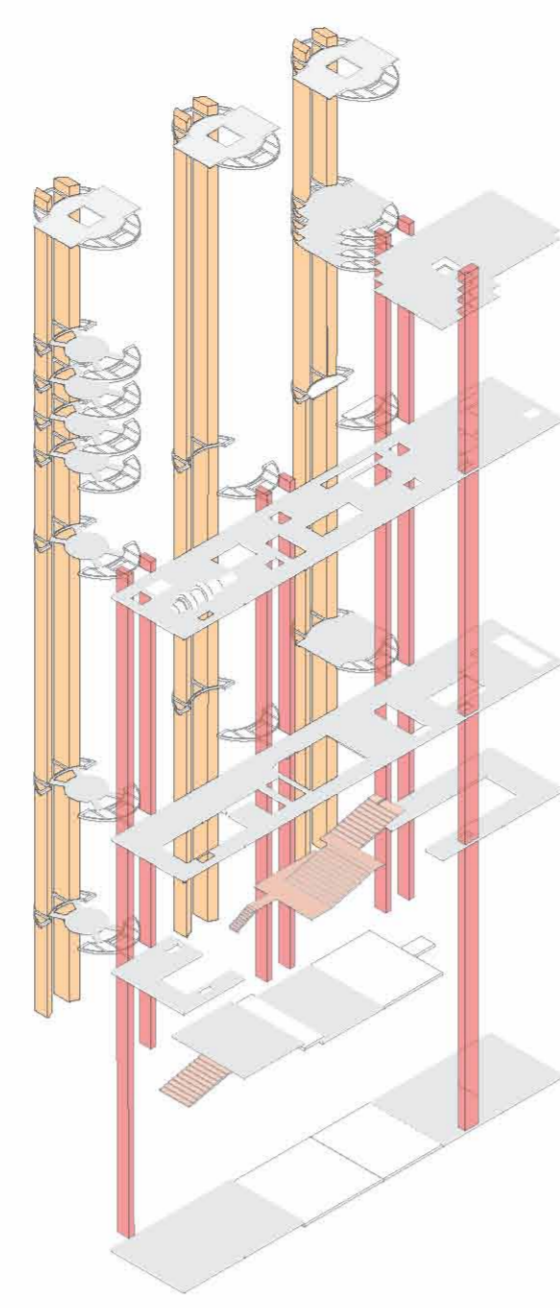
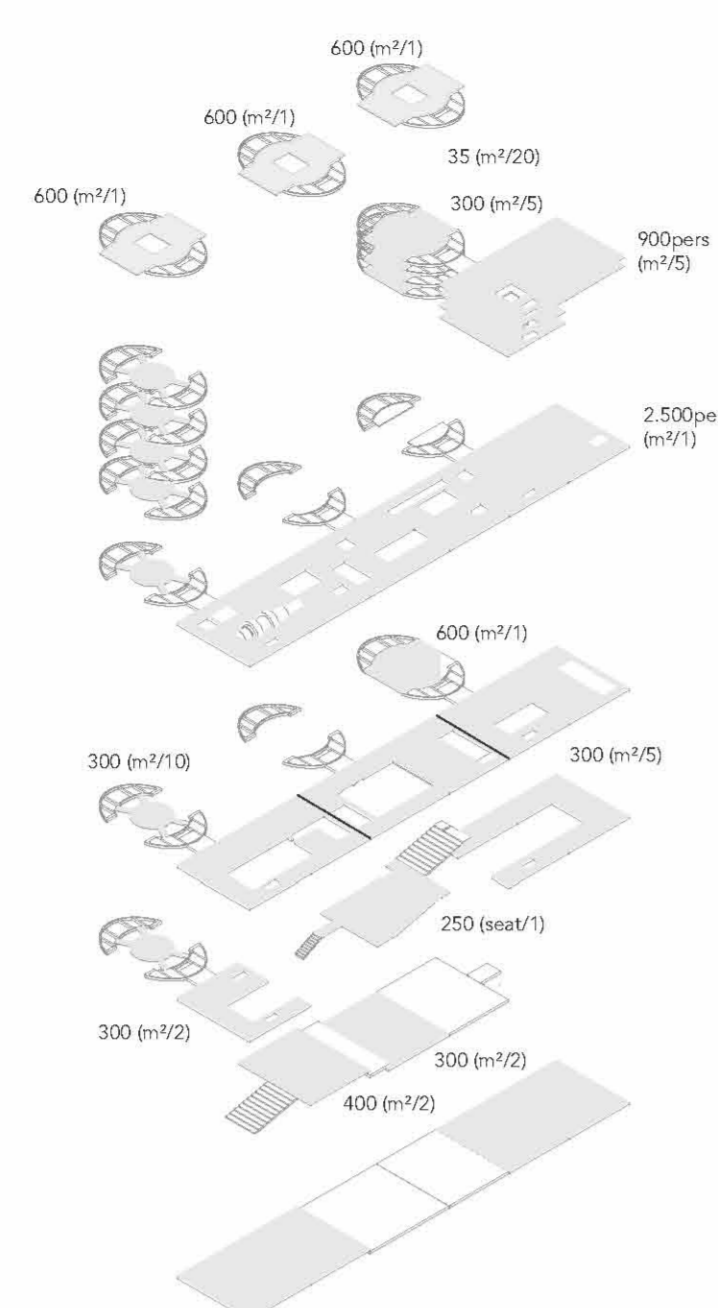
