



Request for Research on Fire Fighting Systems

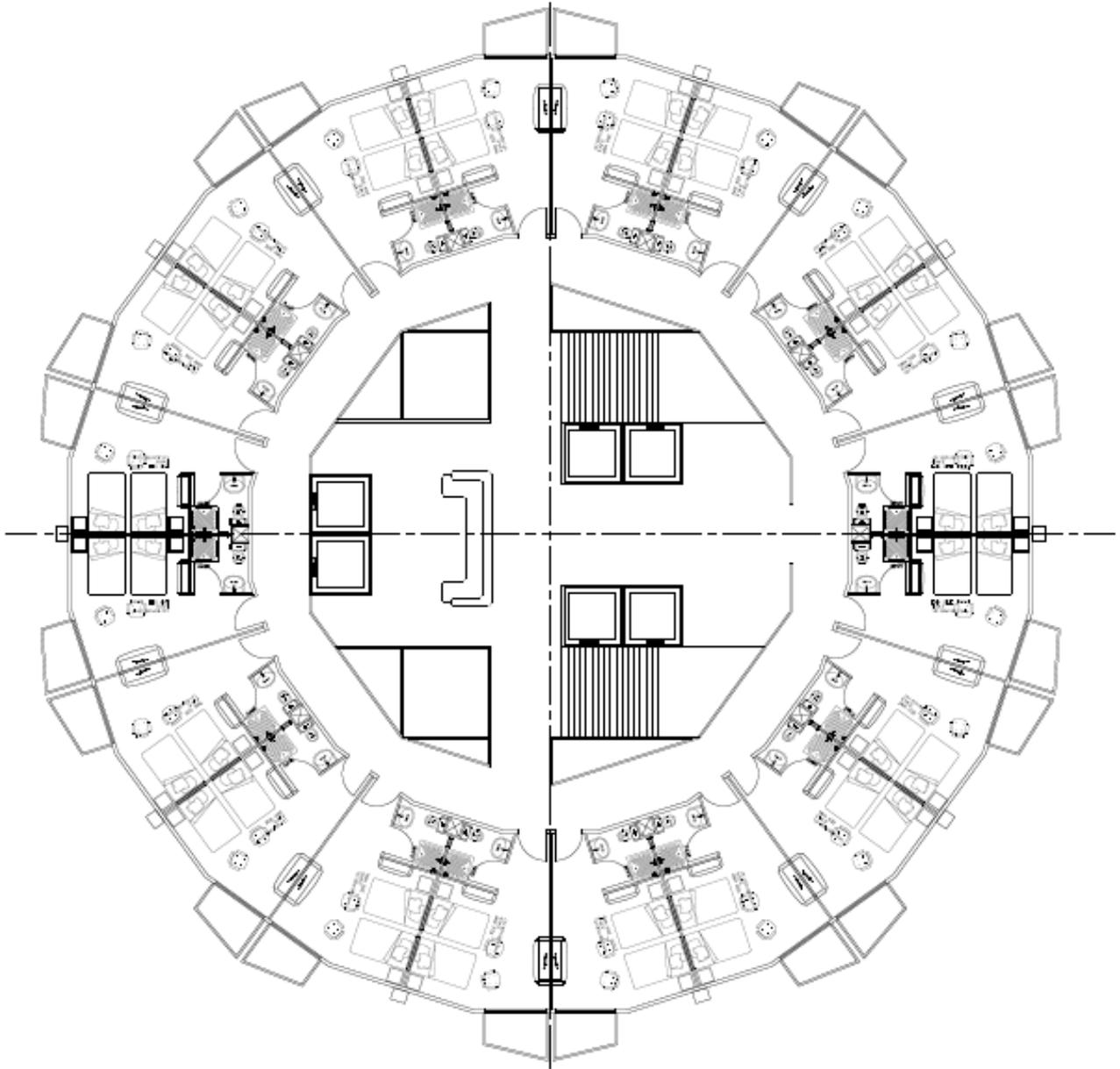
- 1- A Typical **Hotel building located in Cairo City on Nile River** consists of 2 basements (B1+B2), Ground Floor (G), **26 Typical Floors** (from **1st floor to 26th floor**), and the roof annex, as can be seen in **Figure 1**. Each of the Typical Floor consists of 20 Guest Rooms (numbered by including the floor number plus numbers from 01 to 12, and 14 to 21), elevator lobby, service corridor, IT room, and MDB room. The fire water tank and pump room will be located in 2nd basement floor (B2), as can be seen on Figure 1. Each Student is requested to Prepare his/her **Conceptual Design Report for the firefighting works for this hotel building** in not more than 10 pages, including the **hydraulic calculations for automatic water sprinkler system** to protect the highest floor (26th floor) and to **include the following items, calculations and diagrams/drawings:**
- Select, Specify and List*** in a table the **proposed firefighting system(s)** and their system components for all the specified spaces inside all floors of the Hotel building, ***in Tabulated Format***.
 - Plot*** a schematic drawing for the proposed **Riser Diagram for Fire Fighting system(s)** on the attached building Sectional Elevation presented in **Figure 1**, using water based system consists of **Fire Pumping Set (or Two Fire Pumping Sets) (FPs)**, Fire water Tank (FWTs) with specified water storage capacity, (**automatic water sprinklers (SPs)**), **Fire Hose Cabinets (FHCs)**. You can use CAD file Or manual drawings to indicate the using of One Fire Fighting pumping system with **pressure reducing valves (PRVs)** in some floors, if needed, OR You can use Two Fire Fighting Pumping systems for both vertical zones of the building (Lower Zone from B2 to 12th and Higher Zone from 13th to Roof annex), as per **NFPA13** requirements.
 - Design and Plot*** a schematic drawing for the proposed automatic water sprinklers system and Fire Hose Cabinets system for the floor number 26th, which its architecture plan view is presented in **Figure 2**, as the hydraulically most remote floor, taking into consideration that that proposed sprinkler distribution could be used for all typical floors, using **side wall sprinklers for Guest Rooms** which are without reflected ceilings except the room entrance vestibules. However, **concealed pendant sprinklers** shall be used for room entrance vestibules, elevator lobbies, and service corridors in those typical floors, as per **NFPA13** requirements.
 - Calculate*** the **water Demand required** and **pump head** to provide the automatic water sprinkler system and the Fire Hose Cabinets system proposed in the above item, based on the diagram shown **Figure 3** for Fire Pumps Room connected to the Fire Stand pipe(s) and Riser(s) to serve the hotel building under consideration, as per **NFPA13 & NFPA20** requirements.
 - Design and Redraw*** a schematic drawing shown in **Figure 4** for **Fire Pumps Room located beside Fire Water Tank**, as per **NFPA20** requirements, respectively.

