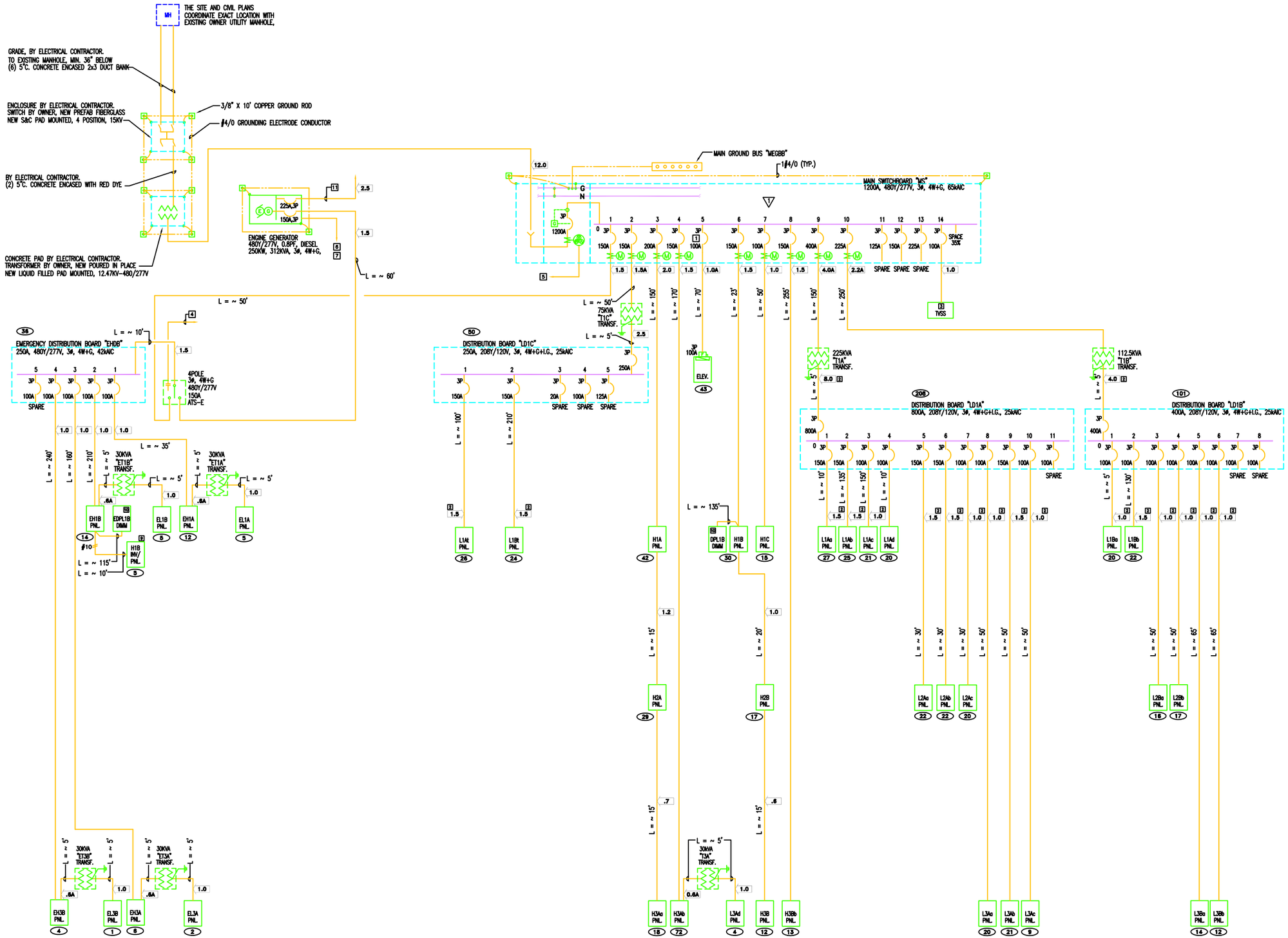

UCSB Student Resource Building

Single Line Diagram
Scale: NTS

Clement Fung
Advisor: Ted Dannerth
Lighting/ Electrical
October 27th 2006

Primary Lamps Characteristics Summary

Lamp Type	Lamp Starting Characteristics	Lamp Watts (W)	Lamps/Ballast (if applicable)	Ballast Type (if applicable)*	Ballast Factor	Ballast Watts (W)	Power Factor (start) **	Power Factor (Operating) **	Starting Current (A) **	Operating Current (A) **	Operating Voltage (V)
T4 Triple Tube Compact Fluorescent	Rapid Start	18	1	Electronic	1.05	20	0.97	0.97	0.17	0.17	120
T4 Triple Tube Compact Fluorescent	Rapid Start	26	1	Electronic	1.10	27	0.98	0.98	0.24	0.24	120
T4 Triple Tube Compact Fluorescent	Programmed Start	32	1	Electronic	0.88	32	0.98	0.98	0.14	0.14	277
T4 Triple Tube Compact Fluorescent	Rapid Start	42	1	Electronic	0.98	46	0.98	0.98	0.38	0.38	120
T8 Fluorescent	Programmed Start	17	1	Electronic	1.00	22	0.97	0.97	0.19	0.19	120
T8 Fluorescent	Programmed Start	25	1	Electronic	0.95	28	0.98	0.98	0.24	0.24	120
T8 Fluorescent	Programmed Rapid Start	32	1	Lutron Hi Lume (Electronic)	1.00 / 0.01	35 / 8	0.95	0.95	0.35	0.35	277
T8 Fluorescent	Programmed Rapid Start	32	2	Sylvania Quicktronic Professional (Electronic)	0.88	59	0.98	0.98	0.50	0.21	277
T5 Fluorescent	Programmed Start	21	1	Electronic	1.03	26	0.99	0.99	0.21	0.21	277
T5 Fluorescent	Programmed Start	28	1	Electronic	1.04	33	0.98	0.98	0.12	0.12	277
T5 Fluorescent	Programmed Start	54	1	Electronic	0.99	62	0.90	0.90	0.24	0.24	277
Quad Tube	Programmed Start	26	1	Electronic	1.00	27	0.98	0.98	0.23	0.23	277
PL Lamp	Programmed Start	18	1	Electronic	1.00	19	0.97	0.97	0.07	0.07	120 - 277
T6 Ceramic Metal Halide	Pulse Start	150	1	Electronic	1.00	166	0.90	0.90	0.60	0.60	277
ED-17 Metal Halide	Pulse Start	70	1	Electronic	1.00	79	0.90	0.90	0.29	0.29	277
PAR38 Metal Halide	Pulse Start	70	1	Electronic	1.00	79	0.90	0.90	0.29	0.29	277
100W Metal Halide	Pulse Start	100	1	Electronic	1.00	110	0.90	0.90	0.40	0.40	277
PAR30 Tungsten Halogen	Instant Start	75	-	-	-	-	-	-	0.63	0.63	120
LED Exit Signs	-	1.3-3.4	-	-	-	1.3-3.4	-	-	0.18	0.18	120 / 277

***Unless specified, all ballast data comes from Advance Transformer**
****Starting and operating characteristics is the same per reference cutsheets**