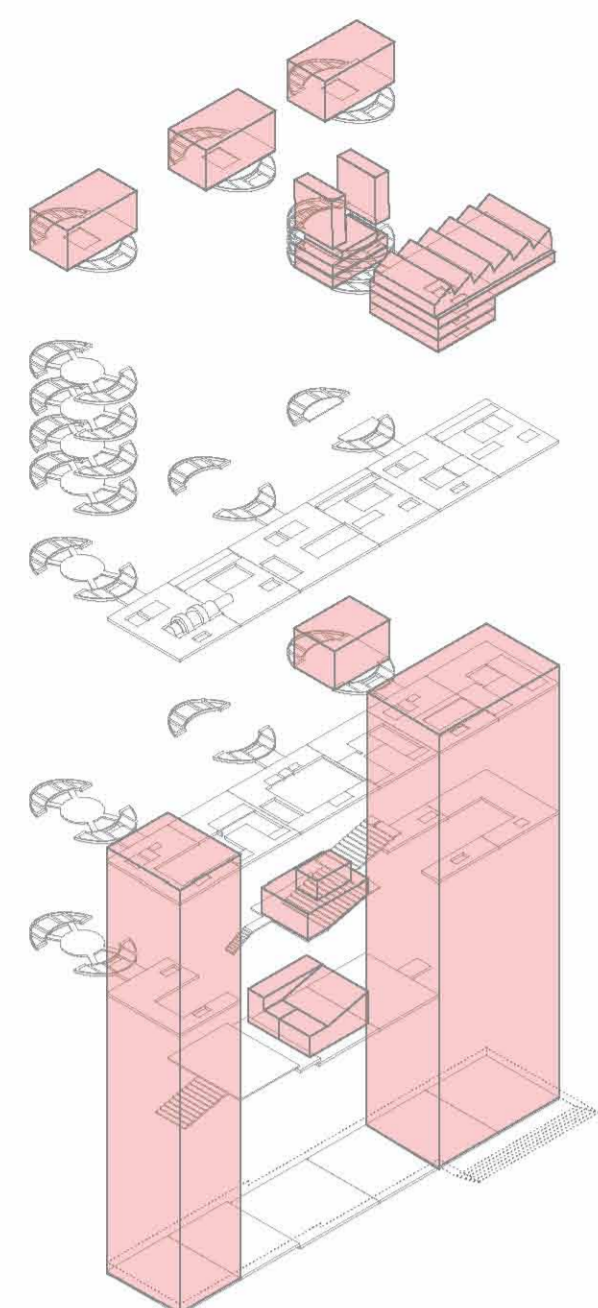


