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Proposal:

Report:

Fire Safety, Ventilation and Noise Mitigation Report

Location:

St. Thomas Tower, Marsascale.

Dear Sir/Madam,

This report deals with the subject noted above and the application being submitted by Architect Robert Grech of iArchitects on behalf of the applicant Mario Farrugia, Chairman Fonadazzjoni Wirt Artna. Please find below the recommendations to be included in the designs and adhere to during the selection, installation, and commissioning of the equipment.

1.0 Scope

The general scope of this report is to check the building under consideration and determine the conformity or otherwise according to the guidelines issued by the Building Construction Industry Department in March 2004 in the *Design Guidelines on Safety for Buildings in Malta*. It also details in general other fire safety and ventilation requirements by the premises under consideration, so that it satisfies the purpose of its operation and functions, according to the governing regulations without imposing any safety hazards to its occupiers and neighbours.

The other scope of this report is to establish and highlight any noise mitigation measures required so that the noise generated (if any) by the new establishment is kept to acceptable levels.

The physical protection of the property does not fall within the scope of this report. Property protection standards may necessitate the incorporation of additional fire safety features and/or security systems and insurers may seek their own standards before accepting the insurance risk.

2.0 Building under consideration

The premises under consideration, consists of a large bastioned watchtower built in 1614, the third of the six Wignacourt towers built in Malta. The purpose of the application is to add two additional light structure levels for use as an exhibition area and a conference area as detailed in the drawings. The building falls under Purpose group 5. A room on the roof is being proposed to be used for warming up food and as a serving kitchen. No cooking is being envisaged and part of the roof is to be used as the reception area. There is going to be two toilets one in the basement level and one on the roof level which will be accessible for special needs persons. This is all indicated in the attached drawings MS01-01-2015 to MS01-10-2015 by architect Robert Grech of iArchitects.

3.0 *Fire Safety*

The layout of the building as well as its proposed use and the nature of its occupancy have been reviewed in conjunction with the Design guidelines on fire safety for buildings in Malta – Vol. D / Draft Building regulations, issued in March 2004 by the BCID. One has to keep in mind that this is a historic scheduled building with limited possibility of interference with the structure.

All Fire protection systems and equipment shall comply with relevant MSA – EN or BS standards.

(i) *Escape route*

The drawings show that there are two escape exits on the ground floor. One is through the main door leading to the bridge and onto the street while the other is through a door to which an external escape stairs are to be added. The latter will lead to the ditch surrounding the tower which leads to the road behind the said tower. In no instance one needs to walk more than 20m to reach the exit from any one direction, which is well within limit listed in the guidelines for more than one exit.

In the first intermediate level which is going to be used as a museum gallery, one escape route is required for the density of people in this area. Since this forms part of the space above the ground floor without any partitioning, one can use the emergency stairs to be located on the side of the main chamber as shown in the drawings. The distance to the stairs from the furthest point on that level is a few metres above the 18m requested by the guidelines. Due to the limitations because of the nature of the building, and the activity on this floor, it is deemed acceptable to have one emergency escape out from this level through the stairs.

The other floor that is going to be constructed, that is the second intermediate floor, will have two meeting rooms one on either side of the lift shaft. The total amount of people that both areas can accommodate determine that only one escape is required. Due to limitations in construction in this scheduled building, it is being suggested that the same open metal stairwell is used as the escape route for this floor too. The area leading to the stairwell has to be properly partitioned in fire retardant material to ensure that the top floor is a compartment on its own. The partitions form part of compartment walls; therefore certified fire retardant material shall be used and assembled in full compliance with the manufacturer's specifications. The escape route is sited on one end of this floor and therefore as shown in the drawings, can only be accessed through one of the meeting rooms. This meeting room should have fixed seating so to ensure that there is always a clear escape path to the fire door and the emergency stairs.

The roof has its own fire escape through stairs leading from the ground floor to the roof directly so no extra action need to be taken except that the necessary signage is installed.

The toilet located in the basement area below the ground level as indicated in the drawing, leads directly to the outside area (ditch surrounding the tower). Therefore there is no need for further action. This same area is also connected to the ground floor through a spiral staircase which could also be used to lead people out to the safe area, although as already indicated there are enough escape routes in the ground floor to deal with the density of people in the museum.

(iii) *Fire doors / Access Panels*

The only subdivision into fire compartments or fire doors required is for the area leading to the meeting rooms that is the 2nd intermediate level. This will ensure that should any fire starts in this area it does not spread to the other areas underneath. Where partitions form part of compartment walls; then certified fire rated material shall be used and assembled in full compliance with the

manufacturer's specifications.

Doors leading to the emergency escape stairs need to be 'fire rated doors' and shall include signage, push pads or lever handles / panic bar.

(iv) Shafts

There are no service shafts present in the building except for the lift shaft. This eliminates any possibility of fire spreading through the shaft. It is to be noted that the different areas are all located in the same chamber voids of the tower and therefore there is not segregation.

(v) Compartmentalization & Structural Stability

The proposed structure's fire resistance appears to fall well within the R60 requirement, although the structural stability is highly dependent on the control of ceiling surface temperature resulting from a fire by exhausting the heat effectively via the natural openings / windows.

