



GUIDELINES FOR PUBLIC SAFETY AND HEALTH AT CONSTRUCTION SITES

(1st Revision)

**DEPARTMENT OF OCCUPATIONAL SAFETY AND HEALTH (DOSH)
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The Guideline has been endorsed by the Department's Jawatankuasa Semakan Dasar chaired by the Director General of the Department of Occupational Safety and Health.

FOREWORD

This guideline is the first revision of the Guidelines For Public Safety And Health At Construction Sites 1994.

The purpose of these guidelines is to provide guidance to employers on how good work practices can be carried out on every activity in the construction to prevent accident to the workers and public.

It is hoped that these guidelines will serve as a standard reference for Developers, Contractors, Engineers, Architects, Designers and Safety and Health Officers. We would exhort all parties concerned to make the work site and its surrounding area a safer place for the public as well as the workers by following the recommended practices.

I would like to thank the Technical Committee for their effort in the preparation and publication of this guideline.

Director General
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1.0 INTRODUCTION

The building operations and works of engineering construction industries in Malaysia have made tremendous progress in recent years and the increase in their activities have affected the general public's safety and health. Construction sites create a risk not only for the construction worker, but also for the public who move around the site or who may live adjoins them. Examples of the hazards created are:-

- Changes to the surface level;
- Excavations, holes and trenches;
- Falling material and debris;
- Plant and equipment;
- Dust, vapours or other hazardous substances;
- Noise;
- Vibration; and
- Movement of vehicular traffic

The general public must be protected from the hazards associated with construction work that may be carried out in a public area or adjacent to such area.

The Department of Occupational Safety and Health (DOSH) and other government agencies have regulations that lay down the legal requirements to ensure the safety and health of not only the workers at the place of work but also the public as well. This guideline applies to all place of work in building operation and work of engineering construction activity in Malaysia covered by the Occupational Safety And Health Act 1994 (Act 514), the Factories And Machinery Act 1967 (Act 139), and all the regulations made there under. It is designed to serve as a handy reference and to be read together with the above mentioned legislations and other industry codes of practice.

In this document, the terms "shall" and "should" are used. "Shall" is used in places where there is a statutory and technical requirement to achieve the desired result. "Should" is used as a way of indicating a preference. It does not indicate a mandatory requirement as other alternatives may achieve an equivalent result.

2.0 DEFINITIONS

- 2.0 **Employer** means immediate employer or the principal employer or both. (*Section 3, Occupational Safety and Health Act 1994*)
- 2.1 **Developer** means any person, body of persons, company, firm or society who or which engages in or carries on or undertakes the business of developing or providing monies for development or purchasing or partly developing and providing monies for purchasing buildings. (*Section 3, Street, Drainage, And Building Act 1974 (Act 133)*)
- 2.2 **Contractor** means a person who has entered into a contract for the purpose of carrying out any building operations or work of engineering construction

and includes a main contractor or subcontractor. (*Regulation 2, Building Operations And Works Of Engineering Construction*) (*Safety*) Regulations, 1986);

- 2.3 **Main contractor** means a person who has entered into a contract with an owner or lessee of a property or his agent for the purpose of carrying out any building operations or work of engineering construction. (*Regulation 2, Building Operations And Works Of Engineering Construction*) (*Safety*) Regulations, 1986);
- 2.4 **Safety and Health Officer** means a person who registered under provision of regulation 6(1), Occupational Safety and Health (*Safety and Health Officer*) Regulations 1997;
- 2.5 **Designated Person** means a competent person appointed by an employer to carry out any supervision or inspection or to perform any tasks or duty prescribed by Building Operations And Works Of Engineering Construction (*Safety*) Regulations, 1986;
- 2.6 **Contractor Safety Supervisor** means a contractor's safety supervisor appointed under regulations 26, Building Operations And Works Of Engineering Construction (*Safety*) Regulations, 1986;
- 2.7 **Site Safety Supervisor** means a site safety supervisor appointed under regulations 25, Building Operations And Works Of Engineering Construction (*Safety*) Regulations, 1986;
- 2.8 **Professional Engineer** means a "registered Professional Engineer" as defined by section 2 of the Registration of Engineers Act 2002 (Amendment).

3.0 LEGAL PROVISION

Subjected to section 17(1) under Occupational Safety And Health Act 1994, it shall be the duty of employer and every self-employed person to conduct his undertaking in such a manner as to ensure, so far as is practicable, that he and the other persons, not being his employees, who may be affected thereby are not thereby exposed to risks to their safety or health.

Subjected to section 17(2) under Occupational Safety And Health Act 1994, it shall be the duty of employer and every self-employed person, in the prescribed circumstances and in the prescribed manner, to give to persons, not being his employees, who may be affected by the manner in which he conducts his undertaking, the prescribed information on such aspects of the manner in which he conducts his undertaking as might affect their safety or health.

