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Beirut on 02/04/2016

On behalf of the esteemed Ministry of Tourism,

His **Excellency the Minister of Tourism, Mr. Michel Pharaon,**

Reference**: RM / RH / I 6.0171 No.: 016.0018**

**Subject: Initial report on the inspection of the lower quarry located within the Jeita tourist facility.**

Greetings **and after,**

with reference to the decision of His Excellency the Minister of Tourism, Mr. Michel Pharaon No. 10 dated 2/1/2016 who commissioned Accordingly, Socotec Lebanon S.A.E. has conducted a detailed and comprehensive survey of the lower and upper sections of the Jaba'ta tourist facility. We hereby submit to you the initial report of the detailed survey conducted by the company (first phase) on the lower section, which includes the general safety measures and urgent rehabilitation works that must be taken to ensure the safety of tourists and visitors.

Please accept our utmost respect,




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Initial **report of the technical inspection of the Lower Grotto - Jeita Tourist Facility**

## 1. Introduction

Following the death of a tourist of Egyptian nationality on January 23, 2016, due to a drowning incident in the lower grotto of the Jeita Grotto tourist site, the Ministry of Tourism assigned SOCOTEC Lebanon L.L.C., under Decision No. 10 dated February 1, 2016, to conduct a technical and safety inspection of both the lower and upper grottos to assess their compliance with public safety standards.

Accordingly, on January 29 and February 3, 2016, engineers and experts from SOCOTEC Lebanon L.L.C. carried out the initial phase of the inspection, which included the findings of the technical assessment and identified the urgent safety measures and rehabilitation works required to safeguard visitors.

## 2. Basis, Methods, and Scope of the Technical Inspection:

SOCOTEC Lebanon L.L.C. relied on the following international references and specifications as a basis for the technical inspection operations it carried out on the Lower Grotto as well as for its analysis of the risks:

**a.** French public safety standards in places intended for the reception of the public (**Arrete du 25 Juin 1980 et Modificatifs)**

**b.** French general safety standards for the prevention of falls **(**Guard Corps NFP **01-012)**

c. French general safety standards for electrical equipment**. (NFC-15-100).**

d. French general safety standards for entertainment boats **(Arretes du 11/4/2012,16/12/2010 and 23/11/2007)**

e. Professional assets and various other references.

field survey conducted by SOCOTEC Lebanon L.L.C. was based on the following means:

a. detailed visual inspection.
b. different measurement operations

The technical inspection included the existing facilities of the Grotto and its equipment without addressing the aspects related to geological, hydrological, seismic and rigidity of the cave ceiling as well as the external cable car (Telephirique).

## 3. Inspection results and urgent public safety procedures

### 3.1. Risks of fire, panic, and stampede:

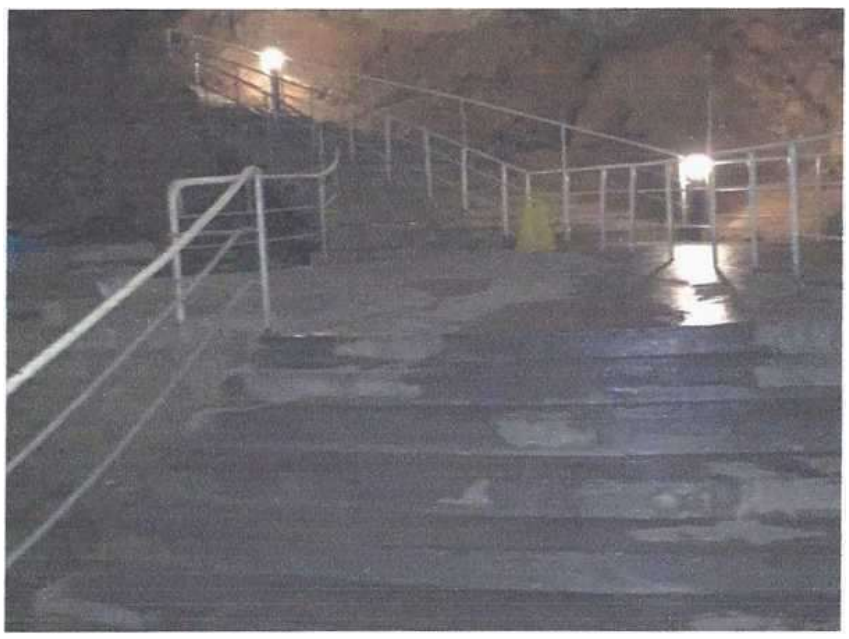
According to fire safety and panic prevention regulations for buildings and facilities, the number of people present simultaneously must be limited to 19 when there is only a single exit available. Although the lower grotto is not classified as a building or facility, and despite it having only one exit to the outside, a maximum occupancy limit must still be applied. Therefore, the number of people allowed inside the lower grotto at any one time should not exceed 100 individuals, distributed as follows: 50 in the waiting area and 50 in the boats. All individuals must be under constant supervision by the grotto staff to assist them in case of any emergency.

