VOLTAGE DROP CALCULATION FROM SUBSTATION TO EXISTING WAREHOUSE'S GENERAL PANEL BOARD WGPB			
Distance (Km)	**0.06**		**Protection level**
Power (KVA)	**50**		
Operational Voltage	208		
Current	138.9506	173.6883	**3X150A**
Real AWG No. 1/0,	**0.197**		Table 9, Chap 9, NTC 2050
Reactancy Inductive AWG No 1/0	0.072		Table 9, Chap 9, NTC 2050
Power Factor	0.85		
Effective impedance	0.205378		Table 9, Chap 9, NTC 2050
Voltage dropping: Z*I*L	1.712247		
Diff	2.965612		
E%	1.425775		
Dropping voltage ratio meets NTC2050			
chap. 210-19 y 215-2			

VOLTAGE DROP CALCULATION FROM WGPB TO NEW DISTRIBUTION PANEL			
Distance (Km)	**0.03**		**Protection level**
Power (KVA)	**15**		
Operational Voltage	208		
Current	41.68519	52.10649	**3X50A**
Real AWG No. 4	**1.02**		
Reactancy Inductive AWG No 4	0.197		Table 9, Chap 9, NTC 2050
Power Factor	0.85		
Effective impedance	0.970776		Table 9, Chap 9, NTC 2050
Voltage dropping: Z*I*L	1.517512		
Diff	2.628331		
E%	1.263621		
Dropping voltage ratio meets NTC2050			
chap. 210-19 y 215-2			

VOLTAGE DROP CALCULATION FROM WGPB TO NEW DISTRIBUTION PANEL-AC			
Distance (Km)	**0.032**		**Proteccion level**
Power (KVA)	**15**		
Operational Voltage	208		
Current	41.68519	52.10649	**3X50A**
Real AWG No. 4	**1.02**		Table 9, Chap 9, NTC 2050
Reactancy Inductive AWG No 4	0.197		Table 9, Chap 9, NTC 2050
Power Factor	0.85		
Effective impedance	0.970776		Table 9, Chap 9, NTC 2050
Voltage dropping: Z*I*L	1.61868		
Diff	2.803553		
E%	1.347862		
Dropping voltage ratio meets NTC2050			
chap. 210-19 y 215-2			

