Ceiling				Cooling
Floor				Heating
				0.00
				0.00
				0.00
				Subtotal
				0.00
Internal Sensible Heat				
ITEM	Description	Quantity	Factor	=
People		35.00	205.00	BTUH
People		195.00		Cooling
Lighting	Flourescent	6,000.00	4.35	Heating
Lighting	Incandescent		3.40	26,100.00
Motors	Less than 3HP		3,600.00	0.00
Motors	More than 3HP		3,000.00	0.00
Electric Appliances			3.40	0.00
				Subtotal
				186,311.70
				1.5%
				9,315.58
				GRAND TOTAL
				195,627.28
Prepared by			Checked by	
M. Garcia			H. Mori	
Feb/26/2002			Aug/13/02	

Project	Detailed Design on Port Reactivation Project in La Union				Calc. File No.	
Section	4D- VENTILATION AND AIR-CONDITIONING				Calc. Index No.	
Subject	THERMAL LOAD CALCULATION-ADMINISTRATION BLD.				Page No. 05	Rev.
						References/ Notes
Internal Latent Heat						
ITEM	Description	Quantity	Factor	BTUH	Cooling	
People		35.00	205.00		7,175.00	
People			205.00		0.00	
Electric Appliances		6,000.00	3.40		20,400.00	
Steam			1,050.00		0.00	
Steam Transfer					0.00	
				Sub-Total Latent Heat	27,575.00	
				F.S. 2.5%	589.38	
				Total Latent Heat	28,264.38	
Ventilation & Infiltration						
Number of People		35.00	x	7.50 CFM x person	262.50	CFM CA
Room Volume		92,952.58			1,549.21	CFM CA
Sensible	1,549.21	CFM CA	x	18.00 delta T	x 1.08 =	30,116.60
Latent	1,549.21	CFM CA	x	62.00 GR/B	x 0.68 =	65,314.68
TOTALS						
1. Sensible						199,627.28 BTUH
2. Latent						28,264.38 BTUH
3. Total Heat						227,891.66 BTUH
4. External Heat						98,431.31 BTUH
5. Heat Grand Total						346,322.97 BTUH
6. A/C Tons						26.61 TONS
7. Sensible Heat Factor					SHF	0.87
8. Dry Bulb Internal Temperature						72.00 °F
9. Dry Bulb Supply Air Temperature						63.00 °F
10. Supply Air Temperature Gain						9.00 Delta T
Total Air Supply (CFM)						20,126.26 CFM
Prepared by				M. Garcia	Checked by	H. Mori
				Feb/26/2002	Aug/13/02	

Project	Detailed Design on Port Reactivation Project in La Union				Calc. File No.		
Section	4D- VENTILATION AND AIR-CONDITIONING				Calc. Index No.		
Subject	THERMAL LOAD CALCULATION-ADMINISTRATION BLD.				Page No. 06		Rev.
THERMAL LOAD ESTIMATION							References/ Notes
Project	PUERTO LA UNION			Building	Port Administration Building		
Made by	M. Garcia			Area	Third Floor		
DESIGN CONDITIONS							
Conditions	DB	WB	%RH	DP	GR/LB	Enthalpy	Latitude
Exterior	90.00	78.00			126.00		14° N
Interior	72.00		55.00		64.00		Temp range 20°F
Difference	18.00				62.00		Peak Load
Area size	9,295.26 Sq Ft			0.00 ceiling height =		92,952.58 Cu Ft	
Glass Direct Sunlight							
ITEM	Area (Sq Ft)	Shadow Coefficient	Gain	=	BTUH	Cooling	Heating
Glass (N)	624.60	0.60			36.02	13,499.72	
Glass (S)	1,180.80	0.60			72.68	51,389.90	
Glass (E)	66.15	0.60			216.45	8,590.89	
Glass (O)	47.56	0.60			216.45	8,176.61	
					Sub Total	79,757.13	
Transmission Through Glass							
ITEM	Area (Sq Ft)	Shadow Coefficient	Gain	=	BTUH	Cooling	Heating
Glass (N)	624.60	1.00	13.50			8,432.10	
Glass (S)	1,180.80	1.00	13.50			15,940.80	
Glass (E)	66.15	1.04	13.20			908.11	
Glass (O)	47.56	1.04	21.00			1,038.71	
					Subtotal	26,319.72	
Transmission Through Roof and Walls							
ITEM	Net Area (Sq Ft)	"U" Coefficient	Equivalent Temperature	=	BTUH	Cooling	Heating
Wall (N)	637.48	0.80	9.00			3,451.20	
Wall (S)	681.75	0.80	12.00			211.51	
Wall (E)	708.57	0.84	17.00			4,095.53	
Wall (O)	727.16	0.84	20.00			4,944.69	
Roof	9,295.26	0.14	46.00			59,861.46	
Roof						0.00	
					Subtotal	70,564.38	
Other Gains per Transmission							
ITEM	Net Area (Sq Ft)	"U" Coefficient	Equivalent Temperature	=	BTUH	Cooling	Heating
Partition Wall							0.00
Ceiling							0.00
Floor							0.00
					Subtotal		0.00
Internal Sensible Heat							
ITEM	Description	Quantity	Factor	=	BTUH	Cooling	Heating
People		100.00	205.00			20,500.00	
People			195.00			0.00	
Lighting	Fluorescent	16,000.00	1.35			26,100.00	
Lighting	Incandescent		3.40			0.00	
Motors	Less than 3HP		3,600.00			0.00	
Motors	More than 3HP		3,000.00			0.00	
Electric Appliances			3.40			0.00	
					Subtotal	223,241.23	
					F.S. 5%	11,162.08	
					GRAND TOTAL	234,403.29	
				Prepared by	Checked by		
				M. Garcia	H. Mori		
				Feb/26/2002	Aug/13/02		

Project		Detailed Design on Port Reactivation Project in La Union			Calc. File No.	
Section		4D- VENTILATION AND AIR-CONDITIONING			Calc. Index No.	
Subject		THERMAL LOAD CALCULATION-ADMINISTRATION BLD.			Page No. 07	Rev.
						References/ Notes
Internal Latent Heat						
ITEM	Description	Quantity	Factor	=	BTUH	Cooling
People		100.00		205.00		20,500.00
People				205.00		0.00
Electric Appliances		6,000.00		3.40		20,400.00
Steam				1,050.00		0.00
Steam Transfer						0.00
					Sub-Total Latent Heat	40,900.00
					F.S. 2.5%	1,022.50
					Total Latent Heat	41,922.50
Ventilation & Infiltration						
Number of People		100.00	x	7.50 cfm x person		750.00 CFM CA
Room Volume		92,952.58				1,549.21 CFM CA
Sensible	1,549.21 CFM CA		x	18.00 delta T	x 1.08 =	30,116.63
Latent	1,549.21 CFM CA		x	62.00 GR/LB	x 0.68 =	65,314.68
TOTALS						
1. Sensible						234,403.29 BTUH
2. Latent						41,922.50 BTUH
3. Total Heat						276,325.79 BTUH
4. External Heat						95,431.31 BTUH
5. Heat Grand Total						371,757.10 BTUH
6. A/C Tons						30.98 TONS
7. Sensible Heat Factor					SHF	0.65
8. Dry Bulb Internal Temperature						72.00 °F
9. Dry Bulb Supply Air Temperature						63.00 °F
10. Supply Air Temperature Gain						9.00 Delta T
Total Air Supply (CFM)						24,115.56 CFM
Prepared by				M. Garcia	Checked by	
				Feb/26/2002	H. Mori	
					Aug/13/02	

