



## **KURDISTAN REGIONAL GOVERNMENT (KRG)**

MINISTRY OF CONSTRUCTION AND HOUSING (MOCAH)

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### **HEALTH, SAFETY AND ENVIRONMENT MANUAL BOOK FOR CONSTRUCTION PROJECTS**

(FOR PROJECTS WITH THE BUDGET OF MORE THAN TEN BILLION IRAQI DINARS)

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## ABBREVIATION

KRI	Kurdistan Region - Iraq
KRG	Kurdistan Regional Government
MOCAH	Ministry of Construction and Housing
PPE	Personal Protective Equipment
WHO	World Health Organization
HSE	Health, Safety & Environment
GHP	Good Housekeeping Practices
LPG	Liquefied Petroleum Gas
MEWP	Mobile Elevated Work Platform
OSHA	Occupational Safety and Health Administration
PUB	Protection Under Bridge
MSDS	Material Safety Data Sheet
HAV	Hand – Arm Vibration



## 1 INTRODUCTION

The Health, Safety, and Environment Manual (hereafter referred to as “this Manual”) has been developed to identify the minimum requirements for the government’s committee and supervisory teams in general, Construction Contractors, Subcontractors and their lower-tier subcontractors (hereafter referred to as “Contractor”) which require personnel to perform construction activities at the Ministry of Construction and Housing (MOCAH’s) directorates.

Kurdistan region of Iraq (KRI) has experienced large development in all areas in the past years; however, it is only at the early stages of the transaction and required the improvement of construction health, safety and environment standards in line with accepted international best practice. These standards which also denotes by security or safety affairs for the work environment in engineering projects defined by the World Health Organization (WHO Healthy Workplace Framework and Model [https://www.who.int/occupational\\_health/healthy\\_workplace\\_framework.pdf](https://www.who.int/occupational_health/healthy_workplace_framework.pdf)) to ensure the safety of all who work inside the project site in a manner to provide physical, social, and physiological welfare.

Standards related to health and safety should get more priority in MOCAH’s contracts, as many contractors strive to compete on price alone and in order to win contracts; they are forced to cut costs. Unfortunately, cutting construction costs usually results in the relegation of perceived indirect services, such as health, safety and environment management to a low value item on the tender submission and bill of quantities.

Our vision is to carefully address HSE and try to give more importance to safety instruction implementation in the fields of engineering projects, also any internal training and seminars for our staffs to increase the awareness and the importance of this instruction are recommended.

This document has been developed by Kurdistan Regional Government (KRG) - Ministry of Construction and Housing (MOCAH) under the supervision of a committee consists of (Eng. Saman Khalid, Eng. Shamal Abdullah, Eng. Solav Ibrahim, Eng. Bawer Shakir and Eng. Bayar Taqueadeen) and with the minimum requirements for both MOCAH and of contractor’s staff engaged on client projects where MOCAH has been assigned responsibility for health, safety and environment.

## 2 OBJECTIVE

The purpose of this Manual is to promote the health and safety of MOCAH’s employees and contractor’s staff by imposing standards for control and specific requirements to avoid dangers from specific hazards during contract work on projects with a view to:

- a. Avoiding accidents, diseases and hazard effects on the health of workers arising from work activities required by employer as part of conditions of employment in construction.
- b. Ensuring adequate design and implementation of construction projects.
- c. Providing means of analyzing from the point of view of safety, health and working conditions, construction processes, activities, technologies and operations, and of taking adequate measures of planning, control and execution.

Anyone who works or visiting the workplaces is obliged to comply with this manual’s terms and conditions.



### 3 DUTIES AND RESPONSIBILITIES

In general terms, the HSE rule prescribes the following major duties for contractors, supervisors, workers, and committees/representatives:

Contractors are responsible for:

- Providing a safe and healthy workplace including the necessary plan, equipment, systems, and tools which are properly maintained.
- Providing information, training, instruction, supervision and facilities to protect the health and safety of workers.
- Establishing, supporting and consulting with HSE committees and/or Workplace HSE representatives on all matters to improve workplace HSE including regular safety inspections of the workplace.
- This effectively means that the contractors/employers are expected to carry out suitable and sufficient risk assessments for any undertakings that are likely to cause harm to employees, visitors, member of public, equipment and/or environment.
- The Engineer may ask tenderers to produce evidence of current insurance coverage for their staff for whole contract duration.

Supervisors are responsible for:

- Ensuring workers under their direction know and comply with health and safety requirements.
- Ensuring workers under their direction receive adequate supervision.

Workers are responsible for:

- Cooperating with management, supervisors and the Occupational Health and Safety committee or Workplace Health and Safety representative.
- Following safe work procedures and using mandatory personal protective equipment (PPE).
- Traditional clothes are forbidden to be worn during construction works especially for (working at height, working in excavation, scaffolding works, installation of rebars & shuttering works). These kinds of clothes might cause serious injuries.
- Reporting hazards (such as unsafe situations and activities) to their supervisor immediately.

HSE committees and/or HSE representatives are responsible for:

- Seeking to identify workplace sides that may be unhealthy or unsafe.
- Participating in workplace inspections.
- Receiving complaints from workers as to their concerns about health and safety in the workplace.
- Making recommendations to management to protect the health, safety, environment and welfare of workers at the workplace.
- Establishing and promoting HSE educational programs for workers.



## 4 RISK ASSESSMENT

In order to reduce the hazards in workplace as much as possible, contractors are required to ensure that risk assessments are carried out for their activities with a view to identifying the hazards of their work along with the control measures that shall be used to decrease the risk of incidents. The risk assessment provides a useful tool to contractor management in identifying the risks of the work and prioritizing high risk activities so that adequate action can be taken.

The following five steps to risk assessment should be followed:

- 1- Identify the hazards.
- 2- Decide who might be harmed and how.
- 3- Evaluate the risks and decide on precautions.
- 4- Record the findings and implement them.
- 5- Review the assessment and update if necessary.

Contractors are obliged to ensure that the risk assessment procedure they develop is simple and easy to follow. Training must be provided to those who directly involved in preparing risk assessments either in client side or contractor.