Clement Fung
Advisor: Ted Dannerth
Lighting/ Electrical
October 27th 2006

Mechanical Equipment Load Summary

Level	Panel	Equipment Designation	Description	Voltage	Phase	Power	Power Factor	Connected Load (KVA)	Demand Factor	Demand Load (KVA)
	H1C	P-1	End Section Centrifugal Pump	460	3	3 hp	0.90	4.05	1.00	4.05
		P-2	End Section Centrifugal Pump	460	3	3 hp	0.90	4.05	1.00	4.05
		P-3	End Section Centrifugal Pump	460	3	3 hp	0.90	4.90	1.00	4.90
		P-4	End Section Centrifugal Pump	460	3	2 hp	0.90	5.74	1.00	5.74
	L1Aa	P-8	In-line	115	1	55 W	0.80	0.05	1.00	0.05
		P-9	In-line	115	1	92 W	0.80	0.05	1.00	0.05
		EF-3	Ceiling Exhaust Fan	120	1	48 W	0.80	0.05	1.25	0.06
		FC-3	Chilled Water Fan Coil Unit	120	1	0.5 hp	0.85	1.14	1.25	1.43
		FC-6	Chilled Water Fan Coil Unit	120	1	0.33 hp	0.85	0.84	1.25	1.05
		FC-8	Chilled Water Fan Coil Unit	120	1	0.5 hp	0.85	1.14	1.25	1.43
	L1Ab	FC-1	Chilled Water Fan Coil Unit	120	1	0.75 hp	0.85	1.61	1.25	2.01
		FC-2	Chilled Water Fan Coil Unit	120	1	0.75 hp	0.85	1.61	1.25	2.01
		B-1	Hot Water Boiler	120	1	-	-	0.10	1.00	0.10
		P-6	In-line	115	1	55 W	0.80	0.05	1.00	0.05
		P-7	In-line	115	1	55 W	0.80	0.05	1.00	0.05
		EF-3	Ceiling Exhaust Fan	120	1	48 W	0.80	0.05	1.25	0.06
	L1Ad	P-10	In-line	115	1	55 W	0.80	0.05	1.00	0.05
		FC-4	Chilled Water Fan Coil Unit	120	1	0.5 hp	0.85	1.14	1.25	1.43
1	L1Ba	P-10	In-line	115	1	55 W	0.80	0.05	1.00	0.05
		FC-5	Chilled Water Fan Coil Unit	120	1	0.75 hp	0.85	1.61	1.25	2.01
		FC-7	Chilled Water Fan Coil Unit	120	1	0.33 hp	0.85	0.84	1.25	1.05
		FC-9	Chilled Water Fan Coil Unit	120	1	0.33 hp	0.85	0.84	1.25	1.05
	L1Bb	-	Kitchen HVAC Control	120	1	-	-	0.10	1.25	0.13
	EL1A	-	Mech. Rm. Smoke Louvers	120	1	-	-	0.12	1.00	0.12
		-	Elec. Rm. Smoke Louvers	120	1	-	-	0.12	1.00	0.12
		-	Lvl 1. Smoke Fire Damper Control	120	1	-	-	0.30	1.00	0.30
		-	Lvl 1. Smoke Fire Damper Control	120	1	-	-	0.30	1.00	0.30
		-	Lvl 2. Smoke Fire Damper Control	120	1	-	-	0.20	1.00	0.20
		-	Lvl 2. Smoke Fire Damper Control	120	1	-	-	0.30	1.00	0.30
		-	Lvl 3. Smoke Fire Damper Control	120	1	-	-	0.20	1.00	0.20