- The edge of the main staircase leading to the boat area must be modified, as its current sharp edge poses a potential hazard in the event of a slip or fall.

- The gap in the floor between the waiting area and the dock area, adjacent to the left rock wall, must be closed off. This gap currently poses a safety risk to visitors (see Photo No. 1).



- The lower section of the emergency staircase, which exceeds 2.4 meters in width (see Photo No. 2), must be equipped with a central iron handrail, 90 cm in height, installed along the centerline of the stairs. This will allow visitors to hold on and evacuate safely in the event of an emergency. As for the upper section of the staircase, it is currently equipped with a side railing at a height of 80 cm, which should be raised to 90 cm.
  (Picture No. 2)



- The structural steel frame supporting the docks, which is currently submerged and could not be inspected during our visit, must be examined to assess the condition of the steel and its connections, ensuring they are free from rust and deterioration, and to verify the stability of its foundations on the ground.

- In addition, some of the metal plates forming the dock floor, which contain holes and weak spots (see Photo No. 3), must be replaced.




- The water level control system in the grotto consists of segmented iron gates that are raised or lowered as needed. These metal barriers, located between the visitor waiting area and the docks, pose a potential hazard in their raised position—especially during a stampede or emergency evacuation (see Photo No. 4). Therefore, as a first step, they must be clearly marked on the ground and enclosed with safety barriers, accompanied by warning signs to prevent visitors from approaching them. In a second phase, it is recommended to relocate these barriers outside the areas accessed by visitors.



- At present, the grotto should not accommodate visitors with mobility impairments or special needs, as the necessary safety conditions to ensure their well-being are not yet in place.

