

## 8.0 ELECTRICAL ANALYSIS

Whenever changing any equipment the first system that is usually affected is the electrical system. The addition of thermal storage and cold air distribution had an impact on the electrical system. The redesign was able to downsize numerous pieces of equipment including chillers, air handling units, fans, and pumps. Most of the equipment that is motor driven is powered through motor control centers. This allows for all the motors in the building to be controlled by in one central location. There are a total of two – 1200A and one 600 A motor control centers located to serve the majority of HVAC equipment in the building. Figure 15 illustrates one of the 1200 A motor control centers within the building.

**Figure 15: 1200 A Motor Control Center**

'MCC-6A'	-								
1200A, 480V 3Ø, 3W + GND (6TH FL. WEST MER)	1	ACC-1	318 KW	-	800	700	3	2 SETS (3-350KCMIL & 1#1/0 GND-2 1/2")	DISCONNECT SWITCH ONLY
	2	AHU-4	5	1	30	15	3	3#12 & 1#12GND-3/4"C	
	3	AHU-5	20	2	60	45	3	3#6 & 1#10GND-1"C	
	4	AHU-6	7 1/2	1	30	15	3	6#12 & 1#12GND-1"C	2 SPEED 1 WINDING
	5	AHU-8	10	2	30	20	3	3#12 & 1#12GND-3/4"C	
	6	AHU-9	15	2	60	35	3	3#8 & 1#02GND-3/4"C	
	7	AHU-10	7 1/2	1	30	15	3	3#12 & 1#12GND-3/4"C	
	8	RF-4	1 1/2	1	30	6	3	3#12 & 1#12GND-3/4"C	
	9	RF-5	5	1	30	10	3	3#12 & 1#12GND-3/4"C	
	10	RF-8	1 1/2	1	30	6	3	3#12 & 1#12GND-3/4"C	
	11	RF-9	3	1	30	10	3	3#12 & 1#12GND-3/4"C	
	12	RF-10	1 1/2	1	30	6	3	3#12 & 1#12GND-3/4"C	
	13	EF-3	3	1	30	10	3	3#12 & 1#12GND-3/4"C	
	14	HEF-1	1 1/2	1	30	6	3	3#12 & 1#12GND-3/4"C	
	15	HEF-2	1 1/2	1	30	6	3	3#12 & 1#12GND-3/4"C	
	16	HEF-3	1 1/2	1	30	6	3	3#12 & 1#12GND-3/4"C	
	17	HEF-4	1 1/2	1	30	6	3	3#12 & 1#12GND-3/4"C	
	18	HEF-5	1 1/2	1	30	6	3	3#12 & 1#12GND-3/4"C	
	19	SPARE	-	1	30	-	3	-	
	20	KX-1	5	1	30	10	3	3#12 & 1#12GND-3/4"C	
	21	TX-1	2	1	30	6	3	3#12 & 1#12GND-3/4"C	
	22	UH-A1	30KW	2	60	50	3	3#6 & 1#10GND-1"C	DISCONNECT SWITCH ONLY
	23	UH-A2	30KW	2	60	50	3	3#6 & 1#10GND-1"C	DISCONNECT SWITCH ONLY
	24	SPARE	-	1	30	-	3	-	
	25	SPARE	-	1	30	-	3	-	
	26	SPARE	-	1	30	-	3	-	
	27	SPARE	-	-	30	-	3	-	DISCONNECT SWITCH ONLY
	28	SPARE	-	-	30	-	3	-	DISCONNECT SWITCH ONLY
	29	SPARE	-	1	60	-	3	-	
	30	SPARE	-	2	60	-	3	-	
	31	SPARE	-	2	60	-	3	-	
	32	SPARE	-	2	60	-	3	-	

This particular motor control center (MCC) serves six of the ten air handling units serving the school. However, because of the cold air distribution, the air handling units and fans were all able to be downsized. An analysis was completed to determine whether the downsizing of the equipment would be able to reduce the size of the motor control centers. In order to perform this analysis the new feeder ampacity was needed for each downsized equipment. Table 10 compares the original and the new equipment.

**Table 10: Comparison of Ampacity Between Original and New Equipment**

	Original	New
AHU-4	15	10
AHU-5	45	35
AHU-6	15	10
AHU-7	20	15
AHU-8	35	25
AHU-9	15	10
AHU-10	10	10
RF-4	6	6
RF-5	10	10
RF-8	6	6
RF-9	10	10
RF-10	6	6
Unchanged Loads	846	846
Total	1039	999
Difference	40	

From Table 10, there was only a 40A difference between the original and new equipment selected. A 1000A MCC could be selected and would meet the necessary load however, the MCC would not be able to take on future expansions. The current 1200A MCC would still allow for future additions of equipment. Although, direct electrical first cost savings could not be found other savings could be found by smaller wire and conduit sizes.