

# STANDARD INDUSTRI PEMBINAAN

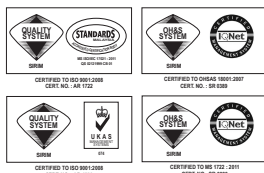
(CONSTRUCTION INDUSTRY STANDARD)

## CIS 28:2021

### PUBLIC & ROAD USER SAFETY – CONSTRUCTION WORKS ADJACENT TO AND ABOVE ROADWAYS

Description: Public Safety, Elevated Construction Works, Falling Object Prevention, Road Users Safety, Checklist

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Construction Industry Development Board



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**PUBLIC & ROAD USER SAFETY**  
**– CONSTRUCTION WORKS ADJACENT TO AND**  
**ABOVE ROADWAYS**

CIS 28:2021 PUBLIC & ROAD USER SAFETY – CONSTRUCTION WORKS ADJACENT TO AND ABOVE ROADWAYS

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Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

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## COMITTEE REPRESENTATION

This Construction Industry Standard (CIS) was developed by Construction Industry Development Board Malaysia (CIDB) with the assistance of the Technical Committee on Public & Road User Safety - Construction Works Adjacent To and Above Roadways which comprises representatives from the following organizations:

Association of Consulting Engineers Malaysia  
Construction Industry Development Board, Malaysia  
Department of Occupational Safety and Health Malaysia  
Institution of Engineers Malaysia  
Malaysian Institute of Road Safety Research  
Jabatan Kerja Raya  
Lembaga Lebuhraya Malaysia  
Mass Rapid Transit Corporation Sdn. Bhd.  
Master Builders Association Malaysia  
Real Estate & Housing Developers' Association  
Universiti Teknologi MARA

## **PREFACE**

This Construction Industry Standard on Public & Road User Safety - Construction Works Adjacent To And Above Roadways was developed to facilitate contractors who are planning to carry out construction activities adjacent to or above existing roadways to prevent incidents or accidents to road users and public due to construction activities. Checklists have been introduced to assist the contractors to take precautionary measures prior to construction activities, during work execution and upon completion of work.

The development of this Construction Industry Standard was carried out by a Technical Committee formed by CIDB. The members of the Technical Committees are represented by the industry stakeholders.

References were made to several documents generally used by industry players in managing construction safety and health, as listed in Section 1 of this CIS 28:2021

It should be noted that compliance with this Construction Industry Standard does not of itself confer immunity from legal obligations.

# **PUBLIC & ROAD USER SAFETY - CONSTRUCTION WORKS ADJACENT TO AND ABOVE ROADWAYS**

## **SECTION 1: GENERAL**

### **1.1 Introduction**

Construction works adjacent to or above existing roadways are considered high risk activities and require strict safety control measures. Apart from the falling objects due to construction activities, road user's safety may be compromised if no adequate safety measures and procedures are fully adhered to during construction phase. Falling objects at construction zone primarily related to falling of construction materials, substances, hand tools, appliances, equipment, machineries, launching gantry, unsecured parapet wall and debris.

### **1.2 Scope**

This Standard sets out the safe work practices for the contractor to comply with when carrying out construction works adjacent to and above roadways. i.e. prior to work commencement, during execution of the work and upon completion of the work. The content in this document is intended to be applied at construction zone/vicinity such as the construction of viaduct, fly-over, bridges, elevated highway, elevated rail track, telecommunication pylon and transmission line, elevated utilities routing and unprotected building edges which are under construction inclusive of loading platform among others.

### **1.3 Normative References**

The following normative reference is indispensable for the application of this construction industry standard. For dated reference, only the edition cited applies. For undated references, the latest editions of the normative references (including any amendments) apply.

