NOTIFICATION APPLIANCE CIRCUITS VOLTAGE DROP CALCULATIONS – DETAIL 1

VOLTAGE DROP CALCULATIONS: CIRCUIT V5

Voltage Drop = (L/1000)(A)(R)
Where:
L = Conductor Distance (twice actual distance)
A = Load (amps)
R = Resistance per 1,000 ft (NEC Table 8)

Appliance Type	Appliance Load (amps)	Cummulative Load (amp)	Actual Distance (ft)	Conductor Distance (ft)	Conductor Gauge	Resistance per 1,000 ft	Voltage Drop
V5–1	0.079	0.079	60	120	14	3.26	0.0309
V5–2	0.178	0.257	35	70	14	3.26	0.0586
V5–3	0.148	0.405	70	140	14	3.26	0.1848
V5–4	0.178	0.583	100	200	14	3.26	0.3801
V5–5	0.178	0.761	25	50	14	3.26	0.1240
V5–6	0.178	0.939	25	50	14	3.26	0.1531
V5–7	0.079	1.018	290	580	14	3.26	1.9248
	Total Load:	1.018				Total V–Drop	2.8564

21.1436 VOLTS REMAINING (within the voltage range of the appliances)
1.018 TOTAL AMPS REQUIRED (within the listed power supply output)

NOTIFICATION APPLIANCES:

TYPE	MAKE	MODEL	CANDELA	LOAD	V–RANGE	NOTE
STROBE	WHEELOCK	NS4	15	0.052	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	30	0.079	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	75	0.148	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	110	0.178	16–33	MULTI CANDELA

VOLTAGE DROP CALCULATIONS: CIRCUIT V6

Voltage Drop = (L/1000)(A)(R)
Where:
L = Conductor Distance (twice actual distance)
A = Load (amps)
R = Resistance per 1,000 ft (NEC Table 8)

Appliance Type	Appliance Load (amps)	Cummulative Load (amp)	Actual Distance (ft)	Conductor Distance (ft)	Conductor Gauge	Resistance per 1,000 ft	Voltage Drop
V6–8	0.079	0.079	25	50	14	3.26	0.0129
V6–7	0.052	0.131	25	50	14	3.26	0.0214
V6–6	0.052	0.183	30	60	14	3.26	0.0358
V6–5	0.052	0.235	80	160	14	3.26	0.1226
V6–4	0.052	0.287	60	120	14	3.26	0.1123
V6–3	0.079	0.366	80	160	14	3.26	0.1909
V6–2	0.079	0.445	30	60	14	3.26	0.0870
V6–1	0.178	0.623	290	580	14	3.26	1.1780
	Total Load:	0.623				Total V–Drop	1.7608

22.2392 VOLTS REMAINING (within the voltage range of the appliances)
0.623 TOTAL AMPS REQUIRED (within the listed power supply output)

NOTIFICATION APPLIANCES:

TYPE	MAKE	MODEL	CANDELA	LOAD	V–RANGE	NOTE
STROBE	WHEELOCK	NS4	15	0.052	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	30	0.079	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	75	0.148	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	110	0.178	16–33	MULTI CANDELA

VOLTAGE DROP CALCULATIONS: CIRCUIT V7

Voltage Drop = (L/1000)(A)(R)
Where:
L = Conductor Distance (twice actual distance)
A = Load (amps)
R = Resistance per 1,000 ft (NEC Table 8)

Appliance Type	Appliance Load (amps)	Cummulative Load (amp)	Actual Distance (ft)	Conductor Distance (ft)	Conductor Gauge	Resistance per 1,000 ft	Voltage Drop
V7–1	0.052	0.052	50	100	14	3.26	0.0170
V7–2	0.052	0.104	60	120	14	3.26	0.0407
V7–3	0.148	0.252	60	120	14	3.26	0.0986
V7–4	0.178	0.43	75	150	14	3.26	0.2103
V7–5	0.148	0.578	50	100	14	3.26	0.1884
V7–6	0.178	0.756	15	30	14	3.26	0.0739
V7–7	0.052	0.808	390	780	14	3.26	2.0546
	Total Load:	0.808				Total V–Drop	2.6834