You are allowed to use CAD files or manual drawings to be attached to your Conceptual Design report for all the above items (from a to e).

	Potable Water Tanks + Elevators Machine Room	
Roof Annex		Roof Annex
26 th floor	Guest Rooms 2601-2621 – Elevator Lobby + MDB + IT Room	26 th floor
25 th floor	Guest Rooms 2501-2521 – Elevator Lobby + MDB + IT Room	25 th floor
24 th floor	Guest Rooms 2401-2421 – Elevator Lobby + MDB + IT Room	24 th floor
23 rd floor	Guest Rooms 2301-2321 – Elevator Lobby + MDB + IT Room	23 rd floor
22 nd floor	Guest Rooms 2301-2321 – Elevator Lobby + MDB + IT Room	22 nd floor
21 st floor	Guest Rooms 2201-2221 – Elevator Lobby + MDB + IT Room	21 st floor
20 th floor	Guest Rooms 2101-2121 – Elevator Lobby + MDB + IT Room	20 th floor
19 th floor	Guest Rooms 1901-1921 – Elevator Lobby + MDB + IT Room	19 th floor
18 th floor	Guest Rooms 1801-1821 – Elevator Lobby + MDB + IT Room	18 th floor
17 th floor	Guest Rooms 1701-1721 – Elevator Lobby + MDB + IT Room	17 th floor
16 th floor	Guest Rooms 1601-1621 – Elevator Lobby + MDB + IT Room	16 th floor
15 th floor	Guest Rooms 1501-1521 – Elevator Lobby + MDB + IT Room	15 th floor
14 th floor	Guest Rooms 1401-1421 – Elevator Lobby + MDB + IT Room	14 th floor
13 th floor	Guest Rooms 1301-1321 – Elevator Lobby + MDB + IT Room	13 th floor
12 th floor	Guest Rooms 1201-1221 – Elevator Lobby + MDB + IT Room	12 th floor
11 th floor	Guest Rooms 1101-1121 – Elevator Lobby + MDB + IT Room	11 th floor
10 th floor	Guest Rooms 1001-1021 – Elevator Lobby + MDB + IT Room	10 th floor
9 th floor	Guest Rooms 901-921 – Elevator Lobby + MDB + IT Room	9 th floor
8 th floor	Guest Rooms 801-821 – Elevator Lobby + MDB + IT Room	8 th floor
7 th floor	Guest Rooms 701-721 – Elevator Lobby + MDB + IT Room	7 th floor
6 th floor	Guest Rooms 601-621 – Elevator Lobby + MDB + IT Room	6 th floor
5 th floor	Guest Rooms 501-521 – Elevator Lobby + MDB + IT Room	5 th floor
4 th floor	Guest Rooms 401-421 – Elevator Lobby + MDB + IT Room	4 th floor
3 rd floor	Guest Rooms 301-321 – Elevator Lobby + MDB + IT Room	3 rd floor
2 nd floor	Guest Rooms 201-221 – Elevator Lobby + MDB + IT Room	2 nd floor
1 st floor	Guest Rooms 101-121 – Elevator Lobby + MDB + IT Room	1 st floor
Ground floor	Reception + Shops + Restaurant	Ground floor
Basement 1	shops + Electrical rooms + MDBs room	Basement 1
Basement 2	Car Park + Fire Pump Room + Water Tanks+ Diesel Generating Set + Transformers	Basement 2