Below are some general points to guide contractors through each of the 5 steps:

### **Step 1: Identify the hazards:**

Check the workplace carefully and identify activities that could reasonably be expected to cause harm. Worst case scenario must be taken in consideration in order to not dismiss a hazard just because you are not aware of any harm being caused previously. It is a good idea to talk to the workers and supervisors who have experience of the work being carried out and may be aware of some objects caused or nearly caused harm in the past. Contractors should also check their incident records or other similar projects incident records as those incidents could help in understanding the hazards that are present in the work activity.

### **Step 2: Decide who might be harmed and how:**

Contractors have to identify the groups of worker that could be harmed by the hazard. The obvious group is the workers that are involved with the activity being carried out but contractors also need to consider others that could be affected. This includes everyone who could be passing the area where the activity is being undertaken. Type of the harm should be identified by contractor that could result from the hazard. For example, public pedestrian could be exposed to vehicles hazards and crushing injuries if they are passing the entrance to a busy construction project.



**Step 3: Evaluate the risks and decide on precautions:**

Contractors should evaluate the risk and decide on the actions that must be taken to reduce the risk to an acceptable level taking into account the effort required in terms of time, money and effort. Wherever possible contractors obliged to eliminate the hazard completely but this is often not possible so risks must be controlled. The risk assessment must identify the control measures that will be taken. That could be in the form of physical controls, supervision, training or personal protective equipment (PPE).

**Step 4: Record the findings and implement them:**

Contractors must record and archive their risk assessments in writing either in hard copy or electronically. A simple template for the risk assessment can be developed and completed each time that a risk assessment is required. The risk assessment findings are important to be communicated to those that will be affected or those that will have certain responsibilities.

**Step 5: Review the assessment and update if necessary:**

Contractors are required to review and update their risk assessments as often as possible especially in the case of construction works since the work environment is continually changing and this shows the importance of the risk assessment being reviewed regularly to ensure that it still fits the work being carried out. It is better to set a review date on the risk assessment when it is prepared. Contractors have to review risk assessment in the following cases:

- After occurrence of an incident.
- In case of introducing of new equipment or processes.
- If there are any other work impacts on the activity that has been assessed.
- On annual basis.

**Ministry of Construction and Housing – Iraq (MOCAH)** expects from contractors to maintain records of risk assessments in accordance with their written procedures on site. This includes evidence that the key findings of the risk assessment have been communicated to those who may be affected by or involved with the activity.

## 5 EMERGENCY PLANNING

Contractors are required to ensure that plans are made to deal with emergency situations that may occur both on site and within site offices. In each case the contractor has to develop an emergency management plan which should reflect the scale and complexity of the site or offices covered. In all cases, the emergency management plan should always be as simple and concise as possible and contain all the information which required to ensure that emergency situations can be managed successfully.

Emergency management planning should start with a risk assessment to identify the areas for potential emergencies. The emergency management plan should firstly identify the types of predictable emergencies that may occur; this information can be determined from the risk assessment undertaken for the site and site offices.

Typical emergency situations include but are not limited to:

- Storms and severe weather.
- Flooding.
- Construction activity emergency i.e. scaffold or excavation collapse.
- Gas leaks.
- Power failure.
- Fire.
- Explosion.
- Terrorism threat.
- Pandemic disease cases.

The contractor must ensure that all those given responsibilities under the emergency management plan are trained and competent to fulfill their duties. The contractor will be responsible for ensuring that the emergency management plan is reaped on at least a six-monthly basis. Practice drills should be conduct which reflect the nature of the work and risks to personnel

## 6 CONTRACTOR MINIMUM REQUIREMENTS

The purpose of this section is to provide health, safety and environment guidance to contractors to assist them in complying with local Kurdistan Region Government standard requirements.

Following, minimum requirements are mandatory for the contractors who work with the Ministry of Construction and Housing.

### 1- Personal Protective Equipment (PPE);

PPE is the personal equipment “that must be worn” by those who are working in construction work-places to minimize exposure to hazards that may cause serious injuries and illnesses.



- 1- No mandatory PPE worn, No duty.
- 2- PPE shall be provided free of charge to workers as required by the contractors.
- 3- Instruction on how to inspect PPE shall be provided to workers.
- 4- PPE shall be stored in the shade out of direct sunlight.



## **2- First Aid on Site;**

First aid is emergency care that must be given immediately to an injured person at the workplace. The aim for first aid is to stabilize injured workers until is taken care of by medical staffs. In critical cases, first aid may be necessary to keep the victim alive. Employer is expected to provide:



- 1- A suitably stocked first-aid kit for places of works where there are activities with potential to cause harm.
- 2- Information for employees about first-aid arrangements.
- 3- Regular inspection for the first aid kits.
- 4- For all projects, contractors are required to appoint a qualified person in the workplace (as a first aider) to look after the first aid kits and give first aid treatment in case of an injury or illness or calling an ambulance in a critical emergency cases.

## **3- Toolbox Meeting**

Toolbox meeting will be held on a daily basis at the start of each day or shift to reinforce the focus on safety topics.



- 1- Keep it short. Toolbox talks should be no longer than 5 – 10 minutes.
- 2- Focus on safety topics relevant to the work being done that day.
- 3- Get workers involved by asking questions.
- 4- Have employees inspect tools, equipment and PPE.
- 5- Share lessons learnt from previous incident, accident or near miss reports.

## **4- Manual Handling;**

Manual handling is transporting or supporting of any objects or materials by lifting, holding, carrying, pushing, lowering, or pulling by one or more workers.



- 1- Avoid the need for hazardous manual handling and try to use automation and lifting equipment as much as possible.
- 2- estimate the risk of injury from any manual handling task that cannot be avoided.
- 3- Reduce the risk of injury from manual handling, so far as is reasonably practicable.
- 4- For a long lift, plan to rest the load midway on a table or bench to change the grip.
- 5- Providing information and training to workers on tasks, the use of equipment and correct handling techniques.



### 5- Slip, Trip & Fall

In general, slips and trips happen due to a misfortune of footing between the shoe and the walking surface or accidental contact with a fixed or moveable object which may lead to a fall.



- 1- Create Good Housekeeping Practices (GHP).
- 2- Reduce Wet or Slippery Surfaces.
- 3- Avoid Creating Obstacles in Aisles and Walk-ways.
- 4- Create and Maintain Proper Lighting.
- 5- Wear Proper Shoes.
- 6- Control Individual Behavior.

