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International Labour Organization

Better Work Jordan Programme

**Enhancing the Structural Integrity of Dormitory
Buildings in Jordan's Garment Sector - Phase II**

**Methodology of the Identification
of Non-Typical Defects Report**

Assessment Checklists

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1. Executive Summary

The “Methodology for the Identification of Non-Typical Defects Report” is the third task assigned to Engicon, under Phase II of Better Work Jordan's (BWJ) project “Enhancing the Structural Integrity of Dormitory Buildings in Jordan's Garment Sector”.

Stemming from the belief that decent living conditions are a right to all workers, and that it is directly proportional with raising their productivity and as a result benefit the business as a whole, the project aims to set guidelines related to assessing and mitigating defects against certain health and safety measures within existing dormitories, as well as develop design regulations related to building new dormitories in the future, to ensure surpassing previously identified mistakes and defects which can form risks to the health and safety of inhabitant workers.

As a result of both previous tasks (task 1: Typical Defects Identification Report and task 2: Guidelines for Assessment and Repair of Typical Defects Report), this report is developed to **help non-technical members** (mainly factory owners) **assess and identify defects** in the dormitory buildings owned by Garment factories; **against 4 main Occupational Safety and Health (OSH) measures (Structural Integrity, Electrical Safety, Fire Safety and Public Health)**, by suggesting an easy to use inspection checklist, illustrating main issues to inspect and check their compatibility with minimum addressed requirements related to the Safety and Health of workers living in the subjected dormitories.

This report illustrates the assessment methodology suggested to identify defects that jeopardize the structural integrity of any dormitory building and affects the health and safety of its inhabitants. This report is considered a guide for applying the assessment methodology, with reference to the background information provided within task 2: "Guidance for Assessment and Repair of Typical Defects Report", related to OSH requirements, to make it easier for them to fill the suggested inspection checklist.

The following steps were followed to come up with the defect identification and assessment methodology:

- Reference to national and international codes and standards related to the OSH requirements in dormitory buildings, to utilize as baseline for minimum requirements.
- Identify different types of defects (structural and non-structural deficiency, material deterioration or serviceability and extent) *(with relevance to previously conducted inspection site visits by the assigned technical team from Engicon, as part of task 1)*
- Set a categorization guide for the identified defects, with relevance to severity of accompanied risks (related to the safety and health of inhabitants).
- Develop an Inspection Checklist, that is easy to use by non-technical members, to help assess the conditions of the dormitories against certain assessment measures: Structural Integrity, Electrical Safety, Fire Safety, and Public Health. *(Which is a simplified version of the inspection checklist suggested in task one, previously used by engineers to assess conditions of certain existing dormitory buildings in Jordan).*
- Keep record of Assessment data in an efficient and effective form that is easy to handle by executives, highlighting compliances and non-compliances to requirements, codes and standards. *(A template was suggested at report 2 (task 2), highlighting defects, in*

consequential order with relevance to the severity of the risks, prioritizing corrective actions needed along with their accompanied costs and consequences.)

In order to ensure proper OSH conditions are addressed in any dormitory building, the inspection is to undergo four main assessment measures:

- **Structural Integrity:**

Dormitory buildings go under structural assessment following two categories:

- *Seismic Loading Resistance*; which cannot be identified in detail for buildings in a visual defects inspection, but the regular shape of buildings as well as the good conditions of the fire escape stairs' (Shear Walls) structural elements and low gravity loads on the upper floors could make the building behaviour against the lateral forces of earthquakes less dangerous and help mitigate any relevant risk to the occupants.
- *Structural Integrity*; where periodic maintenance should be applied. Overloading of slabs and high stresses in columns should be avoided, any cracks or settlements need to be handled by the structural recommendations for each case. (Noting that any water leakage, or poor roof insulation, or any structural additions, or changes to the original design could jeopardize the integrity of the building structure.)

- **Electrical Safety:**

An overview of electrical systems is required in dormitory buildings to ensure compliance with Jordanian and international codes requirements. Periodic maintenance should be applied.

- *Power System*: Checking the condition of wiring, DB, sockets and outlets, ensure no overloading occurs, and that earthing system is provided.
- *Lighting System*: Ensure adequate lighting provided for different spaces in addition to the proper distribution of emergency lights, and check all lighting fittings, fixtures and ceiling fans are properly selected, installed, and in good working condition.
- *Low Current Systems*: Ensure surveillance cameras are provided wherever needed. (Ensuring privacy of workers is not overpassed)

- **Fire Safety:**

Dormitories go under fire safety assessment following three categories:

- *Architectural Configuration*: Checking corridor lengths, limits of dead ends and traveling distance of escape routes if exceeding the allowed in the fire codes. Escape routes to be clear, safe, provided with proper finishes, directional and emergency signage, and protected against fire and smoke, and leading towards safe staircases/exits/assembly areas. Also, doors at floor exits leading into staircases need to be fire rated (doors at final exits to outside do not need to be fire rated, but must be easily openable from inside). Doors should be equipped with self-closing devices as the code requires. Furthermore, some vertical shafts and storage rooms are to be provided with fire rated doors and enclosures, as per codes. And accessibility for Civil Defence vehicles (ambulances and fire engines) in cases of emergency to be provided.

- *Mechanical Firefighting Systems:* Overview of the mechanical firefighting system requirements that are required by National Fire Protection Association (NFPA) and Jordanian National Firefighting Code (2004).
In dorms, this system mainly consists of fire hose reel cabinets and portable fire extinguishers (Powder and CO₂), as well as fire hydrant and sprinklers (connected to fire alarm systems) wherever required.
- *Electrical Fire Alarm System:* Overview of the electrical fire detection and alarm systems (emergency lights and sirens, gas leakage and smoke detectors) required by the Jordanian National Firefighting and NFPA codes. Ensure continuous maintenance of the system.

- **Public Health**

Dormitories go under Public Health assessment following three categories:

- *Architectural Aspects:* Study locations of dormitories, if in a location near to industrial zones, it is safe to assume that workers could be affected by air pollutions and other health hazards. Also, investigate buildings' geographic orientations and openings to ensure adequate natural daylight and ventilation within different rooms. Proper finishing materials to be used inside dorms (complying with fire codes, especially for exit routes, easy to clean and complying with the function of the room), non-slippery floor tiles along emergency routes to prevent hazards during evacuation.
- *Mechanical Systems:* Overview of the requirements of mechanical systems (Sanitary drainage, domestic water supply, ventilation, central heating and/or air-conditioning and LPG systems) in dormitory buildings according to the Jordanian and international codes and standards. Ensure no occlusion of internal sewage network, adequate temperature and humidity levels within different spaces, sufficient ventilation in toilets, bathrooms and bedrooms, and compliance with safety requirements related to LPG systems.
- *Public Health Issues:* Ensure cleanliness within different rooms, toilets and food preparation areas; laundry rooms and hanging wires, kitchen and cafeterias/dining rooms included, in addition to the insects and stray animals that need to be controlled. Trash bins and first aid boxes with the medicaments of appropriate types distributed sufficiently.