Project	Detailed Design on Port Reactivation Project in La Union				Calc. File No.	
Section	4D- VENTILATION AND AIR-CONDITIONING				Calc. Index No.	
Subject	THERMAL LOAD CALCULATION-ADMINISTRATION BLD.				Page No. 08	Rev.
THERMAL LOAD ESTIMATION						
Project	PUERTO LA UNION		Building	Port Administration Building		
Made by	M. Garcia		Area	Fourth Floor		
DESIGN CONDITIONS						
Conditions	DB	WB	%RH	DP	GR/LB	Enthalpy
Exterior	90.00	78.00			126.00	Latitude 14 N
Interior	72.00		55.00		64.00	Temp range 20 F
Difference	18.00				62.00	Peak Load
Area size	2,065.61 Sq Ft x		0.00 ceiling height =		20,656.13 Cu Ft	
Glass, Direct Sunlight						
ITEM	Area (Sq Ft)	Shadow Coefficient	Gain	BTUH	Cooling	Heating
Glass (N)	13.68	0.60	36.02		295.67	
Glass (S)	787.14	0.60	72.68		34,323.99	
Glass (E)	6.84	0.60	216.45		888.31	
Glass (O)	33.88	0.60	216.45		4,399.99	
				Sub Total	39,907.96	
Transmission Through Glass						
ITEM	Area (Sq Ft)	Shadow Coefficient	Gain	BTUH	Cooling	Heating
Glass (N)	13.68	1.04	13.50		192.07	
Glass (S)	787.14	1.04	13.50		11,051.48	
Glass (E)	6.84	1.04	13.20		93.90	
Glass (O)	33.88	1.04	21.00		739.94	
				Subtotal	12,077.35	
Transmission Through Roof and Walls						
ITEM	Net Area (Sq Ft)	U Coefficient	Equivalent Temperature	BTUH	Cooling	Heating
Wall (N)	373.68	0.84	9.00		1,143.46	
Wall (S)	73.66	0.84	12.00		300.53	
Wall (E)	380.52	0.84	17.00		2,199.41	
Wall (O)	353.48	0.84	20.00		2,403.66	
Roof	2,065.61	0.14	46.00		13,302.55	
Roof					0.00	
				Subtotal	19,349.61	
Other Gains per Transmission						
ITEM	Net Area (Sq Ft)	U Coefficient	Equivalent Temperature	BTUH	Cooling	Heating
Partition Wall					0.00	
Ceiling					0.00	
Floor					0.00	
				Subtotal	0.00	
Internal Sensible Heat						
ITEM	Description	Quantity	Factor	BTUH	Cooling	Heating
People		4.00	205.00		820.00	
People			195.00		0.00	
Lighting	Flourescent	1,500.00	4.35		6,525.00	
Lighting	Incandescent		3.40		0.00	
Motors	Less than 3HP		3,600.00		0.00	
Motors	More than 3HP		3,000.00		0.00	
Electric Appliances			3.40		0.00	
				Subtotal	78,679.92	
				H.S. 5%	3,934.00	
				GRAND TOTAL	82,613.92	
Prepared by M. Garcia				Checked by H. Mori		
Feb/26/2002				Aug/13/02		

Project	Detailed Design on Port Reactivation Project in La Union		Calc. File No.	
Section	4D- VENTILATION AND AIR-CONDITIONING		Calc. Index No.	
Subject	THERMAL LOAD CALCULATION-ADMINISTRATION BLD.		Page No. 09	Rev.
				References/ Notes
Internal Latent Heat				
ITEM	Description	Quantity	Factor	= BTUH Cabling
People		4.00	205.00	820.00
People			205.00	0.00
Electric Appliances		1,500.00	3.40	5,100.00
Steam			1,050.00	0.00
Steam Transfer				0.00
			Sub-Total Latent Heat	5,920.00
			F.S. 2.5%	148.00
			Total Latent Heat	6,068.00
Ventilation & Infiltration				
Number of People	4.00	x	7.50 cfm x person	30.00 CFM CA
Room Volume	20,656.13			344.27 CFM CA
Sensible	344.27 CFM CA	x	18.00 delta T	x 1.08 = 6,692.69
Latent	344.27 CFM CA	x	62.00 GR/LB	x 0.68 = 14,514.37
TOTALS				
1. Sensible				82,613.92 BTUH
2. Latent				6,068.00 BTUH
3. Total Heat				88,681.92 BTUH
4. External Heat				21,206.96 BTUH
5. Heat Grand Total				109,888.87 BTUH
6. A/C Tons				9.16 TONS
7. Sensible Heat Factor				SHF 0.93
8. Dry Bulb Internal Temperature				72.00 °F
9. Dry Bulb Supply Air Temperature				63.00 °F
10. Supply Air Temperature Gain				9.00 Delta T
Total Air Supply (CFM)				8,499.37 CFM
		Prepared by	M. Garcia	Feb/26/2002
		Checked by	H. Mori	Aug 13/02

Project	Detailed Design on Port Reactivation Project in La Union					Calc. File No.	
Section	4D- VENTILATION AND AIR-CONDITIONING					Calc. Index No.	
Subject	THERMAL LOAD CALCULATION-ADMINISTRATION BLD.					Page No. 10	Rev.
THERMAL LOAD ESTIMATION							References/ Notes
Project	PUERTO LA UNION			Building	Port Administration Building		
Made by	M. Garcia			Area	Fifth Floor		
DESIGN CONDITIONS							
Conditions	DB	WB	%RH	DP	GR/DB	Enthalpy	Latitude 14° N
Exterior	90.00	78.00			126.00		Temp range 20° F
Interior	72.00		55.00		64.00		Peak Load
Difference	18.00				62.00		
Area size	2,065.61 Sq Ft x			10.00 ceiling height =		20,656.13 Cu Ft	
Glass Direct Sunlight							
ITEM	Area (Sq Ft)	Shadow Coefficient	Gain	BTUH	Cooling	Heating	
Glass(N)	2052	0.60	36.02		1443.51		
Glass(S)	78714	0.60	72.68		34,323.99		
Glass(E)	2052	0.60	216.45		2,664.93		
Glass(O)	3388	0.60	216.45		4,399.99		
				Sub Total	41,832.41		
Transmission Through Glass							
ITEM	Area (Sq Ft)	Shadow Coefficient	Gain	BTUH	Cooling	Heating	
Glass(N)	2052	1.04	13.50		1288.10		
Glass(S)	78714	1.04	13.50		11,051.45		
Glass(E)	2052	1.04	13.20		281.70		
Glass(O)	3388	1.04	21.00		739.94		
				Subtotal	12,361.18		
Transmission Through Roof and Walls							
ITEM	Net Area (Sq Ft)	"U" Coefficient	Equivalent Temperature	BTUH	Cooling	Heating	
Wall (N)	86684	0.84	9.00		1,122.53		
Wall (S)	7366	0.84	42.00		300.53		
Wall (E)	36684	0.84	17.00		2,120.34		
Wall (O)	35348	0.84	20.00		2,403.66		
Roof	2,065.61	0.14	46.00		13,302.55		
				Subtotal	19,249.61		
Other Gains per Transmission							
ITEM	Net Area (Sq Ft)	"U" Coefficient	Equivalent Temperature	BTUH	Cooling	Heating	
Partition Wall						0.00	
Ceiling						0.00	
Floor						0.00	
				Subtotal		0.00	
Internal Sensible Heat							
ITEM	Description	Quantity	Factor	BTUH	Cooling	Heating	
People		40.00	205.00		8,200.00		
People			185.00		0.00		
Lighting	Fluorescent	1,500.00	4.35		6,525.00		
Lighting	Incandescent		3.40		0.00		
Motors	Less than 3HP		3,600.00		0.00		
Motors	More than 3HP		3,000.00		0.00		
Electric Appliances			3.40		0.00		
				Subtotal	88,168.21		
				F.S.15%	4,408.41		
				GRAND TOTAL	92,576.62		
Prepared by M. Garcia				Feb/26/2002	Checked by H. Mori		
					Aug/13/02		

