

HUMAN MACHINE PROCEDURE				Document ID :	
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Doc. Type: PRC	Discipline: CSE	Phase: DE	Class: 2	Page 1 of 14	
Vender Reference: N/A			System / Subsystem: NN	Equipment Type: N/A	

  
AMIRAL PROJECT

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HUMAN MACHINE PROCEDURE

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1 PURPOSE

This procedure and guidance information has been developed to highlight the hazards and the precautions and facilities necessary to prevent accidents/damages while working near the heavy equipment on the CONTRACTOR Construction facilities to prevent loss of life, serious injuries to the people.

Also to make sure the human interface between machinery and human is eliminated/minimized to as reasonable as practicable

2 SCOPE

This document shall cover the AMIRAL Project for both block 15 Construction area and Temporary Construction Facilities at block 14 HDEC laydown and Site Offices.

To be used by all members of the CONTRACTOR, and Subcontractors personnel. It is the responsibility of everyone to take all steps to preventing risks associated with the heavy equipment, not only in their areas of control, but also to continually be vigilant in all other areas of the project, camp accommodation and office facilities.

3 RESPONSIBILITIES

3.1. PROJECT MANAGER/SUPERVISOR

- Project Manager is responsible for the overall implementation of the Human machine Interface Plan.
- Specific responsibilities have been assigned to other personnel as described below.

3.2. CONSTRUCTION MANAGER

To develop, in conjunction with HSE Manager and Administration Manager, that all earthmoving and construction equipment at the Job, Laydown, and Fabrication Sites, whether owned or operated directly by CONTRACTOR, Subcontractor, and any Subcontractors thereof, or rented or provided for the work via other agreements shall have both PWAS and RVCCCS installed, tested, and operating at all times while the equipment

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is at the Job, Laydown, and Fabrication Sites.

To develop, in conjunction with HSE Manager and Administration Manager, Risk Assessments for all Equipment, Heavy vehicle activities on site including delivery arrival and departure, as well as loading and unloading, to enable the introduction of control measures to identify hazards and reduce risks. These include:

- Provisions of one way traffic routes
- Segregation of pedestrians and vehicles
- Loading and unloading areas
- Speed control measures
- Warning notices
- Elimination or maximum reduction on vehicle reversing operations.

3.3. PROJECT HSE MANAGER/SUPERVISOR

- To ensure that training of this procedure are given and followed by all personnel in the construction area.
- To assist with the development of the written emergency plans.
- To provide training is required for drivers, operators and flagmen appointed in site.
- To ensure all the flagman assigned with the equipment are aware of the hazards associated with it.
- To arrange traffic management training for all supervisors and staff for effective controlling of workforce in construction site as per the procedure.
- Ensure that pedestrian walkways are provided and clearly marked and that all the workers are advised or trained one this

3.4. SITE SUPERVISOR

- Site supervisor should be care about the people working near the vehicle access or working near the equipment moving area. Nobody should be allowed to work

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near the moving equipment.

- Ensure unwanted personnel are not entering to the working area.
- Workers entry to the access road in undesignated area should be controlled. A Designated trained person (Flagman) should be assigned with all heavy equipment in the construction area.
- Ensure that unauthorized personnel (without license and SA approval) are not operating the equipment.
- Ensure that equipment are parked in designated parking areas only.
- Ensure the fitness of the vehicle by checking the equipment inspection check list and the 3rd Party sticker and SA equipment sticker.

3.5. EQUIPMENT MANAGER/SUPERVISOR

The contractor's equipment manager/supervisor or equivalent position shall ensure that all equipment purchased, rented or leased is equipped with required safety devices and has a required testing laboratory stamps, labels and certifications affixed, including below responsibilities but not limited to:

- Verify heavy equipment operators are certified as required by SA.
- Ensure compliance with the requirements of GI 7.024 through GI 7.031 as applicable.
- Ensure periodic tests, inspections and maintenance of equipment are carried out when due and records are properly maintained and available for review by the SAPO.
- Ensure equipment defects are promptly repaired and defective equipment is immediately -red tagged, removed from service.
- To established preventive maintenance schedules and strictly followed for each piece of equipment to prevent break down during operations as per CSM III-2 Mechanical and Heavy Equipment 2.3.10
- Ensure tools constructed of good quality materials are used. Use of "homemade"

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tools is prohibited.