21.3166 VOLTS REMAINING (within the voltage range of the appliances)
0.808 TOTAL AMPS REQUIRED (within the listed power supply output)

NOTIFICATION APPLIANCES:

TYPE	MAKE	MODEL	CANDELA	LOAD	V–RANGE	NOTE
STROBE	WHEELOCK	NS4	15	0.052	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	30	0.079	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	75	0.148	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	110	0.178	16–33	MULTI CANDELA

VOLTAGE DROP CALCULATIONS: CIRCUIT V8

Voltage Drop = (L/1000)(A)(R)
Where:
L = Conductor Distance (twice actual distance)
A = Load (amps)
R = Resistance per 1,000 ft (NEC Table 8)

Appliance Type	Appliance Load (amps)	Cummulative Load (amp)	Actual Distance (ft)	Conductor Distance (ft)	Conductor Gauge	Resistance per 1,000 ft	Voltage Drop
V8–1	0.079	0.079	65	130	14	3.26	0.0335
V8–2	0.079	0.158	40	80	14	3.26	0.0412
V8–3	0.079	0.237	65	130	14	3.26	0.1004
V8–4	0.079	0.316	70	140	14	3.26	0.1442
V8–5	0.052	0.368	30	60	14	3.26	0.0720
V8–6	0.052	0.42	340	680	14	3.26	0.9311
	Total Load:	0.42	10	20		Total V–Drop	1.3224

22.6776 VOLTS REMAINING (within the voltage range of the appliances)
0.42 TOTAL AMPS REQUIRED (within the listed power supply output)

NOTIFICATION APPLIANCES:

TYPE	MAKE	MODEL	CANDELA	LOAD	V–RANGE	NOTE
STROBE	WHEELOCK	NS4	15	0.052	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	30	0.079	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	75	0.148	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	110	0.178	16–33	MULTI CANDELA

VOLTAGE DROP CALCULATIONS: CIRCUIT V9

Voltage Drop = (L/1000)(A)(R)
Where:
L = Conductor Distance (twice actual distance)
A = Load (amps)
R = Resistance per 1,000 ft (NEC Table 8)

Appliance Type	Appliance Load (amps)	Cummulative Load (amp)	Actual Distance (ft)	Conductor Distance (ft)	Conductor Gauge	Resistance per 1,000 ft	Voltage Drop
V9–1	0.052	0.052	50	100	14	3.26	0.0170
V9–2	0.052	0.104	60	120	14	3.26	0.0407
V9–3	0.079	0.183	20	40	14	3.26	0.0239
V9–4	0.079	0.262	40	80	14	3.26	0.0683
V9–5	0.079	0.341	25	50	14	3.26	0.0556
V9–6	0.178	0.519	35	70	14	3.26	0.1184
V9–7	0.079	0.598	45	90	14	3.26	0.1755
V9–8	0.079	0.677	300	600	14	3.26	1.3242
	Total Load:	0.677	10	20		Total V–Drop	1.8235

22.1765 VOLTS REMAINING (within the voltage range of the appliances)
0.677 TOTAL AMPS REQUIRED (within the listed power supply output)

NOTIFICATION APPLIANCES:

TYPE	MAKE	MODEL	CANDELA	LOAD	V–RANGE	NOTE
STROBE	WHEELOCK	NS4	15	0.052	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	30	0.079	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	75	0.148	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	110	0.178	16–33	MULTI CANDELA

VOLTAGE DROP CALCULATIONS: CIRCUIT V10

Voltage Drop = (L/1000)(A)(R)
Where:
L = Conductor Distance (twice actual distance)
A = Load (amps)
R = Resistance per 1,000 ft (NEC Table 8)