Project	Detailed Design on Port Reactivation Project in La Union		Calc. File No.	
Section	4D- VENTILATION AND AIR-CONDITIONING		Calc. Index No.	
Subject	THERMAL LOAD CALCULATION-ADMINISTRATION BLD.		Page No. 11	Rev.
				References/ Notes
Internal Latent Heat				
ITEM	Description	Quantity	Factor	= BTUH Cooling
People		40.00	205.00	8,200.00
People			205.00	0.00
Electric Appliances		1,500.00	3.40	5,100.00
Steam			1,050.00	0.00
Steam Transfer				0.00
				Sub-Total Latent Heat 13,300.00
				F.S. 2.5% 332.50
				Total Latent Heat 13,632.50
Ventilation & Infiltration				
Number of People		40.00	x	7.50 cfm x person = 300.00 CFM CA
Room Volume		20,656.13		344.27 CFM CA
Sensible	344.27 CFM CA		x	18.00 delta T x 1.08 = 6,692.59
Latent	344.27 CFM CA		x	62.00 GR/LB x 0.68 = 14,514.37
TOTALS				
1. Sensible				93,576.62 BTUH
2. Latent				13,632.50 BTUH
3. Total Heat				107,209.12 BTUH
4. External Heat				21,206.96 BTUH
5. Heat Grand Total				128,416.08 BTUH
6. A/C Tons				10.62 TONS
7. Sensible Heat Factor				SHF 0.87
8. Dry Bulb Internal Temperature				72.00 F
9. Dry Bulb Supply Air Temperature				63.00 F
10. Supply Air Temperature Gain				9.00 Delta T
Total Air Supply (CFM)				9,524.34 CFM
		Prepared by	M. Garcia	Feb/26/2002
		Checked by	H. Mori	Aug/13/02

Project	Detailed Design on Port Reactivation Project in La Union				Calc. File No.	
Section	4D- VENTILATION AND AIR-CONDITIONING				Calc. Index No.	
Subject	THERMAL LOAD CALCULATION-ADMINISTRATION BLD.				Page No. 12	Rev.
THERMAL LOAD ESTIMATION						
Project	PUERTO LA UNION		Building	Port Administration Building		
Made by	M. Garcia		Area	Sixth Floor		
DESIGN CONDITIONS						
Conditions	DB	WB	%RH	DP	GR/LB	Enthalpy
Exterior	90.00	78.00			126.00	
Interior	72.00		55.00		64.00	
Difference	18.00				62.00	
Area size	2,066.61 Sq Ft x		10.00 ceiling height =		20,666.13 Cu Ft	
Glass, Direct Sunlight						
ITEM	Area (Sq Ft)	Shadow Coefficient	Gain	=	BTUH	Cooling Heating
Glass (N)	20.52	0.60	36.02		443.51	
Glass (S)	787.14	0.60	72.68		34,323.99	
Glass (E)	20.52	0.60	216.45		2,664.93	
Glass (O)	33.88	0.60	216.45		4,399.99	
					Sub total	41,832.41
Transmission Through Glass						
ITEM	Area (Sq Ft)	Shadow Coefficient	Gain	=	BTUH	Cooling Heating
Glass (N)	20.52	1.04	14.50		1309.44	
Glass (S)	787.14	1.04	14.50		11,070.07	
Glass (E)	20.52	1.04	13.20		281.70	
Glass (O)	33.88	1.04	21.00		739.94	
					Subtotal	13,201.15
Transmission Through Roof and Walls						
ITEM	Net Area (Sq Ft)	"U" Coefficient	Equivalent Temperature	=	BTUH	Cooling Heating
Wall (N)	366.84	0.34	19.00			1,122.53
Wall (S)	173.66	0.34	12.00			300.53
Wall (E)	366.84	0.34	17.00			2,120.34
Wall (O)	353.48	0.34	20.00			2,403.66
Roof	2,066.61	0.14	46.00			13,302.66
Roof						0.00
					Subtotal	19,249.61
Other Gains per Transmission						
ITEM	Net Area (Sq Ft)	"U" Coefficient	Equivalent Temperature	=	BTUH	Cooling Heating
Partition Wall						0.00
Ceiling						0.00
Floor						0.00
					Subtotal	0.00
Internal Sensible Heat						
ITEM	Description	Quantity	Factor	=	BTUH	Cooling Heating
People		5.00	205.00			1,025.00
People			195.00			0.00
Lighting	Flourescent	1,500.00	4.35			6,525.00
Lighting	Incandescent		3.40			0.00
Motors	Less than 3HP		3,600.00			0.00
Motors	More than 3HP		3,000.00			0.00
Electric Appliances			3.40			0.00
					Subtotal	81,833.17
					R.S. 15%	4,091.66
					GRAN TOTAL	85,924.83
Prepared by <i>M. Garcia</i>				Checked by <i>H. Mori</i>		
M. Garcia				H. Mori		
Feb/26/2002				Aug/13/02		

Project	Detailed Design on Port Reactivation Project in La Union		Calc. File No.				
Section	4D- VENTILATION AND AIR-CONDITIONING		Calc. Index No.				
Subject	THERMAL LOAD CALCULATION-ADMINISTRATION BLD.		Page No. 13	Rev.			
			References/Notes				
Internal Latent Heat							
ITEM	Description	Quantity	Factor	=	BTUH	Cooling	
People		500	205.00			1,025.00	
People			205.00			0.00	
Electric Appliances		1,500.00	3.40			5,100.00	
Steam			1,050.00			0.00	
Steam Transfer						0.00	
						Sub-Total Latent Heat	6,125.00
						F.S. 2.5%	153.13
						Total Latent Heat	6,278.13
Ventilation & Infiltration							
Number of People		500	x	7.50 cfm x person		3750 CFM CA	
Room Volume		20,656.13				344.27 CFM CA	
Sensible		344.27 CFM CA	x	18.00 delta T	x 1.08 =	6,692.59	
Latent		344.27 CFM CA	x	62.00 GR/LB	x 0.68 =	14,514.37	
TOTALS							
1. Sensible						89,924.83 BTUH	
2. Latent						6,278.13 BTUH	
3. Total Heat						96,202.96 BTUH	
4. External Heat						2,206.96 BTUH	
5. Heat Grand-Total						113,409.92 BTUH	
6. A/C Tons						9.45 TONS	
7. Sensible Heat Factor						SHF 0.93	
8. Dry Bulb Internal Temperature						72.00 °F	
9. Dry Bulb Supply Air Temperature						63.00 °F	
10. Supply Air Temperature Gain						9.00 Delta T	
Total Air Supply (CFM)						8,840.00 CFM	
			Prepared by	M. Garcia	Checked by	H. Mori	
				Feb/26/2002		Aug/13/02	

Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.	
Section	4D- VENTILATION AND AIR-CONDITIONING	Calc. Index No.	
Subject	THERMAL LOAD CALCULATION-ADMINISTRATION BLD.	Page No. 14	Rev.
			References/ Notes
THERMAL LOAD ESTIMATION			
	FLOOR	LOAD (TONS)	
	1	26.68	
	2	26.61	
	3	30.98	
	4	9.16	
	5	10.62	
	6	9.45	
	TOTAL	113.49	
Prepared by <i>M. Garcia</i>		Checked by <i>H. Mori</i>	
M. Garcia		H. Mori	
Feb/26/2002		Aug/13/02	

ELECTRICAL WORK

DESIGN CALCULATION COVER SHEET								
Project	Detailed Design on Port Reactivation Project in La Union Province			Project Code	JC1N004/2N001			
Section	4- Utilities			Calc. File No.				
Sub-Section	4G-Emergency Power Generation E.			Calc. Index No.				
Subject: 4.16 kV diesel engine generator								
<p>Calculation Objective: To determine the capacity (in kVA) of each diesel engine generator set, located on Power Supply Station, depending of loads in case of emergency condition.</p>								
<p><u>References, Calculation Notes and Comments</u></p> <p style="text-align: center;">Emergency power shall be provided by two generator sets, connected by paralleling control switch.</p>								
Rev	Prepared		No. of Pages	Checked		Reviewed		Superseded by Calc No.
	by	Date		by	Date	by	Date	
O	T. Kikuchi	July/10/2002	3	<i>T. Kikuchi</i>	July 24, '02	W. F. F.	14 Aug. '02	
A	<i>T. Kikuchi</i>							
B								
C								

