Milestone 3:
Electrical Design Report

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Lighting Branch Circuit Redesign

As part of a previous study, the lighting systems in four areas of the building have been redesigned (see milestone 2 report). A change in power usage has occurred in each of these four areas: the entry plaza, the lobby, seminar room, and a typical dormitory suite. First the lighting load that has been redesigned was quantified then compared to the lighting load from the new redesigned system. Finally, the comparison allowed for a series of recommended changes to accompany the new lighting system.

Existing System

In order to determine the effects of the lighting systems changes, first all of the affected circuits had to be listed. In the table below, each of these circuits are listed by space. The fixture types and quantities in the table are only those that were eliminated in the redesign. This way the existing load that has been redesigned was determined for each circuit.

Existing Lighting Circuits						
Entry Plaza Lighting						
Fixture Type	**HL-3**	**EL-1**				
EX-1	4					
EX-3		3				
EX-4	10					
EX-5	9					
Existing Load	**1022.5**	**135**				
Lobby Lighting						
Fixture Type	**MP1A-1**	**MP1A-3**	**MP1A-4**	**MP1A-8**	**EMP1-3**	**EMP1-5**
F-8		12		25	7	
F-9	10	9	1	17	7	
F-7E					3	
F-7F				2	2	1
Existing Load	**320**	**792**	**32**	**1722**	**1321**	**64**
Seminar Room Lighting						
Fixture Type	**MP1A-7**					
F-10	21					
F-B1	15					
Existing Load	**1152**					
Dormitory Suite Lighting						
Fixture Type	**MP*A-#**					
F-1	4					
F-2	2					
F-3	1					
F-4	2					
FA	1					
Existing Load	**370**					

Redesigned System

Like with the previous table, next all the fixtures types used in the lighting system redesign needed to be listed. In this new system, almost all of the fixtures were different than those used in the existing system. What was most important in this step was to determine the total load, for each space, that would be added in place of the existing system's lighting load.

Redesigned Lighting Circuits							
Fixture Type	**Quantity**	**Watts**	**Load (VA)**	**Fixture Type**	**Quantity**	**Watts**	**Load (VA)**
Lobby Loads				Dormitory Suite Loads			
L-5	30	1.4	42	L-1	8	15.8	126.4
L-2b	15	19.8	297	L-2a	4	8.7	34.8
L-6a	5	40	200	**Total Dorm Suite Load**			**161.2**
L-6b	8	64	512				
L-6c	4	87	348	Entry Plaza Loads			
L-7	15	4.2	63	LE-1	4	138	552
L-8	3	37	111	LE-2	268	1.4	375.2
Total Lobby Load			**1573**	LE-3	7	8.6	60.2
				Total Entry Plaza Load			**987.4**
Seminar Room Loads							
L-3	4	30	120				
L-4	12	98	1176				
L-5	33	1.4	46.2				
Total Seminar Room Load			**1342.2**				

Next, these loads were applied to the existing circuits for each area. In the case of the seminar room and the dormitory suite, there was only one lighting circuit for these spaces, and the new load was simply placed on that circuit. For the entry plaza, the same load as the existing lighting system was applied to the emergency circuit, and the remaining new load was put on the other exterior lighting circuit used for the existing lighting system. The final space, the lobby, was the most challenging to assign to existing circuits. The table below gives a summary of how different fixtures were placed onto circuits. Fixtures were placed on circuits based which part of the lobby they are located in, where circuits are used in comparable locations as in the existing lighting layout.

Redesign of Lobby Lighting Circuits						
Fixture Type	**MP1A-1**	**MP1A-3**	**MP1A-4**	**MP1A-8**	**EMP1-3**	**EMP1-5**
L-5					30	
L-2b	10				5	
L-6a				5		
L-6b				4	4	
L-6c				4		
L-7				10	4	1
L-8				3		
Redesigned Load (VA)	**198**	**0**	**0**	**957**	**413.8**	**4.2**

Summary

Finally, the loading on all affected circuits was summarized in the following table. This gives a comparison of the load applied by the existing lighting and load from the redesigned lighting system.

Lighting Circuits Comparison					
Circuit Name	Existing Lighting		Redesigned Lighting		Notes
	Existing Load (VA)	Total Circuit Load (VA)	Redesigned Load (VA)	Total Circuit Load (VA)	
HL-3	1022.5	1935	852.4	1764.9	-170.1 VA
EL-1	135	670	135	670	same
MP1A-1	320	482	198	360	-122 VA
MP1A-3	792	1024	0	232	combine with MP1A-4
MP1A-4	32	800	0	768	combine with MP1A-3
MP1A-8	1722	1806	957	1041	-765 VA
EMP1-3	1321	1739	413.8	831.8	-907.2 VA
EMP1-5	64	777	4.2	717.2	-59.8 VA
MP1A-7	1152	1152	1342.2	1342.2	+190.2 VA
MP*A-#	370	370	161.2	161.2	reduce from 7 to 4 circuits per floor

In every space except the seminar room, the lighting load was significantly reduced by using the redesigned lighting systems. For several circuits this allows for some electrical savings to occur alongside the new lighting system.