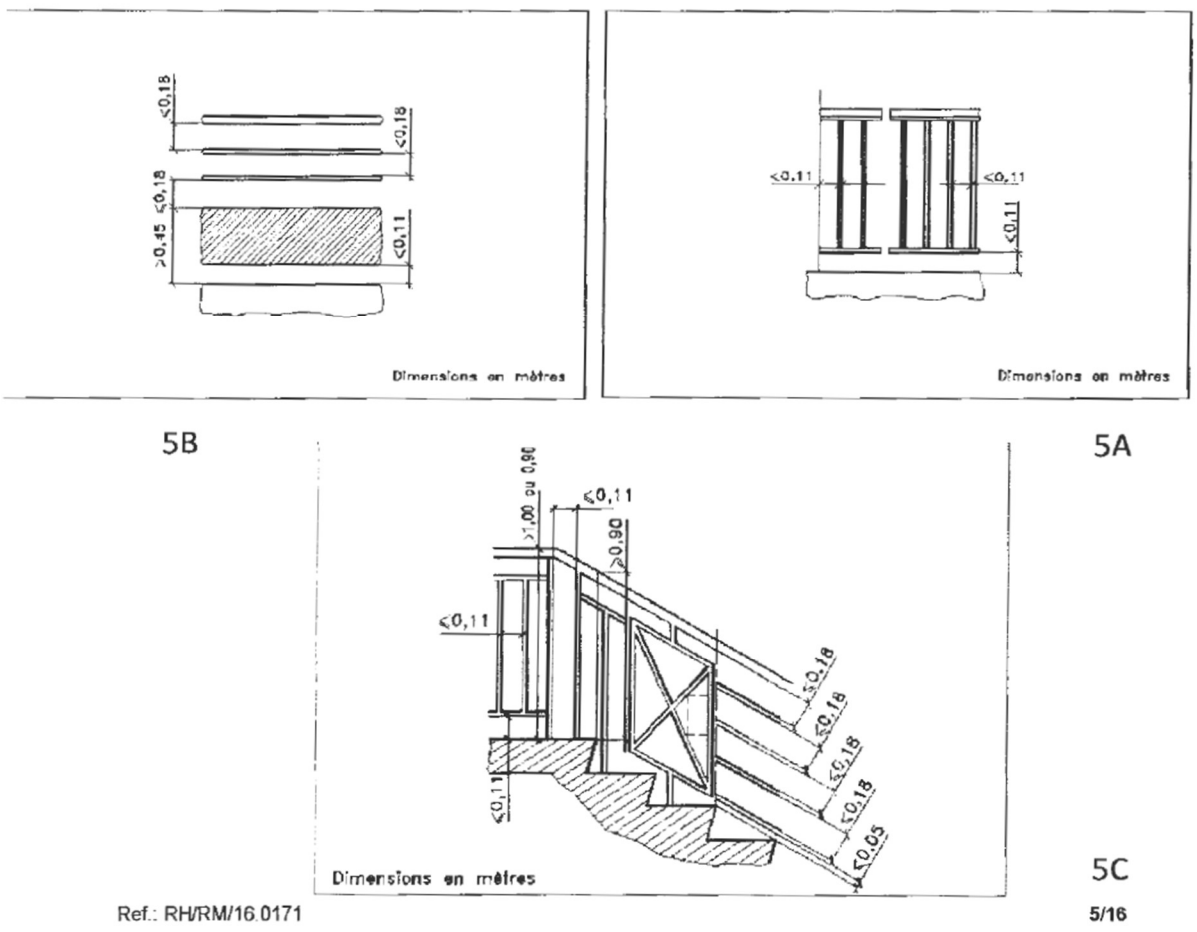
- Additionally, the opening direction of the main exit door of the grotto must be adjusted so that it opens in the direction of evacuation, and it should be equipped with an easy-to-use manual release mechanism (panic bar) (see Photo No. 5).



### 3.2. Risk of Falling and Staircase Safety Hazards:

Upon inspection was found that most of the existing barriers and railings—including those installed along staircases—do not comply with established public safety standards for fall prevention. These barriers are generally less than one meter in height, and their design includes wide gaps that pose a risk of falling, especially for young children who could slip through and fall into the water or open spaces. Furthermore, the current railings feature horizontal iron bars that can be easily climbed, presenting an additional hazard.

Accordingly, these barriers and railings must be replaced with alternatives that fully meet public safety specifications, in accordance with the detailed designs shown in Photos No. 5A, 5B, and 5C.




and install them in the following locations:

- The water channels located behind the visitor queuing area, where the existing railing presents a significant hazard (see Photo No. 6).



- The main emergency staircase, including its sloped and horizontal sections (see Photo No. 7



- The intermediate landing of the main staircase, specifically the area where concrete benches are placed for visitors to rest, lacks any protective barriers or railings to prevent falls. This presents a significant risk to visitor safety (see Photos No. 8 and 9).







### 3.3. Exit Lighting – Emergency Lighting – Lighting Devices – Electrical Hazards:

All exit routes—including corridors, staircases, and doors—must be equipped with permanent Exist light to ensure visitors can safely evacuate the grotto. This includes:

  - Installing an Exit light above the main external exit door of the grotto.
  - Placing Exit light units along all evacuation routes (corridors and stairs) at intervals of every 15 meters.
- These lights must be independent emergency lighting units (*Blocs Autonomes d'Éclairage de Sécurité*) that remain operational for at least one hour in the event of a power outage. Under normal conditions, they must remain continuously lit.
- The level of emergency lighting that activates during power outages must be increased to a minimum of **5 Lux**, to ensure visitors do not panic and can clearly identify the exit paths from the grotto. The current lighting units can be used for this

purpose after upgrading their intensity and powering them with batteries capable of operating for at least one uninterrupted hour.