Finally, raising awareness for OSH quality between different stakeholders is needed to guarantee continual improvement to the Environment Health and Safety management and the structural integrity of dormitories. As it is believed that good living condition for workers lead to raising their productivity and consequently prosperity to the industry as a whole.

2. Abbreviations

2.1. List of General Abbreviations and Acronyms

BWJ	Better Work Jordan Programme
EHS	Environmental Health and Safety
GoJ	Government of Jordan
HR	Human Resources
IEQ	Indoor Environment Quality
IFC	International Finance Corporation
ILO	International Labour Organization
JEA	Jordan Engineers Association
MoH	Ministry of Health
MoL	Ministry of Labour
MoPWH	Ministry of Public Works and Housing
MoU	Memorandum of Understanding
OSH	Occupational Safety and Health
SSC	Social Security Corporation

2.2. List of Technical Abbreviations and Acronyms

AC	Air Conditioning
ACI	American Concrete Institute
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BS	British Standards
CCTV	Closed-circuit television
DB	Electrical Distribution Board
FACP	Fire Alarm Control Panel
FFL	Finish Floor Level
FR	Fire Rated
HVAC	Heating, ventilation, and air conditioning
IBC	International Building Code
ICC	International Code Council, Inc
ID	Interior Design
IRS	Internal Responsibility System
JBC	Jordanian Building Code
LPG	Liquefied petroleum gas
MEP	Mechanical, Electrical and Plumbing
NFPA	National Fire Protection Association
RCD	Residual Current Device
UBC	Uniform Building Code
WC	Water Closet

3. Introduction

3.1. Project Background

The Better Work Jordan Programme (BWJ) was launched in Jordan in 2008 and at the request of the Government of Jordan (GoJ). BWJ is a partnership between the International Labour Organization (ILO) and the International Finance Corporation (IFC). The comprehensive programme brings together stakeholders from all levels of Jordan's garment manufacturing industry to improve working conditions, enhance respect for labour rights, and boost the competitiveness of the sector. Factories participating in BWJ are monitored and advised through factory assessments, advisory visits, and training services.

The programme remains committed to contributing to Jordan's long-term economic and social resilience through livelihoods programming and promotion of decent work for all.

Stemming from its commitment to enhance the capacity of stakeholders to sustain decent working conditions in the sector, BWJ and the Social Security Corporation (SSC) signed a Memorandum of Understanding (MoU) in August 2017, which enacted cooperation to improve the provision of safer working conditions, especially around occupational safety, and health across manufacturing enterprises across Jordan. As per the agreement, the agencies will cooperate on raising awareness and education on occupational safety and health (OSH) across the sector, verify its implementation, help improve where needed, and exchange technical expertise. More so, and in 2020, BWJ signed a MoU with the Ministry of Labour for the purpose of strengthening their collaboration to enforce the legal provisions relating to inspection works, labour inspectors, and conditions of work in order to protect workers while engaged in their work.

A key object of this programme is to demonstrate that good working conditions and decent technical investment can help make factories and their satellite units become more productive.

From all the above descended the main objective of this programme, which is "Enhancing the living environment in the world of work through ensuring decent dormitory conditions" and consequently emerged the sub-project "Enhancing the Structural Integrity of Dormitory Buildings in Jordan's Garment Sector".

3.2. Assigned Tasks

Engicon was assigned to complete four main tasks related to the “Enhancing the Structural Integrity of Dormitory Buildings in Jordan’s Garment Sector” Project:

1. Prepare a Typical Defects Identification Report.
2. Provide Guidance for Assessment and Repair of Typical Defects Report.
3. Set a methodology for identification of other non-typical defects.
(Which this report represents)
4. Suggest standards to be used for rectification of defects in existing dormitory buildings and design of new dormitory buildings.

3.3. Project Main Objectives

The project aims at achieving the following four main objectives:

- Awareness raising among factory owners on typical building safety requirements.
- Guidance to identify safety defects and the level of expertise needed for rectification.
- Identification of national codes requirements for dormitories.
- Identification of safety issues not covered by national codes, with reference to international good practices.

4. References

To prepare this report, Engicon team investigated variable standards and codes related to the assigned task, to develop a checklist against which the existing dormitories will be evaluated.

4.1. OSH Related Documents and Procedures

Comprehensive guide - MoL - Work procedures for safety and health prevention measures to limit the spread of the corona virus

Dormitories Inspection/Assessment Guide (Jordanian MoL, MoH, BWJ)

The Public Health Law

4.2. National and International Technical Codes and Standards

National Fire Protection Association (NFPA)

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

Jordanian National Building Codes

British Standards

American Standards

2015 International Building Code® (IBC), by the International Code Council, Inc (ICC)

5. Influencing Factors

5.1. COVID-19 Pandemic

The COVID-19 pandemic has had a severe impact on the garment sector in Jordan. Many workers and managers were infected with COVID-19 across 46 factories. Cases spread rapidly through the factories despite the efforts to control them. So, increased attention was directed towards general OSH procedures implemented at different facilities to mitigate the risks.

The following diagram illustrates how general requirements related to COVID-19 raised the need for some operational and design requirements within dormitories.