ENTRY PLAZA

For this space, the redesigned lighting uses slightly less power than the existing design. This will reduce amount of power needed to provide lighting to the space, but will have no effect on the electrical system layout.

LOBBY

In the lobby, the reduction of loading was such that two circuits (MP1A-3 and MP1A-4) can be combined and one of those can become a spare circuit. Other circuits in this space will see a decrease in power consumption, but will now need to be changed.

SEMINAR ROOM

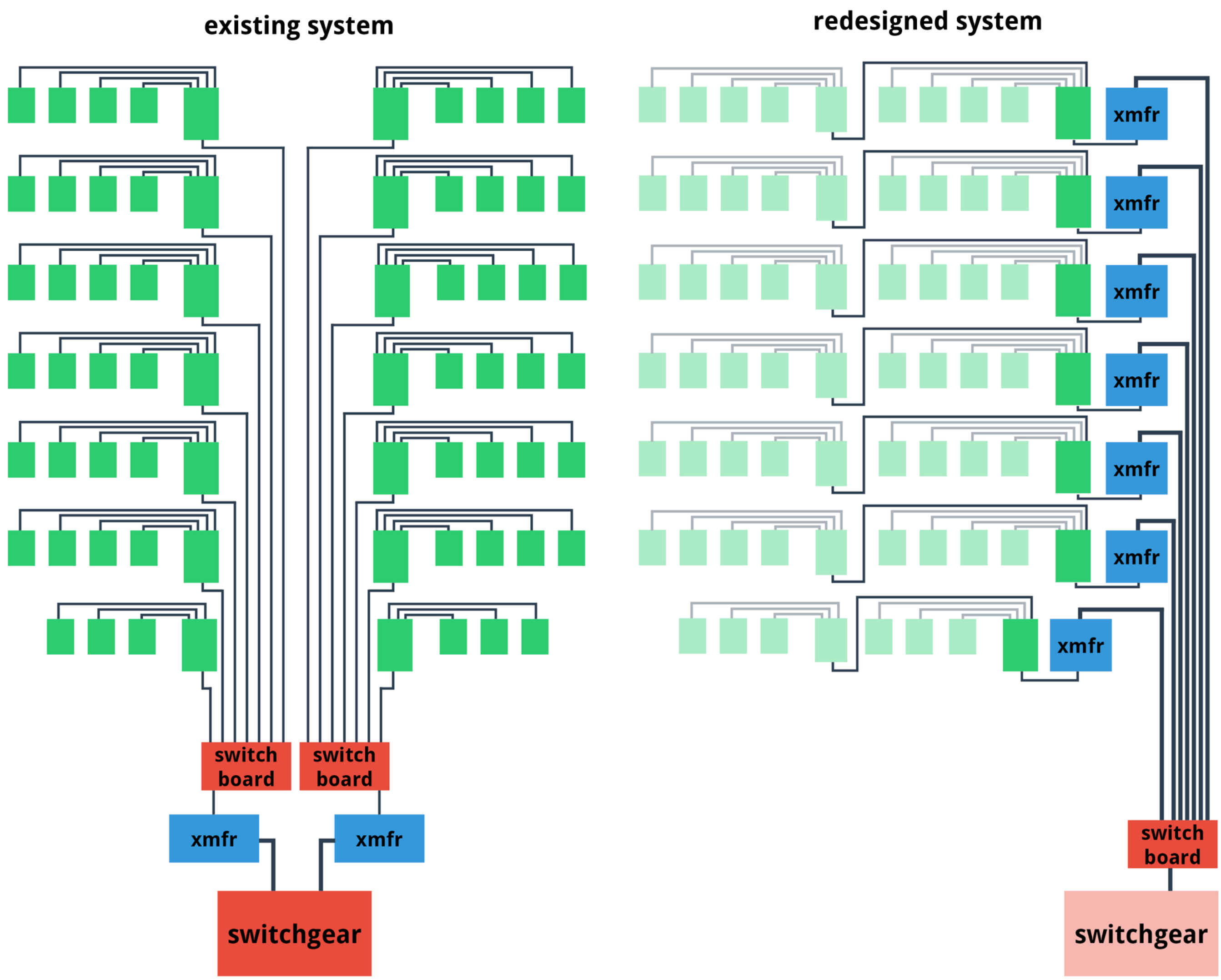
The new lighting system in this space uses slightly more power than the existing design, but no changes are needed to the electrical system.