4.0 NOTIFICATION OF AN OPERATION

- 4.1 Subjected to Section 35 under Factories And Machinery Act 1967, every person who undertakes any building operations or works of engineering construction shall notify to Department of Occupational Safety and Health not later than seven days from the commencement of construction activities.
- 4.2 The notification is exempted to the construction activities that can be completed in a period less than six (6) weeks and does not involve the use of machinery.

5.0 NOTIFICATION AND REPORTING OF AN ACCIDENT AND DANGEROUS OCCURRENCE

- 5.1 Section 32 under Occupational Safety and Health Act 1994, an employer shall notify the nearest Department of Occupational Safety and Health office of any accident, dangerous occurrence, occupational poisoning or occupational disease which has occurred or is likely to occur at the place of work.
- 5.2 Method of notification and reporting an accident shall comply with Occupational Safety and Health (Notification of Accident, Dangerous Occurrence, Occupational Poisoning And Occupational Disease) Regulation 2004.

6.0 SAFETY AND HEALTH ORGANIZATIONS

6.1 Safety and Health Policy

Every employer shall prepare and as often as may be appropriate revise a written statement of his general policy with respect to the safety and health at work of his employees and the organization and arrangements for carrying out that policy, and to bring the statement and any revision of it to the notice of all of his employees. (*Section 16, Occupational Safety and Health Act 1994*)

6.2 Safety and Health Committee

The main contractor of a worksite in which forty or more persons are for the time being employed (whether by him or by other contractors employed by him or the client) shall establish a safety and health committee (on which both employees and management are represented) for the purpose of keeping under review conditions in the worksite which may effect the safety and health of the persons employed therein or the public. (*Section 30, Occupational Safety and Health Act 1994, Occupational Safety and Health (Safety And Health Committee) Regulations 1997*)

6.3 Occupational Safety and Health Management System

Every employer should established, implement and maintain an occupational safety and health management system and shall be in accordance with the requirement of the relevant Malaysian Standard or with any other equivalent Occupational Safety and Health Management System approved by Director General.

6.4 Safety And Health Officer

Every contractor of any building operation and works of engineering construction when the total contract price of the project exceeds twenty million ringgit Malaysia, they shall employ a safety and health officer. (*Section 29, Occupational Safety and Health Act 1994, Occupational Safety and Health (Safety And Health Officer) Order 1997*)

6.5 Site Safety Supervisor

The main contractor of a worksite shall appoint a part time site safety supervisor who should spend at least fifteen hours per week exclusively on safety supervision and on promoting the safe conduct of work generally within the site. (*Reg. 25, Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986*)

6.6 Contractor Safety Supervisor

Every contractor other than the main contractor in charge of worksite who employs more than twenty persons to carry out work on a worksite shall appoint a part time contractor's safety supervisor, who should spend at least five hours per week exclusively on safety supervision and on promoting the safe conduct of work generally by his employees. (*Reg. 26, Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986*)

7.0 GENERAL DUTIES OF EMPLOYERS

7.1 Every developer, main contractor, contractor and sub-contractor shall have a written statement of his general policy with respect to the safety and health at work of his employees and other persons who are not his employees, who may be exposed to risks to their safety and health. (*Section 16, Occupational Safety and Health Act 1994*)

7.2 Every main contractor, contractor and sub-contractor shall develop a safety and health manual that has provision for safe guarding the safety and health of the public and his employees. (*Section 15(2)(a), Occupational Safety and Health Act 1994*)

- 7.3 Every main contractor, contractor, and sub-contractor shall make an arrangement during operation, handling, transport, storage of plant and substance, to ensure the safety and health to the employees and public. *(Section 15(2)(b), Occupational Safety and Health Act 1994)*
- 7.4 Every developer, main contractor, contractor and sub-contractor shall ensure that all workers are properly informed of the hazards of their respective occupations and the precautions necessary and adequately supervise to avoid accidents, injuries and risk to health, and in particular that young workers, newly engaged workers, illiterate and foreign workers. *(Section 15(2)(c), Occupational Safety and Health Act 1994)*
- 7.5 Every developer, main contractor, contractor and sub-contractor shall provide sufficient allocation for ensuring that provisions to ensure the public and his employees safety and health are implemented and maintained.
- 7.6 Every owner, developer, main contractor, contractor and, sub-contractor shall take adequate steps to develop and promote safety and health programs to ensure not only the safety and health of his employees but also members of the public.

8.0 GENERAL DUTIES OF ARCHITECTS, ENGINEERS AND DESIGNERS

- 8.1 At the planning stage of any proposed building or civil engineering works, specific consideration should be given, by those responsible for the design and the construction, to the safety of the workers and the public who will subsequently be affected by the plant associated with the process of the erection of such structures.
- 8.2 Architects, engineers and other professional persons, not to include anything in the design that would necessitate the use of unwarrantably dangerous structural procedures and undue hazards, which could be avoided by design modifications, should exercise care.
- 8.3 Architects, engineers and other professional persons should exercise with care not to include anything in the design that would necessitate the use of unsafe construction procedures and create undue hazards. These should be avoided by means of design modifications where necessary.
- 8.4 It is also of the greatest importance that engineers should take into account the safety problems associated with the subsequent maintenance of plant where this would involve hazards.
- 8.5 Safety and health facilities should be included in the design for such work to be performed with the minimum of risk.
- 8.6 Measures should be taken to ensure that all the necessary safety and health program are efficiently implemented and properly maintained.