# FIRE PROTECTION



## Sectorization

Four different sector units are established: one for each tower and the nave. Inside each sector unit, the different programs are separated according to surface area and occupation as the norm says. This is also done for the different premises and special risk areas.

Spaces assigned to public use such as museums, sport premises, fairs... can constitute a fire sector with a built surface area larger than 2.500 m², if they follow the regulation:  
 -partitioned from other areas with EI 120 elements  
 -evacuation is solved with exits that communicate with a sector of minimum risk through independence halls or building exits  
 -no premises on these spaces are residential.

Each area with a different use and dependant on the main use of the building or the premises where it is integrated, should constitute a different fire sector.  
 Education: If the building is more than one level high, the built surface area of each fire sector should be under 4.000 m².  
 Administration: the built surface area should be less than 2.500 m².  
 Residential: the built surface area should be less than 2.500 m².  
 Other area of public use with an occupation capacity of 500.

Machinery and installation rooms are considered areas of special risk, and their risk degree will vary according to their volume. These should always have an independence hall.

## Occupation

The building's skeleton is built with concrete, which makes it highly resistant to fire. Each one of the new additions are fire resistant according to CTE DB-SI regulation.

Capacity values have been calculated according to the occupation density values shown in table 2.1 (CTE DB-SI) depending on the useful surface area of each zone. The program is considered as being set up to its maximum.

In the particular case of the turbine gallery, the occupation has been calculated for the extreme situation of a standing spectators' area (0,25m²/person)

All the premises have more than one exit from the level or the building. The length of the evacuation routes to the closest exit never exceeds 50m. Though it could increase by 25% as the fire sectors are protected by an automatic fire-extinction installation.

The whole building is equipped with this automatic fire-extinction installation. Each partitioned area activates independently so if it becomes activated, its impact will be minimised in the fire propagation areas.  
 Route length: 62,5m (50 + 25%).  
 Regarding the towers, as the evacuation height is higher than 28m, two exits, an emergency lift and a dry column per level will be set up. In other words, in each tower one of the lifts will be of priority use for the fire-extinction body.

## Evacuation elements

There are two vertical evacuation elements: tower and nave. Besides this, the possibility of using the auditorium and the turbine stairs for evacuation purposes is available.

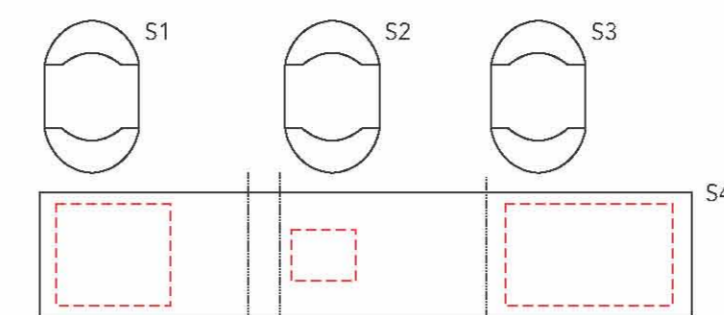
All the cases have an evacuation height over 28m so the stairs must be extra protected with an independence hall in each of their access. The existence of such independence hall is not necessary when the stair is open to the exterior. Besides this, shelter areas should be arranged for the evacuation of handicapped people.

The calculation of the evacuation elements and their capacity has been done according to tables 4.1 y 4.2 (CTE DB-SI) For protected stairs:  $E \leq 3 S + 160 A_s$

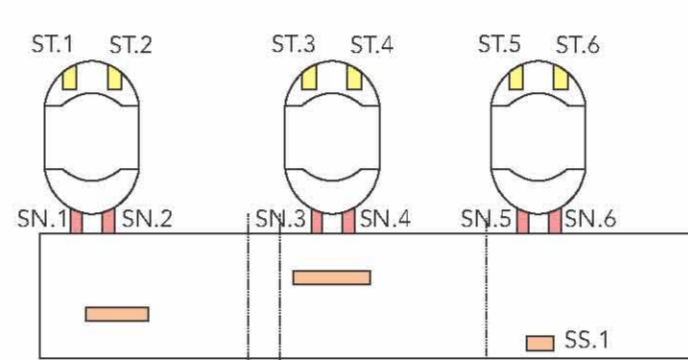
Tower:  $E=2.000$ ;  $S=800$ ;  $A_s=1,20$   
 $3 \times 800 + 160 \times 1,2 = 2.592$   
 Evacuation capacity of the 1,40m wide stairs = 1.012

Nave:  $E=3.350$ ;  $S=1050$ ;  $A_s=1,40$ ;  
 $3 \times 1050 + 160 \times 1,4 = 3.364$   
 Evacuation capacity of the 1,40m wide stairs = 576.  
 $576 \times 6$  escaleras = 3.456