NEW DISTRIBUTION PANEL

ITEM	UNITARY POWER LOAD	FIXTURES & APPLIANCES	CTO	R	S	T	PROTECTION	DUCTS/CONDUIT	SECONDARY BRANCH WIRING
Receptacles 120VAC/15A	**180**	6	1	**1080**			1X20A	Metallic raceway 12cmX5cm	THHN/THNW AWG 3X#12
Receptacles 120VAC/15A	**180**	7	2		**1260**		1X20A	Metallic raceway/PVC 3/4"	THHN/THNW AWG 3X#12
Receptacles 120VAC/15A	**180**	7	3			**1260**	1X20A	Metallic raceway/PVC 3/4"	THHN/THNW AWG 3X#12
Receptacles 120VAC/15A	**180**	6	4	**1080**			1X20A	PVC 3/4"	THHN/THNW AWG 3X#12
Receptacles 120VAC/15A	**180**	6	5		**1080**		1X20A	EMT 3/4"	THHN/THNW AWG 3X#12
Receptacles 120VAC/15A	**180**	6	6			**1080**	1X20A	Metallic raceway 12cmX5cm	THHN/THNW AWG 3X#12
Receptacles 120VAC/15A	**180**	6	7	**1080**			1X20A	Metallic raceway 12cmX5cm	THHN/THNW AWG 3X#12
Receptacles 120VAC/15A	**180**	6	8		**1080**		1X20A	Metallic raceway 12cmX5cm	THHN/THNW AWG 3X#12
Receptacles 120VAC/15A	**180**	6	9			**1080**	1X20A	Metallic raceway 12cmX5cm	THHN/THNW AWG 3X#12
Receptacles 120VAC/15A	**180**	6	10	**1080**			1X20A	Metallic raceway 12cmX5cm	THHN/THNW AWG 3X#12
Receptacles 120VAC/15A	**180**	6	11		**1080**		1X20A	Metallic raceway 12cmX5cm	THHN/THNW AWG 3X#12
Receptacles 120VAC/15A	**180**	6	12			**1080**	1X20A	Metallic raceway 12cmX5cm	THHN/THNW AWG 3X#12
Lamp 4X17W, T5	**68**	4	13	**272**			1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 4X17W, T5	**68**	4	14		**272**		1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 4X17W, T5	**68**	2	15	**136**			1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 4X17W, T5	**68**	4	16			**272**	1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 2X32W, T5	**64**	8	17	**512**			1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 2X32W, T5	**64**	6	18		**384**		1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 2X32W, T5	**64**	7	19			**448**	1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 2X32W, T5	**64**	6	20		**384**		1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 2X32W, T5	**64**	6	21	**384**			1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 2X32W, T5	**64**	8	22			**512**	1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 2X32W, T5	**64**	6	23		**384**		1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 2X32W, T5	**64**	3	24			**192**	1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 4X17W, T5	**68**	4	25	**272**			1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 4X17W, T5	**68**	4	26		**272**		1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 4X17W, T5	**68**	4	27			**272**	1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 2X25W, Flourescent, saving energy	**50**	6	28	**300**			1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 2X25W, Flourescent, saving energy	**50**	4	29		**200**		1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 2X25W, Flourescent, saving energy	**50**	4	30			**200**	1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 2X25W, Flourescent, saving energy	**50**	4	31	**200**			1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 2X25W, Flourescent, saving energy	**50**	4	32		**200**		1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 2X25W, Flourescent, saving energy	**50**	3	33			**150**	1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Lamp 2X25W, Flourescent, saving energy	**50**	4	34	**200**			1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
DPS CLASS B 180KA	**N/A**	1	35,36,37				Depending on Manufacturer's conditions	EMT 3/4"	Depending on Manufacturer's conditions
Spare slots	**N/A**	N/A	38-42				N/A	N/A	N/A
				6596	**6596**	**6546**			

Total Load	19,738.00
Power load 10KVA al 100%	10,000.00
Remaining al 50%	4,869.00
Estimated power value	14,869.00
Current value	41.32
125%	**51.65**
Protection	**3X80A**

NEW DISTRIBUTION PANEL AC

ITEM	UNITARY POWER LOAD	FIXTURES & APPLIANCES	CTO	R	S	T	PROTECTION	DUCTS/CONDUIT	SECONDARY BRANCH WIRING
Air Extractor, industrial type 1HP, 3000 CFM	**750**	1	1	**750**			1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Air Extractor, industrial type 1HP, 3000 CFM	**750**	1	2		**750**		1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Air Extractor, industrial type 1HP, 3000 CFM	**750**	1	3			**750**	1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Air Extractor, industrial type 1HP, 3000 CFM	**750**	1	4	**750**			1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Air Extractor, industrial type,2000 CFM, 1/4HP	**187.5**	1	5		**187.5**		1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Air Extractor, Centifuge, 2500 CFM, 1/2 HP	**375**	1	6			**375**	1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Air Extractor, Centifuge, 2500 CFM, 1/2 HP	**375**	1	7		**375**		1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Air Extractor, Centifuge, 2000 CFM, 1/4 HP	**187.5**	1	8		**187.5**		1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Air Extractor, Centifuge, 2000 CFM, 1/4 HP	**187.5**	1	9			**187.5**	1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Air Extractor, Centifuge, 2000 CFM, 1/4 HP	**187.5**	1	10			**187.5**	1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Air Extractor, Centifuge, 2000 CFM, 1/4 HP	**187.5**	1	11		**187.5**		1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Air Extractor, Centifuge, 2500 CFM, 1/2 HP	**375**	1	12	**375**			1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Air Extractor, Centifuge, 2500 CFM, 1/2 HP	**375**	1	13	**375**			1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Air Extractor, Centifuge, 2500 CFM, 1/2 HP	**375**	1	14	**375**			1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
Air Extractor, Centifuge, 2500 CFM, 1/2 HP	**375**	1	15	**375**			1X15A	EMT 3/4"	THHN/THNW AWG 3X#12
AC 18KBTU	**3000**	1	16-17		**1500**	**1500**	Depending on Manufacturer's conditions	Depending on Manufacturer's conditions	Depending on Manufacturer's conditions
AC 18KBTU	**3000**	1	18-19	**1500**		**1500**	Depending on Manufacturer's conditions	Depending on Manufacturer's conditions	Depending on Manufacturer's conditions
AC 18KBTU	**3000**	1	20-21	**1500**	**1500**		Depending on Manufacturer's conditions	Depending on Manufacturer's conditions	Depending on Manufacturer's conditions
Condenser Unit 54KBTU	**3000**	1	22-23		**1500**	**1500**	Depending on Manufacturer's conditions	Depending on Manufacturer's conditions	Depending on Manufacturer's conditions
DPS CLASS B 180KA	**NA**	1	22-24				Depending on Manufacturer's conditions	EMT 3/4"	Depending on Manufacturer's conditions
Spare slots	**N/A**	N/A	25-36				N/A	N/A	N/A
				6000	**6187.5**	**6000**			

