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Archbishop's Curia Archives, First Floor Piazza San Kalcidonju, Floriana

Fire Safety and Ventilation Report

Preconstruction Report

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Foreword

This document constitutes the preconstruction fire safety and ventilation report for the specific area within the refurbishment of the Archbishop's Curia at Lion Street, Floriana.

This document shall be read in conjunction with drawing FS-10-196-18 and FS-11-196-18 attached which show any special requirements for the fire safety and ventilation of the building.

Drawing Title	Drawing No	Revision
Existing Ground Floor Plan	M180601001	--
Proposed Ground Floor Plan	M180601002	--
Existing/Proposed First Floor Plan	M180601003	--
Intermediate Floor & Section	M180601004	--

The following list of architectural drawings as prepared by architect Mireille Fsadni and dated June 2018 were reviewed;

Any temporary fire safety requirements and procedures during the execution of the works are outside the scope of this document and should be incorporated as part of the Health and Safety risk assessments of the project by management or the contractor/s.

This document requires updating should the architectural layout or the utilisation of the building changes from the above listed drawings. It is also recommended that such a document shall be part of the fire safety manual for the management of the building and its services. This document is to be reviewed at least on a yearly basis in order to be updated according to the changes in operation or utilisation or occupancy of the building.

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Fire Safety and Ventilation Review Report

1.1 Objective

The main objective of this document is to provide adequate life safety for the occupants and acceptable access and safety for the Civil Protection, with a limited property protection.

The main items under review in this document are; namely, compartmentalisation, fire detection and alarm, firefighting equipment, smoke ventilation, electrical installation, access and evacuation routes, emergency lighting, and fire escape signs. All these topics are dealt with in detail under the various headings.

Under each heading a number of mandatory requirements are listed to enable the reader to identify the measures to be undertaken.

1.2 The Specific Area

The specific area within the building is the Archbishop's Curia inside a building which is located at the Central part of Malta and are accessible by the Local Fire Brigade of both Kordin and Hal Far, with an estimated response time of maximum 15 minutes from the furthest fire station.

The proposed utilization of the specific area shall be as detailed below;

- First & Intermediate floor: Offices & Archives.

An analysis of the occupancy, utilisation and expected number of persons in each defined area shall be analysed in section 2.

The majority of the occupants are fit people who can easily move along the evacuation routes, in case of an emergency. Special attention shall be paid particularly to persons occupying the building who have limited mobility and other disabilities. The management shall be aware of such limitations, as much as possible, in order to be able to provide assistance when required.

1.3 Codes and Standards

The designs and concepts stipulated in this document shall be based upon the applicable British Standards and the Maltese Regulations including;

Design Guidelines on Fire Safety for Buildings in Malta,

OHS Act XXV11 and legal notices with particular attention to;

General Provisions for Health and Safety at Work Places Regulations, LN36:2003.

Work Place Minimum Health and Safety Requirements regulation, LN 44 of 2002.
Work Place Provision of Health and, or Safety Signs LN 45 of 2002.

BS 9999-2017 - Code of practice for fire safety in the design, management and use of buildings.

Section 2

Fire Risk Assessment

2.1 Overview

A fire risk assessment was carried out by analysing the various utilizations, fire hazards and occupancies of the premises. Subsequently, the preventative measures and the recommended measures to ensure fire safety; namely; fire detection, evacuation, ventilation and firefighting requirements can be deduced.

The general result of the risk analysis showed that if a fire occurs in an area, the occupants inside the building move safely out of the danger area and escape before critical conditions are reached. The reason being, that if a fire goes out of control there will be no time to wait for the fire brigade. The Civil Protection must be assumed only to take control of the fire and to aid the secondary phase of the evacuation process if required. For purposes of this report, critical conditions are defined as follows;

- A smoke layer lower than 1.9m above floor level, or an air temperature in the lower layer higher than 80 °C.

It should be pointed out that critical conditions as defined above are not the same as lethal conditions. In fact, safe and successful evacuation is still possible even if the critical conditions are attained.

The fire load value describes the amount of energy stored in the area that could be released during a fire.