DORMITORY SUITES

In the dormitory suites, the lighting load of the new system is about half that of the existing system. This, again, requires less circuits than the existing. With seven dormitory suites per floor (one circuit per room), the new lighting system allows for the new electrical system to use four circuits per floor in the same area.

Dormitory Riser Redesign

This next study is intended to determine the benefits of distributing power in a different way to the upper dormitory floors of the building. In the existing design, two 500kVA transformers distribute 208Y-120 through two risers to the upper floors. In this redesign, one riser distributes 480/277 to the upper floors, where it is transformed at each floor to 208Y-120. The following diagram shows a simplified schematic of the two systems for comparison.



Scope

For this study, certain boundaries had to be set to ensure a consistent comparison between the two systems. The area under investigation includes the circuits that provide lighting and power to floors one through seven in the building. They are fed, in the existing system, from two draw-out breakers in a switchgear in the basement level. This study follows those circuits from switchgear to branch panels. To see these circuits in their full context, see the last page of this document, where the building's complete riser diagram is included with these circuits highlighted.

Also in regards to scope, the basis of this study is focused on the electrical systems. Since this is intended first and foremost as an electrical study, disciplines outside of electrical engineering are noted for possible interaction with this system, but are not investigated.

Metrics

For this redesign, changes occur in three major areas: wire sizes, equipment, and installation. The latter, installation costs, are based largely on the cost of labor for this project. This falls largely out of the scope of the study, so while it is acknowledged as having a unique effect on each of the two systems, it is not included here. The first two types of changes: wire sizes and equipment are used to quantify the differences between the existing system and the redesigned system.

EQUIPMENT

Pricing for equipment has simplified in terms of positive or negative costs. Due to the uncertain nature of equipment prices, it has not been quantified in dollar amounts.

WIRE SIZES

The following rates were applied to calculate the change in cost of wire needed to complete each of the two systems:

Type	Pricing	
	$ per 1000 ft	$ per 1 ft (pro-rated)
500 kcmil	8861.26	8.861
400 kcmil	7208.95	7.209
350 kcmil	6401.89	6.402
300 kcmil	5467.48	5.467
250 kcmil	4533.51	4.534
4/0	3738.09	3.738
3/0	2976.79	2.977
2/0	2372.84	2.373
1/0	1892.93	1.893
1	1578.57	1.579
2	1220.56	1.221
3	975.15	0.975
4	778.45	0.778
6	503.56	0.504
8	327.29	0.327
10	203.22	0.203
12	132.9	0.133
14	86.83	0.087
16	65.95	0.066

Southwire: Distributor List Price Sheet

These prices were pro-rated per foot of wired needed in each feeder. Wire sizes for the existing system were available on the electrical riser diagram. And wire sizes for the new system were determined using the allowable ampacities listed in NEC 2011: Table 310.12(B)(16) and grounding conductors in Table 250.122.

Disadvantages

Like with any system, there are several disadvantages to this redesigned system, in comparison to the existing system. First is that moving the transformers up into the occupied floors of the building uses space on those floors; in the existing system, the transformers were in the basement where space wasn't as important. There is however space in the upper floors without significant alterations to the floorplan. Where the largest of the new transformers is height - 75.00; width - 44.20; length - 36.23, and the smallest is height - 48.56; width - 28.22; length - 23.42. Similar to space, each of these transformers will also add extra loading onto the structural system. They can be expected to weigh between 930 - 1440 pounds each.

Advantages

However, the advantages to the redesigned system far outweigh the disadvantages. The two transformers in the existing design that are used to feed power to the dormitory floors are way larger than they need to be. By distributing 480/277 instead of 208Y/120, smaller transformers are needed at each floor. This higher voltage also means that smaller wire sizes can be used, creating savings in copper alone. Additionally, this higher voltage also means less voltage drop to the top of the building, which will increase the overall efficiency of the system. Finally, while there are a greater quantity of transformers needed in the redesigned system, there are several pieces of equipment that can be eliminated. The following equipment list breaks out the changes from the existing system to the redesigned system.