Total Load	18,187.50
Power load 10KVA al 100%	10,000.00
Remaining al 50%	4,093.75
Estimated power value	14,093.75
Current value	39.17
125%	**48.96**
Protection	**3X40A**

I. Cálculos de Iluminación para Aula de clase

RETILAP: Articulo 410.1. Para Aulas de clase se determinan 500-750 Luxes, seung tabla 410.1

Tipo de Utilización: aula de clase

Dimensiones del salón

Area total: 9.5m L X 7.3m An

Altura: 2.6 metros

Coeficiente de Luz Diurna (CLD) Segun Tabla : 410.2.2.c >2% , para ello se instalan 5 ventanas de 0.65mX2m

Artículo 420.1.2: Requisitos de iluminacion para salones. Se refuerza area de tablero.

De acuerdo con articulo 430.3, el número de bombillas requeridas se calcula como:

Aire Acondicionado Al		59696.48
	Tons	4.974707
Aire Acondicionado Ol		14160.16
	Tons	1.180013

φtotal=(EpromXA)/CUxFM) 86687.5

	3.5		X
kW:	6.3	BTU	
	10		

Reflectancia piso al 20%

Reflectancia techo al 80% (PVC), color crema

Reflectanacia paredes del 80% (PVC), color crema

Indice de local: 3.149243

Tipo de bombilla Philips ALTO II T 8 17W 700 Series, Flujo Luminoso promedio 1210

CU, de acuedo a tabla 430.2.3, para las condiciones anteriores es 0.75

Se considera un factor de mantenimineto de 0.8 por ser un lugar limpio

Número de bombillas requeridas para cubrir el area:

N= φtotal/(n*FlujoPromedio)

N=86687.5/(4*1210)=17.91 o 18 luminarias

II. Calculos iluminacion en Area administrativa

RETILAP: Articulo 410.1. Para oficinas se determinan 500-750 Luxes, seung tabla 410.1

Tipo de Utilización: Oficinas, por motivos propios de operacion la oficina "cuarto oscuro" no es candidata para los cálculos, por tener condición especial

Area total 4.7m LX3.5m An

Altura:

Coeficiente de Luz Diurna (CLD) Segun Tabla : 410.2.2.c >2% , se deja una ventana de 1.0mX1.45m

Artículo 420.1.1: Requisitos de iluminacion para salones. Se refuerza area de tablero.

De acuerdo con articulo 430.3, el número de bombillas requeridas se calcula como:

φtotal=(EpromXA)/CUxFM) 20562.5

Reflectancia piso al 20%

Reflectancia techo al 80% (PVC), color crema

Reflectanacia paredes del 80% (PVC), color crema

Indice de local: 6.480243

Tipo de bombilla Philips ALTO II T 8 17W 700 Series, Flujo Luminoso promedio 1210

CU, de acuedo a tabla 430.2.3, para las condiciones anteriores es 0.75

Se considera un factor de mantenimineto de 0.8 por ser un lugar limpio

Número de bombillas requeridas para cubrir el area:

N= φtotal/(n*FlujoPromedio)

N=20562.5/(4*1210)=4.24 o 5 luminarias