(vi) Fire Load

This is the amount of fuel within a particular area which will burn to release heat and feed the fire. The materials used for both the structure (mainly Maltese stone, concrete and metal structure with glass panels) and the finishes (sand-cement plaster/mortar & water-based paint) as well as the furnishings (meeting room seating area furniture) present minimized (or 'nil') heat release, flame spread, and minimal production of toxic fumes.

The artwork however, is a source that can lead to some form of fire/smoke to start in the ground and intermediate floor area. For such instances fire extinguishers are to be present in each chamber and in a location easily reachable, so as to have an effective way to fight any fire outbreak.

(vii) Detection

An automatic fire detection system should be installed to cover the whole area. Such system shall comprise of smoke detectors, monitored by a central control panel. In case any of the detector levels are exceeded, an alarm will be signaled through an indoor and an outdoor sounder unit. The sounder unit should be equipped with a beacon in order to be noticed by deaf people. Beacons shall be installed in close proximity to the indoor sounder(s) in order to give a visual indication, should the fire alarm trigger.

Since the building is scheduled it suggested that the detection system installed is at least partially wireless, so that no damage to the existent structure is done to route the cables. Underneath the new floors, one can use the conventional system, that is hardwired.

A manual call point should be installed at each level of the museum, including one on the roof by the stairs so that in the event a fire breaks, everyone in the building is notified through the appropriate sounders.

(viii) Fire Suppression Systems

Since this is to be used as a museum/ art gallery, and there is to be no cooking carried out in the area on the roof, all areas shall be primarily protected by hand-held fire extinguishers. Being a schedule building is difficult to route a sprinkler system so portable fire extinguishers are deemed to be enough to cater to the areas and its uses. 5-6kg CO₂ and 6ltr. Water extinguishers, together with at least a fire blanket should be provided. Adding some 6kg dry powder is suggested, but the use of

this type (although suitable for all classes) may result in significant damage to the premises in the event of use/fire as the fine powder disperse violently to all areas. Therefore it is recommended that CO₂ & water extinguishers are primarily used for all areas, keeping in mind that no cooking is to be carried out.

CO₂ extinguishers are used mainly for electrical fires (Class E), while
Water based extinguishers are mainly suitable for paper, wood, textile and fabric (Class A).

The building's height does not require a dry riser in accordance to MSA-EN 671, and there are no stairs in the assessed area.

(ix) Safety Signs and Emergency Illumination

Safety signs are required in order to provide clear emergency exit directions to occupants and personnel. Emergency lighting shall be in accordance with EN1838 and EN 50172.

The use of safety signage is of utmost importance, as it will facilitate a quicker exit time for persons who are not acquainted with the building. Signage shall include 'Exit' and 'direction' signage in the form of photo luminescent plaques installed above emergency exit door, or in the path towards the exit. Very often these can be incorporated with emergency luminaries. All areas must include adequate lighting of minimum 75lux, and Emergency (battery-back-up) lighting of minimum 0.2lux in all areas.

(x) Access and Facilities for Fire Service

The layout lends itself to a straight-forward access by the Civil Protection Department.

4.0 Ventilation

The premises are well ventilated through the main entrance located at street level and the windows installed all around the building. Therefore there is no need for mechanical assisted ventilation in the main area, but the toilets should have extractor fans ducted to the outside. The latter should be designed to achieve 10 Air Changes per Hour (ACAH) and can be controlled via the lighting switch and with a time-delayed controller.

Ventilation and air-conditioning are also required in the meeting rooms since these are completely isolated and enclosed. The ventilation rate should be 10l/s/person. The ventilation equipment shall be connected to the fire alarm panel so that in the event of a fire in this area, the exhaust fan **only** is operated while the supply fan is switched off.

No smoking should be enforced in all areas.

All ventilation design requirements must comply with:

- Code 5 – Environmental Aspects, issued by the BCID, also referred to as 'Practical Guidance' – Environmental - Draft Building Regulations; issued in March 1998; and
- ASHRAE or CIBSE Ventilation codes of practices.

Ventilation requirements for fire safety, only concern exhausting heat and smoke from the building. This is necessary to aid fire fighting operations since thick smoke will (1) impair the evacuation of persons; (2) reduce visibility during fire extinguishment; (3) it would increase both the temperature and the concentration of toxic fumes and (4) high temperatures may lead to the collapse of the ceiling slabs and beams.

Smoke venting by natural means is readily available given the number of windows present in the ground and the first intermediate floor. The meeting rooms will be fully enclosed so the same ventilation fans should be used as smoke extraction units in case of fire. No other mechanical measures need to be taken for the scope of this project.

5.0 *Noise Mitigation*

The scope of use of the building under consideration does not create in itself any particular noises; therefore there is no need for further noise mitigation. The extractor fans for the toilets should be of the low speed and sound attenuated type to ensure that 45dB(A) sound pressure level is not exceeded at the closest aperture.

6.0 *Conclusion*

This report has dealt with the three main issues required from this report namely, fire safety, ventilation and noise mitigation for the proposal of restoration of St. Thomas Tower.

The measures mentioned above are all intended to ensure that the building meets the standards highlighted in the guidelines. These measures shall be adhered to, with the required equipment designed, installed and commissioned to ensure proper functioning. Any equipment installed should be maintained regularly as per manufacturer's recommendations and periodical inspection, checking and certification should be carried out (all this will ensure that the standards requested are kept during operation).

Sincerely,



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Warrant no.587