9.0 HAZARD IDENTIFICATION, RISK ASSESSMENT AND RISK CONTROL (HIRARC)

- 9.1 When planning method of work, a suitable and sufficient assessment should be carried out and recorded. Method, materials, and equipment should be selected to remove or minimize risk from work. Employers are responsible to carry out the risk assessment.
- 9.2 The principles of risk assessment listed below should be adhered to when determining methods and sequences of work:
- (a) identification of the hazards involved with the proposed work;
 - (b) assessment of the risk (likelihood and severity) of any potential harm arising;
 - (c) removal of risks, possibly by changing the proposed methods or processes;
 - (d) control of remaining risks;
 - (e) review, and if appropriate, update.

10.0 EMERGENCY RESPONSE PLAN

Emergency response plan should be established and maintained. This plan should identify the potential for accidents and emergency situations, and address the prevention of occupational safety and health risk associated with them. The plan should be made according to the size and nature of activity based on relevant international standard. It should:

- (a) ensure that the necessary information, internal communication and coordination are provided to protect all people in the event of an emergency at the worksite;
- (b) provide information and communication with the relevant authorities and the neighbourhood and the emergency response services;
- (c) address first aid, fire fighting and evacuation at construction sites; and
- (d) provide relevant information and training to all members of the organization, at all levels, including regular exercise in emergency response.

11.0 HOARDING

- 11.1 The worksite should be fully barricaded by protective hoarding so that the general public would be protected from work in progress. The hoarding should be able to protect not only public from dangers within the site but also act as barrier or security to prevent persons from trespassing into the site.



- 11.2 The hoarding should not be less than 1800mm in height and continuous down to the ground. It should be properly designed and constructed in accordance to the specification of the local authority and should be maintained in good condition.
- 11.3 There should be an adequate safety distance between the worksite and the hoarding.
- 11.4 Where the distance from a public place to the building being constructed is such that there is the likelihood of falling materials striking pedestrian or vehicular traffic, a gantry should be required.
- 11.5 During the erection of the hoarding, safe work procedures should be followed to ensure safety of the public.
- 11.6 The entrance to and exit from the worksite should be located in such a manner as to prevent danger and inconveniences to the public. Proper security should be maintained so as to prevent entry of unauthorized persons and public into the worksite.
- 11.7 Suitable warning signs should be posted at conspicuous positions.
- 11.8 No bills except warning signs should be allowed to be posted to the hoarding.
- 11.9 Arrangement should be made not to allow any parking or hawking activities at the surrounding perimeter of the hoarding when there is a high risk activity or operation being carried out that may cause a hazard to the surrounding.
- 11.10 All building materials should be stored and handled within the hoarded area.
- 11.11 Structures of construction machinery should be so located within the hoarded area that if the structures were to collapse, the safety of the public is not affected.
- 11.12 Gates should be of suitable design and adequate strength.

12.0 MOVEMENT OF VEHICULAR TRAFFIC

- 12.1 All vehicles used at worksites shall be roadworthy and comply with the requirements of the Road Transport Department of Malaysia.
- 12.2 No person shall drive a vehicle of any class or description in a construction worksite unless he is the holder of a driving license authorizing him to drive a vehicle of that class or description. (*Reg. 18(2)(b), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986*)



- 12.3 The design of the traffic control shall comply with the standard set and controlled by the relevant authorities.
- 12.4 Whenever any work is being performed over, or in close proximity to a highway or any other place where movement of vehicular traffic into and out of the work site may cause danger to the public, the working area shall be barricaded. Suitable and sufficient warning signs and warning lights shall be set up to direct traffic to slow down or away from it, and when necessary, the traffic shall be specially controlled by designated person. *(Reg. 18(1), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)*
- 12.5 Vehicles arriving at site and leaving site should be suitably scheduled to minimize congestion occurring on public road leading to the worksite.
- 12.6 Vehicles should be parked in designated areas within the hoarded area while being loaded or unloaded.
- 12.7 Where it is authorized by the local authority for vehicles ferrying materials to the worksite to be parked outside the hoarded area, suitable safety measures should be taken. Such measures should include cordoning off such parking areas and suitable warning signs, lights and flagman should be provided.
- 12.8 Where it is absolutely necessary for construction machinery to carry out work from outside the hoarded area, the operating area of the machine outside the hoarded area should be cordoned off. Suitable warning signs and lights and flagman should be provided.
- 12.9 Vehicles for carrying building materials, debris and excavated materials should be clean, well maintained and in good running condition. If they carry loose materials, they should be covered and properly sealed to ensure that there will be no spillage of materials onto the public road.
- 12.10 Hazardous material should be rendered harmless and safe to be handled while transported on public roads.
- 12.11 In residential areas, heavy vehicles engines should not be left idling unnecessarily so as to prevent a nuisance to the public at night and during public holidays.
- 12.12 Vehicles should not be driven at speed exceeding the authorized speed limits.
- 12.13 Vehicles should not be loaded beyond authorized load limits and all loose materials should be securely tied down before being transported.
- 12.14 The main gate shall be attended by a flagman if it is located next to the main road to avoid accident.