Additionally, the existing general lighting inside the grotto must be reinforced to reach **5 Lux**. (The currently measured level does not exceed **2,3 Lux**.) This improvement will provide the minimum required visibility and enable visitors to move safely within the grotto and reach exits in case of any emergency (see Photo No. 10).

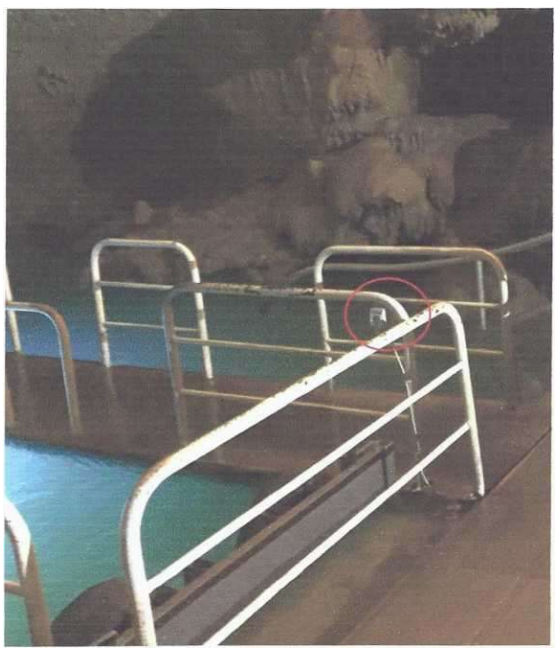



Note:

The lighting levels required above must comply with the standards for protecting and preserving the geological features of the grotto.

- Currently, the underwater lighting fixtures inside the grotto are powered by a 220-volt electrical supply, which poses a significant risk to public safety. Such fixtures must be powered by a voltage not exceeding 12 volts. Moreover, the existing fixtures do not meet the required protection rating (IP 68). Therefore, the transformers for these fixtures must be relocated outside the water, at a minimum distance of 2 meters horizontally and 2.5 meters vertically from the water source. Additionally, the lighting units must be upgraded to meet the necessary protection standards.

- We also observed several 220-volt power outlets being used to charge boat batteries. These outlets are currently mounted on the railings of the boat boarding docks, posing a serious hazard to both visitors and staff due to their proximity to the water and lack of water resistance. Furthermore, their placement on the railings creates an added risk for visitors. These outlets must be relocated away from the water source, as indicated above (see Photo No. 11).



- A grounding system must be installed for all electrical installations to protect individuals from the risks of electric shock. This system is currently not available.

- In addition, all active electrical installations operating at 220 volts must be equipped with Residual Current Devices (RCDs) rated at 30mA to prevent current leakage hazards.

- The main electrical panel supplying the grotto is currently located near the main entrance, in an unsecured area easily accessible to visitors, which exposes them to serious danger. Therefore, this panel must be enclosed within a lockable cabinet, clearly marked with a warning sign indicating electrical hazard (see Photo No. 12).



- A fixed communication device must be installed in the dock area to allow direct contact with the control room for reporting any emergency.