		-	Lvl 3. Smoke Fire Damper Control	120	1	-	-	0.30	1.00	0.30
	EL1B	-	Elec. Rm. Smoke Louvers	120	1	-	-	0.12	1.00	0.12
		-	SRC. Smoke Fire Damper Control	120	1	-	-	0.10	1.00	0.10

		-	Lvl 2. Smoke Fire Damper Control	120	1	-	-	0.20	1.00	0.20
		-	Lvl 2. Smoke Fire Damper Control	120	1	-	-	0.20	1.00	0.20
		-	Lvl 3. Smoke Fire Damper Control	120	1	-	-	0.20	1.00	0.20
		-	Lvl 3. Smoke Fire Damper Control	120	1	-	-	0.30	1.00	0.30
2	L2Ab	-	Lvl 2. HVAC Control	120	1	-	-	0.60	1.00	0.60
		-	Lvl 2. HVAC Control	120	1	-	-	0.50	1.00	0.50
	L2Bb	-	Lvl 2. HVAC Control	120	1	-	-	0.20	1.00	0.20
		-	Lvl 2. HVAC Control	120	1	-	-	0.20	1.00	0.20
3	H3Ab	AH-3	Supply Fan	460	3	7.5 hp	0.90	9.29	1.25	11.61
		AH-3	Return Fan	460	3	3 hp	0.90	4.05	1.25	5.06
		AH-4	Supply Fan	460	3	10 hp	0.90	11.82	1.25	14.77
		AH-4	Return Fan	460	3	5 hp	0.90	6.42	1.25	8.02
		**AH-5	Supply Fan	460	3	15 hp	0.90	17.73	0.31	5.50
		AH-5	Return Fan	460	3	5 hp	0.90	6.42	1.25	8.02
		AH-6	Supply Fan	460	3	7.5 hp	0.90	9.29	1.25	11.61
		AH-6	Return Fan	460	3	3 hp	0.90	4.05	1.25	5.06
	H3Bb	AH-1	Supply Fan	460	3	5 hp	0.90	6.42	1.25	8.02
		AH-1	Return Fan	460	3	2 hp	0.90	2.87	1.25	3.59
		AH-2	Supply Fan	460	3	5 hp	0.90	6.42	1.25	8.02
		AH-2	Return Fan	460	3	2 hp	0.90	2.87	1.25	3.59
	L3Ab	-	Lvl 3. HVAC Control	120	1	-	-	0.40	1.00	0.40
		-	Lvl 3. HVAC Control	120	1	-	-	0.30	1.00	0.30
	L3Ad	EF-2	Roof. Utility Fan	120	1	0.33 hp	0.85	0.84	1.00	0.84
	L3Bb	-	Lvl 3. HVAC Control	120	1	-	-	0.20	1.00	0.20
		-	Lvl 3. HVAC Control	120	1	-	-	0.20	1.00	0.20
		EF-1	Roof. Utility Fan	120	1	0.25 hp	0.85	1.14	1.00	1.14
	EL3A	-	Roof. Smoke Evac Windows	120	1	-	-	0.12	1.00	0.12
		-	Roof. Smoke Evac Windows	120	1	-	-	0.12	1.00	0.12
		-	Roof. HVAC Control	120	1	-	-	0.20	1.00	0.20
		-	Roof. HVAC Control	120	1	-	-	0.20	1.00	0.20
		-	Forum Window Actuators	120	1	-	-	0.04	1.00	0.04
		-	Forum Window Actuators	120	1	-	-	0.04	1.00	0.04
		-	Forum Window Actuators	120	1	-	-	0.04	1.00	0.04
		-	Forum Window Actuators	120	1	-	-	0.04	1.00	0.04
		-	Forum Window Actuators	120	1	-	-	0.04	1.00	0.04
		-	Forum Window	120	1	-	-	0.04	1.00	0.04