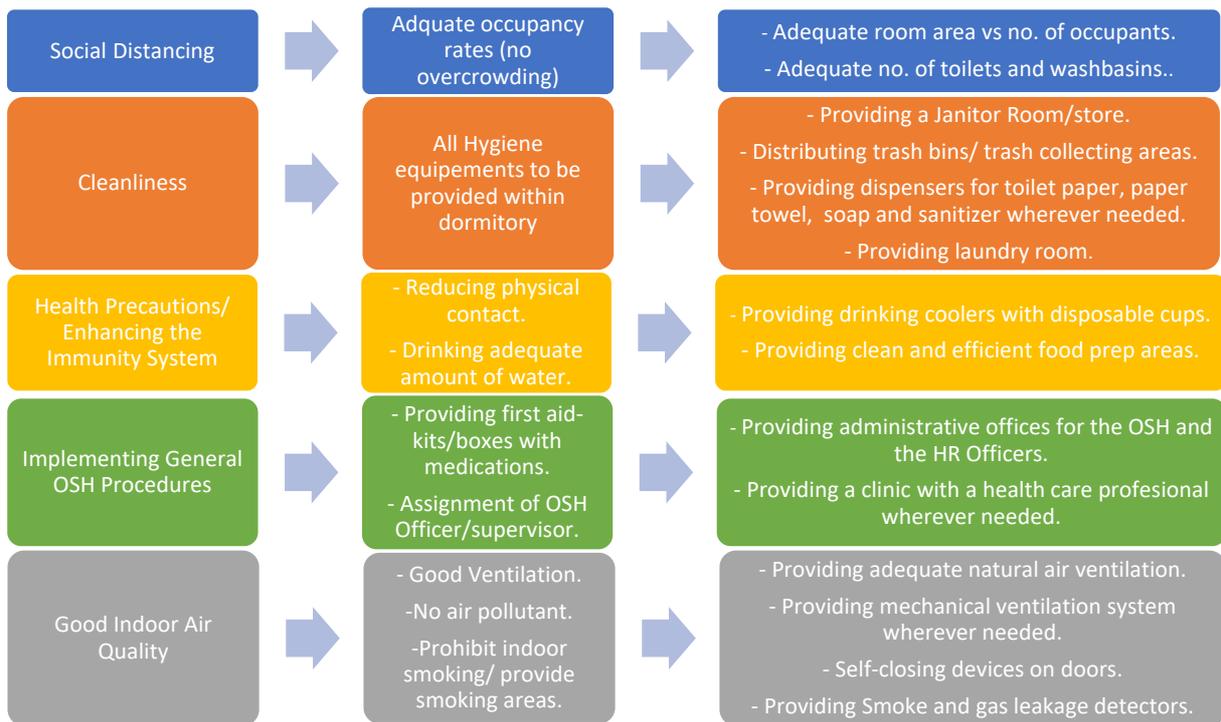


Figure 5-1: Design and Operational Requirements Related to COVID-19

5.2. Indoor Environment Quality

One of the main influencing factors affecting OSH within any facility is the indoor environment quality (IEQ), and different aspects affect the IEQ, consequently defining the comfort levels of occupants, as presented in the figure below:

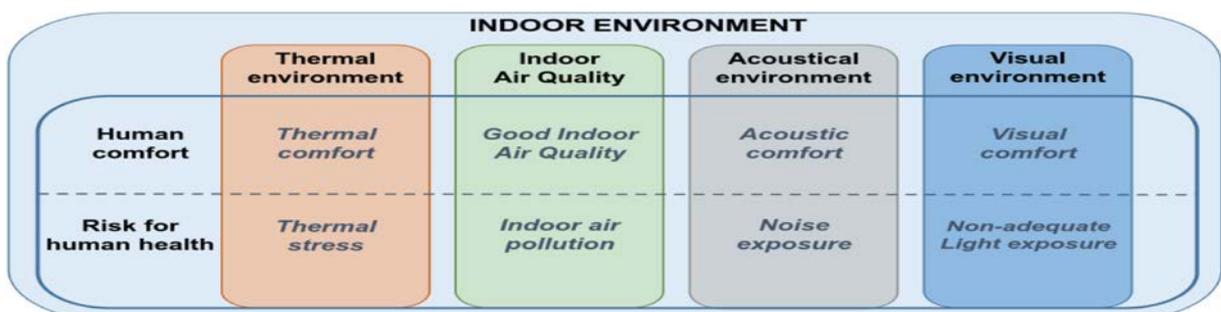


Figure 5-2: Aspects Affecting the Indoor Environmental Quality

5.3. The Link Between Operational Excellence, Indoor Environment Quality and EHS Management

The connection between health, safety and quality is represented in the overlap among requirements of ISO 9001 for Quality Management, ISO 14001 for Environmental Management and ISO45001 for Occupational Health and Safety.

Operational excellence is closely tied to Indoor Environmental Quality and EHS performance. Workers cannot produce quality goods while working or living unsafely or if being unhealthy. This means OSH management leads to certain business benefits, as shown in the figure below.



Figure 5-3: Business Benefits of OSH Management

The following diagram represent the suggested Strategic Plan for Continuous Improvement related to the structural integrity of the dormitories, ensuring appropriate OSH levels are met:



Figure 5-4: The Suggested Strategic Plan to Continuous Improvement (OSH Management System)

6. Assessment Methodology

6.1. Assessment Measures

With reference to all relevant procedures, documents and codes related to the OSH in dormitories, the following basic measures were considered to assess conditions of dorms:

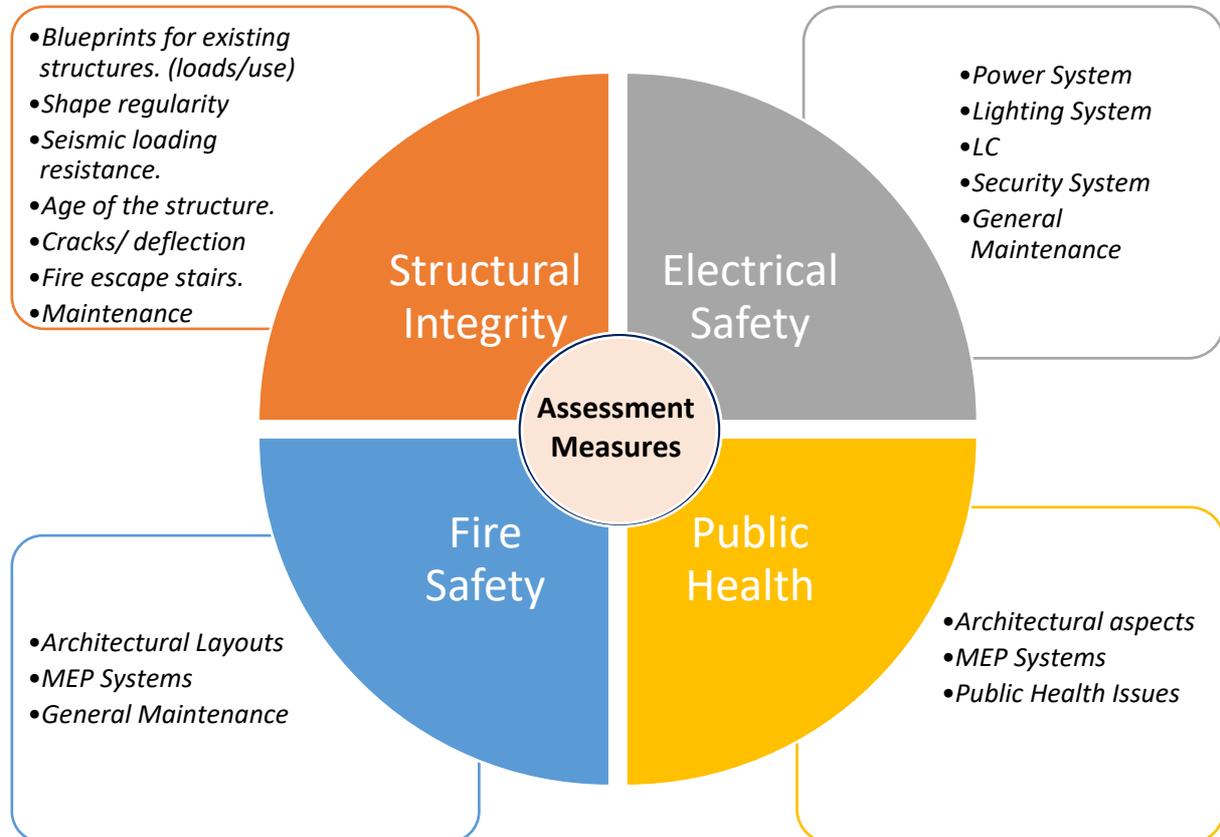


Figure 6-1: Assessment Measures Related to OHS in Dormitories

6.1.1. Structural Integrity

6.1.1.1. Criteria

- Review all available design documents (collected blueprints, reports, calculations, etc...) for the existing structures, to check if the designed function and layouts of the building (as shown on blueprints) matches the currently used one, to ensure that no additional loads, differences in spaces (change of use) or modifications to the original designs/structures occur.
- Visual inspection of the structure to check all the following:
 - Shape regularity, existence of reinforced concrete shear walls (ex: Reinforced concrete staircases or any individual shear wall) as evidence to integrity to resist the seismic loading as per the adopted codes.
 - Loading on the existing slabs; ensuring no existence of additional water tank loads on roof slabs and live loads on floor slabs.

- Cracks, concrete spalling, reinforcing bars corrosion, steel structures dimensions, welding, and connections in all structural elements (Slabs, Beams, Columns, etc...).
- Roof floors insulation and any damage in the concrete due to water leakage.
- External site structures (Stairs, Retaining walls, Concrete tanks, etc...).
- List any other defect identified for each structure individually.

6.1.2. Electrical Safety

6.1.2.1. Criteria

- Review all available as-built dormitory documents (collected blueprints, reports, calculations, etc...) (if available), to compare against existing design and modifications (seek any increment in final electrical connected load of building) and ensure that all electrical systems are well implemented as per approved blueprints.
- Check electrical regular maintenance plan for each dormitory such as: lighting fixtures replacement, out of order circuit breakers replacement, earthing system actual value regular measurement, electrical cables general condition visual inspection, etc...
- Check for compatibility with National and International codes and regulations related to power, lighting, earthing systems (for earthing system; check for the existence of the earth bar, earthing pit and 3wires system in the final circuit.)

6.1.3. Fire Safety

6.1.3.1. Criteria

- Fire Safety systems shall be designed and installed for dormitories as per Jordanian codes (Jordan National Building Council), life safety, Fire Fighting and Fire Alarm System codes and applicable standards, as well as Civil Defence Directorate (CDD) requirements. These codes/standards shall be considered during assessments, design, and implementation stages.

6.1.3.1.1. Architectural assessment related to fire safety

- Ensure compatibility with national and international codes and standards, including the major issues below:
 - Lengths of escape routes and dead ends: Ensure all occupants can exit their floor within acceptable travel distance, then enter a protected zone (normally staircases in multi-storey buildings) which leads directly to outdoors, to an assembly area, protected all the way from smoke and fire.
 - FR doors with all related hardware and self-closing accessories installed wherever needed. (The fire doors shall be checked if in good working order and closing correctly and that the frames and seals are intact.)
 - Adequate number of exits with relevance to room area/occupancy rates. (Alternative means of escape provided from each floor)

- Adequate widths and finishes (non-slippery flooring materials) for emergency routes (free of obstacles) (not going through common areas).
- Location of gas closet/cylinders (needed for cooking/ kitchens) protected against fire hazards.
- Finishes of different spaces (Finishing materials categorization related to fire spread class, smoke developed, fire rating needed with reference to the function, capacity, and use of space, or if the area is a part of an exit route).
- Clear guidance/signage towards emergency exits (evacuation plans) (Check that all safety signs and notices are legible).
- A sign at the dormitory bearing emergency and Civil Defense numbers and instructions for handling accidents, using the languages of all residents.
- Ensure that doors swing freely, close fully and are in a good state of repair.
- Check for correct operation of security devices fitted to fire exits. (Security devices should not impede easy opening from inside in the direction of travel)

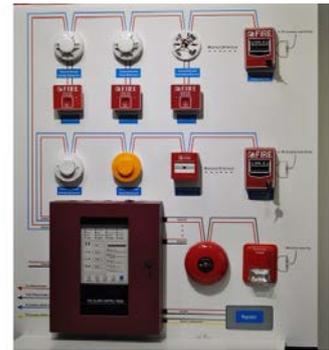
6.1.3.1.2. Mechanical assessment related to fire safety

- Ensure compatibility with national (Jordanian Firefighting code) and international fire safety codes (NFPA), with relevance to the operational status, installation conditions, the distribution and existence of the items below:
 - Hose reel cabinets.
 - Portable fire extinguishers.
 - Sprinklers (wherever needed, with relevance to room area and occupancy rates) (ensure proper connection with fire alarm systems).
 - Sensors monitoring humidity levels and room temperature wherever needed.
 - Gas leakage detectors.

6.1.3.1.3. Electrical assessment related to fire safety

- Ensure compatibility with national (Jordanian Fire Detection and Fire Alarm code) and international fire safety codes (NFPA72 and 101), including mainly the following:
 - Adequate distribution of lighting (Proper lighting for escape routes).
 - Emergency lights (to cover the entire escape route leading to final exit from the building): (Where practicable, safety officer is to visually check on a daily basis that emergency lighting units are in good repair and working properly).
(Safety officer shall carry monthly tests of all emergency lighting systems to make sure they have enough charge and illumination according to the CDD requirements and manufacturers or supplier's instructions).
 - Alarm, Monitoring and security systems to give notification when emergency situations occur (or to notify whenever maintenance is needed).
 - Connection to smoke and gas detectors.

Dormitories mainly need an automatic fire detection and warning system distributed at corridors, staircases, kitchenette, electrical and mechanical rooms and other utilities with a control panel which can identify either the zone or the specific location where the alarm has been raised. The control panel (or a repeat panel) should be located near the entrance to the premises or where there would be 24-hour vigilance.



- Installation, testing and maintenance of fire safety system:

Fire precautions should be installed by a fire specialist. Safety officer must ensure all equipment, devices or facilities in dormitories are provided and in good working condition, such as fire detection and alarm systems, fire extinguishers, emergency lights, signs, fire doors. Separating elements designed to prevent fire and smoke from entering escape routes are to be maintained.

Safety officer must ensure that regular checks, periodic servicing, and maintenance are frequently carried out (check for maintenance records):

- **Daily** Check-ups over the fire alarm panel are needed.
- **Weekly** Tests for the fire detection and warning systems and manually operated devices should be conducted. (Check the batteries of torches and ensure fire extinguishers and hose reels are correctly located and in good working order.)
- Test Fire pumps and standby diesel engines for 30 minutes each week.