Existing System			**Redesigned System**			**Estimated Price Difference**
Type	**Name**	**Size**	**Type**	**Name**	**Size**	
switchgear						
Draw-out breaker	MDPMP	800A	Draw-out breaker	MDPNP	800A	-$
Draw-out breaker	MDPNP	800A				
switchboards						
Switchboard	MDPMP	1600A	Switchboard	MDPNP	1600A	-$
Switchboard	MDPNP	1600A				
transformers						
Transformer	T-5	500kVA	Transformer	T-N1	225kVA	+$
Transformer	T-6	500kVA	Transformer	T-N2	112.5kVA	
			Transformer	T-N3	112.5kVA	
			Transformer	T-N4	112.5kVA	
			Transformer	T-N5	112.5kVA	
			Transformer	T-N6	112.5kVA	
			Transformer	T-N7	112.5kVA	
panels						
Main Circuit Breaker	in NP1	400A	Main Circuit Breaker	in NP1	500A	-$

Aside from equipment cost savings, one of the other advantages is savings created by smaller wire sizes. The same portion of each system was evaluated using the wire pricing schedule given earlier in this report. As comparison of both systems is given below.

Existing System Wire Sizes

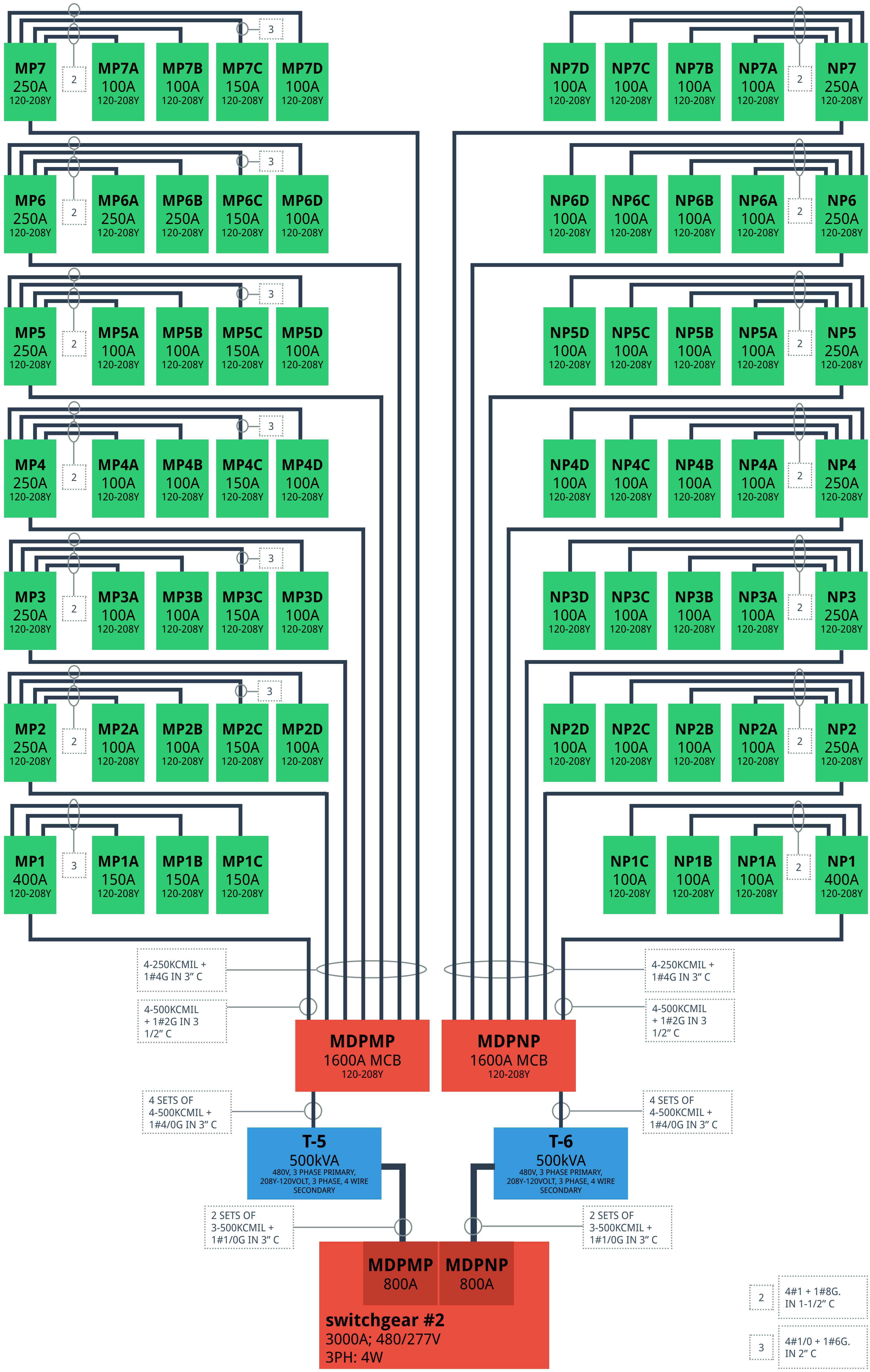
Equipment			Incoming Feed							
				Wire Properties						
Type	Name	Location	From	Listed Feed	Quantity	Type	Ground	Price per ft	Apx. Length	Total Price
Switchgear	Switchgear #2	M0226								
Transformer	T-5	M0226	Switchgear #2	2 SETS OF 3-500KCMIL + 1#1/0G IN 3" C	6	500 kcmil	1/0	55.060	35	$1,927.12