### 6- Work in Excavations;

Excavation work usually means work involving the removal of soil or rock from a site to form an open face, hole or cavity using hand tools, machinery or explosives. Excavating or trenching works can be highly dangerous and may lead to death or severe injuries if not carried out safely.

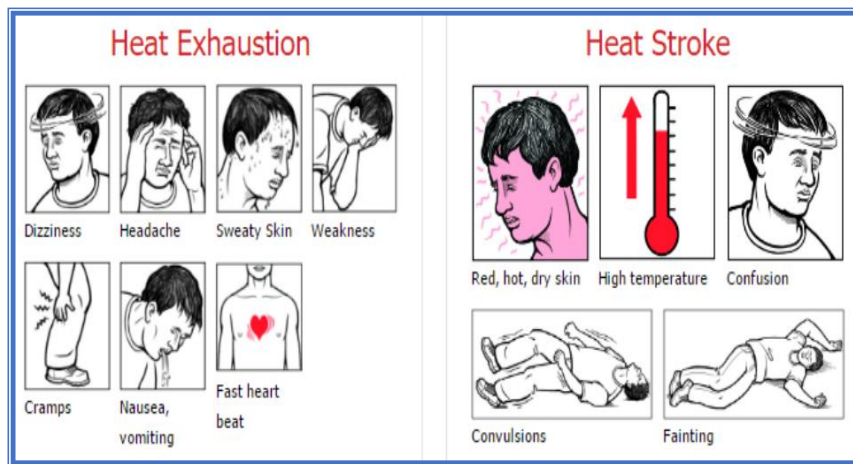


- 1- Identify all the underground facilities in conjunction with the relevant authority within the area to gain formal permission.
- 2- Excavation sides must be prevented from collapsing by shoring or battering and safe ladder access must be provided.
- 3- Warning sign in terms of ribbon and poles with reflective stall day and night must be provided to prevent falls into the excavation.
- 4- Keep heavy equipment away from trench edges. Also, keep surcharge loads at least 0.6 meters from trench edges.
- 5- For deep and big excavations, a test for low oxygen, hazardous fumes, and toxic gases is required.
- 6- Inspect trenches at the start of each shift.

## 7- Working in Hot Weather;

While most of construction work taking place outdoors, it's important to make sure that the workforce are prepared and that health and safety is considered when working in the hot weather of summer. Below points are very important to be followed.

- 1- Hydration is the key: Drink water every 15-20 minutes, even if you're not thirsty.
- 2- Rest in a cool, shaded area: It's important to rest in the shade area "if possible" in order to properly cool down especially between 10am and 15pm.
- 3- Have a plan in place: Having a plan to deal with high temperatures is critical for any construction company. At a minimum, supervisors should know and aware about what temperatures will require more frequent breaks.
- 4- Know the signs: The Occupational Safety and Health Administration (OSHA) offers the diagrams below to help monitor signs of illness.



- 5- Modify schedules: Try to schedule strenuous jobs and hot jobs for the cold parts of the day. Consider scheduling maintenance work during the colder months, if possible. It is also important to support employees' adaptation to higher temperatures by starting small working hours and gradually increasing their work times each day until they become accustomed to the weather.

Nowadays, heat diseases and deaths can be prevented and appropriate measures can be taken to mitigate the risks.

## 8- Working at Height;

Work at height, means work in any place where, if there were no proper protection in place, a person could fall down from a weak roof or scaffolding and causing a serious injury.



- 1- Ensure a permanent robust/stable work platform is available for the workers to safely gain access to the work location or equipment.
- 2- If above is not practicable, construct a scaffold with strong ladders and guardrails.
- 3- If above is not practicable, use a Mobile Elevated Work Platform (MEWP).
- 4- ONLY if the above is not practicable, use safety harnesses along with other applicable PPE for the labors who work at height.
- 5- When use PPE, THINK of fall prevention rather than protection i.e. use personal work restraint systems rather than fall arrest systems. Training to understand the risk of falls must be provided.

## 9- Scaffolding;

Scaffolding is a temporary structure used to support a work crew and materials to assist in the construction, maintenance and repair of buildings, bridges, and all other structures.



- 1- Scaffolds must be robust enough to support a work crew or materials they carry.
- 2- Scaffolds must be equipped with guardrails, toe-boards, no-space planks, and stable ladder.
- 3- It must be designed, erected, inspected, labelled and dismantled by competent, trained persons only.
- 4- Scaffolds must be inspected on weekly basis or after any occurrences that may have caused damages.
- 5- Harnesses must be worn by scaffolders as far as possible.
- 6- Scaffold ties and sheeting or netting requirements must be carefully considered in accordance with the design.

### 10- Pedestrian Segregation;

Create safe walk-way (Pathway) zones by clearly defining pedestrian pathways.



- 1- Safe pedestrian walkways must be established using barriers and baulk timbers.
- 2- Pedestrians must be segregated from vehicles along all main routes.
- 3- Walkways shall be kept clear of debris and leveled to provide safe access.

### 11- Lifting Operations;

Lifting operation is a mechanical process concerned with the lifting and lowering of various loads in all construction projects.



- 1- All cranes must be in a good condition and tested by a third-party at least every 12 months.
- 2- Crane operators must be in possession of a recognized competency certificate and physically fit.
- 3- There must be a lifting plan created for heavy complex lifting operations by qualified and experienced HSE Officers and Performers or Engineers.
- 4- Create permit to work and risk assessment to cover all the risks associated with any lifting operations.

### 12- Fire Prevention;

The goal of fire prevention is to educate the workers to take basic precautions to prevent potentially harmful fires and be educated about surviving them on the work sites.

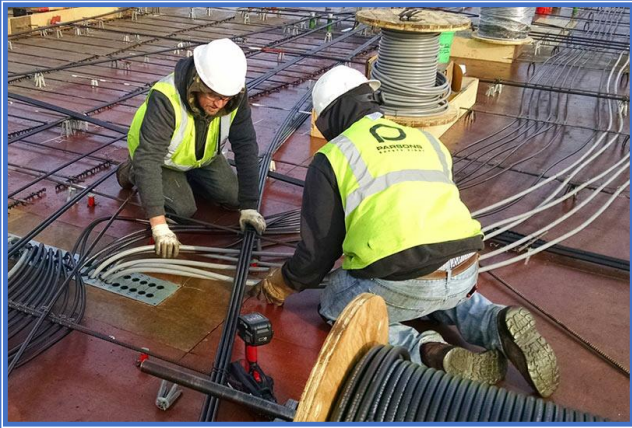


- 1- Combustible construction materials shall be stored away from sources of heat and ignition.
- 2- Flammable liquids, Liquid Petroleum Gas (LPG) and other bottled gases must be strictly controlled.
- 3- Means of raising the alarm must be established on the site and in the offices.
- 4- Clear responsibilities must be assigned to personnel on site.