Further maintenance may need to be carried out by a contractor. Where contractors are used, third party i.e., Civil Defence Directorate (CDD), officer certification is one method where a reasonable assurance of quality of work and competence can be achieved.

6.1.4. Public Health

6.1.4.1. Criteria

Public health has been defined as "the science and art of preventing disease", prolonging life and improving quality of life through organized efforts and informed choices of society, organizations (public and private), communities and individuals.

Every day, there are health epidemics affecting our populations. Some of these public health concerns have been made even more challenging as a result of COVID-19.

Common public health initiatives include promotion of hand-washing, delivery of vaccinations and medication, smoking cessation, increasing healthcare accessibility, and nutrition related education.

As a result, certain implementations are to be present in all dorms to ensure main public health measures are met, such as cleanliness, proper ventilation and indoor environment quality and safety.

Dormitory conditions are to comply with all MoH regulations, international and national codes related to OSH to ensure public health is considered, which as a result will increase worker productivity and benefit the industrial sector in general.

6.1.4.1.1. Architectural assessment related to public health

- Location of dorms with relevance to factories:
 - o To be away from loud machinery noises.
 - o Pathways connecting between dorms and factories/workplaces to be secured and safe (to prevent accidents or injuries).
 - o To be away from chemicals, smokes, gases produced in the workspace or any source of pollution.

The dormitory must be at least 500 meters away from any source of pollution, including carbon monoxide, sulphur dioxide, nitrogen oxides or exhaust emissions; sewerage systems; wastewater; and noise pollution.

- Study orientation of dorms to ensure adequate exposure to day light and nice views.
- Study windows and openings in building boundaries to ensure adequate amount of natural ventilation is provided.
- Provide laundry areas (by hand or by machine):
 - o If washing machines and dryers are provided, assessors must ascertain whether all washing machines, dryers, and electric irons (if available) are safely connected. Also, chemical substances that are used for cleaning, such as acids and other cleaning materials, must be stored safely to avoid burns, especially to the eye. These materials must be stored in a self-closing plastic container for waste collection.
 - o The washing and drying area must not be slippery.
 - o The dormitory must have a place designated for washing (by hand or by machine), with hangers and lines for hanging clothes outside the sleeping quarters and the kitchen at an average of 1 meter of clothesline per worker.
- Ensure adequate number of changing rooms, toilets, bathrooms, washing areas and drinking fountains/coolers with reference to occupancy rates. (The sanitary facility must contain at least one toilet, one shower and one sink per 15 workers).

- Proper places designated for cooking food (Kitchen/Cafeteria) that may be available on each floor in the dormitory, or in one place for cooking food for the entire dormitory, including the following:
 - o Walls with ceramic tiles that are not less than 2 meters high.
 - o Safe source of drinking water and sink(s) for dishwashing.
 - o Separate cabinets for storing food and detergents.
 - o A refrigerator for keeping food.
 - o A cooker/oven for cooking food (zone to be protected against fire hazards or gas leakage) (the kitchen must be separated from emergency exit routes with fire resistant enclosure; including walls and doors)
 - o A self-closing screen door.
 - o Suction fans/ducts.
 - o Pest and rodent control devices.
 - o Proper waste baskets with a lid.

The door of the sanitary facility must not open directly onto the kitchen or the dining room and the distance between the door of the sanitary facility and the kitchen or dining room door must not be less than 4 m.

- Ensure the proper finishing materials are installed with reference to the function/use of space (For example, no slippery tiles for emergency routes or within wet areas).

6.1.4.1.2. Mechanical assessment related to public health

- Ensure compatibility with National and International codes and standards related to the following considering usage of different spaces and occupancy rates; to ensure no deficiency or pollution caused of any leakage or damage in the following systems:
 - o Sanitary / Drainage/ Sewage
 - o Domestic Water Supply
 - o HVAC
 - o LPG (with gas leakage detectors/ Security System)

6.1.4.1.3. OSH assessment

- Ensure compatibility with local and international codes and standards related to OSH:
 - o Cleanliness/ Hygiene/ Order.
 - o Water quality (Drinking and domestic water): The available water for consumption per person must not be less than 60 litres per day for personal consumption including drinking water.
 - o Food quality (Kitchen cleanliness and food preparation process).

- Indoor air quality (Comfortable levels of temperature, humidity, and ventilation/ atmosphere free of odour and pollution caused by toxic materials, fumes, smoke, gas, or dust).
- Insect control (Soft metal screens on the windows and doors, especially in hot areas where flies abound, and insect killers wherever needed).
- Stray animals control (self-closing doors) (surveillance cameras and frequent inspections to ensure no stray animals exist indoors).
- First-aid boxes with medicaments provided within (along with a healthcare giver/ clinic if needed, with reference to the usage of the facility and the capacity loads).
- Health supervisor office.
- Occupancy rates within a room with reference to its area and usage.
- Washing areas, toilets, bathrooms, changing rooms and dining rooms are adequate with reference to occupancy rates and equipped with all the necessary fixtures and accessories.
- Trash collecting area and adequate distribution of trash bins:
 - A waste basket of proper size must be available at each sanitary facility. Self-closing plastic containers are to be used for waste collection.
 - Each floor must be provided with one container or more for solid waste (3 litres per worker) and must be emptied at least once a day.

The premises must be clean and free from waste, rubble, and stagnant water. Stagnant water, waste, insects, and rodents can lead to mosquito-borne diseases, such as malaria and dengue fever, which are considered among the greatest hazards of stagnant water.

- Good illumination (sufficient lighting provided by natural and artificial sources).
- Noise free atmosphere (dorms to be away from any source of loud machinery/ facility boundaries to be well insulated acoustically).
- Certain design requirements on the ground floor, related to workers with special needs, are to be considered with reference to updated Jordanian National Building Codes (Handbook of special building requirements for people with special needs).