Transformer	T-6	M0226	Switchgear #2	2 SETS OF 3-500KCMIL + 1#1/0G IN 3" C	6	500 kcmil	1/0	55.060	54	$2,973.27
Switchboard	MDPMP	M0226	T-5	4 SETS OF 4-500KCMIL + 1#4/0G IN 3" C	16	500 kcmil	4/0	145.518	10	$1,455.18
Switchboard	MDPNP	M0226	T-6	4 SETS OF 4-500KCMIL + 1#4/0G IN 3" C	16	500 kcmil	4/0	145.518	10	$1,455.18
Panelboard	MP1	E1206B	MDPMP	4-500KCMIL + 1#2G IN 3 1/2" C	4	500 kcmil	2	36.666	296	$10,853.02
Panelboard	MP2	E2101	" "	4-250KCMIL + 1#4G IN 3" C	4	250 kcmil	4	18.912	260	$4,917.25
Panelboard	MP3	E3101	" "	" "	4	250 kcmil	4	18.912	271	$5,125.28
Panelboard	MP4	E4101	" "	" "	4	250 kcmil	4	18.912	282	$5,333.32
Panelboard	MP5	E5101	" "	" "	4	250 kcmil	4	18.912	293	$5,541.36
Panelboard	MP6	E6101	" "	" "	4	250 kcmil	4	18.912	303	$5,730.48
Panelboard	MP7	E7101	" "	" "	4	250 kcmil	4	18.912	314	$5,938.52
Panelboard	NP1	E1229	MDPNP	4-500KCMIL + 1#2G IN 3 1/2" C	4	500 kcmil	2	36.666	88	$3,226.57
Panelboard	NP2	E2228	" "	4-250KCMIL + 1#4G IN 3" C	4	250 kcmil	4	18.912	52	$983.45
Panelboard	NP3	E3228	" "	" "	4	250 kcmil	4	18.912	63	$1,191.49
Panelboard	NP4	E4228	" "	" "	4	250 kcmil	4	18.912	74	$1,399.52
Panelboard	NP5	E5228	" "	" "	4	250 kcmil	4	18.912	85	$1,607.56
Panelboard	NP6	E6228	" "	" "	4	250 kcmil	4	18.912	95	$1,796.69
Panelboard	NP7	E7228	" "	" "	4	250 kcmil	4	18.912	106	$2,004.72
									Total Wire Cost	**$63,459.99**