**3.4. Firefighting Measures – Water Level Control System in the Grotto:**

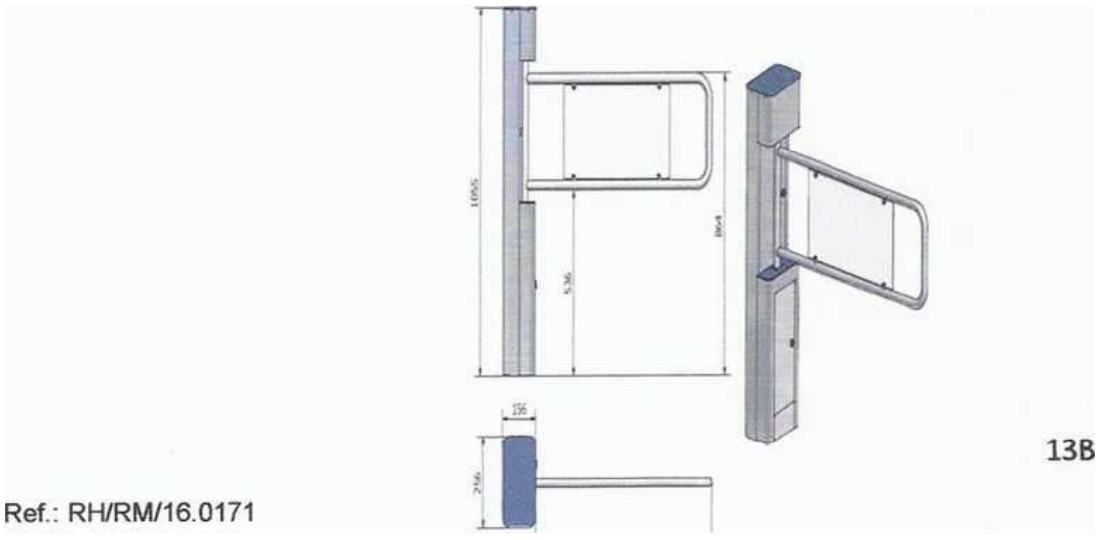
- During the inspection, only one handheld $CO_2$ fire extinguisher, intended for use on the main electrical panel, was found at the grotto's main entrance. Therefore, the grotto must be equipped with additional handheld fire extinguishers as follows:
    - ABC-type handheld extinguishers (6 kg) installed every 15 meters along all evacuation paths within the grotto.
    - One 6 kg ABC-type handheld extinguisher in the visitor waiting area and at the docks.
    - The existing $CO_2$ fire extinguisher must be relocated to be placed directly adjacent to the electrical panel, rather than along the evacuation route at the upper grotto level.
- A water level monitoring device must be installed in the grotto's basin and connected to an alarm system (currently not available).
- The maximum permissible water level must be clearly defined, and if this level is exceeded, visitor entry into the grotto must be strictly prohibited.
- While technicians are operating the water level control system (raising or lowering the iron gates), the grotto must be completely cleared of visitors.
- A continuous vertical barrier must be installed in the water along the entire perimeter of the dock area (refer to the attached map). This barrier must be rigid and designed to prevent any individual—particularly children—from passing through it in the event of a fall into the water, and to prevent them from being swept beneath the docks by the force of the current.

**3.5. Special Safety Provisions in the Dock Area and Visitor Waiting Zone – Safe Use of Boats:**

- The metal railings installed along the edges of the dock area and at the boat boarding points no longer provide the required level of visitor safety. The horizontal openings, ranging from 55 to 70 cm wide, that run along the railings on both sides of the boarding docks pose a significant risk to visitors (see Photo No. 13B).



These openings may pose a serious risk to individuals standing on the dock at the moment of boarding or disembarking, especially in cases of panic, crowding, or any unexpected movement by a visitor. Therefore, while awaiting the installation of a more advanced system that ensures safe boarding and disembarking—such as a Smart Access Boarding Gate (see Photo No. 13B)