7. Applications

Engicon was assigned to develop a methodology, along with a checklist to help factory owners identify defects in their owned dorms, and as a result of the previously illustrated assessment methodology and with reference to codes and standards the following preliminary checklist emerged:

Checklist for Visual Identification of Health and Safety related Defects in Dormitory Buildings

Format no. 1

Name of Dorm/Factory		Location of Dorm	
Inspection Date		Inspector Name	

Repair works/Risk classification guide (With reference to the severity of defects related to OHS standard parameters)	
Major Repair/ Fatal Defect (FA)	<p>Highest level of priority should be given to repair the defect since its accompanied risks are fatal (could result in death, permanent total disability, or irreversible damage that violates law or regulation) such as explosions, vast structural collapses, electrical shocks, suffocation, poisoning or severe injuries.</p> <p>Implementation of repairs takes long time and might need full evacuation of the building. Repair works may pertain but not limited to demolishing, new construction, replacement of MEP or LC networks, insulation and sealing works, or new purchase and installation of FR doors and fittings. Maintenance works are needed.</p>
Principal Repair/ Major Defect (MA)	<p>High level of priority should be given to repair the defect since its accompanied risks are major (could result in permanent partial disability, injuries or occupational illness that may result in hospitalization of at least three personnel). Repairs may be related to but limited to structural elements deterioration, water leakage or conjunction in sewage and drainage networks, poor ventilation, insulation, finishes, fittings or FR doors, filthiness, inadequate temperature or humidity levels, noncompliance to codes with reference to emergency escape routes conditions and firefighting precautions and lack of control over insects and stray animals.</p> <p>Implementation of repairs takes long time and might need partial evacuation of the building. Frequent maintenance works to be conducted.</p>
Patch Repair/ Moderate Defect (MO)	<p>Repair works should be given certain priority to ensure the parameters of the accompanied risks stay at moderate levels (may result in injury or occupational illness resulting in one or more lost workdays, or damage without violation of law or regulation where restoration activities can be accomplished.) Repair works don't necessarily need the evacuation of the building. Repairs pertain but are not limited to replacement of inadequate finishes, broken fixtures or furniture, doors and windows along with their accessories and hardware sets which are in poor condition, in addition to cleaning and organization works, and maintenance or repair works related to MEP networks.</p>
Superficial Repair/ Minor Defect (MI)	<p>Repair works can be easily done, does not take long. The parameters of the accompanied risks exist at minor levels (that can result in injury or illness, yet not resulting in a lost workday or not violating law or regulation). The defect is easily recoverable. Repairs pertain but are not limited maintenance and repair works needed frequently for different MEP systems</p>
Cosmetic Repair/ Insignificant Defect (I)	<p>Repair works to be implemented whenever possible, since does not need much time or effort. Defect None of the relevant risk parameters exist at a level that can cause injury or illness. Repairs may pertain but are not limited to wall or ceiling paint, cleaning and organization, and to ensure that frequent maintenance works are recorded and conducted as per schedules.</p>

(*) Add a ✓ under the column titled **C** if assessed issue complies with requirement, or under the column titled **NC** if it doesn't comply with requirement.

(**) Highlight, Hatch or cross the letters referring to the risk classification identified for each defect, with reference to the previous table/Risk classification guide.

(***) Write down notes related to the defect identified, with relevance to challenges and foreseen consequences related to the needed repair works.

Ref. No.	Assessment Measure/ Subject of Assessment / Point to be checked	Compliance (C) or Non-compliance (NC) (*)		Repair works classification (**)					Remarks (***)	
		C	NC							
General Architectural Aspects										
01	Accessibility (Pathways and corridors of appropriate widths and conditions) (min 90cm corridor width)			FA	MA	MO	MI	I		
02	Handicapped accessibility (Ramps at main entrances, ensuring HC accessibility at least to Ground Floor level) (at least 1 HC toilet provided) (Design adopts requirements for users with special needs, special furniture to accommodate wheelchairs)			FA	MA	MO	MI	I		
03	Proper occupancy rates for different areas. (3.5sq.m. per worker) (Ensure no overcrowding occurs) (If bunk beds are used, 3.5sq.m. applies for both workers in the lower and the upper bed. The distance between bunks ≥70cm and they must meet safety standards)			FA	MA	MO	MI	I		
04	Laundry room and drying area provided. (1m length of hanging wire per worker outside)			FA	MA	MO	MI	I		
05	Adequate room heights (min. 2.8m - max. 3.2m)			FA	MA	MO	MI	I		
06	Adequate number of toilets, showers, and washbasins with reference to occupancy rates. (1toilet, 1 shower, 1 washbasin for 15 workers)			FA	MA	MO	MI	I		
07	Easy accessibility to refilling gas and diesel tanks.			FA	MA	MO	MI	I		
08	Separated, well-ventilated and safe gas closets, diesel storage tanks and boiler rooms.			FA	MA	MO	MI	I		
09	Guard houses provided. (For safety/ security surveillance/ Access controls)			FA	MA	MO	MI	I		

Ref. No.	Assessment Measure/ Subject of Assessment / Point to be checked	Compliance (C) or Non-compliance (NC) (*)		Repair classification (**)					Remarks (***)
		C	NC						
10	Steel/ secured doors for main gates and entrances. (Secured Facility borders including boundary walls and main entrance gates)			FA	MA	MO	MI	I	
11	Finishing materials. (Suitable selection for different activities conducted)			FA	MA	MO	MI	I	
12	Building envelope (from the exterior) and room surroundings (walls, floors, and ceiling from the inside) in safe and good condition.			FA	MA	MO	MI	I	
13	Roof/Top of Roof in proper conditions (Insulation, Lighting, and rainwater drainage)			FA	MA	MO	MI	I	
14	Ensure furniture in proper conditions (shelves and cupboards to be secured to ensure stability) (fixed seats in cafeteria if provided to be adequate and in good condition)			FA	MA	MO	MI	I	
15	No change for the use and layout of space. (Compliance with the original design)			FA	MA	MO	MI	I	
16	Clinic provided within or close by.			FA	MA	MO	MI	I	
17	Cafeteria/ Dining room/ Kitchen provided within or close to the facility and in good and safe conditions			FA	MA	MO	MI	I	
18	Drinking Fountains/coolers provided and in good working conditions.			FA	MA	MO	MI	I	
19	Signage provided (Facility name, room usage or number, directional or any other signs needed provided in all languages of resident workers).			FA	MA	MO	MI	I	
20	OSH supervisor and HR Officer hired (Administrative Offices close to the dormitory) (Their contact numbers available, to be used after working hours in case of emergency.			FA	MA	MO	MI	I	
21	Doors, windows, locks, and latches are in good working order. (Special concern related to doors mechanism along emergency routes)			FA	MA	MO	MI	I	
22	Check schedules and records of maintenance and repair works conducted. (Repair works for finishes, MEP fixtures, equipment, furniture, accessories and hardware of windows and doors). (Preferably to be conducted and recorded every 6months and upon damage)			FA	MA	MO	MI	I	