		-	Actuators	120	1	-	-	0.04	1.00	0.04
	EL3B	-	Roof. Smoke Evac Windows	120	1	-	-	0.12	1.00	0.12
		-	Roof. Smoke Evac Windows	120	1	-	-	0.12	1.00	0.12
		-	Roof. HVAC Control	120	1	-	-	0.20	1.00	0.20
		-	Forum Window Actuators	120	1	-	-	0.04	1.00	0.04
		-	Forum Window Actuators	120	1	-	-	0.04	1.00	0.04
		-	Forum Window Actuators	120	1	-	-	0.04	1.00	0.04
		-	Forum Window Actuators	120	1	-	-	0.04	11.00	0.44
		-	Forum Window Actuators	120	1	-	-	0.04	1.00	0.04
		-	Forum Window Actuators	120	1	-	-	0.04	1.00	0.04

TOTALS: **126.85** **KVA** **135.23** **KVA**

NOTES

1 **Demand Factors Included for AH-5 (supply):**
Continous Load x Largest Motor
1.25 x 0.25 = 0.31

2 **To calculate motor loads, the following power factors were assumed:**

3-phase motors:	0.90
1-phase motors, 1/10 HP and above:	0.85
1-phase motors, 1/12 HP and below:	0.80

Student Resource Building
University of California Santa Barbara
Electrical Systems Existing Condition and Building Load Summary Report

Clement Fung
Advisor: Ted Dannerth
Lighting/ Electrical
October 27th 2006

Power Density Allowances from Title 24 - Table 146-C (2005)

Level	Space Type	Area (sf)	Power Density Allowance (W/sf)	Unit Load (VA/sf) **	Load Allowance (VA/sf)	
1	Offices	3026	1.2	1.26	3822.32	
	Hallways	687	0.6	0.63	433.89	
	Conference Rm.	1085	2.4	2.53	2741.05	*
	Student Resource Centers	4144	2.4	2.53	10469.05	*
	Storage Rms.	824	0.6	0.63	520.42	
	Electrical Rm.	517	0.7	0.74	380.95	
	Mechanical Rm.	1035	0.7	0.74	762.63	
	Pump Rm.	65	0.6	0.63	41.05	
	Communication Rm.	296	0.6	0.63	186.95	
	Kitchen	599	1.6	1.68	1008.84	
	Restrooms	853	0.6	0.63	538.74	
	Childcare Center Reception	477	2.5	2.63	1255.26	*
	Tech./Comp. Rm.	1000	1.2	1.26	1263.16	*
	Entry	292	0.6	0.63	184.42	
	Classrooms	2414	1.2	1.26	3049.26	
	Nap Rm.	363	0.6	0.63	229.26	
	Forum	4811	2.3	2.42	11647.68	*
	Stair Well	727	0.6	0.63	459.16	
	Lactation	96	0.6	0.63	60.63	
	Multipurpose Rm.	1718	2.4	2.53	4340.21	*

*** Additional 1 W/sf allowed is included**
**** Assumed PF = 0.95**

Subtotal (lvl 1): 43394.95 **VA**

Subtotal (lvl 1): 43.39 **KVA**

Student Resource Building
University of California Santa Barbara
Electrical Systems Existing Condition and Building Load Summary Report

Clement Fung
Advisor: Ted Dannerth
Lighting/ Electrical
October 27th 2006

Power Density Allowances from Title 24 - Table 146-C (2005)