Redesigned System Wire Sizes

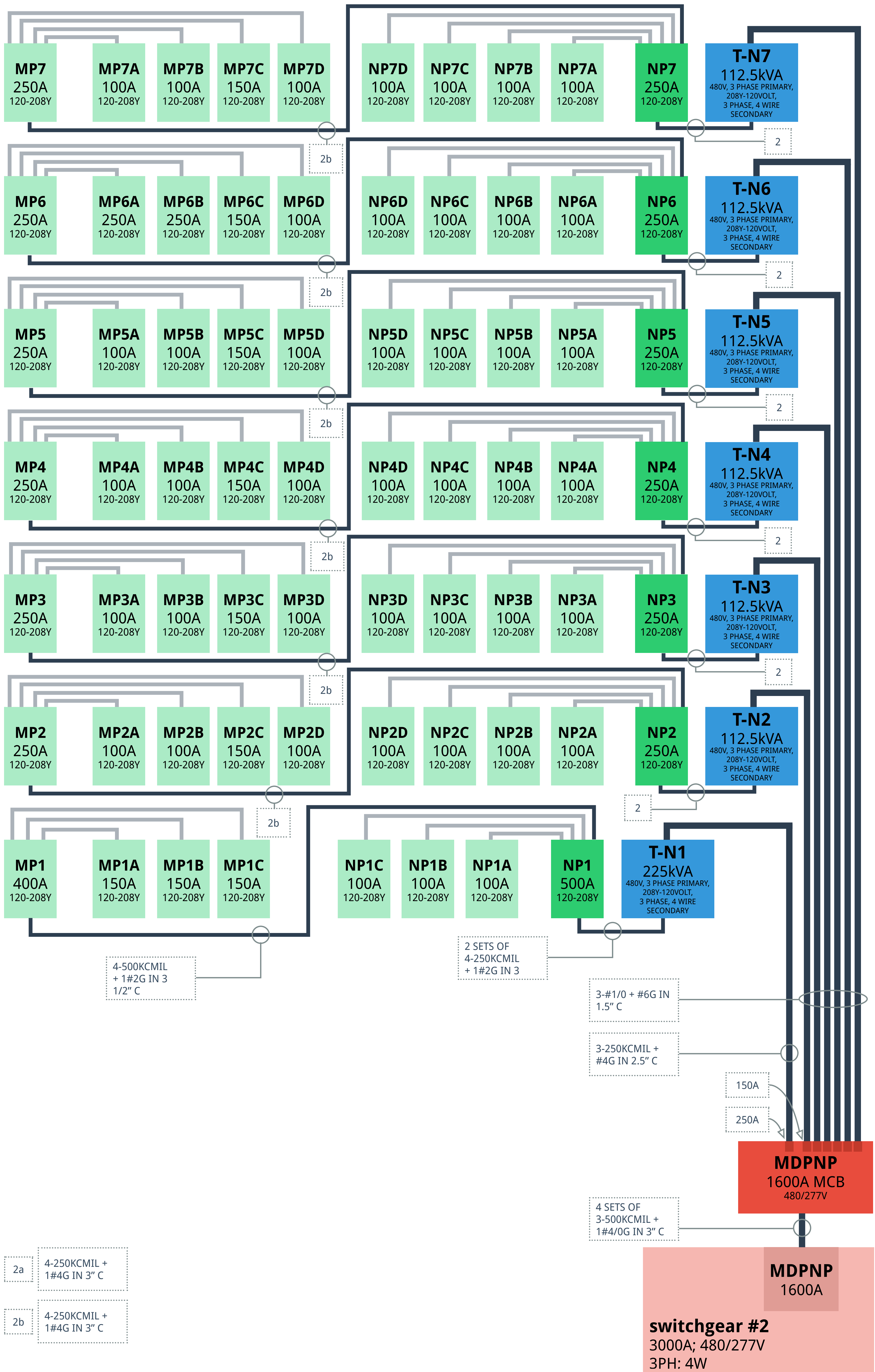
Equipment			Incoming Feed								
					Wire Properties						
Type	Name	Location	From	Protection (A)	Listed Feed	Quantity	Type	Ground	Price per ft	Apx. Length	Total Price
Switchgear	Switchgear #2	M0226									
Switchboard	MDPNP	M0226	Switchgear #2	1600	4 SETS OF 3-500KCMIL + 1#4/0G IN 3" C	12	500 kcmil	4/0	110.073	10	$1,100.73
Transformer	T-N1	E1229	MDPNP	250	3-250KCMIL + #4G IN 2.5" C	3	250 kcmil	4	14.379	88	$1,265.35
Transformer	T-N2	E2228	MDPNP	150	3-#1/0 + #6G IN 1.5" C	3	1/0	6	6.182	52	$321.48
Transformer	T-N3	E3228	MDPNP	150	" "	3	1/0	6	6.182	63	$389.49
Transformer	T-N4	E4228	MDPNP	150	" "	3	1/0	6	6.182	74	$457.49
Transformer	T-N5	E5228	MDPNP	150	" "	3	1/0	6	6.182	85	$525.50
Transformer	T-N6	E6228	MDPNP	150	" "	3	1/0	6	6.182	95	$587.32
Transformer	T-N7	E7228	MDPNP	150	" "	3	1/0	6	6.182	106	$655.33
Panelboard	MP1	E1206B	NP1	400	4-500KCMIL + 1#2G IN 3 1/2" C	4	500 kcmil	2	36.666	210	$7,699.78
Panelboard	MP2	E2101	NP2	250	4-250KCMIL + 1#4G IN 3" C	4	250 kcmil	4	18.912	210	$3,971.62
Panelboard	MP3	E3101	NP3	250	" "	4	250 kcmil	4	18.912	210	$3,971.62
Panelboard	MP4	E4101	NP4	250	" "	4	250 kcmil	4	18.912	210	$3,971.62
Panelboard	MP5	E5101	NP5	250	" "	4	250 kcmil	4	18.912	210	$3,971.62
Panelboard	MP6	E6101	NP6	250	" "	4	250 kcmil	4	18.912	210	$3,971.62
Panelboard	MP7	E7101	NP7	250	" "	4	250 kcmil	4	18.912	210	$3,971.62
Panelboard	NP1	E1229	T-N1	500	2 SETS OF 4-250KCMIL + 1#2G IN 3 1/2" C	8	500 kcmil	2	72.111	10	$721.11
Panelboard	NP2	E2228	T-N2	250	4-250KCMIL + 1#4G IN 3" C	4	250 kcmil	4	18.912	10	$189.12
Panelboard	NP3	E3228	T-N3	250	" "	4	250 kcmil	4	18.912	10	$189.12
Panelboard	NP4	E4228	T-N4	250	" "	4	250 kcmil	4	18.912	10	$189.12
Panelboard	NP5	E5228	T-N5	250	" "	4	250 kcmil	4	18.912	10	$189.12
Panelboard	NP6	E6228	T-N6	250	" "	4	250 kcmil	4	18.912	10	$189.12
Panelboard	NP7	E7228	T-N7	250	" "	4	250 kcmil	4	18.912	10	$189.12
										Total Wire Cost	**$38,688.07**