### 13- Electrical Safety;

Electrical safety is a method of organizational measures and technical means to avoid harmful and dangerous effects on workers from electric current, electric arc, electromagnetic field and static electricity.



- 1- Electrical tools must be checked before use to ensure they are not damaged.
- 2- Cables must be in good condition and free from makeshift repair or damaged sheathing.
- 3- Persons using electrical tools must be trained and briefed on the risks and control measures associated with electricity.
- 4- Electrical tools must be adequately stored to minimize damage.

### 14- Access and Housekeeping;

Housekeeping is not just cleanliness. It includes keeping work areas neat and tidy, maintaining a workplace free of slip and trip hazards, and removing of waste materials.



- 1- Rubbish must be cleared on a regular basis in order to facilitate safe access around the site.
- 2- Trip hazards such as trailing cables must be minimized along main access routes.
- 3- Materials should be stacked safely on a proper and level base.
- 4- Clear signage must be posted whenever a particular area or a walkway is not safe for people.

### 15- Site Security;

Providing an appropriate level of work site security services, as it will protect the site and restrict entry to only authorized personnel.



- 1- The site must be fenced to prevent persons entering the site as far as reasonably possible.
- 2- Night shift guard must be available in the workplace to protect materials and equipment in site from any potential thefts. Taking in consideration the day and night during weekends and holidays.
- 3- Site Security should be uniformed and, trained and established to check and control the access.

**16- Health and Safety During any Pandemic;**

The Health and Safety management must maintain their HSE policy during any pandemic and support all the "responses to COVID-19" by the KRG. HSE has recognized the threat presented by COVID-19 and other potential pandemics on companies and their workers.

During any pandemic situation especially COVID-19, visits to the work sites which will be conducted in line with social distancing regulations and guidelines.

All construction activities must be guided by the specific requirements and characteristics of the sectors that regulate and in line with advice from the KRG and Ministry of Health.

**17- Accommodation & Welfare;**

When accommodation or welfare facilities are provided to Contractor's Personnel, the Contractor shall implement clear policies on the quality and management of such accommodation and the provision of such welfare facilities.

Bellows points are explaining the quality of such accommodation and welfare facilities:

**A. Minimum Space:**

1. All worksites shall be sufficient in size to prevent overcrowding of necessary structures.
2. For sleeping facilities, a separate bed shall be provided for each person.
3. In collective sleeping rooms, occupancy should be limited to a range of 2-8 people.
4. Storage for personal belongings should be provided; depending on worksite hazards, personal protective equipment (PPE) should be stored away from sleeping and eating facilities.

**B. Sanitary and Washing Facilities:**

1. Sanitary and washing facilities shall be designed to provide adequate privacy; such facilities shall not be shared between men and women.
2. Toilets, handwashing basins, and shower facilities should be conveniently located to work sites and sleeping facilities; an adequate number of each should be provided in the range of 1 unit per max. 15 persons.

**C. Supply of Water:**

1. An easily accessible free source of potable water shall be provided, with sufficient resources for each person's drinking, cooking, bathing, and laundry needs.
2. Depending on the climate, weather conditions, and accommodations standards, 200 liters of potable water per person per day should be available.



**D. Sewage and Garbage Disposal Systems:**

1. Wastewater, sewage, food, and any other waste materials shall be adequately discharged in a proper manner that will not cause any significant impacts on camp residents,
2. Specific containers for rubbish collection should be provided and emptied on a daily basis.

**E. Protection Against Heat and Cold:**

1. For facilities located in cold-weather zones, the temperature must be always around 20 degrees Celsius although an adequate ventilation is required.
2. For facilities located in hot weather zones, proper ventilation and/or air conditioning systems shall be provided.

**F. Protection Against the Environmental or Operational Effects:**

Accommodation and welfare facilities should be constructed far away from worksites so as to protect against impacts such as noise, release of gas, or dust.

**G. Cooking and Storage Facilities:**

1. Cooking facilities should be always in a clean and sanitary condition with designated areas for food preparation to permit good food hygiene practices.
2. If personnel can cook their own meals, kitchen space should be provided separately from sleeping areas.

**H. Natural and Artificial Lighting:**

Both natural and artificial lighting should be provided and maintained in living facilities. It is highly recommended that the window area represents not less than 10% of the floor area. Emergency lighting should be provided also.

In order to provide a proper and sufficient management of such accommodation and welfare facilities, all facilities should be built by using adequate and safe materials and should always be kept in good repair, clean and free from rubbish. All reasonable precautions should be taken into consideration to maintain the safety and health of the Contractor's Personnel and others.

The accommodation and welfare facilities shall be provided in a manner consistent with the principles of non-discrimination and equal opportunity.



## 7 SAFETY TIPS IN ROAD CONSTRUCTION PROJECTS & VEHICLE TRAFFIC MANAGEMENT

MOCAH works hard to enhance the safety of highway work zones both of construction workers and road users.

Road construction workers can protect their safety by following these tips:



1. Workers and employees are always obliged to wear high-visibility clothing. This includes armbands, hats, and vests made with reflective materials day and night.
2. Observation and record of the potential hazards and approaching them with caution should be taken. The blind spots should be checked when operating machinery and follow the safety precautions for moving any construction equipment.
3. Awareness sign must be provided of worksite equipment as well as vehicles entering and exiting the work site. Recognize the lanes where walking is prohibited.
4. An experienced spotter should know where is safe to stand and which sign to be used to communicate with the vehicle operators during loading and unloading from vehicles.
5. Every one of the road construction team should understand and use the same communication signals.
6. A seat belt must be worn and the highest degree of caution must be taken in consideration during operating of road construction machinery or a work vehicle. It doesn't matter how short the ride. This certainly decreases the effects of potential hazards.
7. Never think that the operator of the vehicle sees you always signal or inform the vehicle operator to shut down the equipment and get acknowledgment from him before approaching or crossing the path.
8. Road construction work is exhausting, especially in the heat of summer, and over exertion is a common cause of injury. Stay always hydrated on the job and take precautions such as regular water breaks.
9. Vehicle operators are always required to make an eye contact with all workers around them before moving the equipment. Flagman needs to assure the vehicle operator that nothing is around the vehicle.
10. Proprietary signage must be provided in accordance with local statutory requirements.