In some areas, though, the fire load is normally medium to high such as;

Storage areas: Archives

Other areas: Electrical switch rooms, service shafts, electrical and ELV cabinets

2.2 Fire Risk Profiles

According to BS 9999; 2017, risk profiles are given as a combination of occupancy characteristic and fire growth rate. From Table 2 of BS 9999, Occupancy Characteristic, and Table 9, Typical Floor Space Factors, the table below can be drawn up. Table A below also illustrates the calculated and/or designed maximum number of persons occupying the various compartments at any moment in time.

Table A Risk Profiles

Area	Occupancy	Risk Profile	Estimated No of occupants	Max foreseen No of occupants
First & Intermediate	Archives	A3	8	
First & Intermediate	Offices <60m ²	A2	6	

2.2.1 Internal fire spread (linings)

To inhibit the spread of fire within the building, the internal linings shall –

- a) adequately resist the spread of flame over their surfaces; and
- b) have, if ignited, either a rate of heat release or a rate of fire growth which is reasonable in the circumstances.

In this paragraph “internal linings” means the materials or products used in lining any partition, wall, ceiling or other internal structure. The design and construction of the healthcare premises shall inhibit the spread of fire and smoke within the building via the surface finishes.

The internal linings within circulation spaces within dwellings should either conform to Class 1 surface spread of flame in accordance with BS 476-7, when tested in accordance with BS 476-6, or conform to Class C-s3, d2 when tested in accordance with BS EN 13501-1.

The internal linings within other circulation spaces, including the common areas of blocks of flats, should meet Class 0 (national) or Class B-s3, d2 (European). Small rooms of area not more than 4 m² should have internal linings conforming to Class 3 (national) or Class D-s3, d2 (European).

2.2.2 External fire spread

The external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of the building.

The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building.

There is no intention to have external cladding or enclosed external balconies.

2.3 Requirements

Full fire evacuation drills are to be conducted and recorded twice a year. When a fire evacuation is carried out due to a false fire alarm, this is considered to be as a fire drill exercise since this is also recorded.

Smoking is not allowed in the premises by both staff and visitors, and any signs of smoking should immediately be reported to the management.

Internal and ceiling linings shall be as specified while circulation spaces, namely corridors and stairways shall have the internal wall and ceiling linings in conformity to table 33, BS 9999, that is class B-s3, d2, (National: class 0).

Special consideration should be adopted when workers/contractors carry out hot work; namely, welding, grinding, disc cutting and open flame works. Other procedures shall be adopted when generating smoke or dust in order to prevent false fire alarms. This should be part of the Health and Safety written policy of the company which shall be forwarded to all major contractors. Such policy should include the issue of permit by the management, and that an appointed worker has to be assigned to watch over the works, in case of fire, with an appropriate fire extinguisher readily in hand, disablement of detectors, instructions of fire evacuation etc.

Section

3

Fire Containment

3.1 Fire Compartments

Fire spread inside a building shall be restricted by dividing it into separate compartments by fire resistant walls or floors. The objective is to; prevent rapid fire spread which could trap the occupants, and to reduce the possibility of the fire becoming large.

The compartments shall;

- a) subdivide a building to limit the compartment size
- b) separate non ancillary commodities
- c) enclose a place of special fire hazard

The structure, load bearing walls, roofs, external walls, shafts and stairs shall be made of either concrete or limestone. Since both materials have a fire resistance performance of more than 120 minutes, table 23, BS 9999 is satisfied. Solid or hollow brick, filled or unfilled made of clay or shale of at least 150mm thickness will provide a fire resistance of 3 hours. The fire resistance of slabs shall be as a minimum equal to the highest fire compartment of any the walls surrounding the area above or below the slab.

From table 28 BS 9999, the maximum dimensions of compartments depending on the building height can be deduced.

Additional fire compartment, if applicable, should be contained for the following ancillary accommodation as per table 29, BS 9999, and other areas, namely storage, plant rooms, stairways, service shafts, lift shafts etc.

The maximum pipe diameters from table 31 BS 9999:2017, shall be considered when installing any through a compartment wall or floor. Adequate means of fire stopping whenever services shall pass through a fire compartment shall be provided.

3.2 Fire doors

The fire safety drawings details the specification and fire resistance requirement for each fire door using table 30 BS 9999:2017, as the minimum fire resistance when the door is tested to EN 1634-1.