- a) Lembaga Pembangunan Industri Pembinaan Malaysia Act 1994 (Act 520)
- b) Occupational Safety and Health Act (OSHA) 1994 (Act 514)
- c) Department of Occupational Safety and Health (DOSH) - Guidelines for Public Safety and Health at Construction Site 2007
- d) Department of Occupational Safety and Health (DOSH) – Guidelines for the Prevention of Falls at Workplace 2007
- e) Department of Occupational Safety and Health (DOSH) – Guidelines On Occupational Safety and Health in Construction Industry (Management) 2017
- f) Factories and Machinery Act (FMA) 1967 (Act 139)
- g) Factories and Machinery (FM) (Building Operations and Works of Engineering Construction (BOWEC)) (Safety) Regulations 1986
- h) Arahan Teknik Jalan 2C/85 (2017) – Manual on Traffic Control Devices Temporary Signs and Work
- i) CIS 14:2019 Guidelines On Construction Works at Night
- j) CIS 22:2017 Safe Use of Scaffolding in Construction
- k) CIS 23:2018 Safe Use of Falsework and Formwork in Construction
- l) CIS 25:2018 Guidelines for Construction Activity Risk Assessment (CARA - HIRARC)
- m) CIS 27:2019 Occupational Safety and Health – Specification and Bill of Quantities (BQ) For Construction Works
- n) CIS 13:2009 Guidelines On Handling, Transportation, Stacking and Installation of Structural Steel
- o) Manual Fasilitas Keselamatan Jalan, Cawangan Kejuruteraan Jalan & Geoteknik, Jabatan Kerja Raya Malaysia
- p) Registration of Engineers Act (REA) 1967 amended in 2015
- q) Managing Health and Safety in Construction (Design and Management) Regulations 2015, UK
- r) ANSI/ASSE A10.34-2001 (R2012) Protection of the Public on or Adjacent to Construction Sites, American National Standard for Construction and Demolition Operations
- s) Akta Pengangkutan Jalan, 1987 (Pindaan 2020)



## 1.4 Terms and Definitions

For the purpose of this standard, the following definitions apply;

### 1. Designated Person

“Designated person” as defined in Factories and Machinery (Building Operations and Works of Engineering Construction (BOWEC)) (Safety) Regulations 1986 refers to a competent person appointed by an employer to carry out any supervision, or inspection, or to perform any task or duty prescribed by BOWEC Regulations 1986.

### 2. Document(s)

For the purpose of CIS 28:2021, document(s) refer to:

- Communication of information
- Evidence of conformity
- Knowledge sharing
- To disseminate and preserve the organization’s experiences

The medium can be paper, magnetic, electronic, photograph or master sample, or a combination.

### 3. Emergency Response and Preparedness (ERP) Facilities

ERP Facilities or provision which includes any emergency preparedness; which include First Aid provision, firefighting provision, and incident and/or accident reporting provision.

### 4. Falling Objects

Any objects that fall from static position under its own weight or with a force with that have potential to cause serious consequences such as injuries or fatalities and damages towards the equipments and environment. Even a small object that falls from a height can cause a serious impact.

### 5. Hazard

Hazard means source with a potential to cause injury and ill health; hazard can include sources with the potential to cause harm or hazardous situations or circumstances with the potential for exposure leading to injury and ill health.

### 6. Hoisting Machine

A lift; escalator; hoist; crane; sheer legs; gin; crab; winch; excavator; teagle; runway; launching gantry; transporter or piling frame and allied equipment.

### 7. Hoisting Tackle

Includes a chain or rope sling; ring; link; hook; shackle; swivel; eyebolt; chain; rope; pulley block and chain block.

### 8. Inspector of Work (IOW)

Is a person registered under Subsection 10(E) of the Registration of Engineers Act 1967 (Revised 2015)

### 9. Local Authority

Any city council, municipal council, district council, town council, town board, local council, rural board, or other similar local authority established by any written law and includes an authority in charge of Federal Territory established by any written law.

### 10. Physical Hazard

Sources of potential damaging energy.

## **11. Permit to Work (PTW)**

A documented permission derived by the company to meet its specific OSH needs. It aims to ensure proper OSH planning and consideration is given to a particular work for the purpose of this standard, PTW should be issued / approved by contractor's project manager (PM) / construction manager (CM) or contractor's site engineer (CSE)

## **12. Personal Protective Equipment (PPE)**

Personal Protective Equipment or Personal Protective Clothing and Appliances (as defined in FMA 1967) provision and maintenance are mandatory to be provided for workers who are exposed to injurious substances which are liable to cause bodily injury. PPE shall include the following (but not limited to) (FMA 1967, Section 24):

- i) Safety hard hat/safety helmet
- ii) Safety footwear
- iii) Hand protection/hand gloves
- iv) Eye protection such as safety glasses or goggles
- v) Fall arrest system
- vi) Self-contained breathing apparatus (SCBA)
- vii) Face shield
- viii) Hearing protection (e.g. ear plugs, ear muffs)
- ix) Protective clothing (especially for chemical hazards)
- x) Respirator
- xi) Dust mask
- xii) Safety vest
- xiii) Dust mask / Face mask

## **13. Project Consultant**

Project Engineer for infrastructure project or Project Architect for building project appointed by the Client/Developer or Design & Build Contractor/Turnkey Contractor.