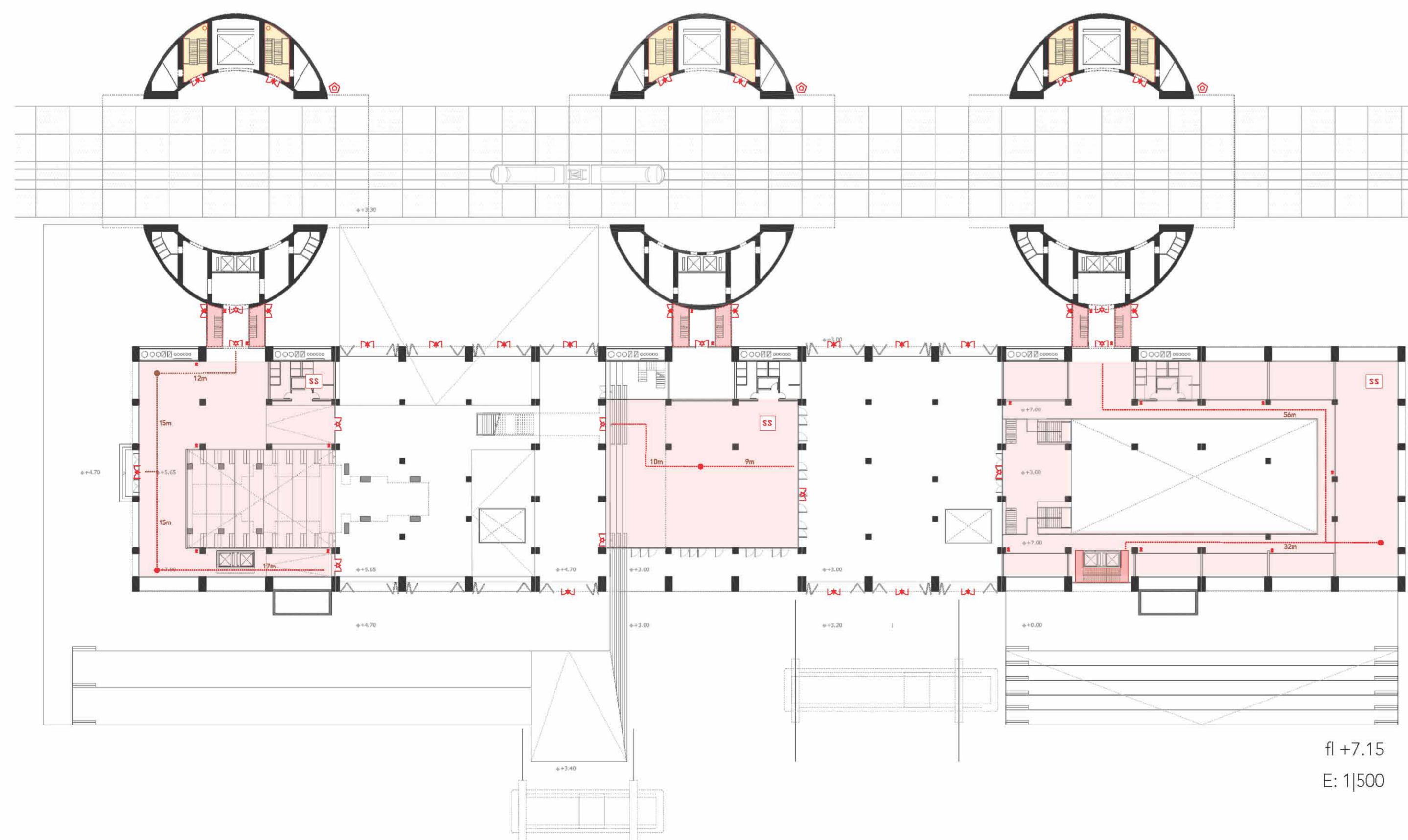
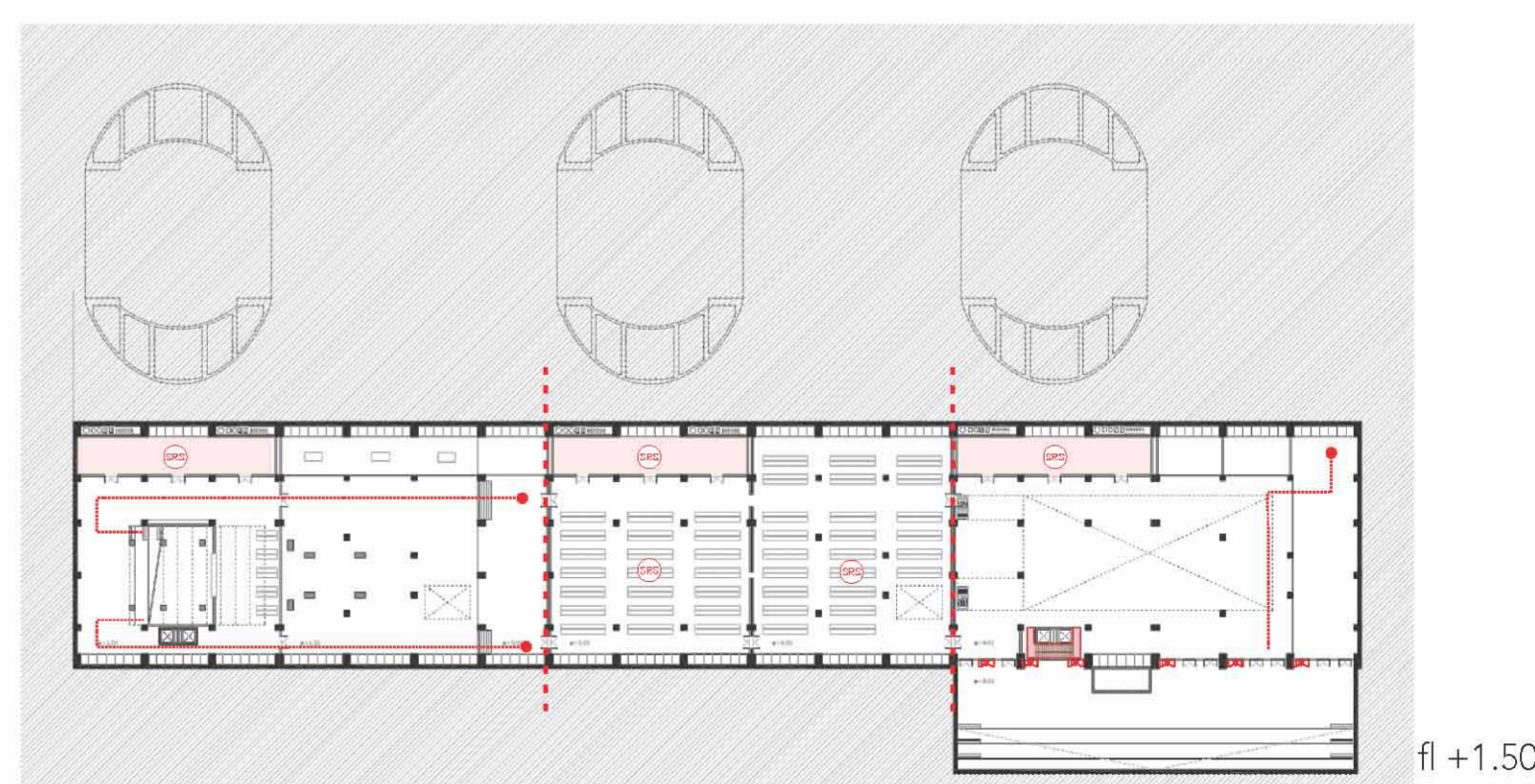
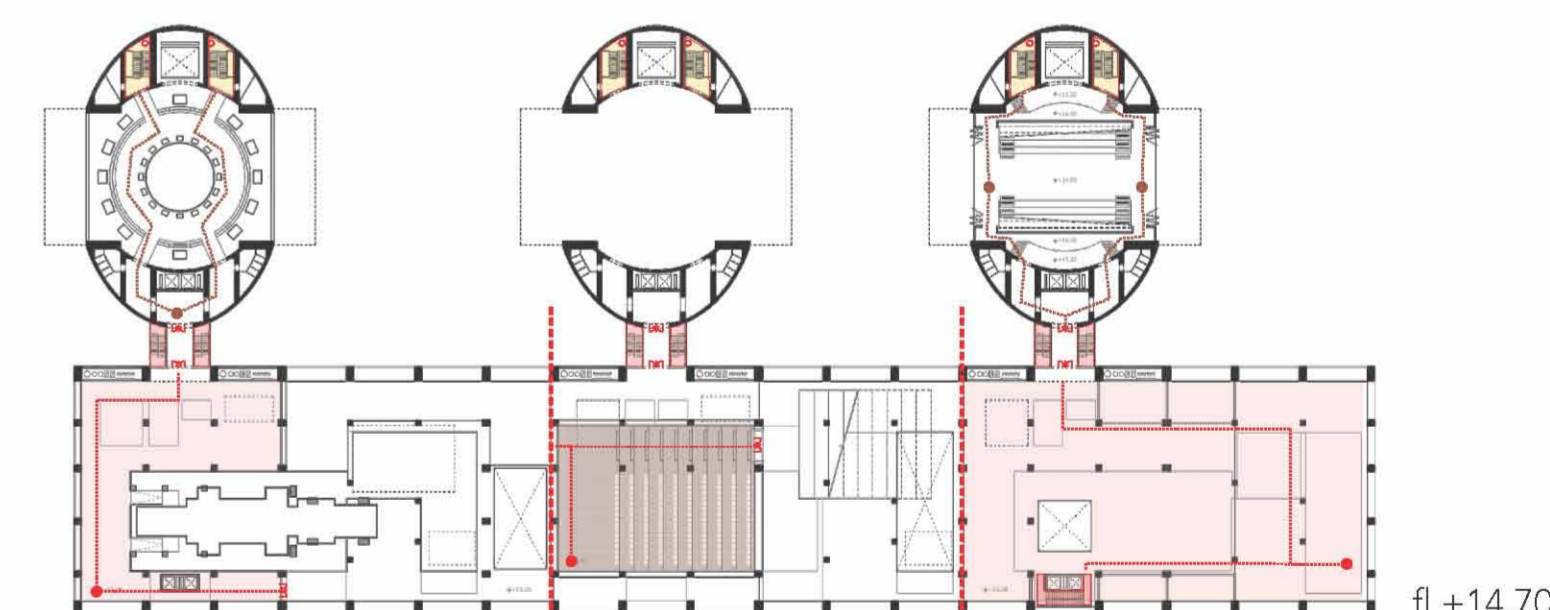
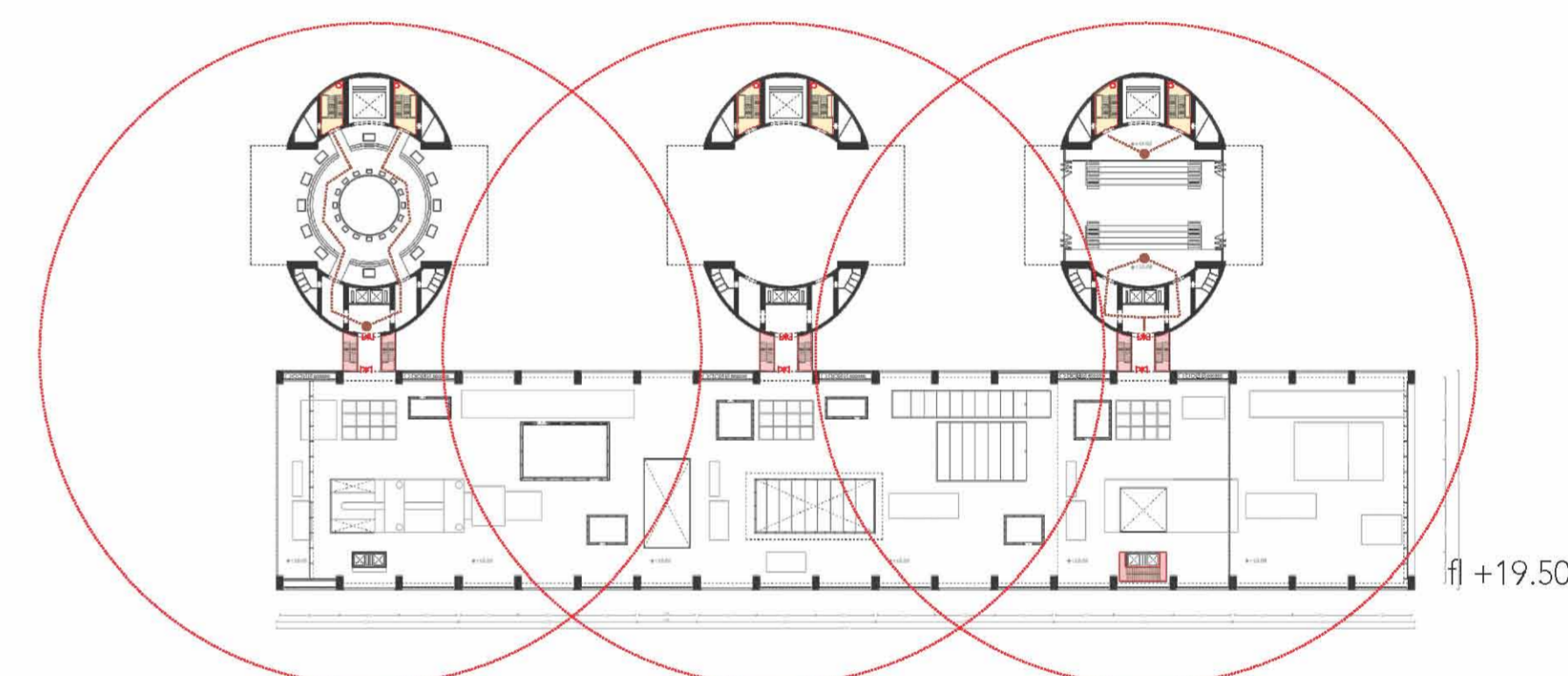