- Use only trained personnel who are properly qualified for the work to be performed.
- Ensure that equipment operators operate only the specific equipment for which they have been trained and/or certified
- Plan and maintain good housekeeping in the work area.

3.6. EQUIPMENT OPERATOR

- Operators shall ensure the work area is clear prior to operating mechanical and heavy equipment.
- Equipment operators shall conduct pre-use inspections on all mechanical and heavy equipment. Operators performing these inspections shall ensure the following, at a minimum, prior to operating the equipment:
 - No fuel, oil, hydraulic fluid, water, etc., leaks are coming from the equipment. Spills shall be immediately contained, cleaned up, and properly disposed.
 - Hose and pipe connections are checked and free of wear and cracks. Defective hoses/pipes shall be replaced or repaired.
 - All lights and warning devices operate properly.
 - Wiring inspected and free of damage or improper repairs.
 - Fire extinguisher(s) available, inspected, tagged, and operable.
- To ensure any mechanical or heavy equipment left unattended at night, if adjacent to a highway or construction area where work is in progress, shall have appropriate lights/reflectors installed or barricades shall be installed and equipped with appropriate lights/reflectors to identify the location of the equipment. As per CSM III-2 Mechanical and Heavy Equipment 2.3.18.
- To ensure when a crane or other mechanical and heavy equipment, such as concrete pumping equipment or boom truck, is operating near or traveling under an energized overhead power line, a designated signalman or flagman shall be assigned to ensure that minimum distances are maintained. As per CSM 111-2 Mechanical and Heavy Equipment 2.3.23.

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3.7. CONTRACTOR PERSONNEL

- Personnel shall not ride in or work off any part of the equipment, unless it is specifically designed for such work. As per CSM III-2 Mechanical and Heavy Equipment 2.3.19.
- Personnel shall not rest or sleep (e.g., seek shade) under mechanical or heavy equipment at any time. As per CSM III-2 Mechanical and Heavy Equipment 2.3.20.
- Immediately report all incidents or hazardous conditions to their supervisor.
- Properly use the correct tools and equipment for the job.
- Keep tools in good condition and repair and properly use the correct PPE.
- Obey posted warning signs.
- Personnel shall make direct eye contact with the driver when entering barricaded area where the heavy equipment is operating to make sure the Heavy equipment operator or driver is made aware of the personnel presence in the work location.

4 INTRODUCTION

The goal of this plan is to contribute to the design and implementation of safe and effective human machine interfaces. This plan will help to eliminate unintentional contact between construction equipment and personnel during heavy equipment operations.

Equipment including powered mobile plant moving in and around workplaces, reversing, loading and unloading are activities frequently linked with workplace injuries and fatalities.

The safest way to protect personnel is to eliminate the hazard, which means removing the use of all vehicles including powered mobile plant or removing all personnel from the heavy equipment working areas.

Where this is not reasonably practicable, the risks must be minimized so far as is reasonably

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practicable. This can be achieved by careful planning and by controlling heavy equipment operation area from the unwanted or unauthorized personnel entry.

The key issues to consider for managing construction heavy equipment at a construction workplace include:

1. Keeping all personnel away from the heavy equipment area by providing barricades and signage.
2. Only allow the trained operators to operate the equipment.
3. Clear visibility of equipment and personnel. All windows should be clean and clear (curtains/cardboard shall not obstruct the operator's view).
4. Provide a trained flagman/Spotter to assist the operator.
5. Reverse/backup alarms shall be audible at a level at least 10 dB above ambient noise on all heavy equipment.
6. Repairs, adjustments or replacement of parts shall not be permitted on operating equipment.
7. Personnel shall not ride in or work off any part of the equipment, unless it is specifically designed for such work.
8. Engines shall be stopped, the parking brake applied and wheels chocked when mechanical or heavy equipment is left unattended, including overnight. As per CSM III-2 Mechanical and Heavy Equipment 2.3.16.
9. Equipment must be stopped and engines turned off before refueling as per CSM III-2 Mechanical and Heavy Equipment 2.3.21.
10. Heavy equipment that will be left unattended overnight shall be made immobile by disconnecting the battery or by other appropriate means if there is no lock for the cab and the engine compartment access is readily available.