Existing System

The next two pages contain a complete summary of the components of both the existing system and the redesigned system.



Thesis System



Short Circuit Analysis

The last part of this electrical study is a short circuit current calculation. This 5-level analysis was used to determine the maximum short circuit current at 5 critical points between switchgear #2 and branch panel MP2. This branch circuit was selected because it is typical of branch circuits feeding panels MP2 - MP7, where this is the branch circuit with the shortest wire lengths. This means that all other branch circuits (for MP3 - MP7) will have an equal or lower short circuit current, and can be sized to match panel MP2.

Level 1: Switchgear Fault Current	
Main Transformer Impedance	5.75%
Main Transformer Size (kVA)	3000
Voltage at Switchgear (V)	480
Full Load Current (FLA)	3,608.55
I sc (A)	62,757.30
% motors	25%
I motor contribution (A)	3,608.55
I total sym sc RMS (A)	66,365.85
Wire Length	92
Number of Wires per Phase	8
C Value	26706
f	0.0975
M	0.9112
I sc sys RMS (A)	57,181.41
I motor contribution (A)	3,608.55
I total sym sc RMS (A)	**60,789.95**

Level 2: MDPNP Fault Current	
Wire Length	6
Number of Wires per Phase	4
C Value	26706
Voltage (V)	480
f	0.0116
M	0.9885
I sc sys RMS (A)	56,526.33
% motors	5%
I motor contribution (A)	721.71
I total sym sc RMS (A)	**57,248.04**

Level 3: Transformer (T-N2) Fault Current	
I sc sys RMS (A) from 2	56,526.33
Primary Voltage (V)	480
Secondary Voltage (V)	208
Impedance	2.30%
Transformer Size (kVA)	112.5
	100,000.00
f	0.0961
M	0.9123
I sc sys RMS	**119,011.24**

Level 4: Panel NP2 Fault Current	
Wire Length	8
Number of Wires per Phase	1
C Value	16483
Voltage (V)	208
f	0.4810
M	0.6752
I sc sys RMS (A)	80,359.83
% motors	0%
I motor contribution (A)	0
I total sym sc RMS (A)	**80,359.83**

Level 5: Panel MP2 Fault Current	
Wire Length	210
Number of Wires per Phase	1
C Value	16483
Voltage (V)	208
f	8.5252
M	0.1050
I sc sys RMS (A)	8,436.52
% motors	0%
I motor contribution (A)	0
I total sym sc RMS (A)	**8,436.52**

These calculations were conducted using the Cooper-Bussman method for finding short circuit currents.

electrical riser diagram

RISER NOTES:

1. REFER TO SWITCHGEAR, AND PANEL SCHEDULES DRAWINGS E6.01 THROUGH E6.07 FOR ADDITIONAL INFORMATION
2. 4#1 + 1#8G. IN 1-1/2" C.
3. 4#1/0 + 1#6G. IN 2" C.
4. 4-250KCMIL + 1#4G IN 3" C.
5. 15KVA DRY TYPE TRANSFORMER 480V, 3 PHASE PRIMARY, 208Y-120VOLT, 3 PHASE, 4 WIRE SECONDARY.
6. 25KVA DRY TYPE TRANSFORMER 480V, SINGLE PHASE PRIMARY, 240-120VOLT, SINGLE PHASE, 3 WIRE SECONDARY.
7. 30KVA DRY TYPE TRANSFORMER 480V, 3 PHASE PRIMARY, 208Y-120VOLT, 3 PHASE, 4 WIRE SECONDARY.
8. 45KVA DRY TYPE TRANSFORMER 480V, 3 PHASE PRIMARY, 208Y-120VOLT, 3 PHASE, 4 WIRE SECONDARY.
9. 75KVA DRY TYPE TRANSFORMER 480V, 3 PHASE PRIMARY, 208Y-120VOLT, 3 PHASE, 4 WIRE SECONDARY.
10. (3) 150KVA DRY TYPE TRANSFORMER 480V, 3 PHASE PRIMARY, 208Y-120VOLT, 3 PHASE, 4 WIRE SECONDARY.
11. 500KVA DRY TYPE TRANSFORMER 480V, 3 PHASE PRIMARY, 208Y-120VOLT, 3 PHASE, 4 WIRE SECONDARY.
12. 2 SETS OF 4-350KCMIL + 1#1G IN 3" C.
13. 3#4 + 1#8G IN 1" C.
14. 4#1/0 + 1#6G. IN 2" C.
15. 3#10 + 1#10G. IN 3/4" C.
16. 4#4 + 1#10G. IN 1 1/4" C.
17. 2#4 + 1#8G. IN 1 " C.
18. 3#1 + 1#8G. IN 1 1/4 " C.
19. 100A, 240V, SINGLE PHASE, DISCONNECT SWITCH FUSED @ 100A.
20. 4#4/0 + 1#4G. IN 2 1/2" C.
21. (4 WAY CONCRETE ENCASED DUCTBANK) 4- 5" PVC CONDUITS, 2 SET OF 3-500KCMILS + 2/0G. (15KV CABLE).
22. (2 WAY CONCRETE ENCASED DUCTBANK) 2- 4" PVC CONDUITS, 1 SET OF 3#4/0 + 2/0G. (15KV CABLE).
23. (2 WAY CONCRETE ENCASED DUCTBANK) 2- 5" PVC CONDUITS, 1 SET OF 3-500KCMILS + 2/0G. (15KV CABLE).
24. HIGH VOLTAGE LOOP SWITCH S&C #PMU-19 (74" X 74").
25. 3000KVA 13.8 / 480/277V TRANSFORMER (117" X 91").
26. 2 SETS OF 4-500KCMIL + 1#1/0G IN 3" C.
27. 2 SETS OF 3-500KCMIL + 1#1/0G IN 3" C.
28. 4#4/0 + 1#6G. IN 2 1/2" C.
29. 3#6 + 1#10G. IN 1" C.
30. 2 SETS OF 4#3/0 + 1#3G IN 2 1/2" C.
31. (3) 3#2/0 + 1#6G. IN 2" C.
32. 4-500KCMIL + 1#2G IN 3 1/2" C.
33. 4 SETS OF 4-500KCMIL + 1#4/0G IN 3" C.
34. 400A, 480V, THREE PHASE, DISCONNECT SWITCH FUSED @ 350A FOR FIRE PUMP.
35. 3P-225A, 277/480V, A.T.S
36. 3P-400A, 277/480V, A.T.S
37. (3) 3#4/0 + 1#4G. IN 2 1/2" C.
38. 2 SETS OF 4-350KCMIL + 1#1G IN 3" C.
39. 4#4/0 + 1#4G. IN 2" C.
40. 3#4 + 1#8G. IN 1" C.
41. 3P-150A, 277/480V, A.T.S
42. (12 WAY CONCRETE ENCASED DUCTBANK) 12- 4" PVC CONDUITS, 8 SET OF 4-500KCMILS + 2/0G.
43. NEW (2 WAY CONCRETE ENCASED DUCTBANK) 2- 4" PVC CONDUITS, 1 SET OF 3#4 + 1#6G. (15KV CABLE).
44. 4#1 + 1#6G. IN 1 1/2" C.
45. 3#4 + 1#6G. IN 1 1/2" MI CABLE.
46. (3) 3#2/0 + 1#4G. IN 2" C.
47. 70A, 480V, THREE PHASE, SHUNT TRIP ENCLOSED CIRCUIT BREAKER. THE BREAKER SHALL BE CAPABLE OF BEING LOCKED IN THE OPEN POSITION.
48. (4) 35A, 480V, THREE PHASE, SHUNT TRIP ENCLOSED CIRCUIT BREAKER. THE BREAKER SHALL BE CAPABLE OF BEING LOCKED IN THE OPEN POSITION.
49. 150A, 480V, THREE PHASE, CIRCUIT BREAKER.
50. 3#4 + 1#10G. IN 1 " C.
51. 3#1 + 1#6G. IN 1 1/2 " C.
52. FIRE PUMP 40HP, 480V, THREE PHASE.
53. 3 SETS OF 3-500KCMIL + 1#3/0G IN 3" C.
54. 4-500KCMIL + 1#2G IN 3 1/2" C.
55. (2) 4#1 + 1#8G. IN 1 1/2" C.
56. 3#12 + 1#12G. IN 1 1/2" C.
57. (3) 80A, 480V, THREE PHASE, SHUNT TRIP ENCLOSED CIRCUIT BREAKER. THE BREAKER SHALL CAPABLE OF BEING LOCKED IN THE OPEN POSITION. (4)
58. 3#6 + 1#10G. IN 3/4" C.