File in Calc. File

Project	Detailed Design on Port Reactivation Project in La Union		Calc. File No.	
Section	UTILITIES		Calc. Index No.	
Subject	DIESEL ENGINE GENERATOR CALCULATION		Page No. 01	Rev.
DESIGN FACTORS				References/ Notes
Demand Factor (D.F.)				
	AREA	D.F.		
	Gantry cranes	0.7		
	Cargo handling equipment	0.6		
	Flood lighting	1.0		
	Reefer outlets	0.6		
	Street lights	1.0		
	Administration Building	0.7		
	Container Freight Station	0.9		
	Maintenance and Repair Shop	0.6		
	Container Gate	1.0		
	Cargo Gate	1.0		
	Power Supply Station	1.0		
Power Factor (P.F.)				
	AREA	P.F.		
	Gantry cranes	0.75		
	Cargo handling equipment	0.75		
	Flood lighting	0.9		
	Reefer outlets	0.85		
	Street lights	0.9		
	Administration Building	0.85		
	Container Freight Station	0.85		
	Maintenance and Repair Shop	0.85		
	Container Gate	0.85		
	Cargo Gate	0.85		
	Power Supply Station	0.85		
		Prepared by <i>T. Kikuchi</i>	Checked by <i>T. Kikuchi</i>	
		T. Kikuchi	July 18 2002	July 15 2002

Project		Detailed Design on Port Reactivation Project in La Union					Calc. File No.		
Section		UTILITIES					Calc. Index No.		
Subject		DIESEL ENGINE GENERATOR CALCULATION					Page No. 02		Rev.
								References/ Notes	
In case of Emergency Condition (Essential Loads)									
Clause No. in Final Report	Voltage Level	Description of Load	Load (kW)	Demand Factor	Power Factor	Decided Capacity (KVA)			
6.2.3 (4)	4.16 kV	Gantry Crane (2 sets)	750 kW x 2 = 1,500	0.7	0.75	1400			
6.2.3 (4)	480 V	Reefer Outlet Area Lighting	44 kW x 8 = 352	0.6	0.85	248			
6.2.3 (4)	480 V	Container Yard Street Light and	72/3 = 24	1	0.9	27			
6.2.3 (4)	480 V	Maintenance area Port Administration	14/2 = 7	1	0.9	8			
6.2.3 (4)	480 V	Building	156	0.7	0.85	128			
6.2.3 (4)	480 V	Container Freight Station	21	0.9	0.85	22			
6.2.3 (4)	208-120V	Maintenance and Repair Shop	17	0.6	0.75	14			
6.2.3 (4)	208-120V	Container Gate	11	1	0.85	13			
6.2.3 (4)	208-120V	Cargo Gate	7	1	0.85	8			
6.2.3 (5)	208-120V	Power Supply Station	24	1	0.85	28			
Total KVA			2,119			1897			
DECIDED CAPACITY: 2 SETS OF 1000 KVA /4.16 KV									
				Prepared by <i>T. Kikuchi</i>		Checked by <i>T. Kikuchi</i>			
				T. Kikuchi		July 18 2002			
						July 24 2002			

DESIGN CALCULATION COVER SHEET								
Project	Detailed Design on Port Reactivation Project in La Union Province			Project Code	JC1N004/2N001			
Section	4- Utilities			Calc. File No.				
Sub-Section	4H-Power Distribution Equipment			Calc. Index No.				
Subject:	4.16/0.48 kV and 4.16/0.208-0.12 kV transformer							
Calculation Objective:								
To determine the capacity (in kVA) of each distribution transformer, located on Power Supply Station, depending of loads fed by each transformer.								
<u>References, Calculation Notes and Comments</u>								
Electric loads are calculated by computer based analysis.								
Rev	Prepared		No. of Pages	Checked		Reviewed		Superseded by Calc No.
	by	Date		by	Date	by	Date	
O	T. Kikuchi	July/10/2002	3	<i>T. Kikuchi</i>	July 24 '02	<i>BT FT</i>	14 Aug '02	
A	<i>T. Kikuchi</i>							
B								
C								

File in Calc. File

Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.																													
Section	UTILITIES	Calc. Index No.																													
Subject	4.16/0.48 KV AND 4.16/0.208-0.12 KV TRANSFORMER	Page No. 01	Rev.																												
DESIGN FACTORS			References/ Notes																												
Demand Factor (D.F.)																															
<table border="1"> <thead> <tr> <th>AREA</th> <th>D.F.</th> </tr> </thead> <tbody> <tr><td>Gantry cranes</td><td>0.7</td></tr> <tr><td>Cargo handling equipment</td><td>0.6</td></tr> <tr><td>Service outlets</td><td>0.5</td></tr> <tr><td>Flood lighting</td><td>1.0</td></tr> <tr><td>Reefer outlets</td><td>0.6</td></tr> <tr><td>Street lights</td><td>1.0</td></tr> <tr><td>Administration Building</td><td>0.7</td></tr> <tr><td>Container Freight Station</td><td>0.9</td></tr> <tr><td>Maintenance and Repair Shop</td><td>0.8</td></tr> <tr><td>Container Gate</td><td>1.0</td></tr> <tr><td>Cargo Gate</td><td>1.0</td></tr> <tr><td>Power Supply Station</td><td>1.0</td></tr> <tr><td>Fuel Station</td><td>1.0</td></tr> </tbody> </table>		AREA	D.F.	Gantry cranes	0.7	Cargo handling equipment	0.6	Service outlets	0.5	Flood lighting	1.0	Reefer outlets	0.6	Street lights	1.0	Administration Building	0.7	Container Freight Station	0.9	Maintenance and Repair Shop	0.8	Container Gate	1.0	Cargo Gate	1.0	Power Supply Station	1.0	Fuel Station	1.0		
AREA	D.F.																														
Gantry cranes	0.7																														
Cargo handling equipment	0.6																														
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Fuel Station	1.0																														
Power Factor (P.F.)																															
<table border="1"> <thead> <tr> <th>AREA</th> <th>P.F.</th> </tr> </thead> <tbody> <tr><td>Gantry cranes</td><td>0.75</td></tr> <tr><td>Cargo handling equipment</td><td>0.75</td></tr> <tr><td>Service outlets</td><td>0.8</td></tr> <tr><td>Flood lighting</td><td>0.9</td></tr> <tr><td>Reefer outlets</td><td>0.85</td></tr> <tr><td>Street lights</td><td>0.9</td></tr> <tr><td>Administration Building</td><td>0.85</td></tr> <tr><td>Container Freight Station</td><td>0.85</td></tr> <tr><td>Maintenance and Repair Shop</td><td>0.85</td></tr> <tr><td>Container Gate</td><td>0.85</td></tr> <tr><td>Cargo Gate</td><td>0.85</td></tr> <tr><td>Power Supply Station</td><td>0.85</td></tr> <tr><td>Fuel Station</td><td>0.85</td></tr> </tbody> </table>		AREA	P.F.	Gantry cranes	0.75	Cargo handling equipment	0.75	Service outlets	0.8	Flood lighting	0.9	Reefer outlets	0.85	Street lights	0.9	Administration Building	0.85	Container Freight Station	0.85	Maintenance and Repair Shop	0.85	Container Gate	0.85	Cargo Gate	0.85	Power Supply Station	0.85	Fuel Station	0.85		
AREA	P.F.																														
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Container Gate	0.85																														
Cargo Gate	0.85																														
Power Supply Station	0.85																														
Fuel Station	0.85																														
Prepared by <i>T. Kusan</i>		Checked by <i>T. Kusan</i>																													
July 18 2002		July 12 th 2002																													