Fire doors should be provided with automatic self-closing devices. Exceptions are allowed for doors that are normally kept locked shut. Fire doors in the main concourse may be kept open by a door retainer, as long as the retainer conform to BS 5839 part 3 1988 and be fail safe, the doors are linked to the fire alarm system, the doors are provided with a manual release and tested on a regular basis by competent personnel during the weekly fire alarm test.

All fire doors on escape routes should be provided with glazing as a vision panel. Where a fire door needs also to provide for smoke control it is denoted by a suffix "S".

3.3 Requirements

The location and fire rating of the fire doors, with automatic self-closing device are indicated on the fire safety drawings. Doors which are usually kept closed do not require any self-closing devices.

Fire compartmentalisation and their respective fire rating are also indicated on the drawings. Safe refuge areas for people with limited mobility and protected corridors are also shown on these drawings.

Fire doors need to be inspected and certified for proper maintenance and operation on a yearly basis.

Fire compartmentalisation and their respective fire rating are also indicated on the drawings.

Any services passing through these fire compartment walls should retain the fire rating of the wall by means of fire collars or Intumescent or fusible link fire dampers and fire sealed as required.

Any exposed load bearing steel structure, shall be protected by intumescent paint to ensure a fire resistance of 60mins.

Any access control doors shall be fail safe, and if any fail secure doors are to be installed anywhere, their use shall be in consultation with the fire consultant.

Section

4

Civil Protection Access

4.1 Overview

In a low-rise building with no basements, requirements for access of the Civil Protection will be met by a combination of the normal means of escape and provision of vehicle access if required.

The fire brigade can easily access the premises from the main entrances. Given the extensive foot print area of the building a dry riser may be required, however, this is outside the scope of this report.

The floor level of the first floor, which is in the scope of this report is below 11m above the street level.

The specific area within the building is at the first level and the facade is more than 15% of the perimeter of the building and thus there is adequate access to the Civil Protection since Table 19, BS 9999 is satisfied.

4.2 Requirements

For additional fire safety requirements please refer to sections related to Fire Fighting and Evacuation.

Section 5

Evacuation Strategy

5.1 Evacuation

Occupants in any part of the building shall be able to escape to a safe location outside the building without any external assistance namely; the Civil Protection.

The evacuation strategy for persons who can self-evacuate is that all areas in a near distance should reach a point from which there is an option of two independent safe escape routes that leads to a place of safety outside the building. All walking distances to the next fire compartment shall be as stipulated by the British Standard.

Owing to the commodity and size of the building, the evacuation strategy is based on full and simultaneous evacuation.

5.2 Travelling Distances

The travel distance is the distance a person actual distance a person needs to travel from any point within a building to the nearest storey exit, having regard to the layout of walls, partitions and fittings. The maximum travel distance depends upon whether there is a single or alternative direction of escape, the risk profile, table 11, BS 9999, ceiling height, table 14, and whether clear benefit in installing an automatic detection system is demonstrated. Applying 15% increase in the travelling distance assuming that the fire alarm installation will be installed and will be beneficial in reducing the response time, refer to section 19.2.

Table B – Maximum Travel Distances (m)

Risk Profile	Table 11 Two way	Table 11 One way	Table 14 Ceiling Height effect	Max permissible Travel Two way	Max permissible Travel One way
A2	55	22	5%	66.0	24.0
A3	45	18	5%	54	22.0

The travelling distances for all single and alternative direction escape routes from all compartments in the building were compared to the permissible maximum travel distances in table B and the single way travel through risk profile is exceed. Therefore, an alternate exit is being proposed through the office to provide two way

travel and meet the requirements as depicted in table B. The alternate exit proposed is shown in fire safety drawings FS-11-126-18.

5.3 Widths of doors, corridors and escape routes

No door or path, in or on the way to, an escape route should be less than 800mm in minimum clear opening width. Where double doors are provided the width of one of the leaves should be not less than 800mm. All doors leading to protected lobbies and stairways, shall not be less than 850mm in minimum clear opening width.

Owing to the limited number of occupants further analysis on this item is not required.

The width of a corridor should be not less than the calculated width of any door leading to it or 1200mm (1000mm no wheelchair users), whichever is the greater. The absolute minimum width of stairs for downward movement is 1000mm and 1200mm for upward movement.

5.4 Access to escape routes and exits

Every protected stairway should discharge directly to a final exit, or by way of a protected exit passageway to a final exit.