Figure 1: Sectional Elevation Diagram for New Cairo Mall Building (Item a, b)

Note: This appendix shall be attached to your Conceptual Design Report and submitted after plot the necessary firefighting systems.



**Figure 2: Typical Floor for Guest Rooms (starting from 1st floor up to 26th Floor) (Item c)
(CAD File with Dimensions in mm is available and attached to this proposal)**

Note: This appendix shall be attached to your Conceptual Design Report and submitted after plot the necessary firefighting systems.

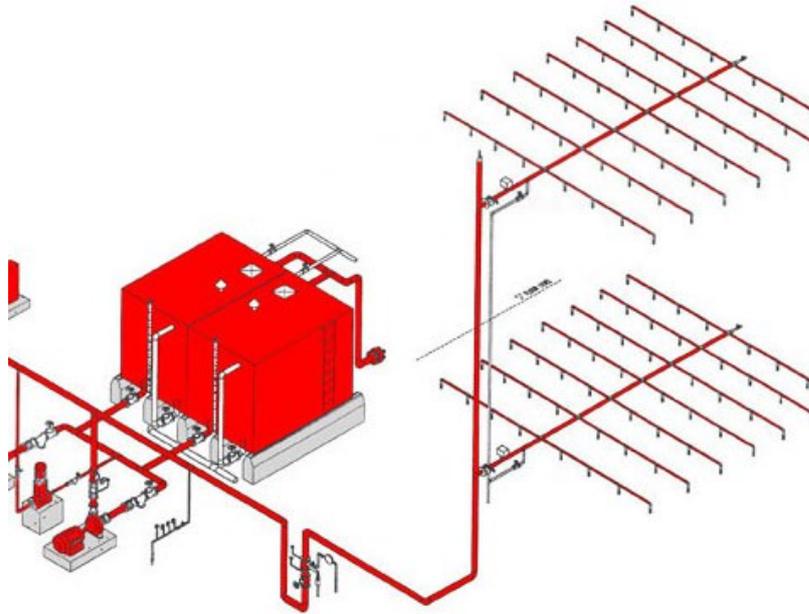


Figure 3: Sectional Elevation Diagram for New Cairo Mall Building (Item d)

Note: This appendix shall be attached to your Conceptual Design Report and submitted after perform the hydraulic calculation necessary for the proposed firefighting systems.