Project	Detailed Design on Port Reactivation Project in La Union		Calc. File No.				
Section	UTILITIES		Calc. Index No.				
Subject	4.16/0.48 KV AND 4.16/0.208-0.12 KV TRANSFORMER		Page No. 02	Rev.			
				References/ Notes			
LOAD SCHEDULE							
FOR 46KV/4.16KV TRANSFORMER							
In case of Normal Condition				10/07/2002			
Clause No. in Final Report	Voltage Level	Description of Loads	Load (kW)	Demand Factor	Power Factor	Decided Capacity (KVA)	
6.2.2 (1)	4.16 kV	Gantry Crane (2 sets)	750 kW x 2 =	1.500	0.7	0.75	1400
6.2.2 (2)	4.16 kV	Movable Pneumatic Loader (2 sets)	400 kW x 2 =	800	0.6	0.75	640
6.2.2 (3)	4.16 kV	or (Movable Loader)					
6.2.2 (3)	4.16 kV	Movable Belt Conveyor	500	0.6	0.75	400	
6.2.2 (4)	480 V	Reefer Outlet	44 kW x 8 =	352	0.6	0.85	248
6.2.2 (5)	480 V	Area Lighting					
6.2.2 (5)	480 V	Container Yard	1 kw x 6 x 12 =	72	1	0.9	80
6.2.2 (5)	480 V	Area Lighting					
6.2.2 (5)	480 V	Multi-purpose Yard	1 kw x 6 x 4 =	24	1	0.9	27
6.2.2 (5)	480 V	Street Light and					
6.2.2 (5)	480 V	Maintenance area	0.25 kW x 55 =	14	1	0.9	16
6.2.2 (5)	480 V	Port Administration					
6.2.2 (6)	480 V	Building		288	0.7	0.85	237
6.2.2 (6)	480 V	Container Freight					
6.2.2 (6)	480 V	Station		103	0.9	0.85	109
6.2.2 (6)	480 V	Maintenance and					
6.2.2 (6)	208-120V	Repair Shop		136	0.6	0.75	109
6.2.2 (6)	208-120V	Container Gate		46	1	0.85	54
6.2.2 (6)	208-120V	Cargo Gate		29	1	0.85	34
6.2.2 (6)	208-120V	Power Supply Station		40	0.8	0.85	38
6.2.2 (7)	480 V	Service Outlet	38 kW x 7 =	266	0.5	0.8	166
Total				4,170			3558
DECIDED CAPACITY= 4000 KVA							
Prepared by <i>T.K. Kuroki</i>				Checked by <i>T.K. Kuroki</i>			
July 18 2002				July 124 2002			

Project	Detailed Design on Port Reactivation Project in La Union				Calc. File No.		
Section	UTILITIES				Calc. Index No.		
Subject	4.16/0.48 KV AND 4.16/0.208-0.12 KV TRANSFORMER				Page No. 03	Rev.	
LOAD OF 4.16KV/480V TRANSFORMER No. 1						References/ Notes	
					10/07/2002		
Circuit No.	From	To	Load (KW)	Demand Factor	Power Factor		Decided Capacity (KVA)
MV11	4.16KV/480V Transformer No. 1	Service outlet for crane in Container Berth (2 sets)	76	0.5	0.8		48
MV12	"	Service outlet for ship in Container Berth	38	0.5	0.8		24
MV13	"	Service outlet for crane in Multi-purpose Berth	38	0.5	0.8		24
MV14	"	Service outlet for ship in Multi-purpose Berth	38	0.5	0.8		24
MV15	"	Service outlet for ship in Passenger Berth (2 sets)	76	0.5	0.8		48
MV16	"	Flood Lighting, T1- T4	24	1.0	0.9		27
MV17	"	Flood Lighting, T5- T8	24	1.0	0.9		27
MV18	"	Flood Lighting, T9- T12	24	1.0	0.9		27
MV19	"	Flood Lighting, T13- T6	24	1.0	0.9		27
Total							273
Load of 4.16KV/480V TRANSFORMER No. 2							
Circuit No.	From	To	Load (KW)	Demand Factor	Power Factor		Decided Capacity (KVA)
MV21	4.16KV/480V Transformer No. 2	Reefer outlet (R1, R2, R3, R4)	176	0.6	0.85		124
MV22	"	Reefer outlet (R5, R6, R7, R8)	176	0.6	0.85		124
MV23	"	Street lighting essential loads	7	1.0	0.9		8
MV24	"	Street lighting non-essential loads	7	1.0	0.9		8
MV25	"	Port Administration Building	288	0.7	0.85		237
MV26	"	Container Freight Station	103	0.9	0.85		109
MV27	"	Spare				50	
MV28	"	Spare				50	
Total						710	
LOAD OF 4.16KV/208-120V TRANSFORMER NO. 3							
Circuit No.	From	To	Load (KW)	Demand Factor	Power Factor	Decided Capacity (KVA)	
LV11	4.16KV/208-120V Transformer No. 3	Maintenace and Repair Shop	136	0.6	0.85	96	
LV12	"	Container Gate	46	1.0	0.85	54	
LV13	"	Cargo Gate	29	1.0	0.85	34	
LV14	"	Spare	40	1.0	0.85	47	
LV15	"	Spare	5	1.0	0.85	6	
Total						237	
Prepared by <i>[Signature]</i>				Checked by <i>[Signature]</i>			
July 18 2002				July 24 2002			

DESIGN CALCULATION COVER SHEET								
Project	Detailed Design on Port Reactivation Project in La Union Province			Project Code	JC1N004/2N001			
Section	4- Utilities			Calc. File No.				
Sub-Section	4I-Cabling and Piping			Calc. Index No.				
Subject: Cable Size Calculation								
Calculation Objective:								
To determine the conductor size (in square millimeters) of each circuit feeder, from Power Supply Station to each load, depending of current, cable length and maximum voltage drop.								
<u>References, Calculation Notes and Comments</u>								
Rev	Prepared		No. of Pages	Checked		Reviewed		Superseded by Calc No.
	by	Date		by	Date	by	Date	
O	T. Kikuchi	July/18/2002		T. Kikuchi		VA FT	14 Aug 02	
A	<i>T. Kikuchi</i>			<i>T. Kikuchi</i>	July 24, 02			
B								
C								

File in Calc. File

Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.	
Section	UTILITIES	Calc. Index No.	
Subject	CABLING AND PIPING	Page No. 01	Rev.
DESIGN FACTORS			References/ Notes
Demand Factor (D.F.)			
AREA		D.F.	
Gantry cranes		0.7	
Cargo handling equipment		0.6	
Service outlets		0.5	
Flood lighting		1.0	
Reefer outlets		0.6	
Street lights		1.0	
Administration Building		0.7	
Container Freight Station		0.9	
Maintenance and Repair Shop		0.6	
Container Gate		1.0	
Cargo Gate		1.0	
Power Supply Station		1.0	
Fuel Station		1.0	
Power Factor (P.F.)			
AREA		P.F.	
Gantry cranes		0.75	
Cargo handling equipment		0.75	
Service outlets		0.8	
Flood lighting		0.9	
Reefer outlets		0.85	
Street lights		0.9	
Administration Building		0.85	
Container Freight Station		0.85	
Maintenance and Repair Shop		0.85	
Container Gate		0.85	
Cargo Gate		0.85	
Power Supply Station		0.85	
Fuel Station		0.85	
Prepared by <i>T. Kikuchi</i>		Checked by <i>T. Kikuchi</i>	
T. Kikuchi		July 18 2002	T. Kikuchi July 24 2002

Project Detailed Design on Port Reactivation Project in La Union
Section UTILITIES
Subject CABLING AND PIPING