The requirements of Inner and Access rooms as stipulated in BS 9999, section 16.3.4 can all been met by following the recommendations of this document.

All escape routes should be unobstructed and doors easy to open by pushing the door handle, where reasonably practical, be hung to open in the direction of escape, and should always do so if the number of persons serves more than 60 persons.

5.5 Signage, Lighting and Emergency Lights

Lighting diffusers should meet the relevant classification in Table 34, BS 9999, or be classified as TP(a) or TP(b) in accordance with section 34.1.2.

Emergency exit signs shall comply with the Health and Safety Regulation, LN 45 of 2002 and BS 5266:1.

Every doorway or other exit providing access to a means of escape should be distinctively and conspicuously marked by an exit sign in accordance with BS 5266-1, and BS 5266-7 and shall be supplied via the essential power supply. Emergency lights shall be maintained and with a typical response time of 0.5 seconds, with a minimum duration time of 3 hours.

5.6 Requirements

Alternate fire exit through archivist's office the meet the travel distance requirements.

Emergency lighting shall be provided along the escape routes to ensure a lighting level of about 1.0 lux anywhere on the centre line of the route and 0.5 lux in open areas. Open spaces which exceed 60 m² should be equipped with emergency lighting.

Maintained emergency exit signs shall be installed next to each and in each fire escape stairs, at each floor, and wherever required to indicate the fire escape route, by means of graphical and indication arrow.

Emergency lights are to be checked for functionality every 3 months, while a one hour battery test is to be done on a yearly basis, and a number of emergency exit signs were noted to be out of order.

Exit signs shall be self-luminous and photo luminescent signs are only allowed if an emergency light is installed just next to it.

Proper evacuation plans shall be affixed in prominent locations, as indicated to indicate clearly the major escape routes and fire safety equipment.

An assembly point located at a safe distance outside the building should be clearly marked for this purpose.

Section

6

Fire Fighting Installation

6.1 Overview

First aid firefighting should be provided with fire extinguishers and hose reel system according to BS 5306-0, BS 5306-1 or EN 671 and 5306-3 and BS 5306-8, and to workplace Occupation Health and Safety.

The distance from the outside to inside exceed the 45m limit, hence a dry riser is required, however this is outside the scope of this report.

6.2 Requirements

Adequate number of dry powder, foam, and CO₂ fire extinguishers shall be located at strategic locations where required as per the recommendations of BS 5306 part 8, shall be to EN 3 with adequate label to indicate instruction of use.

Fire extinguishers to EN 3, shall be located as required by the relevant standard and adequately labelled to indicate instructions of use. According to the relevant

standards the maximum travelling distance to the nearest fire extinguisher from any point, shall be less than 30m.

Considering that the premises shall be used as an archive with sensitive documents, for property protection, it is being recommended that a fixed automatic firefighting system be installed. Since water can damage the items, a gas extinguishing system is being proposed. Argonite gas systems or equivalent, shall be calculated such that a depletion of at least 12% oxygen is achieved within 1 minute. The system shall be a complete system including gas aspiration and smoke detection system as zone 1 and 2 respectively, connected to a gas release panel which shall control smoke dampers, activate and monitor the system and interfaced with the main fire alarm system to report faults, fire detection and gas release

Section

7

Fire Detection and Alarm System

7.1 Fire Alarm

From table 7, BS 9999, for an A2 risk profiles a category M fire alarm is required. Since this section of the building under consideration in this report form part of a bigger block an, L1/P1 automatic fire detection and alarm system is required, that is, fire detection throughout all the building. Considering that the building is occupied by a number of different departments, this enhanced fire detection system from the basic requirement for an office building is considered essential.

The evacuation strategy shall be as follows.

Each fire compartment shall be a separate fire detection zone.

The fire evacuation strategy of this building shall be full simultaneous evacuation of whole building, which may be two-staged to allow an investigation period.

The following sequence of events is expected to be followed when a detector goes on fire.

- A buzzer on at the fire alarm panel
- Activation of a smoke / heat detector will evacuate the building with a time delay. The time delay is overridden when a second detector is activated.
- Activation of a manual break glass unit shall immediately trigger the sounders to evacuation mode

In the case that an evacuation mode is commenced the following sequence of events shall occur.