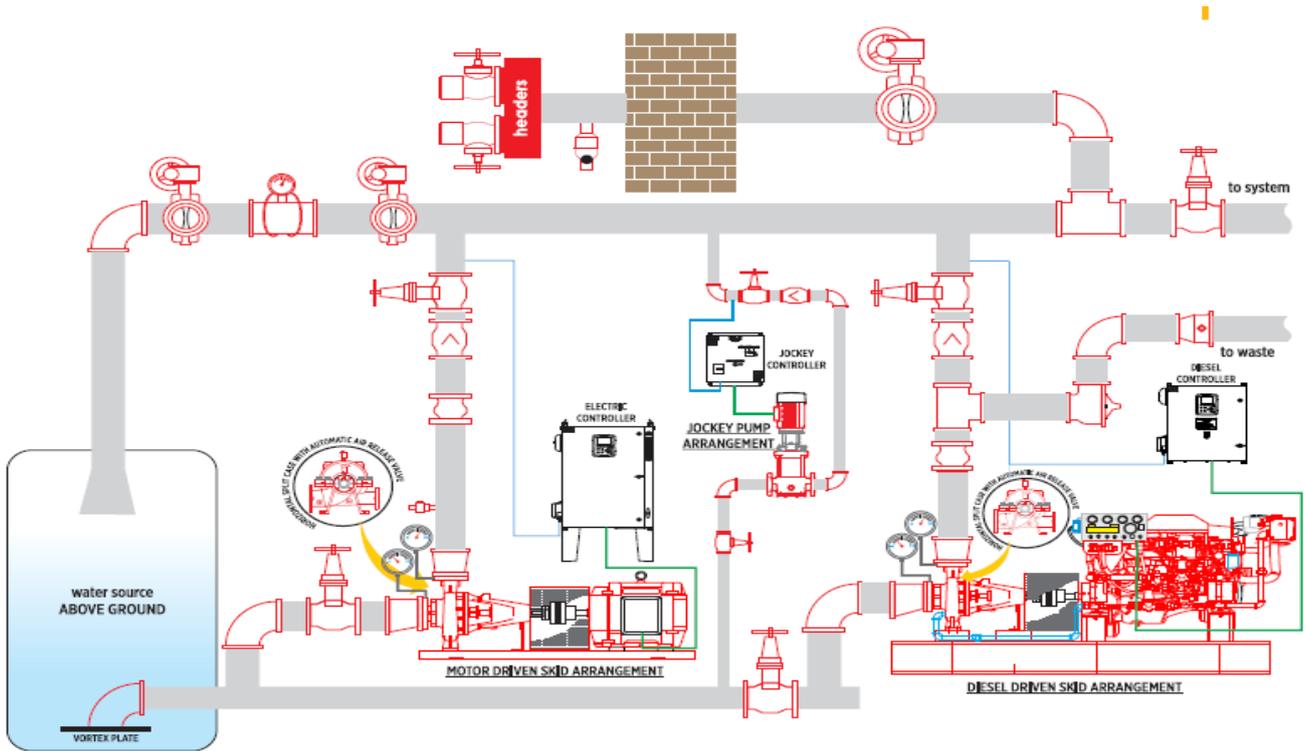


Figure 4: Sectional Elevation Diagram for New Cairo Mall Building (Item e)

Note: This appendix shall be attached to your Conceptual Design Report and submitted after design the fire pump room necessary for the proposed firefighting systems.

with My Best Wishes
Dr. Tarek Adel Mouneer



Appendix A
NFPA 13, Pipe Schedule for Light Hazard, and Ordinary Hazard

Table 8-5.2.2 Light Hazard Pipe Schedules				Table 8-5.3.2(a) Ordinary Hazard Pipe Schedule			
Steel		Copper		Steel		Copper	
1 in.	2 sprinklers	1 in.	2 sprinklers	1 in.	2 sprinklers	1 in.	2 sprinklers
1 ¹ / ₄ in.	3 sprinklers	1 ¹ / ₄ in.	3 sprinklers	1 ¹ / ₄ in.	3 sprinklers	1 ¹ / ₄ in.	3 sprinklers
1 ¹ / ₂ in.	5 sprinklers	1 ¹ / ₂ in.	5 sprinklers	1 ¹ / ₂ in.	5 sprinklers	1 ¹ / ₂ in.	5 sprinklers
2 in.	10 sprinklers	2 in.	12 sprinklers	2 in.	10 sprinklers	2 in.	12 sprinklers
2 ¹ / ₂ in.	30 sprinklers	2 ¹ / ₂ in.	40 sprinklers	2 ¹ / ₂ in.	20 sprinklers	2 ¹ / ₂ in.	25 sprinklers
3 in.	60 sprinklers	3 in.	65 sprinklers	3 in.	40 sprinklers	3 in.	45 sprinklers
3 ¹ / ₂ in.	100 sprinklers	3 ¹ / ₂ in.	115 sprinklers	3 ¹ / ₂ in.	65 sprinklers	3 ¹ / ₂ in.	75 sprinklers
4 in.	See Section 5-2	4 in.	See Section 5-2	4 in.	100 sprinklers	4 in.	115 sprinklers
				5 in.	160 sprinklers	5 in.	180 sprinklers
				6 in.	275 sprinklers	6 in.	300 sprinklers
				8 in.	See Section 5-2	8 in.	See Section 5-2

For SI units, 1 in. = 25.4 mm.

Useful Equations

$$p = \frac{4.52 Q^{1.85}}{C^{1.85} d^{4.87}}$$

Table 8-4.4.5 Hazen-Williams C Values

Pipe or Tube	C Value*
Unlined cast or ductile iron	100
Black steel (dry systems including preaction)	100
Black steel (wet systems including deluge)	120
Galvanized (all)	120
Plastic (listed) all	150
Cement-lined cast or ductile iron	140
Copper tube or stainless steel	150
Asbestos cement	140
Concrete	140

*The authority having jurisdiction is permitted to consider other C values.