13.0 DISCONNECTION OF UTILITIES

- 13.1 Approval from relevant authorities shall be obtained before any work to disconnect utilities for example electric cable or pipeline is carried out.
- 13.2 Disconnection of utilities should be carried out by competent person.



14.0 DEMOLITION

14.1 General

- 14.1.1 The selection of demolition method should take into consideration the size, strength and location of the structure to safeguard the safety and health of the employees and public.
- 14.1.2 The risk assessment study should be done to determine possible causes for structural instability and provide the action plan to ensure safety and health.
- 14.1.3 Demolition work should be carried out in such a way so as not to affect the stability of the structure or adjacent structure, which may cause the structure to collapse unplanned.
- 14.1.4 In demolition of structures that are in close proximity to public area, demolition work should be carried out during non-peak hours.
- 14.1.5 All demolition work should be done by trained personnel under the supervision of a designated person.
- 14.1.6 Demolition activities should not be continued under adverse weather conditions, such as high winds, storm, which could cause collapse of already weakened structures.



14.2 Preparatory Work

- 14.2.1 Before demolition operations begin:
- (a) adequate inspection should be made by designated person;
 - (b) if necessary to prevent danger, unstable parts of the structure should be made secure; and
 - (c) all utilities should be effectively disconnected or shut off at or outside the property line.

- 14.2.2 The danger zone around the structure should be adequately fenced off or warning sign posted.
- 14.2.3 Before the commencement of demolition work, the structure should be free from any toxic or hazardous substances (e.g asbestos materials).
- 14.2.4 Where applicable metal scaffold enclosed with peripheral nettings should be erected around the building or structure to be demolished.
- 14.2.5 Before demolition work is carried out, ensure that these materials are removed:
 - (a) glass in doors, windows, etc;
 - (b) loose objects;
 - (c) projecting parts and
 - (d) explosive, inflammable, toxic and harmful substances

14.3 Catch Platforms for Demolition Operations

- 14.3.1 During the demolition of the exterior walls of a structure originally more than 12.2 metres high, catch platforms shall be provided along the exterior, faces of such wall, where necessary, to prevent injury to the public. *(Reg. 43(1), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)*
- 14.3.2 Such platform shall be designed by a Professional Engineer and certified for safety prior to erection and use. *(Reg. 43(2), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)*
- 14.3.3 Such catch platform shall be maintained not more than 6 metres below from which the exterior walls are being removed. *(Reg. 43(3), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)*
- 14.3.4 Catch platform shall not be used for storage of materials or be used as working platforms or walkways. *(Reg. 43(4), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)*

14.4 During Demolition

- 14.4.1 During demolition work, the contractors should:
 - (a) provide workers and public the appropriate information related to safety and health hazards during demolition works;
 - (b) follow demolition sequence and method as provided by demolition/structural engineer;

- (c) ensure the site in a safe condition and in compliance with safety and health plan requirements;
- (d) provide workers with all the appropriate personal protective equipment (PPE) related to safety and health risks they are exposed to; and
- (e) take adequate steps to keep the debris or area being worked on sufficiently moist to lay the dust.

15.0 BLASTING AND USE OF EXPLOSIVES

15.1 Approval from relevant authorities shall be obtained before blasting activity is carrying out.

15.2 Explosives shall not be handled or used except in accordance with the manufacturer's instructions. (Reg. 135, Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)



15.3 All blasting work shall be done by trained personnel under the immediate control of a designated person who has a training, knowledge or experience in the field of transporting, storing, handling and use of explosives. (Reg. 135, Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)

15.4 Before blasting, the owner should take every precaution for the protection of life and property such as fly rock, dust and vibration. Warning notices shall be given to all residence and others in the immediate vicinity of the blasting operation. (Reg. 145, Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)

15.5 All use of explosives and any handling of explosive shall be stopped immediately upon the approach of a thunderstorm. All personnel in the area shall immediately seek a safe place for shelter as directed by the person-in-charge of the blasting. (Reg. 146, Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)

15.6 The structures earmarked for demolition using explosive should be cordoned off with hoarding and adequate danger signs displayed.

15.7 Before firing, the blaster shall sound a warning distinctly audible to all persons within the danger zone and all such persons shall retreat to a safe distance or to a safe shelter. No blast shall be fired while any person is in the danger zone as determined by the blaster. (Reg. 142, Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)

- 15.8 Round-the-clock security, signboards and red flags should be used to keep out unauthorized people from the area.
- 15.9 Residents from the adjacent buildings should be given circulars to inform them of the explosion and explain the safety measures adopted. The public also should be informed by the media of the closure of nearby public roads.
- 15.10 After demolition by explosive method, areas and building within the immediate vicinity should be certified safe by competent person.