11. An adequate warning must be provided by signage well ahead at least 500m from each side of the hazard or required action. In a manner that the signage establishment will be increased by approaching the workplace especially in the maintenance of roads.
12. Lighting must be checked regularly and maintained immediately as required.
13. Positioning and use of safety barriers must be taken into consideration.
14. Flagmen must be available during the intensive construction working hours on the road to manage the traffic.
15. All machines should be mechanically well maintained every day before using it especially brake and lightings.
16. At the end of each working day, the vehicles and equipment should be properly & safely parked out of the road and well barricaded by reflect-able signs and hazard tapes to avoid any potential accident during the night.

Workplace safety is something that all workers need to approach it accurately and properly. Accidents are most likely to occur when safety standards are not applied, and when workers fail to take basic precautions.

U-Turn is considered one of the most dangerous driver maneuvers on roads worldwide. Therefore, road designers are strongly recommended to avoid any U-turn in their design especially in highways and try to find other solutions to change the vehicles their directions.

## 8 ESSENTIAL SAFETY TOOLS FOR BRIDGE CONSTRUCTION WORKERS

The major and the biggest risks faced by bridge workers is falling from a higher level of a bridge to a lower one. This often happens because workers are using the wrong equipment to reach sections of bridges.

### 1- Using Specialized Equipment to Access the Bridge Elements;



- a. Bridge walkers, which can secure the workers up to 6 m below a bridge, even if working space is limited.
- b. Hydra platforms, able to move workers up to 10 m below a bridge. They have a work stage that can be moved and rotated to give the workers easy access to the edges of the bridge deck.
- c. Paxton-Mitchel snoopers, which provide safe access to even the most hard-to-reach areas of the largest bridges.

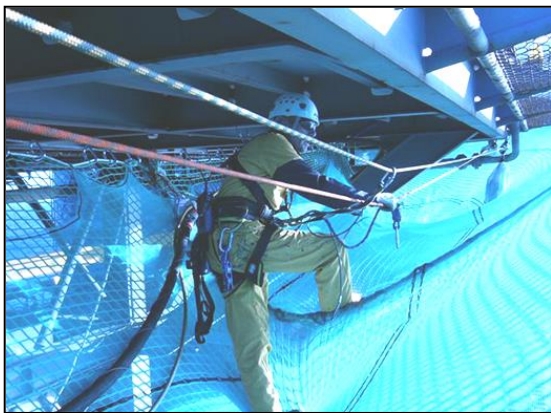
## 2- Under-Bridge Protection;

Protection under Bridge (PUB) systems are caging units designed to protect weak and unsafe facilities under bridges. They can support and help ensure ongoing utility service, along with worker and community safety.

### a. Guardrail Systems

Guardrail systems consist of a top rail, mid rail, and if necessary a toe board. Guardrail systems can be made of different materials.

### b. Safety Nets



Safety nets are required to be supplied for all work places, 7.5 m or more above surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines, or safety belts is impractical.

Safety nets must be extended 2.4 m beyond the edge of the surface where employees are exposed.

## 3- Eye and Face Protection

All bridge workers are obliged to use appropriate eye and face protection equipment for any operations that present potential eye or face injury due to entering of particles to the eye while grinding, welding, cutting, nailing, or during casting of concrete.

## 4- Head, Hand and Foot Protection

- a. All employees and visitors on bridge sites are required to wear protective helmets.
- b. Employers are required to make sure that their workers are using appropriate hand protection to avoid any potential injury during the work.
- c. To prevent accidents of slips, trips, and falls all employers must make sure that employees and visitors are using protective footwear.

## 5- High-Visibility Safety Equipment

People who are working on bridges and roadways are strongly required to wear special colorful and reflective clothing in day and night shifts. It makes the workers visible to drivers in work zones.

## 9 GENERAL HEALTH & SAFETY IN TUNNELING CONSTRUCTION

Tunneling construction work is widely executed in the construction of railway, Irrigation and road projects. This work is very hazardous because of tight working space, wet and slippery flooring, artificial lighting. Usually described by inappropriate ventilation, deadly gases, unseen weaknesses of rock, collapses, handling of explosives, pulling muck, etc, leading to fatal accidents and injuries.

All employees who are involved in Tunneling construction must be well trained and respond properly to the hazards that linked with this type of work.

The following subjects should be part of Tunneling construction employee training program:

### 1- Air Monitoring Requirements

Air monitoring should be managed by an assigned person with an adequate training and experience. Pre-entry atmospheric testing and atmospheric monitoring during work by air monitoring equipment must be done properly and regularly.

Below are some important points on the use of air monitoring equipment specifically for conducting pre-entry tests in hazardous environments and confined spaces:

- The only properly maintained and calibrated equipment must be used for atmospheric testing.
- The most common configuration for a multiple-sensor gas monitor is one that displays readings on levels of oxygen, combustible gas, hydrogen and carbon monoxide.
- The air monitoring equipment should be of the explosion proof type.
- The air monitoring equipment should have an audio-visual alarm device which would alert workers in the tunnel when any indication of danger is detected.

### 2- Ventilation

The tunnel ventilation equipment should be designed and installed by persons with suitable training and experience. The schedule of inspections, tests and maintenance of the tunnel ventilation system should be clearly specified to ensure its efficiency.





### 3- Drilling and Blasting Underground

- Before starting any drilling process in tunneling projects, an expert person must inspect all drilling and related equipment as well as the drilling area and correct any hazards.
- Employees are not allowed to touch drill mast when a drill bit is in operation or a drill machine is being moved.
- In case of moving a drill machine, all associated equipment and tools must be secured and the mast placed in a safe position.
- Whenever a tunneling blasting operation is complete, the expert person must check the air quality.
- Blasting wires must be kept away from electrical lines, pipes, rails and other conductive material (except earth), to prevent explosions.