Appliance Type	Appliance Load (amps)	Cummulative Load (amp)	Actual Distance (ft)	Conductor Distance (ft)	Conductor Gauge	Resistance per 1,000 ft	Voltage Drop
V10–1	0.079	0.079	20	40	14	3.26	0.0103
V10–2	0.052	0.131	25	50	14	3.26	0.0214
V10–3	0.079	0.21	25	50	14	3.26	0.0342
V10–4	0.178	0.388	40	80	14	3.26	0.1012
V10–5	0.079	0.467	20	40	14	3.26	0.0609
V10–6	0.052	0.519	35	70	14	3.26	0.1184
V10–7	0.178	0.697	35	70	14	3.26	0.1591
V10–8	0.079	0.776	345	690	14	3.26	1.7455
	Total Load:	0.776	10	20		Total V–Drop	2.2510

21.7490 VOLTS REMAINING (within the voltage range of the appliances)
0.776 TOTAL AMPS REQUIRED (within the listed power supply output)

NOTIFICATION APPLIANCES:

TYPE	MAKE	MODEL	CANDELA	LOAD	V–RANGE	NOTE
STROBE	WHEELOCK	NS4	15	0.052	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	30	0.079	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	75	0.148	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	110	0.178	16–33	MULTI CANDELA

VOLTAGE DROP CALCULATIONS: CIRCUIT V11

Voltage Drop = (L/1000)(A)(R)
Where:
L = Conductor Distance (twice actual distance)
A = Load (amps)
R = Resistance per 1,000 ft (NEC Table 8)

Appliance Type	Appliance Load (amps)	Cummulative Load (amp)	Actual Distance (ft)	Conductor Distance (ft)	Conductor Gauge	Resistance per 1,000 ft	Voltage Drop
V11–1	0.079	0.079	45	90	14	3.26	0.0232
V11–2	0.079	0.158	65	130	14	3.26	0.0670
V11–3	0.079	0.237	70	140	14	3.26	0.1082
V11–4	0.079	0.316	50	100	14	3.26	0.1030
V11–5	0.052	0.368	35	70	14	3.26	0.0840
V11–6	0.052	0.42	15	30	14	3.26	0.0411
V11–7	0.079	0.499	40	80	14	3.26	0.1301
V11–8	0.178	0.677	365	730	14	3.26	1.6111
	Total Load:	0.677	10	20		Total V–Drop	2.1676

21.8324 VOLTS REMAINING (within the voltage range of the appliances)
0.677 TOTAL AMPS REQUIRED (within the listed power supply output)

NOTIFICATION APPLIANCES:

TYPE	MAKE	MODEL	CANDELA	LOAD	V–RANGE	NOTE
STROBE	WHEELOCK	NS4	15	0.052	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	30	0.079	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	75	0.148	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	110	0.178	16–33	MULTI CANDELA

VOLTAGE DROP CALCULATIONS: CIRCUIT V12

Voltage Drop = (L/1000)(A)(R)
Where:
L = Conductor Distance (twice actual distance)
A = Load (amps)
R = Resistance per 1,000 ft (NEC Table 8)

Appliance Type	Appliance Load (amps)	Cummulative Load (amp)	Actual Distance (ft)	Conductor Distance (ft)	Conductor Gauge	Resistance per 1,000 ft	Voltage Drop
V12–1	0.052	0.052	50	100	14	3.26	0.0170
V12–2	0.052	0.104	45	90	14	3.26	0.0305
V12–3	0.079	0.183	15	30	14	3.26	0.0179
V12–4	0.052	0.235	25	50	14	3.26	0.0383
V12–5	0.148	0.383	35	70	14	3.26	0.0874
V12–6	0.079	0.462	35	70	14	3.26	0.1054
V12–7	0.079	0.541	40	80	14	3.26	0.1411
V12–8	0.148	0.689	350	700	14	3.26	1.5723
	Total Load:	0.689	10	20		Total V–Drop	2.0099

21.9901 VOLTS REMAINING (within the voltage range of the appliances)
0.689 TOTAL AMPS REQUIRED (within the listed power supply output)

NOTIFICATION APPLIANCES:

TYPE	MAKE	MODEL	CANDELA	LOAD	V–RANGE	NOTE
STROBE	WHEELOCK	NS4	15	0.052	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	30	0.079	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	75	0.148	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	110	0.178	16–33	MULTI CANDELA

VOLTAGE DROP CALCULATIONS: CIRCUIT V13

Voltage Drop = (L/1000)(A)(R)
Where:
L = Conductor Distance (twice actual distance)
A = Load (amps)
R = Resistance per 1,000 ft (NEC Table 8)

Appliance Type	Appliance Load (amps)	Cummulative Load (amp)	Actual Distance (ft)	Conductor Distance (ft)	Conductor Gauge	Resistance per 1,000 ft	Voltage Drop
V13–1	0.079	0.079	50	100	14	3.26	0.0258
V13–2	0.052	0.131	15	30	14	3.26	0.0128
V13–3	0.079	0.21	40	80	14	3.26	0.0548
V13–4	0.148	0.358	40	80	14	3.26	0.0934
V13–5	0.079	0.437	25	50	14	3.26	0.0712
V13–6	0.052	0.489	35	70	14	3.26	0.1116
V13–7	0.148	0.637	50	100	14	3.26	0.2077
V13–8	0.148	0.785	285	570	14	3.26	1.4587
	Total Load:	0.785	10	20		Total V–Drop	2.0359

21.9641 VOLTS REMAINING (within the voltage range of the appliances)
0.785 TOTAL AMPS REQUIRED (within the listed power supply output)

NOTIFICATION APPLIANCES:

TYPE	MAKE	MODEL	CANDELA	LOAD	V–RANGE	NOTE
STROBE	WHEELOCK	NS4	15	0.052	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	30	0.079	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	75	0.148	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	110	0.178	16–33	MULTI CANDELA

VOLTAGE DROP CALCULATIONS: CIRCUIT V14

Voltage Drop = (L/1000)(A)(R)
Where:
L = Conductor Distance (twice actual distance)
A = Load (amps)
R = Resistance per 1,000 ft (NEC Table 8)

Appliance Type	Appliance Load (amps)	Cummulative Load (amp)	Actual Distance (ft)	Conductor Distance (ft)	Conductor Gauge	Resistance per 1,000 ft	Voltage Drop
V14–1	0.148	0.148	60	120	14	3.26	0.0579
V14–2	0.079	0.227	75	150	14	3.26	0.1110
V14–3	0.079	0.306	50	100	14	3.26	0.0998
V14–4	0.052	0.358	30	60	14	3.26	0.0700
V14–5	0.052	0.41	40	80	14	3.26	0.1069
V14–6	0.079	0.489	70	140	14	3.26	0.2232
V14–7	0.079	0.568	50	100	14	3.26	0.1852
V14–8	0.178	0.746	335	670	14	3.26	1.6294
	Total Load:	0.746	10	20		Total V–Drop	2.4834

21.5166 VOLTS REMAINING (within the voltage range of the appliances)
0.746 TOTAL AMPS REQUIRED (within the listed power supply output)

NOTIFICATION APPLIANCES:

TYPE	MAKE	MODEL	CANDELA	LOAD	V–RANGE	NOTE
STROBE	WHEELOCK	NS4	15	0.052	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	30	0.079	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	75	0.148	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	110	0.178	16–33	MULTI CANDELA

VOLTAGE DROP CALCULATIONS: CIRCUIT V15

Voltage Drop = (L/1000)(A)(R)
Where:
L = Conductor Distance (twice actual distance)
A = Load (amps)
R = Resistance per 1,000 ft (NEC Table 8)

Appliance Type	Appliance Load (amps)	Cummulative Load (amp)	Actual Distance (ft)	Conductor Distance (ft)	Conductor Gauge	Resistance per 1,000 ft	Voltage Drop
V15–1	0.052	0.052	50	100	14	3.26	0.0170
V15–2	0.052	0.104	50	100	14	3.26	0.0339
V15–3	0.148	0.252	35	70	14	3.26	0.0575
V15–4	0.148	0.4	45	90	14	3.26	0.1174
V15–5	0.148	0.548	40	80	14	3.26	0.1429
V15–6	0.178	0.726	45	90	14	3.26	0.2130
V15–7	0.052	0.778	345	690	14	3.26	1.7500
	Total Load:	0.778	10	20		Total V–Drop	2.3317