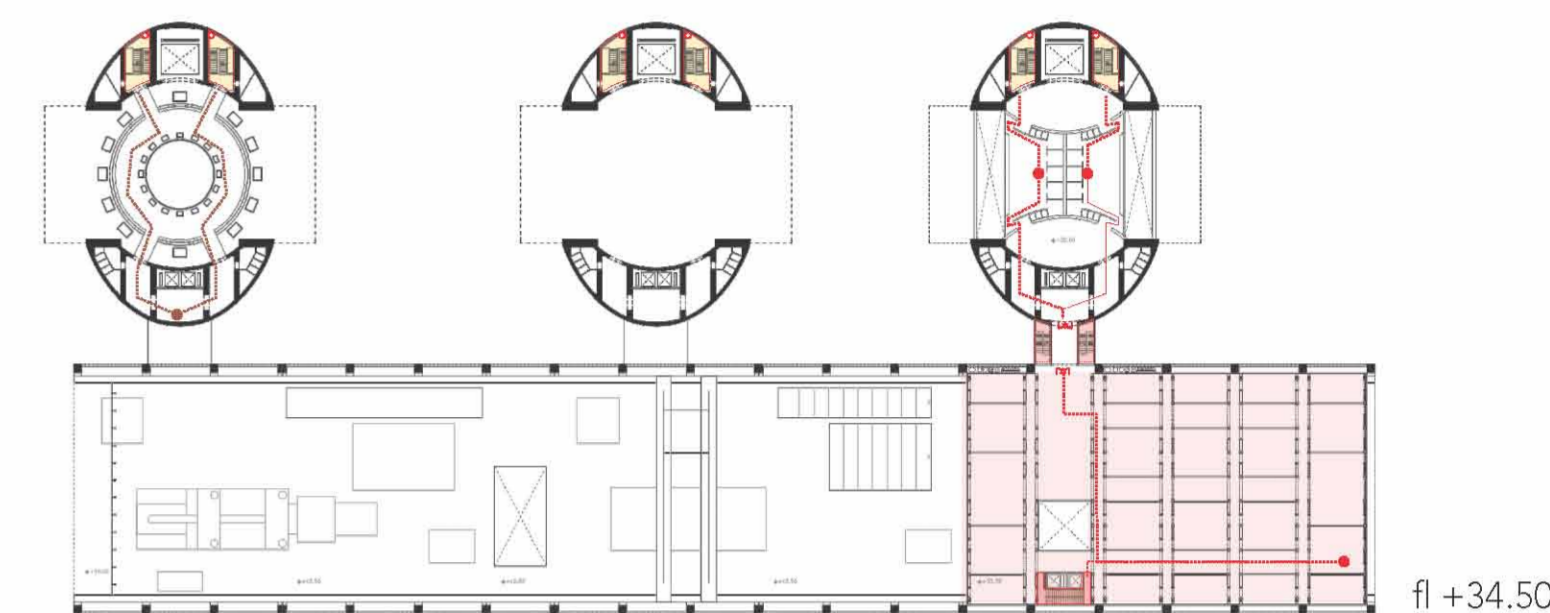
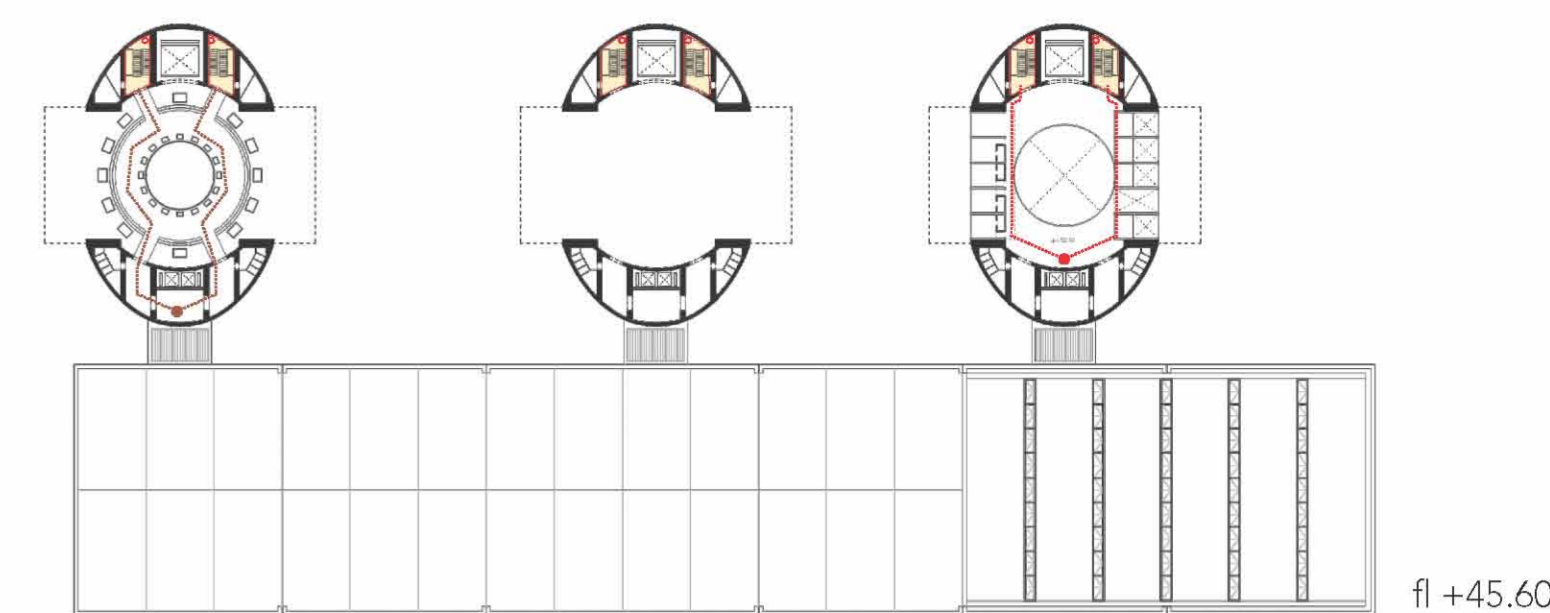
School:  $E=450$ ;  $S=180$ ;  $A_s=1,00$   
 $3 \times 180 + 160 \times 1,0 = 592$   
 Evacuation capacity of the 1,00m wide stairs= 480.



Sectors



Evacuation routes



fl +7.15  
E: 1/500

- Evacuation route
- Starting point
- Ⓜ Sector exit
- Ⓜ Building exit
- Dry column
- Ⓜ Fire hydrant
- Ⓜ Fireplug
- Button alarm system
- Ⓜ Alarm system
- Fire extinguisher
- Smoke detector
- Specially protected evacuation staircase
- Protected evacuation staircase
- Open air protected evacuation staircase
- Ⓜ Special Sector
- Ⓜ Special Risk Sector

Legend

Floorplans  
E: 1/1.000