DEPARTMENT OF ELECTRICAL
AND COMPUTER ENGINEERING

ENEL 674: Industrial and Commercial Power Systems

Group – 10

Name	UCID
Arfa Islam	30224398
Fahim Md Saharear	30223055
Md Imran Hossain	30218856
Muntasir Chowdhury	30226347
Nabil Ahmed	30154778
S M Zahid Hassan Shuvo	30230774

Room Number	Room Name	Equipment Name	Equipment Numbers	Current for each device (A)	Total Equipment Current (A)	Input Voltage (V)	Total Current (A)	Type	Power (kW)	Conductor
100	Foyer	Lights	2	0.169583333	0.339166667	120	8.839166667	Electrical	1.0607	#14 AWG
		FF-1	1	7.5	7.5	120				
		Receptacles	1	1	1	120				
101	Classroom	Lights	6	0.316666667	1.9	120	6.067	Electrical	0.72804	#14 AWG
		Receptacles	4	1	4	120				
		Sprinkler	2	0.056	0.112	120				
		Smoke Detector	1	0.055	0.055	120				
102	Closet	Lights	1	0.316666667	0.316666667	120	1.316666667	Electrical	0.158	#14 AWG
		Receptacles	1	1	1	120				
103	Women's Washroom	Lights	6	0.316666667	1.9	120	2.955	Electrical	0.3546	#14 AWG
		Receptacles	1	1	1	120				
		Smoke Detector	1	0.055	0.055	120				
104	Washroom	Lights	4	0.316666667	1.266666667	120	2.377666667	Electrical	0.28532	#14 AWG
		Receptacles	1	1	1	120				
		Sprinkler	1	0.056	0.056	120				
		Smoke Detector	1	0.055	0.055	120				
		BB-8	1	25	25	120	25	Mechanical	3	#12 AWG
105	Corr	Lights	1	0.169583333	0.169583333	120	1.169583333	Electrical	0.14035	#14 AWG
		Receptacles	1	1	1	120				
106	Jan	Lights	1	0.169583333	0.169583333	120	1.169583333	Electrical	0.14035	#14 AWG
		Receptacles	1	1	1	120				
107	Water Meter	Lights	1	0.169583333	0.169583333	120	1.169583333	Electrical	0.14035	#14 AWG
		Receptacles	1	1	1	120				
		FF-4	1	7.5	7.5	120	7.5	Mechanical	0.9	#14 AWG
108	Kitchenette	Lights	11	0.316666667	3.483333333	120	9.150333333	Electrical	1.09804	#14 AWG
		Receptacles	5	1	5	120				
		Sprinkler	2	0.056	0.112	120				
		Smoke Detector	1	0.055	0.055	120				
		CCTV	1	0.5	0.5	120				
		BB-1	1	13.75	13.75	120	13.75	Mechanical	1.65	#14 AWG
		BB-2	1	25	25	208	25	Mechanical	5.2	#12 AWG
109	Commons	Lights	15	1.641666667	24.625	120	33.019	Electrical	3.96228	#10 AWG
		Receptacles	7	1	7	120				
		Sprinkler	4	0.056	0.224	120				
		Smoke Detector	2	0.055	0.11	120				
		CCTV	1	0.5	0.5	120				
		Fire Alarm Horn	2	0.28	0.56	120				
		BB-3	1	25	25	120	25	Mechanical	3	#12 AWG