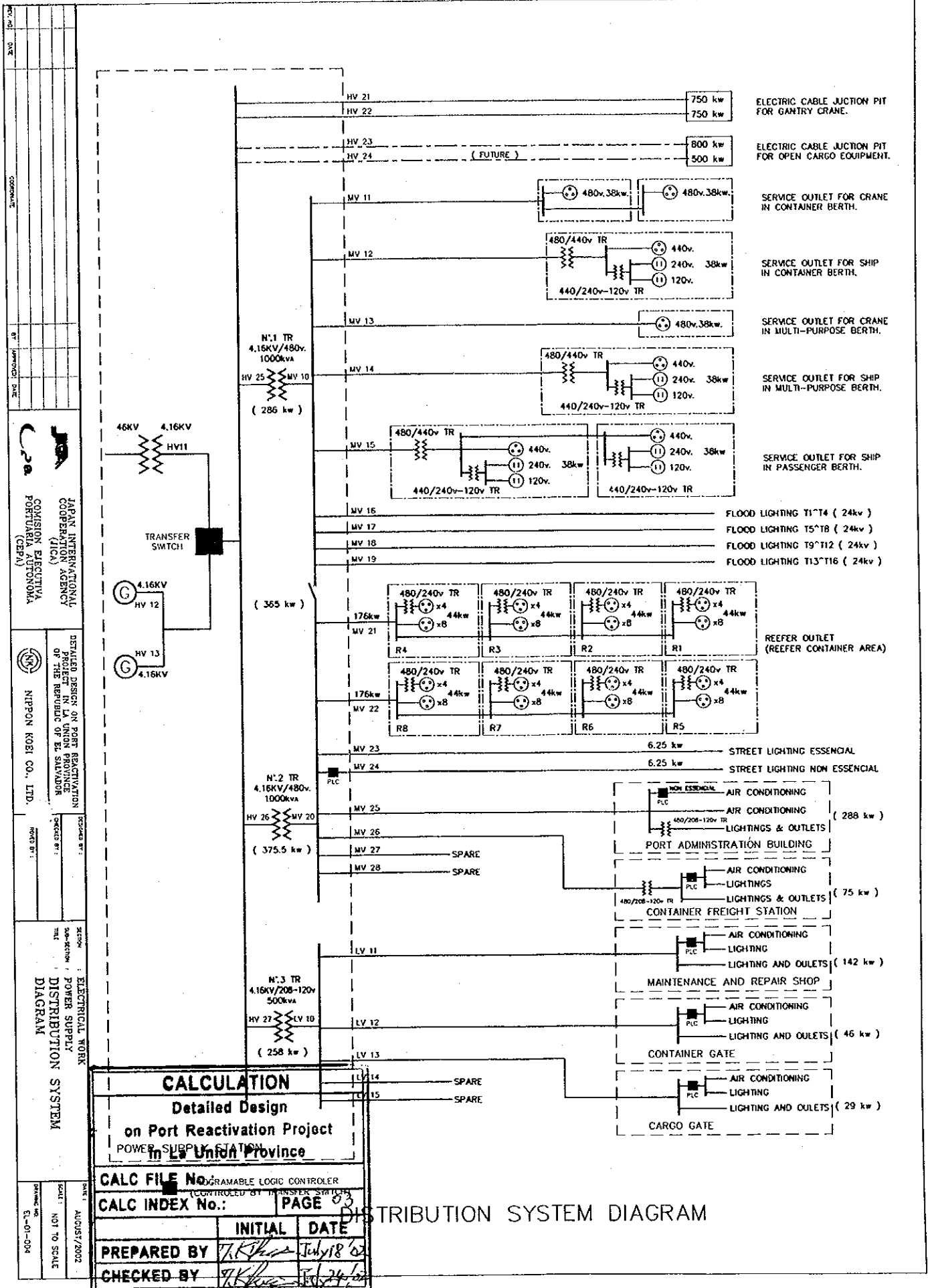
Calc. File No.
 Calc. Index No.
 Page No. 02 Rev.

7-AUG-02

CABLE SCHEDULE

CIRCUIT No.	FROM	TO	LOAD (KW)	PHASE-VOLTAGE	POWER FACTOR	POWER FACTOR	REBAND CAPACITY (KVA)	CURRENT (A)	CABLE ALLOWABLE CURRENT x 0.75	ACTUAL CABLE LENGTH	CALCULATION LENGTH (M)	VOLTAJE DROP (V)	WIRE SIZE (SQ. MM)	No of core
	4.16 KV network of 200	4.16KV outdoor switchgear		3P - 4.16 KV			4,000	50						
W11	4.16KV Transformer	4.16KV indoor switchgear		3P - 4.16 KV			4,000	555	623	20	10	0	400	1C
W12	4.16 KV Generator No. 1	"		3P - 4.16 KV			1,000	130	299	20	20	1	100	3C
W13	4.16 KV Generator No. 2	"		3P - 4.16 KV			1,000	130	299	25	25	1	100	3C
W21	4.16KV indoor switchgear	Center crane No. 1	750	3P - 4.16 KV	0.7	0.75	700	97	207	490	490	15	83	100
W22	"	Center crane No. 2	750	3P - 4.16 KV	0.7	0.75	700	97	207	490	490	15	83	100
W23	"	Cargo handling loader (future)	400	3P - 4.16 KV	0.6	0.75	400	89	207	430	430	12	83	100
W24	"	Cargo handling belt conveyor (future)	500	3P - 4.16 KV	0.6	0.75	400	56	155	430	430	12	83	100
W25	"	4.16KV/480V Transformer No. 1		3P - 4.16 KV			1,000	130	155	20	15	1	60	3C
W26	"	4.16KV/480V Transformer No. 2		3P - 4.16 KV			1,000	130	155	20	15	1	60	3C
W27	"	4.16KV/200-120V Transformer No. 3		3P - 4.16 KV			500	63	50	20	15	1	22	3C
W10	4.16KV/480V Transformer No. 1	No. 1 480V Switchgear	76	3P - 480V	0.5	0.8	1,000	1203	834 x 2	120	20	7	400 x 2	1C
W11	No. 1 480V Switchgear	Service outlet for crane in container berth	38	3P - 480V	0.5	0.8	48	57	215	710	420	7	19	100
W12	"	Service outlet for ship in container berth	38	3P - 480V	0.5	0.8	24	25	102	400	400	7	19	100
W13	"	Service outlet for crane in multi-purpose berth	38	3P - 480V	0.5	0.8	24	29	102	585	585	9	19	100
W14	"	Service outlet for ship in multi-purpose berth	38	3P - 480V	0.5	0.8	24	29	102	545	545	8	19	100
W15	"	Service outlet for ship in passenger berth	76	3P - 480V	0.5	0.8	48	57	215	805	685	12	19	100
W16	"	Flood lighting (T1, T2, T3, T4)	24	3P - 480V	1.0	0.9	27	32	126	575	410	11	19	38
W17	"	Flood lighting (T5, T6, T7, T8)	24	3P - 480V	1.0	0.9	27	32	126	520	355	6	19	38
W18	"	Flood lighting (T9, T10, T11, T12)	24	3P - 480V	1.0	0.9	27	32	126	415	335	15	19	22
W19	"	Flood lighting (T13, T14, T15, T16)	24	3P - 480V	1.0	0.9	27	32	126	580	375	17	19	22
W20	4.16KV/480V Transformer No. 2	No. 2 480V Switchgear	176	3P - 480V	0.6	0.85	1000	1203	834 x 2	90	15	19	400 x 2	1C
W21	"	Refrigerator outlet (R1, R2, R3, R4)	176	3P - 480V	0.6	0.85	124	148	215	270	200	9	10	100
W22	"	Refrigerator outlet (R5, R6, R7, R8)	176	3P - 480V	0.6	0.85	124	148	215	310	220	10	10	100
W23	"	Sirens lighting, essential load	7	3P - 480V	1.0	0.9	6	5	32	2060	220	3	22	3C
W24	"	Street lighting, non-essential load	7	3P - 480V	1.0	0.9	6	5	32	2,060	220	3	22	3C
W25	"	Pool administration building	288	3P - 480V	0.7	0.85	237	210	215	210	210	14	19	100
W26	"	Container freight station	100	3P - 480V	0.9	0.85	109	131	215	540	480	19	19	100
W27	"	Spurs		3P - 480V										
W28	"	Spurs		3P - 480V										
W10	4.16KV/200-120V Transformer No. 3	200-120V Switchgear	156	3P - 200/120V	0.6	0.85	500	1388	707 x 2	80	10	8	500 x 2	1C
W11	200-120V Switchgear	Maintenance and repair shop	46	3P - 200/120V	1.0	0.95	95	266	273	185	185	8	8	200
W12	"	Container gate	29	3P - 200/120V	1.0	0.95	34	150	102	260	270	8	8	150
W13	"	Cargo gate	40	3P - 200/120V	1.0	0.85	47	113	126	158	120	8	8	238
W14	"	Power supply station	5	3P - 200/120V	1.0	0.85	6	14	72	20	15	1	8	38
W15	"	Port station	5	3P - 200/120V	1.0	0.85	6	14	72	130	130	4	8	14

Prepared by T. Kikuchi
 Checked by T. Kikuchi
 July 2002



CALCULATION
 Detailed Design
 on Port Reactivation Project
 POWER SUPPLY STATION
 In La Unión Province

CALC FILE No. PROGRAMABLE LOGIC CONTROLLER
 (CONTROLLED BY TRANSFER SWITCH)