Level	Occupancy	Area (sf)	Power Density Allowance (W/sf)	Unit Load (VA/sf) **	Load Allowance (VA/sf)	
2	Office	9232	1.2	1.26	11661.47	
	Reception	507	2.5	2.63	1334.21	*
	Work Area	651	1.2	1.26	822.32	
	Restrooms	271	0.6	0.63	171.16	
	Conference Area	2132	2.4	2.53	5386.11	*
	Filing	327	0.6	0.63	206.53	
	Mail Rm.	81	0.6	0.63	51.16	
	Stair Well	583	0.6	0.63	368.21	
	Electrical Rm.	184	0.7	0.74	135.58	
	Communication Rm.	657	0.6	0.63	414.95	
	Hallway	2621	0.6	0.63	1655.37	
	Lobby	72	2.5	2.63	189.47	*
	Storage	203	0.6	0.63	128.21	
	Copy/Print	327	0.6	0.63	206.53	
	Second Floor Forum	657	2.3	2.42	1590.63	*

* **Additional 1 W/sf allowed is included**
** **Assumed PF = 0.95**

Subtotal (lvl 2): 24321.89 VA

Subtotal (lvl 2): 24.32 **KVA**

Student Resource Building
University of California Santa Barbara
Electrical Systems Existing Condition and Building Load Summary Report

Clement Fung
Advisor: Ted Dannerth
Lighting/ Electrical
October 27th 2006

Power Density Allowances from Title 24 - Table 146-C (2005)

Level	Occupancy	Area (sf)	Power Density Allowance (W/sf)	Unit Load (VA/sf) **	Load Allowance (VA/sf)	
3	Office	4927	1.2	1.26	6223.58	
	Student Resource Center	590	2.4	2.53	1490.53	*
	Storage	376	0.6	0.63	237.47	
	Restrooms	279	0.6	0.63	176.21	
	Tutorial/ Seminar Rm.	4367	1.2	1.26	5516.21	
	Electrical Rm.	183	0.7	0.74	134.84	
	Communication Rm.	174	0.6	0.63	109.89	
	Conference Rm.	508	2.4	2.53	1283.37	*
	Copy/Print	201	0.6	0.63	126.95	
	Reception	136	2.5	2.63	357.89	*
	Common Area	401	2.3	2.42	970.84	*
	Hallway	3087	0.6	0.63	1949.68	
	Third Floor Forum	591	2.3	2.42	1430.84	*
	Stair Well	564	0.6	0.63	356.21	
	Bio/Chem Drop-in Lab	86	1.2	1.26	108.63	

* **Additional 1 W/sf allowed is included**
** **Assumed PF = 0.95**

Subtotal (lvl 3): 20473.16 VA

Subtotal (lvl 3): 20.47 **KVA**

Student Resource Building
University of California Santa Barbara
Electrical Systems Existing Condition and Building Load Summary Report

Clement Fung
Advisor: Ted Dannerth
Lighting/ Electrical
October 27th 2006

Per Title 24 - Table 146-C (2005)

Level	Area (sf)	Subtotal (KVA)
1	25029	43.39
2	18505	24.32
3	16470	20.47
Totals:	60004 **sf**	88.19 **KVA**

Per NEC - Table 220.12 (2005)

Level	Area (sf)	Unit Load VA/sf	Subtotal (KVA)
1	25029	3.00	75087.00
2	18505	3.00	55515.00
3	16470	3.00	49410.00
Totals:	60004 **sf**		180.01 **KVA**

Clement Fung
Advisor: Ted Dannerth
Lighting/ Electrical
October 27th 2006

DISTRIBUTION BOARD: LD1A

Receptacle Load Summary

Distribution Board	Panel	Voltage	No. of 180VA Receptacles	Load from all 180VA recept. (KVA)
LD1A	L1Aa	208/120	34	6.12
	L1Ab	208/120	32	5.76
	L1Ac	208/120	65	11.70
	L1Ad	208/120	11	1.98
	L2Aa	208/120	51	9.18
	L2Ab	208/120	47	8.46
	L2Ac	208/120	57	10.26
	L3Aa	208/120	52	9.36
	L3Ab	208/120	51	9.18
	L3Ac	208/120	35	6.30

Connected Load Subtotal (KVA): 78.30

Distribution Board	Panel	Voltage	No. of dedicated receptacles	Load from all dedicated recept. (KVA)
LD1A	L1Aa	208/120	6	6.25
	L1Ab	208/120	9	5.86
	L1Ac	208/120	15	6.80
	L1Ad	208/120	5	2.80
	L2Aa	208/120	23	10.34
	L2Ab	208/120	24	10.16
	L2Ac	208/120	23	9.16
	L3Aa	208/120	17	8.80
	L3Ab	208/120	18	9.88
	L3Ac	208/120	4	1.60