16.0 REMOVAL OF DEBRIS

- 16.1 Debris shall be handled and disposed off by a method, which will not endanger workers and public safety and health. *(Reg. 22(1), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)*
- 16.2 Debris shall not be allowed to accumulate so as to constitute a hazard. *(Reg. 22(2), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)*
- 16.3 Debris shall be kept sufficiently moist to lay the dust. *(Reg. 22(3), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)*
- 16.4 Wherever materials are dropped more than 6 metres to any point lying outside the exterior walls of the building, an enclosed chute of wood, or materials of equivalent strength shall be used. *(Reg. 123, Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)*



17.0 SITE CLEARING

- 17.1 Felling of trees should be done by trained personnel to safeguard public safety and to prevent damage to public property.
- 17.2 Where the site is located in the immediate vicinity of a build-up area, hoarding should be erected with proper and adequate signs to prevent unauthorized entry.



- 17.3 Arrangement should be made to prevent landslides, sinkhole and flooding or other unstable ground condition. These arrangement should conform to the requirements of relevant authorities.
- 17.4 All access and egress roads at the site should be maintained in safe condition.
- 17.5 Every measure should be taken to suppress any dust generated by the vehicles.
- 17.6 Care should be taken to protect existing underground and overhead utilities (if any) especially electric cables to avoid any undue accident during site clearing work if relocation of such services are not possible.

18.0 EXCAVATION WORK

- 18.1 All public walkways, sidewalks and the thoroughfares bordering on or running through any excavation site shall be provided with substantial guard-rails or board fences. In addition, temporary footwalks beyond the kerb shall be substantially constructed and provided with protection on both sides. (Reg. 111(1) Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)



- 18.2 During darkness, all public sidewalks shall be adequately illuminated and warning lights or flares shall be placed about the property to ensure safety for pedestrian and vehicular traffic. (Reg. 111(3), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)
- 18.3 Where construction vehicles or plant use public thoroughfares, notices or warning sign should be placed at all exist and entrance to the work area to warn all person in the vicinity.
- 18.4 All work carried out on a road or highways shall have an approval of the road controlling authority before any work starts. Temporary warning sign shall be erected and traffic control exercised in accordance with the requirements from other relevant authorities.
- 18.5 Where there is any question of stability of structures adjoining or over areas to be excavated, such structures shall be supported where necessary by underpinning, sheet piling, shoring, bracing or other means made or erected according to the design of a Professional Engineer to prevent injury to any person. (Reg. 112, Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)
- 18.6 The excavation site and its vicinity shall be checked by a designated person after every rainstorm or other hazard-increasing occurrence and the

protection against landslides and cave-ins shall be increased, if necessary. (Reg. 113(2), *Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986*)

- 18.7 Temporary sheet piling installed to permit the construction of a retaining wall shall not be removed until the wall has developed its full strength. (Reg. 113(3), *Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986*)
- 18.8 Where banks are undercut, adequate shoring shall be provided to support the overhanging materials. (Reg. 113(4), *Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986*)
- 18.9 Excavated materials and other superimposed loads shall be placed at a safe distance from the edge of open excavation and trenches, and shall be so piled or retained that no part thereof can fall into the excavation, or cause the banks to slip or cause the upheaval of the excavation bed. When determining the safe distance, consideration shall be given on the depth and slope of excavation, nature of soil material and the weight of the superimposed load.
- 18.10 Banks shall be stripped of loose rocks or other materials which may slide, roll or fall upon persons below. (Reg. 113(6), *Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986*)
- 18.11 Open sides of excavations where a person may fall more than 3 metres shall be guarded by adequate barricades and suitable warning signs shall be put up at conspicuous positions. (Reg. 113(7), *Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986*)
- 18.12 De-watering and de-silting facilities should be provided to prevent floods and pollution of the drainage system and surrounding areas.

19.0 PILING

- 19.1 Piling should be handled by trained personnel.
- 19.2 In view of the prevailing need to conserve the environment and protection of public health, piling machinery that generate excessive vibration, noise, smoke or other pollutants should not be used in build-up areas.
- 19.3 Where there is any question of stability of structures adjoining areas to be piled, such structures shall be supported where necessary by underpinning, sheet



piling, shoring, bracing or other means in accordance with the design of a Professional Engineer to prevent injury to any person. (Reg. 124, *Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986*)

- 19.4 All pile-driving equipment shall be inspected daily by a designated person before the start of work and every defect shall be immediately corrected before pile-driving commences. (Reg. 125, *Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986*)
- 19.5 Reasonably practicable measures shall be taken to warn persons not to approach within 50 metres of a pile under test. (Reg. 133(2), *Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986*)
- 19.6 Before placing or advancing a pile driver, the ground shall be inspected by a designated person and, where necessary for firm and level footing, timber shall be placed. After placing or advancing a pile driver, inspection and correction of the footing shall be made, when necessary, to maintain stability. (Reg. 134, *Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986*)
- 19.7 Noise impact can be reduced at the source e.g. by introducing non-metallic dolly between the hammer and the driving helmet and installing acoustic enclosure which encloses the hammer and the complete length of the pile being driven.
- 19.8 For continuous noise such as from diesel engine, the noise can be reduced by introducing a more effective exhaust silencer or designing an acoustic canopy to replace engine cover.
- 19.9 All mechanical equipment and plant should be well maintained throughout the piling work.