## **14. Record**

Document stating results achieved or providing evidence of activities performed.

## **15. Risk**

A combination of the likelihood of an occurrence of a hazardous event with specified period or in specified circumstances and the severity of injury or damage to the health of people, property, environment or any combination of these caused by the event.

## **16. Roadway**

Any public road or highway under construction includes bridges, tunnels, lay-bys, interchanges, roundabouts, traffic islands, road dividers, all traffic lanes, acceleration lanes, deceleration lanes, side-tables, median strips, overpasses, underpasses, approaches, entrance and exit ramps, toll plazas, parking places, service areas, and other structures and fixtures.

## **17. Safe System of Work**

A safe system of work is a formal procedure which results from the systematic examination of a task in order to identify all hazards. It defines safe methods to ensure that hazards are eliminated or risks minimized.

## **18. Safe Work Procedure (SWP) or Work Method Statement (WMS)**

SWP or WMS is a risk management tools / a working risk control document developed to describe the safest and most efficient way to perform certain work. The document is used as a guide when completing the work at site.

## **19. Secondary Retention**

The engineered method for securing the primary fixing to prevent loss of clamping force or displacement of fastening components (i.e. locking washers, locking wire, safety pin).

## **20. Safety**

The condition of being protected from or unlikely to cause danger, risks or injury.

## **21. Safety and Health Officer (SHO)**

A person who is registered as Safety and Health Officer with DOSH in pursuant to Section 29 (3) in OSHA 1994 (Act 514).

## **22. Site Safety Supervisors (SSS)**

A person who is competent to perform the duties specified in Regulations 25 of Factories and Machinery (Building Operations and Works of Engineering Construction (BOWEC)) (Safety) Regulations 1986.

### **1.5 Abbreviation**

- |     |        |   |
|-----|--------|---|
| 1.  | BOWEC  | - Building Operations and Works of Engineering Construction |
| 2.  | CIDB   | - Construction Industry Development Board of Malaysia       |
| 3.  | CIS    | - Construction Industry Standard                            |
| 4.  | CM     | - Construction Manager                                      |
| 5.  | CSE    | - Contractor's Site Engineer                                |
| 6.  | DOSH   | - Department of Occupational Safety and Health              |
| 7.  | HIRARC | - Hazard Identification, Risk Assessment and Risk Control   |
| 8.  | OSH    | - Occupational Safety and Health                            |
| 9.  | PETW   | - Professional Engineer for Temporary works                 |
| 10. | PM     | - Contractor Project Manager                                |
| 11. | SHO    | - Safety and Health Officer                                 |
| 12. | SSS    | - Site Safety Supervisor                                    |

### **1.6 Objectives of CIS**

CIS 28:2021 was designed and developed to enable the user to achieve any, or a combination, of the following objectives:

- i) To prevent falling object occurrences during construction works adjacent to or above existing roadways which can cause injuries or fatal accidents to road users and public;
- ii) To ensure public safety at construction zone by having adequate safety control measures and procedures;
- iii) To guide the contractors on the use of checklists and take necessary precautionary measure when planning for construction works adjacent to or above existing roadways.

### **1.7 Use of CIS**

CIS 28:2021 is to be used by contractor together with the checklists provided in this Standard. It is not intended to be used independently to decide whether a project site and/or parts of the project site are in accordance with the requirements of the relevant Acts and Regulations or OSH Management System. It is the responsibility of all parties involved directly in a project site to ensure that safety of road users and the activities within a construction site is all time conform to the legislation's requirement; approved standards; approved work method statement; code of practice; guidelines; specifications and contractual requirements.