Connected Load Subtotal (KVA): 71.65

Kitchen Equipment Load Summary

Distribution Board	Panel	Voltage	Kitchen Equipment	Load (KVA)
LD1A	L1Aa	208/120	U. Ref	0.50
		208/120	Lt/ Co	0.48
		208/120	Dishwasher	1.00
		208/120	Microwave	1.00
		208/120	U. Ref	0.50
		208/120	Lt/ Co	0.48
		208/120	Dishewasher	1.00
		208/120	Microwave	1.00
		208/120	Garbage Disposal	1.65
		208/120	Garbage Disposal	1.65
	L1Ad	208/120	R. Hood/ Co	0.54
		208/120	Microwave	1.00
		208/120	Coffee Maker	1.00
		208/120	Refrig/ Co	1.08
		208/120	Dishwasher	1.00
		208/120	Garbage Disposal	1.65

Connected Load Subtotal (KVA): 15.53

Lighting Load Summary

Distribution Board	Panel	Voltage	Lighting Connected Load (KVA)
	L1Aa	208/120	0.33
	L1Ab	208/120	0
	L1Ac	208/120	0
	L1Ad	208/120	0.2
A	L2Aa	208/120	0

LD1	L2Aa	208/120	0
	L2Ab	208/120	0
	L2Ac	208/120	0
	L3Aa	208/120	0
	L3Ab	208/120	0
	L3Ac	208/120	0

Connected Load Subtotal (KVA): 0.53

Load Summary

Distribution Board	Item	Total Connected Load (KVA)	Total Demand Load (KVA)	Notes
LD1A	Total Recept. Loads From All Panels	149.95	79.98	1
	Kitchen Equipment	15.53	9.32	2
	Lighting Equipment	0.53	0.66	3
	Mechanical Equipment	10.44	12.90	4
	Totals (KVA):	**176.45**	**102.86**	

Notes:

1	Receptacle Loads Demand Factor: 1.0 for 1st 10 KVA, 0.5 for > 10KVA	Per NEC 220.44
2	Kitchen Equipment Demand Factor: more than 2 items = 0.60	Per NEC 220.20
3	Continuous Load Demand Factor (1.25)	Per NEC 210.20 (A)
4	See "Mechanical Load Summary" for assumptions	

	Amps	Poles	Voltage System
Switchboard Size	800	3	208Y/120V
Allowed KVA:	KVA = I x √3 x KV	(eqn.)	
	288.21	**KVA**	

288.21 KVA > 102.86 KVA , therefore distribution board LD1A is sized appropriately.

Clement Fung
Advisor: Ted Dannerth
Lighting/ Electrical
October 27th 2006

DISTRIBUTION BOARD: LD1B

Receptacle Load Summary

Distribution Board	Panel	Voltage	No. of 180VA Receptacles	Load from all 180VA recept. (KVA)
LD1B	L1Ba	208/120	53	9.54
	L1Bb	208/120	20	3.60
	L2Ba	208/120	46	8.28
	L2Bb	208/120	37	6.66
	L3Ba	208/120	33	5.94
	L3Bb	208/120	26	4.68

Connected Load Subtotal (KVA): 38.70

Distribution Board	Panel	Voltage	No. of dedicated receptacles	Load from all dedicated recept. (KVA)
LD1B	L1Ba	208/120	16	6.40
	L1Bb	208/120	3	0.58
	L2Ba	208/120	20	7.66
	L2Bb	208/120	15	7.48
	L3Ba	208/120	12	6.88
	L3Bb	208/120	19	5.78

Connected Load Subtotal (KVA): 34.78

Kitchen Equipment Load Summary

Distribution Board	Panel	Voltage	Kitchen Equipment	Load (KVA)
	L1Bb	208/120	Appliance	0.50
		208/120	Appliance	0.50
		208/120	Dishwasher	1.00
		208/120	Lt/ Co	0.66

LD1B		208/120	Refrig.	0.90
		208/120	Refrig.	0.90
		208/120	Appliance	0.36
		208/120	Oven	3.60
		208/120	R. Hood	0.18
		208/120	Stove	6.00
		208/120	Garbage Disposal	1.00

Connected Load Subtotal (KVA): 15.60

Load Summary

Distribution Board	Item	Total Connected Load (KVA)	Total Demand Load (KVA)	Notes
LD1B	Total Recept. Loads From All Panels	73.48	41.74	1
	Kitchen Equipment	15.60	9.36	2
	Mechanical Equipment	10.44	6.26	4
	Totals (KVA):	**99.52**	**57.36**	