CALC INDEX No.: PAGE 03

INITIAL DATE

PREPARED BY *T.K. K...* July 18 '02

CHECKED BY *T.K. K...* July 24 '02

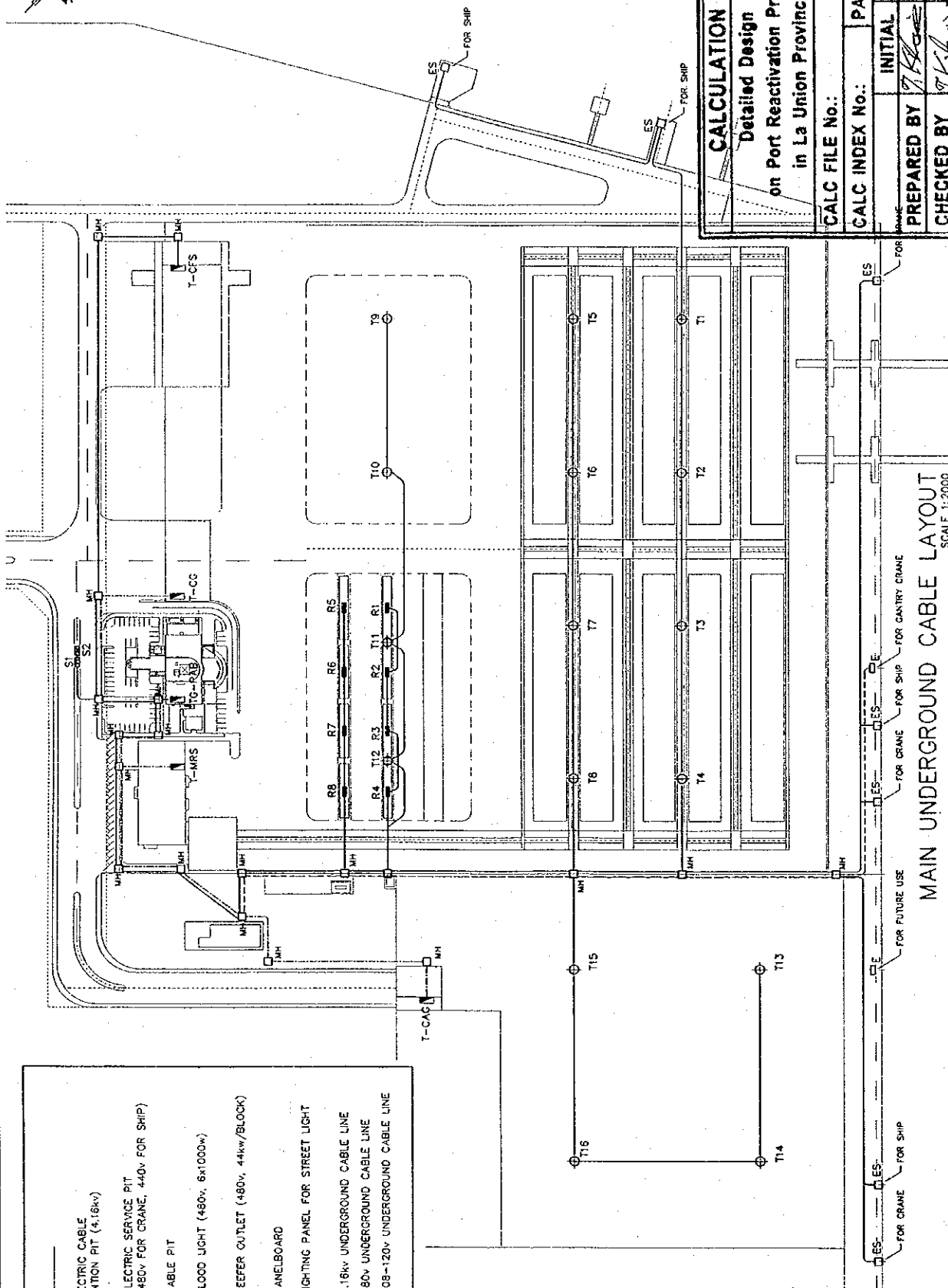
DISTRIBUTION SYSTEM DIAGRAM

JAPAN INTERNATIONAL
 COOPERATION AGENCY
 (JICA)
 COMISION EJECUTIVA
 PORTUARIA AUTONOMA
 (CESPA)

DESIGNED BY: NIPPON KOGI CO., LTD.
 OF THE REPUBLIC OF EL SALVADOR

ELECTRICAL WORK
 POWER SUPPLY
 DISTRIBUTION SYSTEM
 DIAGRAM

DATE: AUGUST 7/2002
 SCALE: NOT TO SCALE
 DRAWING NO: EL-01-004



LEGEND

E	ELECTRIC CABLE
ES	ELECTRIC SERVICE PIT (4.16kv)
MH	ELECTRIC SERVICE PIT (480v FOR CRANE, 440v FOR SHIP)
T1-T16	CABLE PIT
RT-R8	FLOOD LIGHT (480v, 6x1000w)
ST-S2	REEFER OUTLET (480v, 44kw/BLOCK)
	PANELBOARD
	LIGHTING PANEL FOR STREET LIGHT
---	4.16kv UNDERGROUND CABLE LINE
---	480v UNDERGROUND CABLE LINE
---	208-120v UNDERGROUND CABLE LINE

CALCULATION
Detailed Design
on Port Reactivation Project
in La Union Province

CALC FILE No.:
CALC INDEX No.: PAGE 28
PREPARED BY: [Signature] INITIAL DATE: [Signature] July 18, 2000
CHECKED BY: [Signature] DATE: [Signature] July 29, 2000

SECTION: ELECTRICAL WORKS	DATE: AUGUST/2002
SUB-SECTION: POWER SUPPLY	SCALE: 1:2000
TITLE: MAIN UNDERGROUND CABLE LAYOUT	DRAWING NO.: EL-01-005
DESIGNED BY:	CHECKED BY:
APPROVED BY:	EMPLOYED BY:
DETAILED DESIGN ON PORT REACTIVATION PROJECT IN LA UNION PROVINCE OF THE REPUBLIC OF EL SALVADOR 	
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) COMISION EJECUTIVA PORTUARIA AUTONOMA (CEPA) NIPPON KOEI CO., LTD.	
REV. NO.	DATE
BY	DATE
COORDINATE	

MAIN UNDERGROUND CABLE LAYOUT
SCALE 1:2000

DESIGN CALCULATION COVER SHEET								
Project	Detailed Design on Port Reactivation Project in La Union Province			Project Code	JC1N004/2N001			
Section	4- Utilities			Calc. File No.				
Sub-Section	4j- Area Lighting System			Calc. Index No.				
Subject: Area Lighting Design Calculation								
Calculation Objective: To determine the number and location of lighting fixtures in each area, depending of fixture type and the required illuminance level.								
<u>References, Calculation Notes and Comments</u> Illuminance levels are from Illuminating Engineering Society of North America (IESNA) Lighting Handbook 9th Edition, 2000. Illuminance unit is LUX Reflectances for floor (Outdoor) To design the interior luminaire distribution it was used VISUAL lighting design software of Lithonia Lighting. The following parameters are requested: Type of fixture and lamps to be used. Illuminance level and units. Reflectances of floor. Length and width of each area. Work plane and luminaire plane. Light Loss Factor (LLF) of each luminaire type								
Rev	Prepared		No. of Pages	Checked		Reviewed		Superseded by Calc No.
	by	Date		by	Date	by	Date	
O	M. Garcia	July/23/2002	3	T. Khac	July 24 '02	PT	14 Aug 02	
A								
B								
C								

File in Calc. File

Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.	
Section	UTILITIES	Calc. Index No.	
Subject	LIGHTING DESIGN CALCULATION-AREA LIGHTING.	Page No. 01	Rev.
DESIGN FACTORS			References/ Notes
Recommended Lighting Levels (Acording IESNA Specification)			
	AREA	LUX	
	Container yard	30	
	Multipurpose yard	30	
	Reefer container yard	30	
	Empty container yard	30	
	Roads	30	
Typical Surface Reflectances			
	CONDITION	%	
	Ceiling	0%	
	Wall	0%	
	Floor	0%	
Luminaire Types (from Lithonia Lighting Catalog)			
	AREA	LUMINAIRE	LUMEN
	Container yard	High Mast HPS 1000w	130000
	Multipurpose yard	High Mast HPS 1000w	130000
	Reefer container yard	High Mast HPS 1000w	130000
	Empty container yard	High Mast HPS 1000w	130000
	Roads	Cobra type HPS 250w	28500
			LLF
	Container yard		0.92
	Multipurpose yard		0.92
	Reefer container yard		0.92
	Empty container yard		0.92
	Roads		0.87
		Prepared by <i>M. Garcia</i>	Checked by <i>T. K. Garcia</i>
		M. Garcia	July 24 1200
		July/23/2002	