## **1.8 Roles and Responsibilities**

### **1.8.1 Duty of Contractors**

Contractor undertaking construction works shall ensure the safety of construction works are carried out in accordance to the Sub-Section 34(b) CIDB Act 1994 (Act 520) and any other regulations currently being enforced. A contractor undertaking any construction works shall; –

- i. Ensure the construction works are carried out in accordance with the provisions of Sub-Section 34(b) CIDB Act 1994 (Act 520), any regulations, terms and conditions imposed by the authorities and any other written law (OSH Act etc.); and
- ii. Ensure the public and road user safety from any potential hazards due to construction works whether during or post construction works.

General duty of contractor shall include but not limited to the following:

- i. To notify construction works to DOSH within seven (7) days of site possession for project with contract period of six (6) weeks and more.
- ii. To provide and maintain a safe plant and system of work.
- iii. To make arrangements for handling, usage, transporting, and storage of substances.
- iv. To provide safety and health information, instruction, training and supervision.
- v. To provide and maintain safe access and egress at construction site
- vi. To ensure all construction personnel at Construction work site holding a valid CIDB Personal Registration Card.
- vii. To provide and maintain safety provision and effective communication for their workers including the subcontractor and others.
- viii. To comply to the requirements and conditions imposed by authorities prior to and during construction works

### **1.8.2 General Duty of Client / Project Owner**

Client or Project Owner undertaking any project has duty to consult with Designer / Project Consultant and Contractor to ensure, so far as is practicable, that the structures or buildings to be built are designed and constructed so that road users and workers, and any other persons on the construction site, are protected from hazards arising from construction works/activities. Client or Project Owner to provide sufficient budget for safe construction and reasonable project completion period after consulting with Designer/Project Consultant.

### **1.8.3 General Duty of Designer / Project Consultant**

Designer or Project Consultant shall have duty to ensure, to the extent that they have control over the design, that fall hazards arising from the design are identified and, where possible, eliminated or substituted by design modification. Hazards that remain should be identified in a written report to the clients.

### **1.8.4 General Duty of Workers**

Workers must ensure, so far as is practicable, that their work does not put road users or others at risk and that they undertake work at height in accordance with the information, instruction and training with which they have been provided.

## 1.9 Traffic Control on Existing Roadways Nearby Construction Zone

- a) All project vehicles used on existing roads shall be roadworthy and comply with the requirements of the Road Transport Department of Malaysia.
- b) No worker shall drive vehicle of any class or description public roads unless he is the holder of a driving license authorizing him to drive a vehicle of that class or description.
- c) Traffic management plan shall be developed by Contractor, reviewed by Project Consultant and submitted for approval to relevant authority.
- d) Whenever any work is being performed over, or in close proximity to existing roads, 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 and when necessary, the traffic shall be controlled by designated person.
- e) Vehicles arriving at site and leaving site should be scheduled to minimize congestion occurring on public road leading to the worksite.
- f) 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.
- g) 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. Required warning signs and lights and flagman should be provided.
- h) 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, lashed and properly sealed to ensure that there will be no spillage of materials onto the public road.
- i) Temporary structures or falsework erected or installed above any existing road(s) shall have minimum height clearance approved by authority or PETW and adequate protection based on *Arahan Teknik Jalan ATJ 2C/85 (Pindaan 2017)* for the traffic in relation to horizontal clearance from the edge of the existing road. These temporary supports shall be clearly visible and must be not obstructed. Warning signage and blinkers to be placed at suitable locations as required to warn the public road users against the temporary structures ahead. The use of temporary gantry is recommended at locations where height clearances may pose a hazard to the traffic movement.
- j) Construction vehicles should not be loaded beyond authorized load limits and all loose materials should be securely tied down before being transported on existing road. The main gate shall be attended by a flagman if it is located next to the existing road to avoid accident.