20.0 SUPERSTRUCTURE

20.1 Scaffolds

- 20.1.1 Every scaffold and every part thereof shall be of good construction, of suitable and sound material and of adequate strength for the purpose for which it is used. (Reg. 72(1), *Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986*)
- 20.1.2 Every scaffold and every part thereof shall comply with the Malaysian Standard or any other relevant international standard.



- 20.1.3 No scaffold shall be erected or be substantially altered or be dismantled except under the direct supervision of a designated person. *(Reg. 74(1), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)*
- 20.1.4 All materials to be used for the construction of scaffolds shall be inspected by a designated person on each occasion before being used. *(Reg. 74(2), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)*
- 20.1.5 Every scaffold erector shall be registered with Department of Occupational Safety and Health.
- 20.1.6 Scaffold erector should always adopt a safe system of work during the erection, altering and dismantling of scaffolds. This will usually include the use of fall arrest equipment.
- 20.1.7 All scaffolds require bracing to help prevent them from collapsing. All scaffolds, including 'independent scaffolds, should be secured tied, or otherwise supported. More ties will be required if:-
- (a) the scaffold is sheeted or netted due to the increased wind loading;
 - (b) it is used as a loading platform for materials or equipment; or
 - (c) hoists, lifting appliances or rubbish chutes are attached to it.
- 20.1.8 The erection of scaffold and peripheral netting should be one floor higher than the structural floor under construction to ensure there is no chance of objects falling off the perimeter of building.
- 20.1.9 Every scaffold shall be properly maintained and every part thereof shall be kept so fixed secured or placed in position as to prevent, as far as practicable, accidental displacement. *(Reg. 73(1), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)*
- 20.1.10 Every metal tube scaffold exceeding 40 metres in height and every other scaffold exceeding 15 metres in height shall be constructed in accordance with the design and drawings of a Professional Engineer. *(Reg. 75(1), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)*
- 20.1.11 Scaffolds shall be inspected by a designated person:-
- (a) before first use;
 - (b) after substantial alteration and after any event likely to have affected their stability, for example after heavy rain or following strong winds; and
 - (c) at regular intervals not exceeding seven days.

20.2 Safety Net and Peripheral Net

20.2.1 Every safety net shall be attached to sufficient anchorages or supports outside and beyond the area of possible fall and supported at a height sufficient to prevent dropping to any surface or object. (Reg. 55(3), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)



20.2.2 Every safety net shall comply with any relevant international standard.

20.2.3 Where a scaffold is erected in an area where the construction activities may pose hazards to pedestrian or vehicular traffic in the form of falling objects, peripheral nets should be used to envelope the scaffold.

20.2.4 Every safety net or combination of safety nets shall be of sufficient size, strength and must be provided to the area of possible fall. (Reg. 55(2), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)

20.2.5 No safety net and peripheral net that is broken should be installed.

20.2.6 Safety net and peripheral net shall be inspected by a designated person before each installation.

20.2.7 Safety net, peripheral net and their supports shall be inspected daily after each installation.

20.3 Catch Platform

20.3.1 Catch platforms should be erected along the exterior faces of the exterior walls to prevent injury to the public below.

20.3.2 Catch platforms may be constructed of material other than wood provided such material is of equal strength and does not otherwise lessen the security against falling material. (Reg. 44(2), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)

20.3.3 All loose materials at elevated areas should be secured so as to prevent them from being blown off the structure by strong gusts of wind.

20.4 Concrete Work

20.4.1 Formwork and reshores shall be certified structurally safe by a Professional Engineer and shall be properly braced or tied together so as to maintain position and shape. *(Reg. 28(1), Building Operations And Works Of Engineering Construction (Safety) Regulations, 1986)*



20.4.2 The formwork including the shores, braces and other supports shall be inspected by the designated person:-

- (a) during erection;
- (b) during and after concreting; and
- (c) after any event likely to have affected their stability, for example after heavy rain or following strong wind.

20.4.3 All concreting equipment and mould shall be kept safe and stored in an area away from building edge.

20.4.4 Storage area should be cordoned off.

21.0 FINISHING

21.1 Installation of exterior glass panels or other cladding materials should be carried out by trained personnel. Installation work should stop when weather conditions could make it unsafe for such work to be carried out.

21.2 Painting operations should be carried out in a manner that will minimize dispersal of paint mist and solvent vapors in public areas.