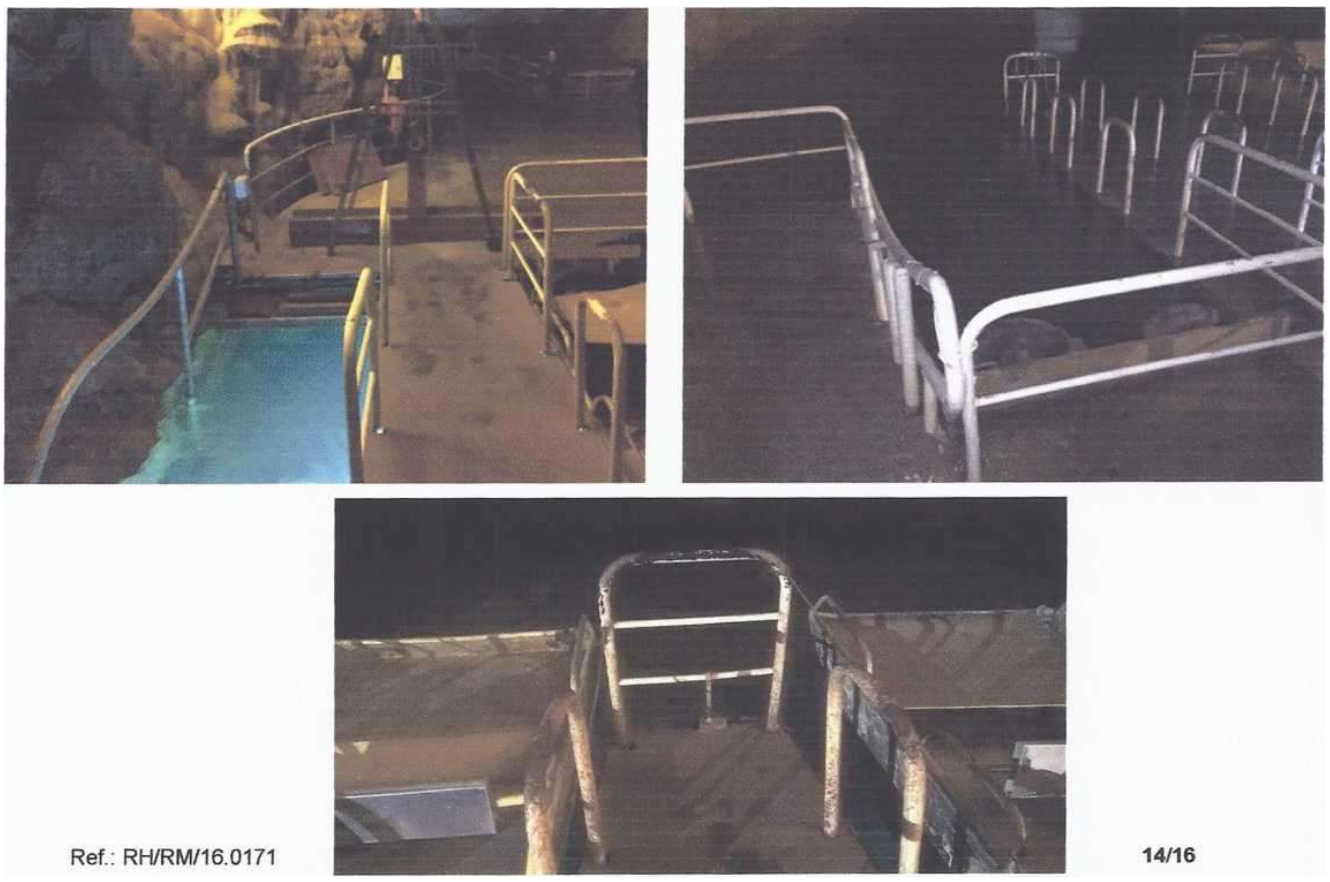

In addition to replacing the existing fixed railings to comply with standard NFP 012-01, the following safety procedures must be strictly implemented:

- At least **three staff members** must be present in the dock area, responsible for overseeing the safe boarding and disembarking of visitors—especially children.
- A **controlled barrier** must separate the visitor waiting area from the dock zone. One of the three staff members is to operate this barrier (open and close it), and no movement between these two zones is allowed without a signal from the other two staff members responsible for visitor safety during the boarding and disembarking process. A maximum of **two visitors** may be present at a time on each boarding dock, and only **after all returning visitors have fully exited the dock area**.
- It is recommended to **restrict boarding and disembarking to one side** of each dock, while the other side should be fitted with protective barriers that meet **NFP 012-01** specifications.
- Boats must be **mechanically secured to the dock** immediately after docking to ensure stability and prevent accidents while visitors are boarding or disembarking.
- Visitors must not be allowed to leave the waiting area and proceed to the docks until the boat has been fully docked and securely fastened.
- It is advisable to install a **divider across the dock area** equipped with doors that open **only in the direction of exit**. This will allow visitors who have completed their tour to move directly from the dock area toward the designated exit paths, helping to avoid crowding in the dock zone, which could interfere with the boarding process of other visitors. It will also reduce the risk of mixing and potential pushing or shoving (refer to attached map).