Notes:

1	Receptacle Loads Demand Factor: 1.0 for 1st 10 KVA, 0.5 for > 10KVA	Per NEC 220.44
2	Kitchen Equipment Demand Factor: more than 2 items = 0.60	Per NEC 220.20
3	Continuous Load Demand Factor (1.25)	Per NEC 210.20 (A)
4	See "Mechanical Load Summary" for assumptions	

	Amps	Poles	Voltage System
Switchboard Size	400	3	208Y/120V
Allowed KVA:	KVA = I x √3 x KV	(eqn.)	
	144.11	**KVA**	

144.11 KVA > 57.36 KVA , therefore distribution board LD1B is sized appropriately.

Clement Fung
Advisor: Ted Dannerth
Lighting/ Electrical
October 27th 2006

DISTRIBUTION BOARD: LD1C

Receptacle Load Summary

Distribution Board	Panel	Voltage	No. of 180VA Receptacles	Load from all 180VA recept. (KVA)	Notes
LD1C	L1At	208/120	13	2.34	-
	L1Bt	208/120	12	2.16	-

Connected Load Subtotal (KVA): 4.50

Distribution Board	Panel	Voltage	No. of dedicated receptacles	Load from all dedicated recept. (KVA)	Notes
LD1C	L1At	208/120	20	24.00	Provides service to communication racks
	L1Bt	208/120	18	18.00	

Connected Load Subtotal (KVA): 42.00

Load Summary

Distribution Board	Item	Total Connected Load (KVA)	Total Demand Load (KVA)	Notes
LD1C	Total Recept. Loads From All Panels	46.50	28.25	1
	Totals (KVA):	**46.50**	**28.25**	

Notes:

1 Receptacle Loads Demand Factor: 1.0 for 1st 10 KVA, 0.5 for > 10KVA Per NEC 220.44

	Amps	Poles	Voltage System
Switchboard Size	250	3	208Y/120V
Allowed KVA:	KVA = I x √3 x KV	(eqn.)	
	90.07	**KVA**	

90.07 KVA > 28.25 KVA , therefore distribution board LD1C is sized appropriately.

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DISTRIBUTION BOARD: EHDB

Receptacle Load Summary

Distribution Board	Panel	Voltage	No. of 180VA Receptacles	Load from all 180VA recept. (KVA)
EHDB	EL1B	208/120	1	0.18
	EL1A	208/120	1	0.18
	EL3B	208/120	1	0.18
	EL3A	208/120	1	0.18

Connected Load Subtotal (KVA): 0.72

Distribution Board	Panel	Voltage	No. of dedicated receptacles	Load from all dedicated recept. (KVA)
EHDB	EL1B	208/120	6	0.90
	EL1A	208/120	4	1.10

Connected Load Subtotal (KVA): 2.00

Transformer Load Summary

Distribution Board	Xfmr	Connected Load (KVA)
EHDB	ET1A	3.44
	ET1B	5.48
	ET3A	0.76
	ET3B	0.62

Connected Load Subtotal (KVA): 10.30

Lighting Load Summary

Distribution Board	Panel	Voltage	Lighting Connected Load (KVA)
	EH1B	208/120	2.67

EHDB	EL1B	208/120	2.59
	EH1A	208/120	2.72
	EL1A	208/120	1.09
	INV/H1B	208/120	3.67
	EH3B	208/120	2.02
	EL3B	208/120	0.53
	EH3A	208/120	3.4
	EL3A	208/120	0.97

Connected Load Subtotal (KVA): 19.66

Miscelleneous Load Summary

Distribution Board	Panel	Item	Connected Load (KVA)
EHDB	EH1B	Xfmr Door Opener	0.6
		EDPL1B	0.44
	EDP1B	-	0.44
	EL1B	FATC1B	0.2
		ELCP1B	0.2
	EH1A	Xfmr Door Opener	1.2
		Exit Signs	0.07
	EL1A	Elevator Power/Lgts	0.28
		FACP	0.2
		FAAP	0.2
		ELCP1A	0.2
	EH3B	Exit Signs	0.07
	EL3B	ELCP3B	0.2
	EH3A	Exit Signs	0.11
	EL3A	ELCP3A	0.2