22.0 USE OF HOISTING EQUIPMENT

22.1 General

22.1.1 All hoisting machinery such as tower crane, mobile crane, derrick crane, goods hoist, passenger hoist, gondola and access platform to be used shall possess a valid certificate of fitness from the Department of Occupational Safety and Health.

22.1.2 The tower crane, mobile crane and derrick crane operator shall be registered with the Department of Occupational Safety and Health.

22.1.3 The contractor for erecting, dismantling, and maintaining of tower crane, gondola, material hoist, passenger hoist, access platform shall be registered with the Department of Occupational Safety and Health. Every process of erection, dismantling, and maintain shall be carried out strictly by responsible person and in accordance with the manufacture's instructions. The manufacturer should provide all specification for erection, dismantling, and maintain.



22.1.4 Every overhead structure, crane, hook, block, spreader, strongback, sling and other appliance for lifting a load should be of sound construction and in every way suitable for the purpose.

22.1.5 Selection of cranes should be suitable for the intended use. These should also take into consideration the nature of the worksite or the position in which the crane is to be set up.

22.1.6 Attention should be given to the slewing radius of the crane at the maximum luff of the jib to ensure that there are no obstacles to the slewing such as overhead power line, nearby structures or other cranes and proximity hazards to public access areas.

22.1.7 No part of the crane should extend beyond the hoarded or fenced up area of the worksite.

22.1.8 The worksite should be fully enclosed by means of hoarding or fencing or cordoning before erection of tower crane can be carried out. This is to protect the general public from any hazards during the work in progress.

22.1.9 Lifting operation using cranes should comply with the following:

- (a) maintained in a safe working condition;
- (b) operator, slinger and rigger should have adequate ability, knowledge, or authority;
- (c) no lifting of load should be carried out outside the hoarded or fenced up area of the worksite. If lifting operation were to be carried out outside the hoarded or fenced up area of the worksite, written approval from the local authorities shall be obtained. Working area should be cordoned off and means for public control such as setting up of warning signs, warning lights to direct public or traffic away from it and controlled by a designated person shall be provided.

- 22.1.10 Danger zone should be established before any lifting operation, erection, jacking or climbing and dismantling of crane is carried out. The perimeter of the danger zone must be cordoned off. If danger zone extend beyond the worksite hoarding or fenced up area, means for public control such as setting up of warning signs, warning lights to direct public or traffic away from it and controlled by a designated person shall be provided.
- 22.1.11 For mobile cranes, the following steps should be followed to ensure the stability of the mobile cranes during the operation:
- (a) all outriggers should be fully extended;
 - (b) all jacks should be placed upon adequate footings and packing. Care should be taken to ensure that there is adequate bearing surface under the packing, especially where the ground is soft or backfilled;
 - (c) the crane should be leveled and all outriggers beam packed in case of rebound, close to the ends of the outrigger beams. Anchor pins should be inserted where provided in chassis and outriggers;
 - (d) the base timbers of any packing, i.e. those timbers resting on the ground, should be closely packed, and should cover as large area as necessary to safely transmit their load to the ground;
 - (e) all timber packing should be sound, free from defects, of ample and adequate strength;
 - (f) the base layer packing should be of sufficient length, width and thickness to cover the area required. These should be closely laid over a leveled and consolidated area; and
 - (g) packing should not be removed until all operations are completed.

22.2 Erection

- 22.2.1 Erection of tower crane shall be carried during favorable weather only.
- 22.2.2 The sequence of erection should be done in accordance with manufacturer's instructions.
- 22.2.3 The contractor should ensure that the foundation have been certified by a Professional Engineer and ensure that concrete is cured accordingly.
- 22.2.4 A checklist which includes the manufacturer's specifications, recommendations and instructions for safe erection of the crane should be adhered to in every detail. The check list should be checked and filled up by the responsible person.

22.3 Jacking

- 22.3.1 Jacking should be done only in accordance with the manufacturer's recommendations, and only competent persons should be assigned to this task.
- 22.3.2 Jacking shall be done during favorable weather only.

22.3.3 All jacking safety device, working ropes and jacking system should be checked by a competent person prior to jacking.

22.3.4 Following each jacking, all fastenings should be checked.

22.4 Operation

22.4.1 Only registered crane operator shall be allowed to operate the crane.

22.4.2 All safety devices shall be checked and tested and be in good working condition prior to operating the crane.

22.4.3 Crane operator shall have full visibility and assisted by trained signalman during the operation of the crane or movement of a load.

22.4.4 Where a crane is not controlled from the ground, but from an elevated cab, hand signaling or voice communications should be established between the operator and a trained signalman on the ground.

22.4.5 The weights of materials to be lifted should be specified, and responsibility assigned for checking loads. Overloading shall not be allowed.

22.4.6 Materials should be suitably packed before delivery to the worksite to ensure safe lifting by the crane. Special precautionary measures should be established and practiced for exceptional lifting operations, such as lifting large panels, which may be blown about by wind, or tandem lifting by two or more cranes.