Project	Detailed Design on Port Reactivation Project in La Union Province of the Republic of El Salvador	Calc. File N°	
Section:	UTILITY WORK	Calc. Index N°	
Subject:	AREA LIGHTING DESIGN CALCULATION	Page N°	2

STATISTICS						
Description	Avg	Max	Min	Max/Min	Avg/Min	
ROADS	24 lux	67 lux	3 lux	22.3:1	7.9:1	
Calc Zone #9	28.6 lux	65.9 lux	2.6 lux	25.3:1	11.0:1	
Calc Zone #10	54.1 lux	122.6 lux	6.1 lux	20.1:1	8.9:1	

Prepared by	<i>M. Garcia</i>	Checked by	<i>V. Kikuchi</i> July 24, '02
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SURFACE SCHEDULE

Name	Reflectances			Normal			Area (sq. m)
	Front	Back	X	Y	Z		
Base	0%	0%	0.0	0.0	-1.0	640.064	
Wall 1	0%	0%	1.0	0.0	0.0	440.0	
Wall 2	0%	0%	0.0	-1.0	0.0	145.938	
Wall 3	0%	0%	-1.0	0.002	0.0	440.001	
Wall 4	0%	0%	0.0	1.0	0.0	145.0	
Roof	0%	0%	0.0	0.0	1.0	640.064	
Base	0%	0%	0.0	0.0	-1.0	783.579	
Wall 1	0%	0%	0.0	1.0	0.0	160.0	
Wall 2	0%	0%	1.0	0.018	0.0	170.029	
Wall 3	0%	0%	-0.138	0.99	0.0	72.567	
Wall 4	0%	0%	0.877	0.48	0.0	45.591	
Wall 5	0%	0%	0.872	0.49	0.0	22.947	
Wall 6	0%	0%	0.997	-0.073	0.0	30.08	
Wall 7	0%	0%	0.782	-0.623	0.0	25.574	
Wall 8	0%	0%	0.86	-0.511	0.0	23.26	
Wall 9	0%	0%	0.0	-1.0	0.0	77.187	
Wall 10	0%	0%	0.998	0.062	0.0	130.254	
Wall 11	0%	0%	0.0	-1.0	0.0	160.938	
Wall 12	0%	0%	-1.0	-0.019	0.0	420.079	
Roof	0%	0%	0.0	0.0	1.0	783.579	

LUMINAIRE SCHEDULE

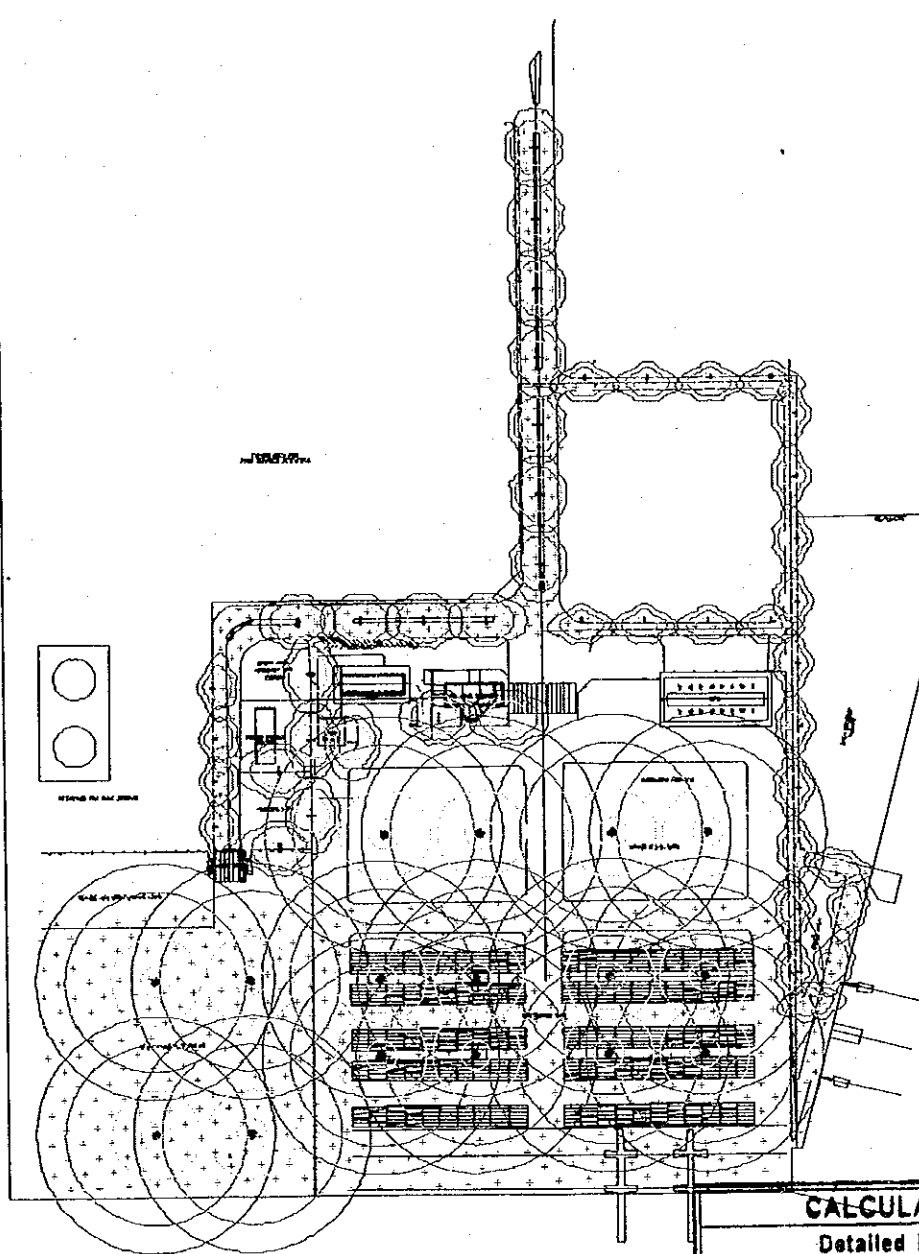
Symbol	Label	Qty	Catalog Number	Description	Lamp	File	Lumens	LLF	Watts
⋮	A	20	HIMSTC10HP00S1	HIGH MAST	LU1000 1000W HPS SY	36357.ies	130000	0.92	6450
⋮	B	21	CHL 250S R2 DLG	TYPE II COBRA HEAD	250W HPS PH	AE22431.IES	28500	0.87	295
⋮	C	26	CHL 250S R2 DLG	TYPE II COBRA HEAD	250W HPS PH	AE22431.IES	28500	0.87	295

CALCULATION	
Detailed Design on Pert Reactivation Project in La Union Province	
CALC FILE No.:	
CALC INDEX No.:	PAGE 3
PREPARED BY	INITIAL DATE MGC/ll July 22/02
CHECKED BY	T. K. Garcia July 24/02

PUERTO LA UNION
 LIGHTING DESIGN CALCULATION
 AREA LIGHTING LAYOUT



Designer M. GARCIA
Date Ene 31 2002
Scale
Drawing No.
2 of 2



CALCULATION		
Detailed Design on Port Reactivation Project in La Union Province		
CALC FILE No.:		
CALC INDEX No.:		PAGE 4
	INITIAL	DATE
PREPARED BY	<i>M.A. [Signature]</i>	Apr 8/02
CHECKED BY	<i>T.R. [Signature]</i>	July 24 '02

Designer
 M. GARCIA
 Date
 Apr 8 2002
 Scale
 1 : 5000
 Drawing No.

PUERTO LA UNION
LIGHTING DESIGN CALCULATION
AREA LIGHTING LAYOUT