5 INFORMATION, INSTRUCTION AND TRAINING

All workers need to know and understand the rules, site safety policies and procedures for the workplace. Instructions should be provided to visitors before their visit.

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External drivers should be aware of the site's traffic safety procedures, any restrictions on vehicle size or type, speed limits and where they are to make the delivery prior to attending the workplace.

A site-specific health and safety rules and the arrangements for ensuring that all persons at the workplace are informed of these rules must be included as part of training.

Other persons at the workplace, so far as they're able, must comply with any reasonable instruction that is given by. They must also take reasonable care for their own health and safety and that they do not adversely affect the health and safety of others.

6 KEEPING PERSONNEL AND EQUIPMENT APART

1. The following actions will help keep personnel and equipment apart in the workplace.
2. Secure the areas where vehicles and powered mobile plant are being used, for example pedestrian barriers or traffic control barricades.
3. Provide barricade and signage to control the unauthorized entry of personnel in to the area.
4. Where equipment are working near the access road, personnel or other equipment/vehicles controlled by providing signal men and sign boards.
5. Construction equipment should be parked in designated parking areas or if it is parked near the road, hard barricades shall be provided.
6. Only authorized personnel shall be allowed to enter the work area where mechanical and heavy equipment is in operation. When entering the work area, authorized personnel shall make direct eye contact with the equipment operator(s) to ensure their presence is known.
7. Trained banksman/flagmen shall be used when human traffic is present in a heavy equipment work area.
8. Consider scheduling work that eliminates vehicles, powered mobile plant and



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pedestrians being in the same area at the same time.

9. Steps should be taken to make sure that all workers have the necessary training, qualifications or licenses to operate the vehicles, plant and attachments they use, for example:
 - a. Checks for licensing, qualifications and health when recruiting drivers/operators or hiring contractors
 - b. Training drivers and operators
 - c. Managing the activities of visiting drivers.

Incidents can also occur when untrained or inexperienced workers drive construction vehicles. Access to vehicles should be managed and workers alerted to the risk.

Where multiple items of powered mobile plant are being operated around the workplace, a person with the necessary training (flag man) should direct the plant:

1. When operating in close proximity to each other.
2. When reversing.
3. Where persons are on the ground.
4. In other situations as indicated by a risk assessment.

7 VEHICLE/S REVERSING

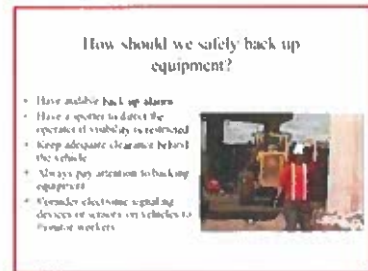
The need for equipment to reverse/maneuver should be avoided where possible as reversing is a major cause of fatal accidents where it is necessary for vehicles to reverse:

1. Use beacon lights, reversing sensors, mirrors and warning devices such as reversing alarms
2. Ensure drivers have another person (Trained Flag man) to direct them before reversing if they cannot see clearly behind. The driver should maintain visual contact with the person directing them and signalers should wear high visibility clothing.

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3. Ensure workers and other people are familiar with reversing areas and reversing areas are clearly marked
4. Ensure operational plant movements are alerted to workers including swing radius, articulation points and overhead load movement.