22.4.7 Free-fall lowering of loads should be prohibited.

22.4.8 No loads shall be carried over personnel, public thoroughfare, roads, neighboring building or cast in an attempt to get them down at a point which is beyond the crane's normal reach.

22.4.9 Standards and codes relating to proximity of power-lines should be adhered to.

22.4.10 Slewing of the crane should be limited to a few rounds unless slip-ring or similar devices is provided to convey electric current from a stationary part to a moving part of the machine.

22.4.11 Operating zone of two or more cranes should not overlap, unless vertically offset to avoid collision. Priority of operation should be established.

22.4.12 Tampering with any limit switch should be prohibited.

22.4.13 Loads should never be left suspended without control.

- 22.4.14 Provide means for securing the crane (jacks, rail clamps, choke, bracing, guys, etc.). When applying brakes to permit immobilization when the crane is unattended, the load block should be parked near to its top position, and, where necessary, the jib should be allowed to slew freely in the wind. The manufacturer should supply detail instructions.
- 22.4.15 The power supply should be cut off and locked out by the operator when he leaves the cab.
- 22.4.16 Lifting operations should be ceased during adverse weather conditions.
- 22.4.17 Flood lights installed at elevated crane structures should not pose a nuisance to the public.

22.5 Inspection and Testing

- 22.5.1 Inspection and testing should be done only by responsible person.
- 22.5.2 The crane should be completely inspected and tested before they are being put into operation.
- 22.5.3 Cranes and their accessories should be inspected and tested each time they are put into service or after remaining idle for an extended period. A full test of all functions should be made after erection or jacking, and before the crane is approved by DOSH for operation.
- 22.5.4 A daily and weekly check list should be established for inspection by the crane operator.
- 22.5.5 Daily inspection should be made on condition of brakes under no load conditions, adjustment, and functioning of various safety devices and limiting devices fitted to the hoisting apparatus, the electric power installation and overload controls.
- 22.5.6 Weekly inspection should be made on wire rope on hoist and trolley, guys, electric power cable, jib and counter weight jib guy lines, hoist rope anchorage on winding drum, foundation, bolts and pins.
- 22.5.7 Similar safeguards should be checked regularly for grounding devices, guards, junction box cover to make sure they are in place and properly function.
- 22.5.8 All structural parts should be inspected by a responsible person for any weld defect, bending etc. in accordance with manufacturer' recommendations.

22.6 Maintenance and Repair

- 22.6.1 Maintenance and repair should be done by trained personnel and in compliance with manufacturer's recommendations.
- 22.6.2 Catwalks, railings, or similar means of access must be properly secured to the crane structure.
- 22.6.3 If necessary to set the crane in motion when performing certain maintenance, it should only be done under the supervision of the responsible person, and under normal operation of the crane.
- 22.6.4 All welding repair on crane parts shall comply with manufacturer's recommendations, and be done only by certified welders.

22.7 Dismantling

- 22.7.1 A check should be made on all jacking devices prior to dismantling operations. Only responsible person should be allowed to perform the job.
- 22.7.2 Safe dismantling procedures should be established. These procedure should include the manufacturer' specifications and recommendations.
- 22.7.3 Dismantling shall not be carried out unless written approval from DOSH is obtained.

22.8 Crane Storage

- 22.8.1 Only areas approved by relevant government agencies should be used as storage area.
- 22.8.2 Area where crane or crane parts are to be stored should be securely fenced and provided with safe access into the area. This is to prevent any unauthorised personnel or public from trespassing into the area and exposing themselves to any danger therein.
- 22.8.3 The gate should be locked and the key should be kept by authorised personnel.
- 22.8.4 Fence or guard should be soundly designed and constructed to resist the collapsing of nearby stack of crane structures.
- 22.8.5 Crane structures should be placed on firm foundation, not liable to settle, and should not be subjected to a weight so as to overload the ground.

- 22.8.6 No parts of the crane should be stacked:
- (a) against the fence or guard unless it is known that the fence or guard is of sufficient strength to withstand the pressure; and
 - (b) to a height which would render the stack unstable.
- 22.8.7 Substantial warning signs prohibiting unauthorised personnel from entering the storage area should be posted at conspicuous positions such as at the gateways.
- 22.8.8 Measures should be taken to prevent the breeding of mosquitoes, houseflies, rats and other harmful animals and insects.

REFERENCES

1. The Factories & Machinery Act 1967
2. The Factories & Machinery (Building Operations & Works of Engineering Construction) (Safety) Regulations 1986
3. The Occupational Safety And Health Act 1994
4. The Occupational Safety And Health (Safety and Health Officer) Regulations 1997
5. The Occupational Safety And Health (Safety and Health Officer) Order 1997
6. The Occupational Safety And Health (Safety and Health Committee) Regulations 1996
7. Safety, Health and Welfare on Construction Sites A Training Manual, International Labour Office