### 4- Personal Protective Equipment (PPE)

All workers are required and obliged to wear a full package of PPE to prevent any serious injuries.

### 5- Illumination

- Adequate illumination is essential for the workers to work and move around safely in the tunnel construction. It also allows workers to easily see and recognize the hazards in the workplace.
- The lighting system in the tunnel should be of waterproof type and fixed at suitable locations to provide illumination and reduce glare or shadow.
- Where portable lighting devices are used, a proper management system should be put in place and facilities should be provided for their proper storage, charging, distribution and maintenance.
- Emergency lighting should be installed along the escape route, at the entrances and exits.





#### **6- Check-in/check-out Procedures (Tag in/tag out System)**

The employer must maintain a check-in/check-out procedure to ensure that personnel outside the tunnel maintain an accurate accounting of the number of persons inside the tunnel and to prevent unauthorized persons from gaining a safe access to the site.

In other word, the number of workers staying in the tunnel should, as much as possible, be kept to a minimum. Although, the work is not appropriate to work alone.

#### **7- Fire Prevention and Control**

- Open flames and fires are prohibited in tunnel construction areas except as permitted for welding, cutting, or other hot work operations.
- Smoking is forbidden in tunnels construction operation unless an area is free of fire and explosion hazards. Signage of No-smoking and open flames should be placed throughout work areas.
- Keep work areas orderly and clean-up worksite from all debris at the end of each work shift.

#### **8- Tools & Equipment**

- All power and extension cables must be connected with ground-fault protection.
- Ladders, scaffolding, forklifts, etc., shall be performed by skilled and properly trained workers.
- Tools and equipment must be inspected prior to use and remove from service if found any defective.
- The use of radios, disc players, or other devices with ear phones is strongly prohibited.

#### **9- Chemical Use & Storage**

- Material Safety Data Sheets (MSDS) must be available for any chemical brought to the site and be readily accessible at all times.
- Storage and disposal of explosive, chemicals and other hazardous materials must be done in full compliance with all applicable KRG's regulations.



## 10 CONSTRUCTION HEALTH & SAFETY CHECKLIST

This checklist identifies some of the risks most likely found on construction sites (Road and Building Projects). By answering below questions, the Ministry can decide whether the work site is enough safe and healthy places to work or not.

ACCESS ON SITE	Y	N	N/A	COMMENTS
Can everybody get to their workplace safely?				
Are access ways free from barriers and clearly sign boarded?				
Are holes well protected with clearly marked and fixed covers to prevent falls?				
Are temporary structures stable, properly braced and not overloaded?				
Will permanent structures stay stable throughout whatever repair or demolition work?				
Is the site clean and tidy, and are materials stored safely?				
Is lighting sufficient, especially when work is being carried on after dark outside or inside buildings?				

WELFARE	Y	N	N/A	COMMENTS
Are toilets available and are they kept clean and properly lit?				
Are there washbasins, hot and cold water, soap and towels?				
Are the washbasins big enough? And are they kept clean?				
Is there any place to change, dry and store clothing?				
Is there a cabinet where workers can sit, make hot drinks and prepare food? Are drinking water and cups provided?				
Can everyone reach the welfare facilities easily and safely?				

LADDERS	Y	N	N/A	COMMENTS
Is there a safer way or more suitable equipment to be used instead of ladders?				
Are the ladders in good condition?				
Are the ladders rest against a solid surface and not on easily broken surfaces or insecure materials?				
Are the ladders secured to prevent of any slipping sideways or outwards?				
Do ladders raise a sufficient height above their landing place (above five rungs)? If not, are other handholds available?				
Are the ladders installed so that users do not have to overstretch?				





SCAFFOLDS	Y	N	N/A	COMMENTS
Are scaffolds erected, changed and dismantled by experienced people?				
Are all uprights provided with base plates (and where necessary, timber individual plates)?				
Are all uprights, ledgers, transoms and braces in their position?				
Is there scaffold tied to the building or structure in enough places to prevent collapse?				
Are there double guard rails and toe boards or other appropriate protection at every edge, to prevent falling?				
Are brick guards provided to avoid materials falling from scaffolds?				
Would those attempting platforms fully boarded and are the boards arranged to avoid tipping or tripping?				
Are there proper barriers or warning signs available to stop people using an incomplete scaffold?				
Is the scaffold strong enough to hold all the weight of materials stored on it and are these consistently distributed?				
Does a capable person inspect the scaffold often, e.g. at least once a week if the working platform is 2m or higher or at suitable intervals if less than 2m and always after it has been misused or damaged and following extreme weather?				
Have the wheels of tower scaffolds been well locked and outriggers deployed when in use and are the platforms empty when they are moved?				

ROOFWORK	Y	N	N/A	COMMENTS
Is there any protection to stop people or materials from falling?				
During the roofing construction, have nets been provided and been rigged safely by an experienced person to stop people falling from the leading edge of the roof?				
Have you identified weak surfaces such as fiber cement sheets and roof lights?				
Have necessary precautions been taken to stop people falling through weak surfaces when working on the roof, e.g. by providing barriers, covers, or working platforms?				
Are people informed and kept away from the area below the roof work?				



POWERED ACCESS EQUIPMENT	Y	N	N/A	COMMENTS
Has the equipment been installed by an experienced person?				
Are the operators well trained and competent?				
Is the safe working load clearly marked?				
Is the equipment inspected by an experienced person?				
Does the working place of the powered access equipment have sufficient, secure guard rails and toe boards or other barriers to avoid people and materials falling off?				

TRAFFIC, VEHICLE AND PLANTS	Y	N	N/A	COMMENTS
Are vehicles and pedestrians kept apart? If not, do you: <ul style="list-style-type: none"><li>• Separate them as much as possible and use barriers?</li><li>• Advise people about the problem, and what to do about it?</li><li>• Display warning signs?</li></ul>				
Can nil tail swing excavators be used or is there sufficient authorization around slewing vehicles?				
Can reversing be avoided in the case of using a one-way system? if not, have trained flagmen been involved to guide the drivers?				
Are vehicles and place properly maintained, e.g. do the steering, lights, handbrake and footbrake work safely and properly?				
Are loads properly secured?				
Have you made sure that plant and vehicles are not used on unsafe slopes?				