Ref. No.	Assessment Measure/ Subject of Assessment / Point to be checked	Compliance (C) or Non-compliance (NC) (*)		Repair classification (**)					Remarks (***)
		C	NC						
	Structural Integrity								
23	Available Documents (Accuracy of blueprints; the building is built according to the design approved plans by authorities with no deviations.)			FA	MA	MO	MI	I	
24	Periodic Maintenance (Structural Only).			FA	MA	MO	MI	I	
25	Shape Regularity.			FA	MA	MO	MI	I	
26	Shear Walls Existence and continuation to ground. And occurrence of soft story.			FA	MA	MO	MI	I	
27	No excessive gravity loads. (Especially in upper stories)			FA	MA	MO	MI	I	
28	No Floors Slabs overloading.			FA	MA	MO	MI	I	
29	No Roof Slab overloading.			FA	MA	MO	MI	I	
30	No water leakage in slabs.			FA	MA	MO	MI	I	
31	No spalling in concrete cover and plastering.			FA	MA	MO	MI	I	
32	No cracks in non-structural elements and roofs parapets			FA	MA	MO	MI	I	
33	No cracks in structural elements and signs of corrosion.			FA	MA	MO	MI	I	
34	Position of nearby plants (ex: boilers rooms) to be enclosed, protected, preferably away from highly occupied spaces, due to possibility of explosion and their proximity to critical structural elements.			FA	MA	MO	MI	I	
35	Steel Structures in good conditions			FA	MA	MO	MI	I	
36	No settlement in ground slab on grade and differential movement across expansion joints (if any) or column / foundation settlement.			FA	MA	MO	MI	I	
37	Proper insulation of roof slab. (No water leakage, corrosion marks or fungus detected in lower levels)			FA	MA	MO	MI	I	
38	External site reinforced concrete structures in good conditions. (No corrosion, cracks, bending or overloading)			FA	MA	MO	MI	I	

Ref. No.	Assessment Measure/ Subject of Assessment / Point to be checked	Compliance (C) or Non-compliance (NC) (*)		Repair classification (**)					Remarks (***)
		C	NC						
Electrical Safety									
39	Ensure no overloading (reasonable number of plugs/ power extensions connected to a socket/outlet).			FA	MA	MO	MI	I	
40	No exposed wires. No missing covers for sockets/outlets.			FA	MA	MO	MI	I	
41	Waterproof outlets provided within kitchens or wet areas/ outdoor.			FA	MA	MO	MI	I	
42	Ensure safe connection to DB and boards are not exposed/ controlled/ located in a way to avoid vandalism.			FA	MA	MO	MI	I	
43	Earthing system provided.			FA	MA	MO	MI	I	
44	Adequate distribution of lighting fixtures.			FA	MA	MO	MI	I	
45	Lighting fittings, fixtures and ceiling fans are properly installed /in good working condition.			FA	MA	MO	MI	I	
46	Cameras provided where needed. (At main entrances and at circulation areas)			FA	MA	MO	MI	I	
Fire Safety									
47	Lengths of corridors at dead ends as per codes (not more than 10m long, if no sprinklers are provided).			FA	MA	MO	MI	I	
48	Widths of emergency pathways/ corridors to be adequate, safe, considering occupancy rates and free of obstacles. (≥0.9m wide)			FA	MA	MO	MI	I	
49	Finishes of different spaces complying to codes (Materials categorization related to Fire Spread Class, Smoke developed, Fire Rating needed with reference to the function and capacity of space, or if the area is part of an exit route)			FA	MA	MO	MI	I	
50	Stairsteps and ramps are in safe conditions/ of appropriate dimensions (≥1.1m wide tread)/ nonslip surfaces/ secured with handrails of min. 75cm high wherever needed			FA	MA	MO	MI	I	
51	Staircases to be protected against fire and smoke along escape routes.			FA	MA	MO	MI	I	
52	Partitions' heights in bedroom to reach ceiling (full height)/ separation between rooms/ protection against vast fire spread.			FA	MA	MO	MI	I	

Ref. No.	Assessment Measure/ Subject of Assessment / Point to be checked	Compliance (C) or Non-compliance (NC) (*)		Repair classification (**)					Remarks (***)
		C	NC						
53	Doors at fire exits leading into a protected stair or corridor to be fire-rated (to stop fire and smoke ingress into protected areas). No need for final exits to be fire rated. (All Doors to be in good working condition)			FA	MA	MO	MI	I	
54	Doors to be equipped with self-closing devices and hardware as per codes. (Free opening width $\geq 0.8\text{m}$ for a single leaf door and 1.6m for a double leaf door)			FA	MA	MO	MI	I	
55	Vertical shafts and storage rooms to be provided with FR enclosures and doors as per codes.			FA	MA	MO	MI	I	
56	Clear directional signs to emergency exists/ evacuation plans and emergency contact lists legible in all languages of resident workers (of durable materials/ properly fixed).			FA	MA	MO	MI	I	
57	Safe and sufficient area identified as an assembly point/ refuge area.			FA	MA	MO	MI	I	
58	Lengths of escaping routes towards exits as per codes ($\leq 15\text{m}$ from the furthest room door to the stairs door/ exit on the same floor). (Full travel distance to the outside $\leq 55\text{m}$)			FA	MA	MO	MI	I	
59	Number of exits comply with codes with reference to room area and capacity loads			FA	MA	MO	MI	I	
60	Alternative means of escape provided from each floor. (The distance between two alternatives not to be less than half of the distance between the two furthest points in the room or floor)			FA	MA	MO	MI	I	
61	Easy accessibility for Civil Defense vehicles and ambulance (min. 9m wide road).			FA	MA	MO	MI	I	
62	Proper distribution of Hose Reel Cabinets (max 36m apart and located close to main circulation pathways/stairs).			FA	MA	MO	MI	I	
63	No vandalism of Hose Reel cabinets (fully operational) (Properly fixed and secured)			FA	MA	MO	MI	I	
64	Proper distribution of portable fire extinguishers (Powder and CO_2) (Max. travel distance to grab an extinguisher is 75ft . (22m .)			FA	MA	MO	MI	I	

Ref. No.	Assessment Measure/ Subject of Assessment / Point to be checked	Compliance (C) or Non-compliance (NC) (*)		Repair classification (**)					Remarks (***)
		C	NC						
65	Distribution of sprinklers and smoke detectors as per code. Connected to a fire alarm system (wherever needed, mainly in big halls with high occupancy rates such as cafeterias and kitchen)			FA	MA	MO	MI	I	
66	Existence of fire hydrant (as needed)			FA	MA	MO	MI	I	
67	Ensure continuous/ periodic maintenance documented and applied to different electrical, security and alarm systems/ fixtures.			FA	MA	MO	MI	I	
68	Provide fire alarm system including detectors, sirens, break glass along corridors, staircases, electrical and mechanical rooms, storages, kitchens, cafeterias, shafts and wherever needed as per Jordanian code and CDD requirements.			FA	MA	MO	MI	I	
69	Provide built-in batteries emergency lighting along corridors, staircases, electrical and mechanical rooms, as well as exit signs at escape routes. (and wherever else needed as per codes)			FA	MA	MO	MI	I	
Public Health									
70	Location of Dorm (to be in adjacency to the manufactory and away from any source of pollution or any other hazard)			FA	MA	MO	MI	I	
71	Sufficient openings and orientation of Dorm (providing adequate exposure to nice views, daylight and natural ventilation)			FA	MA	MO	MI	I	
72	Operable Sanitary Drainage System (No Occlusion of sewage network)			FA	MA	MO	MI	I	
73	Domestic water supply (potable water for drinking and washing)			FA	MA	MO	MI	I	
74	(Providing mixers for hot and cold-water systems) (ensure water cabinets are in good operable condition, closed/controlled)			FA	MA	MO	MI	I	
75	Sufficient Ventilation (No excessive undesired odors in toilets, bathrooms, Kitchen, cafeterias, corridors and bedrooms)			FA	MA	MO	MI	I	
76	Central heating/ AC provided (in good working condition)			FA	MA	MO	MI	I	