- Audible and visual evacuation will be activated.
- Fire doors in the evacuated and alerted areas shall be released.
- Emergency lights shall be switched on (if applicable).
- Public Address system switched off (if applicable).
- Access control doors released (if applicable).
- Air supply fans switched off (if applicable).
- Fire/smoke dampers close (if applicable)

7.2 Requirements

The building shall be provided with an automatic fire detection system to protect the occupants and property from fire. The fire detection and evacuation system shall be in accordance with BS 5839-1:2017, Type L1/P1, that is, system installed throughout the premises, designed and certified by a competent person.

An automatic analogue addressable fire detection and alarm system may be advisable if the premises are medium sized. In case of fire an auto dialler shall advise the CPD as required. The fire alarm system shall be designed and certified by a competent person.

Device testing of the fire alarm shall be done 100% on a yearly basis and duly recorded, while a weekly fire sounder test is also to be carried out.

The testing of the fire alarm sounders shall be done and recorded on a dedicated Fire Log book on a weekly basis, while 100% device testing is also required. The fire log book should describe any faults, fires, modifications, intervention and maintenance done as regards the fire alarm and fire-fighting systems.

Section 8

Smoke ventilation and extraction

8.1 Smoke ventilation and extraction systems

Should any ventilation system be required, this shall be designed and installed to comply with EN 13779, Ventilation for non-residential buildings, Performance requirements for ventilation and room conditioning systems.

Should any smoke and heat control systems be required these shall be designed and installed to EN 1210.

The general criteria for the smoke ventilation and extract systems are as detailed hereunder. Ventilation is naturally provided by opening windows to the outside air for all areas.

8.3 Requirements

No smoke and heat control systems are required.

Section

9

Electrical Engineering

9.1 Power supply

The electrical power supply shall be design and installed and periodically inspected and tested by a qualified person in accordance to BS7671 and all cables to BS 7671.

9.2 Electrical distribution and equipment

Electrical distribution systems are identified as being one of most common causes of fires. Proper design and installation of the distribution system in order to ensure no possible overloading of cables and switchgear, proper utilization and integrity of switchgear, tightness of connections and proper protection of cables is very crucial.

The secondary electrical supply shall continue to operate safely in case of fire condition. Secondary supply shall be separate from the primary and can be provided by an electrical generator with a capacity of at least 3 hours. Secondary supply shall be provided to at least the smoke ventilation and control, fire and rescue communication, firefighting equipment, firefighting lift and normal lighting within firefighting shaft. Electrical power supply to life safety and fire protection equipment should be separate from all other circuits and fed via an isolated protective device reserved for life safety and fire protection, which should be kept locked-on and properly labelled.

Cables intended for primary and secondary power supplies should conform to EN60702-1 or other cables meeting the performance objectives of BS 8491.

Exterior or interior lighting working at voltages exceeding 1,000V a.c. or 1,500 d.c. should be controlled by a fire-fighter's emergency switch to BS 7671. Discharge lighting such as floodlights and neon should be able to be switched off in case of a fire.

Fire detection and alarm, and emergency lighting systems require additional specifications other than those listed in this section.

Multiple socket outlets are to be avoided as much as possible and only allowed when the load is minimal like mobile battery charging etc.

Electrical equipment, especially kitchen and plant equipment, is to be regularly maintained and tested at least on a yearly basis, while any fault or damage is to be immediately reported and repaired by a competent person.

9.3 Requirements

Any works on the electrical distribution system shall be carried out by a qualified person as appropriate. Regular maintenance and certification of all the electrical system shall be carried out by a qualified electrician and duly recorded at least on a yearly basis.

A lightning protection system and bonding to metal parts to EN 62305 shall be designed and certified in order to protect the building from lightning strikes and possible fire breakouts which is the second most common sources of fire. This system shall be tested and certified on a yearly basis by a competent person.

Any reports of smoking, faulty electrical switches, electrical equipment and socket outlets in these areas should be addressed to immediately.

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Annexes

Drawing Title	Drawing Number	Revision
Fire Safety Plan, Archives, First Floor, The Archbishop's Curia, Floriana	FS-11-126-18	00

The above drawing is being attached as part of the report.

Conclusion

Should all the measures and works detailed under each section above be undertaken, the building will comply with the applicable standards and regulations as listed in this document.



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Warrant No. 11