21.6683 VOLTS REMAINING (within the voltage range of the appliances)
0.778 TOTAL AMPS REQUIRED (within the listed power supply output)

NOTIFICATION APPLIANCES:

TYPE	MAKE	MODEL	CANDELA	LOAD	V–RANGE	NOTE
STROBE	WHEELOCK	NS4	15	0.052	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	30	0.079	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	75	0.148	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	110	0.178	16–33	MULTI CANDELA

VOLTAGE DROP CALCULATIONS: CIRCUIT V16

Voltage Drop = (L/1000)(A)(R)
Where:
L = Conductor Distance (twice actual distance)
A = Load (amps)
R = Resistance per 1,000 ft (NEC Table 8)

Appliance Type	Appliance Load (amps)	Cummulative Load (amp)	Actual Distance (ft)	Conductor Distance (ft)	Conductor Gauge	Resistance per 1,000 ft	Voltage Drop
V16–1	0.148	0.148	25	50	14	3.26	0.0241
V16–2	0.079	0.227	30	60	14	3.26	0.0444
V16–3	0.148	0.375	25	50	14	3.26	0.0611
V16–4	0.052	0.427	15	30	14	3.26	0.0418
V16–5	0.148	0.575	70	140	14	3.26	0.2624
V16–6	0.148	0.723	30	60	14	3.26	0.1414
V16–7	0.148	0.871	315	630	14	3.26	1.7889
	Total Load:	0.871	10	20		Total V–Drop	2.3641

21.6359 VOLTS REMAINING (within the voltage range of the appliances)
0.871 TOTAL AMPS REQUIRED (within the listed power supply output)

NOTIFICATION APPLIANCES:

TYPE	MAKE	MODEL	CANDELA	LOAD	V–RANGE	NOTE
STROBE	WHEELOCK	NS4	15	0.052	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	30	0.079	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	75	0.148	16–33	MULTI CANDELA
STROBE	WHEELOCK	NS4	110	0.178	16–33	MULTI CANDELA

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Building 67

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RECORD DRAWINGS		18 JAN 2007

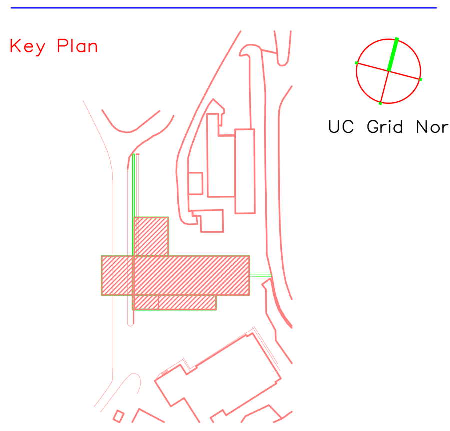
Seals and Signatures

RECORD DRAWINGS

SPECIAL NOTE:
THE INFORMATION SHOWN IN THIS DRAWING WAS DEVELOPED USING THE RECORD DRAWINGS PROVIDED BY SIEMENS BUILDING TECHNOLOGIES, INC. FOLLOWING THE COMPLETION OF THIS PROJECT (IDENTIFIED AS JOB NUMBER 107739, SHEETS 1 THROUGH 24). SPECIFICALLY, SEE SHEET 11 OF 24 FOR INFORMATION.

LBNL Project Title: MOLECULAR FOUNDRY
LBNL Building Number: 67

Key Plan



Drawing Title

FIRE ALARM SYSTEM VOLTAGE DROP CALCULATIONS

Scale

SG Project Number
LBNL Project Number: MF1212

FA0.9

Drawing Number: 9 OF 20

5N67E029

LBNL Drawing Number: IFB 841