HOISTS	Y	N	N/A	COMMENTS
Has the equipment been installed by an experienced person?				
Have you ensured that the hoist legs are balanced and in the most stable position?				
Are the operators enough trained and capable?				
Is the rated capacity clearly marked?				
Are the hoists regularly inspected by an experienced person?				
Is there an appropriate base enclosed space to prevent people from being struck by any moving part of the hoist?				



CRANES	Y	N	N/A	COMMENTS
Is the crane maintained for the job?				
Has the lift been properly planned by a selected person'?				
Is the crane on a firm, level base? Are the riggers properly set?				
Who is the selected 'crane supervisor' responsible for controlling the lifting operation on site?				
Is the load well secured?				
Has the signaler/slinger been well trained to give signals and to attach loads correctly?				
Are you sure that the driver can see the load and a trained signaler has been provided to help?				
Does the crane have a current report of detailed examination and record of inspection?				

EXCAVATION	Y	N	N/A	COMMENTS
Is there adequate support for the excavation, or the edges have been sloped back to a safe angle?				
Is there safe access into the excavation, e.g. a sufficiently long, secured ladder?				
Are there fences or other protection to stop people and vehicles from falling in?				
Are secure stop blocks provided to prevent tipping vehicles from falling in?				
Could the excavation influence the stability of neighboring structures or services?				
Is the excavation regularly inspected by a capable person?				
Is there adequate support for the excavation, or the edges have been sloped back to a safe angle?				

MANUAL HANDLING	Y	N	N/A	COMMENTS
Are heavy materials such as roof trusses, concrete lintels, curb-stones or bagged products could cause problems if they have been moved by hand? If so, can you: <ul style="list-style-type: none"><li>Choose lighter materials.</li><li>Use wheelbarrows, hoists, or other equipment so that manual lifting of heavy objects is kept to a minimum.</li><li>Order materials in bags such as cement and aggregates in 25 kg.</li></ul>				
Have people been coached and trained on how to lift safely?				



HAZARDOUS SUBSTANCES	Y	N	N/A	COMMENTS
All dangerous substances and materials, such as asbestos, solvents, paints, and cement have been identified and safely stored?				
Has been properly checked whether a qualified contractor is needed to deal with asbestos on-site? (License is required for most of the asbestos works)				
Have you identified and put into place precautions to avoid or control exposure to hazardous substances, by: <ul style="list-style-type: none"><li>• Doing the work in a different method in order to remove the risk totally.</li><li>• Using a less harmful material; or</li><li>• Using tools fitted with dust removal?</li></ul>				
Have workers had enough information and training so they know what the risks are from the hazardous materials used and produced on site, and what they need to do to avoid the risks?				
Has a healthy surveillance technique been arranged for people using certain hazardous substances (e.g. lead)?				

NOISE	Y	N	N/A	COMMENTS
Have workers had all information and training so they know what the risks are from noise on-site, and what they need to do to avoid those risks?				
Can the noise be reduced by using a different working manner or selecting a quieter plant, e.g. using machinery with silencers?				
Are people who not involved in the work kept away from the source of the noise?				
Is proper hearing protection provided and worn in noisy areas?				
Have hearing protection zones been clearly marked?				
Has a healthy environment been arranged for people exposed to high levels of noise?				

HAND- ARM VIBRATION	Y	N	N/A	COMMENTS
Have workers have had all the information and training so they know what the risks are from hand-arm vibration (HAV) on site, and what they need to do to avoid those risks?				
Are the risks have been explained and assessed to workers from long-time use of vibrating tools such as concrete breakers, angle grinders, or hammer drills?				
Has exposure to hand-arm vibration (HAV) been reduced as much as possible by selecting suitable work manners and plant?				
Are reduced-vibration tools used whenever possible?				



Have vibrating tools been well checked and accurately maintained?				
Has a healthy atmosphere been arranged for the people who exposed to high levels of hand-arm vibration, particularly for long period's users?				

ELECTRICITY AND OTHER SERVICES	Y	N	N/A	COMMENTS
Have all necessary services been provided on-site before commencing of the and have you also identified existing services present on site (e.g. electric cables or gas mains) and taken effective steps to prevent danger from them?				
In case of using low voltage for tools and equipment, e.g. battery-operated tools or low-voltage systems?				
In case of using mains voltage, are trip devices (e.g. residual current devices) provided for all equipment?				
Are residual current devices checked daily by users and properly maintained?				
Are cables and leads protected from damage?				
Are tools and equipment have been checked by trained users? visually examined on-site and regularly inspected and tested by an experienced person?				
Where there are overhead lines, has the electricity supply been turned off, or have other precautions been taken, such as providing taped markers?				

CONFINED SPACES	Y	N	N/A	COMMENTS
Do the workers and employees working in confined spaces where there may be an insufficient supply of oxygen or the existence of poisonous or flammable gas? If so, have you taken all the necessary precautions?				
Confined spaces include tanks, sewers and manholes; do they look dirty and dangerous?				

TOOLS AND MACHINERY	Y	N	N/A	COMMENTS
Are the proper tools or machinery being used?				
Are all hazardous parts guarded, e.g. gears, chains drives, projecting engine shafts?				
Are guards well secured and in good repair?				
Are all operators well trained and skilled?				



FIRES AND EMERGENCIES	Y	N	N/A	COMMENTS
<b>GENERAL</b>				
Are there emergency procedures, e.g. for evacuating all people from the site in case of fire or for rescue from a confined space?				
Do all the peoples on site know what the procedures are?				
Is there a means of raising the alarm, and does it work properly?				
Are there sufficient escape routes and are these kept clear?				
Is there sufficient first-aid provision?				
<b>FIRE</b>				
Is the quantity of flammable materials, liquids and gases on-site kept to the minimum level?				
Are they properly and safely stored?				
Are flammable gas cylinders returned to a ventilated store at the end of each shift?				
Are smoking and other explosion sources barred in areas where gases or flammable liquids are stored or used?				
Are gas cylinders, associated hoses and other equipment properly maintained and in good condition?				
When gas cylinders are not in use, are the valves fully closed and marked?				
Is flammable and burnable waste removed regularly and stored in suitable container or skips?				
Are suitable fire extinguishers provided?				