- The current boats must be **replaced with modern boats** that comply with **international safety standards (CE marking or equivalent)**.

Until the boats are replaced, the following measures must be taken:

- Each boat must be **equipped with handheld fire extinguishers**.
- Boats must be equipped with handheld fire extinguishers.
- Boats must be equipped with a rescue aid, such as rope ladders, to allow any person who falls into the water to climb back aboard.
- Boats must also be equipped with portable lighting devices and a first aid kit.
- The maximum passenger capacity allowed on each boat must not be exceeded, as defined by the manufacturer's specifications.
- All boats must undergo a thorough technical inspection to verify their safety, structural stability, and hull integrity, in addition to receiving regular periodic maintenance.
- The existing metal barriers installed behind the boats while docked must be replaced with protective railings that comply with NFP 01-1012 standards, in order to prevent visitors from falling into the water when a boat is not present at the dock. This measure also applies to the edges of the docking areas designated for maintenance and emergency boats, as well as the front ends of each boarding dock (see Photos No. 14, 15, and 16).



Ref.: RH/RM/16.0171 14/16

- Since the depth of the water inside the grotto does not exceed 0.75 meters, as informed during the inspection, all visitors under 1.10 meters in height must be provided with life jackets before boarding the boat. The need for this measure should be assessed prior to entry, using height measurement devices installed at the entrance to the grotto.
- The dock area and boats must be equipped with rescue ropes and lifebuoys that comply with international safety standards.
- A trained and qualified lifeguard must be permanently stationed at the dock area inside the grotto. Their primary responsibility is to act immediately and effectively to rescue any visitor who may fall into the water. One of the three staff members mentioned previously may be assigned this role, provided their competency in this area has been verified.

### 3.6. Safety Signage – Public Safety Instructions

Currently, the entrances to the grotto, the evacuation paths, waiting areas, and docks lack sufficient public safety signage. The existing signs are limited to prohibitions such as **no smoking**, **no photography**, **no touching the rocks**, **no food allowed**, along with a few signs warning of **slipping hazards**.

Therefore, the grotto must be equipped with **additional safety and warning signage**, particularly those indicating:

- Direction of **evacuation routes**
- Locations of fire extinguishers
- Do not climb on balustrades
- Maintain silence
- Caution signs near the water control system
- Do not cross the safety line (between the waiting area and the dock area)

In addition, **general safety instructions** must be **clearly displayed at the entrance and throughout the grotto**. These should include, but are not limited to, the following:

- Children under the age of **12** must be accompanied and supervised by **responsible adults** at all times.
- Carrying young children or toddlers on the **shoulders is strictly prohibited**.
- Visitors must **stay in designated areas**, **avoid running**, and **remain calm** while inside the grotto.
- During the boat ride, visitors must **remain seated**, avoid standing or playing, **keep their heads low** when passing under low ceilings, and **refrain from extending limbs** through narrow passages between the rocks.
- Life jackets must not be removed at any time during the tour.

### 3.7. Personnel Accompanying Visitors – Visitor Guidance, Rescue, and First Aid – Staff Competency and Training

Upon inquiry regarding the personnel assigned to accompany visitors during their entry into the grotto, we found that the team is currently composed as follows:

- Two staff members stationed at the **ticket verification point** at the upper entrance of the grotto.
- One staff member at the **locker area** located at the main entrance.
- One staff member in the **visitor queuing and dock area**.
- Four **boat operators**.

In light of this, the staffing levels in the dock area need to be increased, as detailed in **Section 3.5** of this report. Additionally, a technician must be permanently available to handle any malfunction that may affect the grotto's systems while visitors are present.

Furthermore, all staff members—especially those stationed in the **dock area**, including boat operators—must undergo **training programs**, particularly in the following areas:

- Water rescue techniques
- First aid and emergency response
- Visitor guidance and communication protocols

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Engineer Roland Maari