8 VISIBILITY OF VEHICLES AND PEDESTRIANS

The following measures should be considered for the visibility:

1. Mirrors, reversing cameras and sensors that can help drivers see movement all-round the vehicle
2. Visual (flashing lights) warning devices, reversing alarms and high-visibility markings for powered mobile plant
3. A trained person (Flag man) who can be appointed to control maneuvers.
4. The use of positive communication, for example flags, hand signals, eye contact and verbal confirmation. Line of sight communication can include the use hand signals or cap lamp light signals. The person receiving the message must provide acknowledgement that the message has been received and understood
5. High-visibility or reflective clothing for workers, pedestrians and plant operators at the workplace.
6. Equipment operators shall have 360-degree visibility when operating equipment (e.g., curtains/cardboard shall not obstruct the operator's view). Cabs shall be kept clean and clear of items such as rubbish and loose tools. Windows shall be kept clean at all times and shall be replaced if the glass becomes pitted, cracked, or broken. As per CSM 111-2 Mechanical and Heavy Equipment 2.3.14.

8. TRAINING:

- Management shall conduct required training and awareness for usage, function, maintenance of Proximity Warning Alert System (PWAS).
- All training shall be conducted by a competent person from the PWAS

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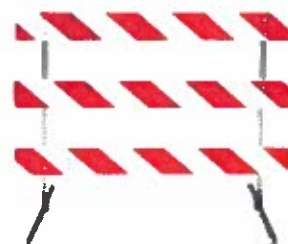
manufacturer/provider.

- Heavy equipment operator will be required to undertake appropriate refresher training every Six (6) months in order to improve their competency. This will include "Defensive Driving" training.
- Safe Driving campaign to be conducted every 6 months that is relevant to heavy equipment operator working on the site

9 SIGNS

Prominently display clear warning signs in relevant, well-lit areas to remind persons of the hazards and requirements. Excavations should be clearly signed and properly barricaded.

Traffic routes should be clearly sign posted to indicate restricted parking, headroom, speed limits, vehicle movement, key site areas and other route hazards. Standard road signs should be used where possible and speed limits should be implemented and enforced.



10 PROXIMITY WARNING SYSTEM

"Warning Alert System" or "PWAS" shall mean a set of equipment consisting of Sensor(s) & Alarm Display(s) to be installed in moving equipment, which detects objects and personnel within a pre-defined hazard zone and provides an audible and visible warning to equipment operator(s) when entry into the zone is detected.

All earthmoving and construction equipment at the Job, Laydown, and Fabrication Sites

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shall have both PWAS and RVCCCS installed and operating at all times while the equipment is at work sites.

Examples of earthmoving and construction equipment include,

- Bulldozer
- Roller / Vibratory Compactor
- Earthmoving Equipment
- Haul and Dump Trucks
- Tracked or Wheeled Shovels and Loaders
- Tracked or Wheeled Excavators
- Scrapers
- Motor Graders
- Gradalls
- Water Tankers
- Waste and Fuel Tankers
- Tractors
- Telescopic Handlers
- Backhoe

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Buses, passenger cars, pickup trucks, concrete pump trucks, and external vendor or supplier delivery trucks bringing material to the Job, Laydown, and Fabrication Sites (collectively, "Excluded Equipment") do not require installation or use of a PWAS or RVCCCS.

11 REFERENCES

1. Saudi Aramco Construction Safety Manual CSM III Part 2 Mechanical and Heavy Equipment
2. Construction HSE Plan - SA-AMI-000-EHSE-000001
3. SAFETY MANAGEMENT SYSTEM - SA- AMI-000-EHSE-000010
4. GI 7.025 HEAVY EQUIPMENT OPERATOR TESTING AND CERTIFICATION
5. GI 7.030 INSPECTION & TESTING REQUIREMENTS FOR ELEVATING/LIFTING EQUIPMENT
6. GI 6.001 NOTIFICATION REQUIREMENTS FOR INCIDENTS
7. GI 6.030 TRAFFIC AND VEHICLE SAFETY
8. G.I 7.026 11/28/1993 CRANES AND HEAVY EQUIPMENT ACCIDENT REPORTING PROCEDURES