CABLE AMPACITY PROGRAM (CYMECAP) STUDY: MANHOLE 2445

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Background

There are four ductbanks entering manhole 2445. After the fire in manhole 2445, a CYMECAP study was done on the four ducts entering this manhole to see what the capacities of the cables were. The study looked at each of the four ducts entering the manhole. Each duct was modelled in two ways:

1) to find out what the ampacity of each cable was when the temperature of each cable was allowed to rise to 90 °C
2) to find out what temperature each cable would rise to using the maximum recorded demand on each cable for the period of May 1, 2008 to July 14, 2008.

The maximum demand recorded for each of the circuits in the manhole for the period of May 1, 2008 to July 14, 2008 are shown in the table below.
Note that for circuit 12F215, 240 amps was used. This is because when this circuit leaves the substation, it immediately splits into 2 parts in manhole 2249. Approximately 1/3 of the current goes south, and 2/3 goes north to manhole 2445. Also note that 60 amps was used for the 7F83 portion of 12F95.

Circuit	Max Demand (Amps)	Comments
12F124	100	No readings, this is an assumption
12F211		Standby
12F212	0	?
12F215	357	Used 240 because only 2/3 of the current goes north
12F221	171	
12F223	213	
12F225	237	
12F226	112	
12F625	179	
12F626	147	
4F51	172	
4F52	148	
4F56		Standby
12F95	220	Used 60 amps for 7F83

Table 1: Recent Maximum Demands

Ductbank on South West

Ampacities at Maximum Temperature

The current carrying capacity of each of the cables is as shown below when the temperature of each cable is allowed to rise to 90°C. This simulation assumes that the standby circuit, 7F147 is not carrying any current (had to set to 1A since CYMECAP can't handle 0). The simulation shows that 12F215 could handle 285 amps under this scenario.

Temperature at Recent Maximum Demands

The following simulation was done by assigning each cable to be carrying the maximum load on that cable from May 1, 2008 to July 14, 2008. 12F215 could carry 400 amps and only rise to 90°C under this scenario. The recent maximum for this section of 12F215 was about 240 amps.

(R=1.000 °C-M/W)

Circuit	Ampacities at Max Temperature	Temperatures at Recent Max Demands
12F223	310A @ 90°C	213A @ 55°C
12F221	224A @ 90°C	171A @ 58°C
12F226	217A @ 90°C	112A @ 54°C
12F625	236A @ 90°C	179A @ 59°C
12F211	315A @ 90°C	1A @ 47°C
Neutral	1A @ 75°C	1A @ 50°C
12F626	226A @ 90°C	147A @ 58°C
7F147	1A @ 73°C	1A @ 51°C
12F212	352A @ 90°C	1A @ 46°C
12F215	285A @ 90°C	400A @ 90°C
12F225	302A @ 90°C	237A @ 65°C

Table 2: Ductbank on South West

Ductbank on North East

Ampacities at Maximum Temperature

The current carrying capacity of each of the cables is as shown below when the temperature of each cable is allowed to rise to 90°C. 12F215 could carry 308 amps and rise to 90°C under this scenario.

Temperature at Recent Maximum Demands

The following simulation was done by assigning each cable to be carrying the maximum load on that cable from May 1, 2008 to July 14, 2008. 12F215 could carry 362 amps and only rise to 90°C under this scenario. The recent maximum for this section of 12F215 was about 240 amps.

(R=1.000 °C-M/W)

Circuit	Ampacities at Max Temperature	Temperatures at Recent Max Demands
12F212	399A @ 90°C	1A @ 37°C
12F626	305A @ 90°C	147A @ 45°C
Neutral	1A @ 61°C	1A @ 41°C
12F211	1A @ 59°C	1A @ 41°C
12F625	320A @ 90°C	179A @ 51°C
12F215	308A @ 90°C	362A @ 90°C

Table 3: Ductbank on North East

Ductbank on North West

(R=1.000 °C-M/W)

Circuit	Ampacities at Max Temperature	Temperatures at Recent Max Demands
7F83	159A @ 90°C	60A @ 55°C
4F52	231A @ 90°C	148A @ 63°C
7F147	230A @ 90°C	1A @ 60°C
4F56	1A @ 70°C	297A @ 90°C
12F223	260A @ 90°C	213A @ 67°C
12F221	227A @ 90°C	171A @ 67°C
4F51	220A @ 90°C	172A @ 71°C
12F225	242A @ 90°C	237A @ 80°C

Table 4: Ductbank on North West

Ductbank on South East

(R=1.000 °C-M/W)

Circuit	Ampacities at Max Temperature	Temperatures at Recent Max Demands
12F215	272A @ 90°C	240A @ 68°C
4F51	244A @ 90°C	172A @ 66°C
7F147	266A @ 90°C	1A @ 50°C
4F52	239A @ 90°C	148A @ 61°C
12F226	229A @ 90°C	112A @ 62°C
4F56	247A @ 90°C	305A @ 90°C

Table 5: Ductbank on South East

Conclusion

The simulations all show that there was no overheating or overloading of any of these cables under the scenarios examined.