Ref. No.	Assessment Measure/ Subject of Assessment / Point to be checked	Compliance (C) or Non-compliance (NC) (*)		Repair classification (**)					Remarks (***)
		C	NC						
77	Proper Indoor Environment Quality (Odors, Temperature and Humidity, noise, visual comfort levels are comfortable)			FA	MA	MO	MI	I	
78	LPG System (Check for Safety Requirements/ Gas leakage detectors/ location away from highly occupied areas)			FA	MA	MO	MI	I	
79	Proper Rainwater drainage (No Occlusion in drains/network) (No water pools occur on roofs/outdoors)			FA	MA	MO	MI	I	
80	Cleanliness and order.			FA	MA	MO	MI	I	
81	Food preparation and kitchen are safe, clean, and properly located (away from sanitary areas) (provided with sufficient and properly working equipment) (separated from emergency escape routes with FR enclosures (walls and doors))			FA	MA	MO	MI	I	
82	No cooking allowed within sleeping rooms.			FA	MA	MO	MI	I	
83	Insects Killers distributed wherever needed. (Mainly where food is cooked or eaten, at trash collecting areas close to main entrance doors and wherever insects usually hover)			FA	MA	MO	MI	I	
84	Steel wire mesh screens provided for windows (no holes/ movable/ in good operable condition).			FA	MA	MO	MI	I	
85	Control over existence of stray animals within facility (monitoring of installed surveillance cameras and frequent inspection/ self-closing devices for doors)			FA	MA	MO	MI	I	
86	First-aid boxes with medicaments provided (in good condition/ properly fixed to wall at min. 1m high from finish floor level) (locked with keys available with the assigned member who should be available/reachable at all times.)			FA	MA	MO	MI	I	
87	Trash collecting area and adequate distribution of trash bins provided.			FA	MA	MO	MI	I	
88	A waste basket of proper size at each toilet.			FA	MA	MO	MI	I	
89	Self-closing plastic trash containers to be used.			FA	MA	MO	MI	I	
90	Each floor has 1 container or more for solid waste (3liters/ worker).			FA	MA	MO	MI	I	

Ref. No.	Assessment Measure/ Subject of Assessment / Point to be checked	Compliance (C) or Non-compliance (NC) (*)		Repair works classification (**)					Remarks (***)
		C	NC	FA	MA	MO	MI	I	
91	Trash emptied at least once a day.			FA	MA	MO	MI	I	
92	Clean wet areas with all the needed sanitary fixtures, fittings, and accessories in good working conditions.			FA	MA	MO	MI	I	

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Phase II

Annex A

List of References

Reference Number	Reference Code Name/ Section Number	Subject of Inspection	Assessment measure addressed	
R1	Jordan National Building Code (MoPWH)- Space Requirements in Buildings Code	Space/ Room Requirements and qualities	General conditions affecting all measures	
R11	Jordan National Building Code (MoPWH) (2002)- Water Insulation and humidity in Buildings Code	Water insulation and humidity levels		
R1	Jordanian National Building Code- Earthquake Resistant Buildings.	Regularity of the structure and resisting of seismic loading	Structural Integrity	
R2	International) Uniform Building Code (UBC 1997).			
R3	Jordanian Code of Loads and Forces, 2006.	All loads on structures and minimum loading as per the function		
R4	Jordanian Code for Plain and Reinforced Concrete JBC5-93 (All Parts).	The design of the reinforced concrete structures and the serviceability		
R5	(International) Building Code Requirements for Structural Concrete ACI 318M-19.			
R6	(International) British Standard- Structural use of concrete - BS 8110.			
R7	Jordanian Code for Steel Structures	Steel structures design		
R8	The Handbook of Repair and Rehabilitation of RCC Buildings. Published by: Director General (Works), Central Public Works Department, Government of India, Nirman Bhawan, 2002.	Rehabilitation and retrofitting		
R9	Jordanian local Earthing and Lightning code.	Earthing and lightning systems	Electrical Safety	
R10	British standards (BS 7430 Code of Practice for Earthing).			
R11	Jordanian local Electrical Installation code.	Electrical installation "cables, socket outlet "		
R12	International Electrotechnical Commission (IEC).			
R13	British standards (BS7671 Requirements for electrical installations. IEE Wiring Regulations. Seventeenth edition).			
R14	CIBSE 2012 SLL CODE FOR LIGHTING			Lighting system "recommended lux level and the IP (Ingress Protection) rating of a bulb or light fixture
R15	British standards (BS526 Code of Practice for Emergency Lighting).			

Reference Number	Reference Code Name/ Section Number	Subject of Inspection	Assessment measure addressed
R16	Jordanian Fire Protection Code 2004	Architectural applications and Interior conditions with relevance to precautional measures taken against fire hazards	Fire Safety
R17	Fire Detection and Fire Alarm System/ Jordan National Building Council/2004	MEP systems precautional applications against fire hazards	
R18	NFPA 72/ National Fire Alarm and Signalling Code/2019	MEP systems precautional applications against fire hazards	
R19	BS 5839-1/ Fire Detection and Fire Alarm System for Building/2017		
R20	Jordanian Firefighting Code		
R21	Jordanian Fire Protection Code		
R22	NFPA 10 and NFPA14/ Standard for the Installation of Standpipe and Hose System		
R23	Boiler Workbook provided by BWJ		
R24	Comprehensive guide - MoL - Work procedures for safety and health prevention measures to limit the spread of the corona virus: Applying the standard work procedures manual for textile and apparel manufacturing establishments and companies in development zones and qualified industrial zones	Architectural applications and Interior conditions with relevance to compliance to public health minimum requirements	Public Health
R25	Dormitories Inspection/Assessment Guide 2019 (by Jordanian MoL, MoH, BWJ)		
R26	The Public Health Law		
R27	Uniform plumbing code/ 2018	MEP systems applications and operational conditions with relevance to compliance to public health minimum requirements	
R28	ASHRAE standard/ 2009		
R29	Jordanian code for gas system installation in buildings		
R30	Jordanian National Building Codes (Space requirements in buildings code, Natural ventilation and Health Assets code, Natural Light code)		