PROTECTING THE PUBLIC	Y	N	N/A	COMMENTS
Is the work fenced off from the public?				
Are roadwork's barrier off and lit, and a safe alternative road provided?				
Are the public protected from falling material?				
A safe route has been provided through roadwork's or pavement scaffolding for people with prams, wheel-chair users and visually impaired people?				
When work has stopped for the day: <ul style="list-style-type: none"><li>• Is the borderline safe and undamaged?</li><li>• Are all ladders removed so that they cannot be used?</li><li>• Are excavations and openings securely and properly covered or fenced off?</li><li>• Is all plant immobilized to avoid unauthorized use?</li><li>• Are bricks and materials safely stacked?</li><li>• Are unsafe materials locked away in secure storage places?</li><li>• Are the vehicles and equipment properly &amp; safely parked out of the road?</li><li>• Vehicles are well barricaded by reflect-able signs and hazard tapes to avoid any potential accident during the night?</li></ul>				



## 11 SAFETY SIGNS & COLOR CODING

This section includes some essential advices for both supervisor directorate and contractor's staffs which should keep and implement in all project sites.

### A- Signage Colors;

MOCHA and its contractor must ensure that their staff and workers are aware of the different types of signage, their color coding and meanings. All signs will have a pictogram as well as text indicating the condition required. For example;









<b>Red</b>	<b>Prohibitive</b>	<b>(Must not do)</b>
No Smoking, No unauthorized entry, Do not touch, No vehicles, etc.		
<b>Blue</b>	<b>Mandatory</b>	<b>(Must do)</b>
Wear hard hat, Wear eye protection, Wear hearing protection, Sound home, etc.		
<b>Yellow</b>	<b>Caution</b>	<b>(Hazard warning)</b>
Fragile roof, High voltage, Asbestos, Forklift trucks, Low headroom, etc.		
<b>Green</b>	<b>Safe Condition</b>	<b>(The Safe way)</b>
First aid, Escape route, Assembly Point, Eye wash, Emergency phone, etc.		

- Some signs may contain a combination of two or more conditions for example;



## B- Safety Helmet Color;

The color of safety helmet depends on site, department, company, industry and sometimes geography. However, below are some of the helmet colors.

Color	Image	For
White		Managers, Engineers, Supervisors and Foremen.
Blue		Electricians, Carpenters and other technical operators apart from civil workers.
Green		Safety Officers, health and Environment personnel.
Red		Fire Fighters.
Orange		Lifting operatives, Banksman slingers / signallers or traffic marshals but mainly lifting operatives wear orange hard hats so the crane operator can pick them out from other operatives. Also, can be used by road crews.
Yellow		General laborers and earth moving operators.
Brown		Welders and workers with high heat application.
Grey		Site Visitors.



## 12 APPENDIX A

HAZARD REPORT			
Company: _____		Project: _____	
Date: _____			
Submitted by: _____		Signature: _____	
Submitted to: _____			
The following hazard has been identified in relation to your work:			
Risk Level: <input type="checkbox"/> Class A (High) <input type="checkbox"/> Class B (Low) <input type="checkbox"/>			
Location: _____			
To be completed by Supervisor:			
Action Required:			
By Whom: _____		By When: A. Within 24-48 hrs <input type="checkbox"/> B. Within 7 days <input type="checkbox"/> C. Within 7-14 days <input type="checkbox"/>	
Corrective Action:			
Completed By: _____		Time: _____ Date: _____	
Signature: _____			
Confirmed By: _____		Time: _____ Date: _____	
Signature: _____			



REGISTER OF INJURY	
<b>Details of Injured Person:</b>	
NAME: _____	Surname: _____ Given Name(s): _____
Sex (M/F): _____	
Address: _____	
City: _____	Contact Phone: _____
EMPLOYER: _____	Business Name: _____
Address: _____	
City: _____	Contact Phone: _____
<b>Accident/ Incident Details:</b>	
Description of Events: _____	
Date of Injury: _____	Time of Injury: _____ am/pm
Task/ operation undertaken at the time of injury: _____	
Physical location (area) where the injury occurred: _____	
Type of injury (eg. Bruise, cut, fracture, grit in eye, etc.): _____	
Part of body injured (eg. Arm, leg, head, etc.): _____	
Cause of Injury (what happened): _____	
Treatment given/ Action taken: _____	
<b>Person Completing the Form:</b>	
Surname: _____	Given Name(s): _____
Signature: _____	
Date: _____	Time: _____ am/pm
Did the person stop work?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Has a referral for further treatment been issued?	<input type="checkbox"/> Yes <input type="checkbox"/> No

## 13 REFERENCES

<https://www.hse.gov.uk/construction/>

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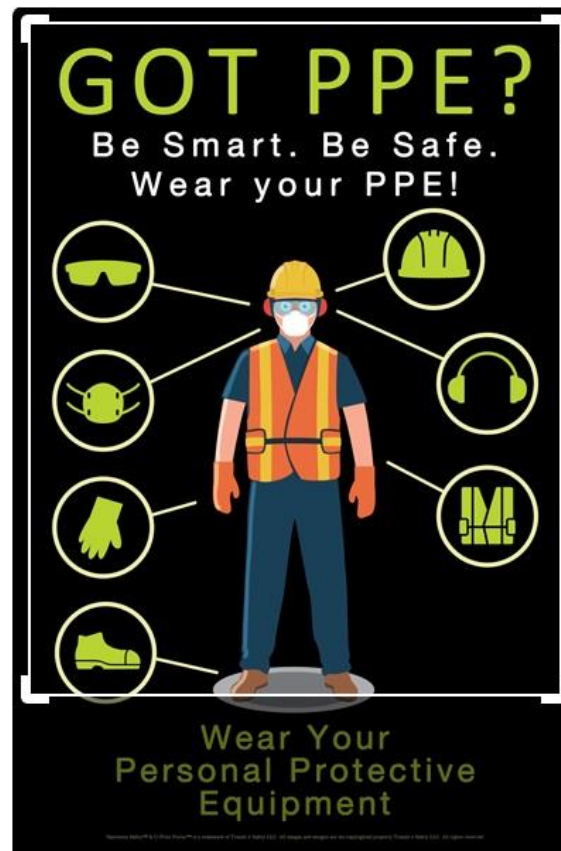
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