		BB-4	1	12.5	12.5	208	12.5	Mechanical	2.6	#14 AWG
		BB-5	1	25	25	120	25	Mechanical	3	#12 AWG
		BB-9	1	25	25	120	25	Mechanical	3	#12 AWG
110	Cultural Activity Room	Lights	10	1.641666667	16.41666667	120	25.52766667	Electrical	3.06332	#12 AWG
		Receptacles	9	1	9	120				
		Sprinkler	1	0.056	0.056	120				
		Smoke Detector	1	0.055	0.055	120				
		BB-6	1	21.3	21.3	208	21.3	Mechanical	4.4304	#12 AWG
		BB-7	1	21.3	21.3	208	21.3	Mechanical	4.4304	#12 AWG
		CU-1	1	17.5	17.5	208	17.5	Mechanical	3.64	#14 AWG
		CU-2	1	22.5	22.5	208	22.5	Mechanical	4.68	#12 AWG
		CU-3	1	50	50	208	50	Mechanical	10.4	#6 AWG
		CU-4	1	47.5	47.5	208	47.5	Mechanical	9.88	#8 AWG
111	Storage	Lights	1	0.169583333	0.169583333	120	1.169583333	Electrical	0.14035	#14 AWG
		Receptacles	1	1	1	120				
113	Information & Gift Shop	Lights	6	0.316666667	1.9	120	6.011	Electrical	0.72132	#14 AWG
		Receptacles	4	1	4	120				
		Sprinkler	1	0.056	0.056	120				
		Smoke Detector	1	0.055	0.055	120				
114	Storage (Gift Shop)	Lights	1	0.169583333	0.169583333	120	1.169583333	Electrical	0.14035	#14 AWG
		Receptacles	1	1	1	120				
115	Yukata	Lights	1	0.169583333	0.169583333	120	1.280583333	Electrical	0.15367	#14 AWG
		Receptacles	1	1	1	120				
		Sprinkler	1	0.056	0.056	120				
		Smoke Detector	1	0.055	0.055	120				
116	ED Office	Lights	3	0.316666667	0.95	120	4.061	Electrical	0.48732	#14 AWG
		Receptacles	3	1	3	120				
		Sprinkler	1	0.056	0.056	120				
		Smoke Detector	1	0.055	0.055	120				
117	Mechanical	Lights	2	0.316666667	0.633333333	120	3.744333333	Electrical	0.44932	#14 AWG
		Receptacles	3	1	3	120				
		Sprinkler	1	0.056	0.056	120				
		Smoke Detector	1	0.055	0.055	120				
		FF-3	1	30	30	120	30	Mechanical	3.6	#10 AWG
		F-1	1	12.5	12.5	208	12.5	Mechanical	2.6	#14 AWG
		F-2	1	12.5	12.5	208	12.5	Mechanical	2.6	#14 AWG
118	Staff	Lights	2	0.169583333	0.339166667	120	1.450166667	Electrical	0.17402	#14 AWG
		Receptacles	1	1	1	120				
		Sprinkler	1	0.056	0.056	120				
		Smoke Detector	1	0.055	0.055	120				
119	Admin Office	Light	4	0.316666667	1.266666667	120	4.377666667	Electrical	0.52532	#14 AWG
		Receptacles	3	1	3	120				
		Sprinkler	1	0.056	0.056	120				
		Smoke Detector	1	0.055	0.055	120				

120	Vestibule	Lights	2	0.169583333	0.339166667	120	1.450166667	Electrical	0.17402	#14 AWG
		Receptacles	1	1	1	120				
		Sprinkler	1	0.056	0.056	120				
		Smoke Detector	1	0.055	0.055	120				
		FF-2	1	30	30	120	30	Mechanical	3.6	#10 AWG
		EF-2	1	8.75	8.75	208	8.75	Mechanical	1.82	#14 AWG
121	Classroom	Lights	6	0.316666667	1.9	120	3.011	Electrical	0.36132	#14 AWG
		Receptacles	1	1	1	120				
		Sprinkler	1	0.056	0.056	120				
		Smoke Detector	1	0.055	0.055	120				
122	Exhibit Gallery	Lights	10	0.316666667	3.166666667	120	8.277666667	Electrical	0.99332	#14 AWG
		Receptacles	5	1	5	120				
		Sprinkler	1	0.056	0.056	120				
		Smoke Detector	1	0.055	0.055	120				
123	Tea Ceremony	Lights	1	0.316666667	0.316666667	120	1.427666667	Electrical	0.17132	#14 AWG
		Receptacles	1	1	1	120				
		Sprinkler	1	0.056	0.056	120				
		Smoke Detector	1	0.055	0.055	120				
200	Stair	Lights	2	0.097836538	0.195673077	120	0.195673077	Electrical	0.023480769	#14 AWG
203	Mechanical	Lights	20	0.316666667	6.333333333	120	20.04433333	Electrical	2.40532	#12 AWG
		Receptacles	13	1	13	120				
		Sprinkler	1	0.056	0.056	120				
		Smoke Detector	1	0.055	0.055	120				
		Keypad	1	0.1	0.1	120				
		CCTV	1	0.5	0.5	120				
		EF-1	1	7.5	7.5	120	7.5	Mechanical	0.9	#14 AWG
		DHWT-1	1	6.25	6.25	120	6.25	Mechanical	0.75	#14 AWG
204	Telecom	Lights	6	0.316666667	1.9	120	9.091	Electrical	1.09092	#14 AWG
		Receptacles	7	1	7	120				
		Sprinkler	1	0.056	0.056	120				
		Smoke Detector	1	0.055	0.055	120				
		Wireless Access Point	1	0.08	0.08	120				
									94.82352077	

Total Continuous Load we got from previous Service Sizing calculation is *94.824 kW.*

After adding the EV charging station of *1.5 kW.*

30 HP fire pump with assuming 85% efficiency for the building is *19 kW*.

So,

$Max.\ Operating\ Load$ = *94.824+1.5+19 = 115.324 kW*

Now,

New Service Size for Operating Load is,

$$Amp = \frac{(94.824 * 1.25) + 20.5\ kW}{\sqrt{3} * 600} = 133.78\ A$$

In this case we must increase from a 100A, 347/600V, 3 phase service to a 150A, 347/600V, 3 phase service for this building.

So, the conductor sizing is affected by the addition of EV charging portal & motor pump. However, with the new service size we can now add 16 kW more load in the future and it will not affect the new 150 A conductor sizing. So, it becomes more robust and future proof.