Connected Load Subtotal (KVA): 24.27

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Load Summary

Distribution Board	Item	Total Connected Load (KVA)	Total Demand Load (KVA)	Notes
EHDB	Total Recept. Loads From All Panels	2.72	2.72	1
	Transformers	10.30	12.88	3
	Lighting Equipment	19.66	24.58	3
	Mechanical Equipment	4.52	4.92	4
	Miscellenous Equipment	24.27	30.34	3
	Totals (KVA):	**61.47**	**75.43**	

Notes:

1	Receptacle Loads Demand Factor: 1.0 for 1st 10 KVA, 0.5 for > 10KVA	Per NEC 220.44
2	Kitchen Equipment Demand Factor: more than 2 items = 0.60	Per NEC 220.20
3	Continuous Load Demand Factor (1.25)	Per NEC 210.20 (A)
4	See "Mechanical Load Summary" for assumptions	

	Amps	Poles	Voltage System
Switchboard Size	250	3	480Y/277V
Allowed KVA:	KVA = I x √3 x KV	(eqn.)	
	207.85	**KVA**	

207.85 KVA > 75.43 KVA , therefore distribution board EHDB is sized appropriately.

Clement Fung
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DISTRIBUTION BOARD: Main Switchboard (MS)

Receptacle Load Summary

Distribution Board	Panel	Voltage	No. of dedicated receptacles	Load from all dedicated recept. (KVA)
MS	L3Ad	208/120	16	2.70

Connected Load Subtotal (KVA): 2.70

Transformer Load Summary

Distribution Board	Xfmr	Capacity (KVA)
MS	T-1A	225
	T-1B	112.5
	T-1C	75
	T-3A	30

Total Capacity (KVA): **442.5**

Lighting Load Summary

Distribution Board	Panel	Voltage	Lighting Connected Load (KVA)
MS	H1A	480/277	12.43
	H1B	480/277	10.00
	DP1B	480/277	0.44
	H2A	480/277	11.61
	H2B	480/277	5.95
	H3Aa	480/277	14.77
	H3B	480/277	8.64

Connected Load Subtotal (KVA): 63.84

Elevator Load

Distribution Board	Panel	Equipment Description	Voltage	Power	Power Factor	Connected Load (KVA)	Notes
MS	Elevator	3-phase hydraulic AC Elevator	208	15 hp	0.9	39.00	see below

Connected Load Subtotal (KVA): 39.00

The following assumptions were made to calculate the electrical load of the elevator:

3-phase motors: **0.90**

Information pertaining to the electrical consumption of the elevator motor was not given.
Therefore, the motor horsepower was estimated using the following equation (source: www.greenspun.com)

Unbalanced Load(lbs) x Speed(fpm) divided by 33000 x Efficiency = Elevator motor HP

(3500 lbs x 150 fpm) x 0.9 / 33000 = **14.32 HP** *(assume 15 HP)*

Load Summary

Distribution Board	Item	Total Connected Load (KVA)	Total Demand Load (KVA)	Notes
MS	Total Recept. Loads From All Panels	2.70	2.70	1
	Lighting Equipment	63.84	79.80	3

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	Mechanical Equipment	107.20	112.46	4
	Elevator	39.00	48.75	3
EHDB	Total Recept. Loads From All Panels	2.72	2.72	1
	Transformers	10.30	12.88	3
	Lighting Equipment	19.66	24.58	3
	Mechanical Equipment	4.52	4.92	4
	Miscellenous Equipment	24.27	30.34	3
LD1A	Total Recept. Loads From All Panels	149.95	79.98	1
	Kitchen Equipment	15.53	9.32	2
	Lighting Equipment	0.53	0.66	3
	Mechanical Equipment	15.13	17.87	4
LD1B	Total Recept. Loads From All Panels	73.48	41.74	1
	Kitchen Equipment	15.60	9.36	2
	Mechanical Equipment	10.44	6.26	4
LD1C	Total Recept. Loads From All Panels	46.50	46.50	1
	Totals (KVA):	**601.37**	**530.83**	

Notes:

1	Receptacle Loads Demand Factor: 1.0 for 1st 10 KVA, 0.5 for > 10KVA	Per NEC 220.44
2	Kitchen Equipment Demand Factor: more than 2 items = 0.60	Per NEC 220.20
3	Continuous Load Demand Factor (1.25)	Per NEC 210.20 (A)
4	See "Mechanical Load Summary" for assumptions	

	Amps	Poles	Voltage System
Switchboard Size	1200	3	480Y/277v
Allowed KVA:	KVA = I x √3 x KV	(eqn.)	
	997.66	**KVA**	

997.66 KVA > 530.83 KVA , therefore main switchboard is sized appropriately.