## **SECTION 2: WORKS ADJACENT TO AND ABOVE ROADWAYS**

### **2.1 General Safety Requirements**

The provisions of these general safety requirements are to supplement the existing construction safety standards and requirements that already being adopted by the industry as a good practice to prevent construction related incidents and accidents: -

- a) Traffic control plan and associated traffic management control shall be constructed wherever the construction site encroaches on existing roads, highways, footpaths, cycle tracks, access to properties, etc. The contractor will need to liaise with the relevant local authority, and required authorization from them if work involves the closure or obstruction of public footpaths or roads. The contractor shall be responsible for designing, obtaining approval and any necessary permits from the Relevant Authorities and implementing all such traffic management control are required.
- b) When possible, close the road and divert the traffic flow to eliminate work above traffic risk.
- c) No traffic signs, road markings, and other traffic control devices shall be erected, relocated or removed in the public road unless approved by the relevant authorities.
- d) The contractor shall implement all traffic management measures in strict compliance with the approved traffic control plan.
- e) The contractor shall at all times take full and sufficient precautions to ensure the safety of all traffic through and around the Work Site and of the diverted traffic. Daily inspection regime shall be in place to ensure the traffic management requirement are adhered.
- f) All temporary work using scaffolding shall follow requirement in latest CIS 22 (Safe Use of Scaffolding in Construction) and CIS 23 (Safe Use of Falsework and Formwork in Construction) published by CIDB Malaysia.

### **2.2 Hazards Identification, Risk Assessment And Risk Control (HIRARC)**

The Contractor shall identify potential hazards, conduct risk assessment and control measures for such hazards. Records of HIRARC shall be kept, maintained and reviewed during the course of work as required.

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 that could cause harm to public and road users. Contractor is responsible to carry out the risk assessment and adopt suitable control measures for construction project.

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.

For preparation and development of HIRARC, contractor may refer to Construction Industry Standard, CIS 25:2018 published by CIDB Malaysia.

## **2.3 Potential Hazards Causing Accidents to Road Users**

There are several key hazards that could cause harm to public and road users. The most common causes of construction-related injuries to the public / road users are: -

### **2.3.1 Topple of Machinery / Collapse of Temporary Structure onto Roadways**

Topple of machinery / temporary structure come in diverse range of shapes, sizes and weight, and may fall or collapse for variety of conditions. Topple of machinery / temporary structure onto roadway may occur when any of the following situation or combination of situation listed below:

- a) Collapse of scaffold structure onto live traffic due poor design and erection.
- b) Topple of machinery / temporary structure onto roadway by contact with an energy source.
- c) Topple of machinery / temporary structure onto roadway due to unsecured or awkward positioning.
- d) Topple of machinery / temporary structure onto roadway due to unstable ground.
- e) Topple of machinery / temporary structure onto roadway due to the failures of mechanical components.
- f) Topple of machinery / temporary structure onto roadway due to unsafe act by human.
- g) Topple of machinery / temporary structure onto roadway due to lack of risk assessment.

### **2.3.2 Road user encroaching construction zone**

Road user encroaching construction zone may occur when any of the following situation or combination of situation listed below:

- a) Road user encroached site vicinity due to poor traffic management control.
- b) Pedestrian trespass site area due to no hoarding/barricade.
- c) Public vehicle falling into holes/trench due to no hoarding/barricade.
- d) Road user encroached site vicinity due to insufficient lighting.

### **2.3.3 Collisions with moving plant and vehicles**

Collisions with moving plant and vehicles may occur when any of the following situation or combination of situation listed below due to:

- a) poor traffic management control.
- b) illegal site access/egress.
- c) unattended site access/egress.
- d) poor maintenance of construction vehicle.
- e) no provision of escort vehicle.

### **2.3.4 Road user colliding with construction structures / temporary structures**

Road user hit the construction structure may occur when any of the following situation or combination of situation listed below due to:

- a) design failure.
- b) lack of inspection on construction structure.
- c) no provision of height limit sign at construction structure.
- d) poor road condition/maintenance.

## **2.4 Safety Precautions to Prevent Injuries or Accident to Road Users**

### **2.4.1 Safety precautions to prevent topple of machinery / collapse of temporary structure onto live traffic**

- a) The contractor shall design all Temporary Works of whatever nature, including Permanent Works that will be used as Temporary Works during construction to suit his own construction sequence and methodology. These Temporary Works shall be designed, endorsed and supervised by PETW.
- b) The structural analysis, design calculation, specifications and drawings of a scaffolding system shall be performed and endorsed by a PETW. Where design is applicable and required under Class 2 or Class 3 Temporary Works, it shall be designed, endorsed and supervised by a PETW.
- c) Viaduct launching gantries, balanced cantilever deck erection, form traveler, portal temporary supports, trestle support systems, significant Temporary Works required for support during the erection of station roof trusses and cross heads shall be checked and approved by Accredited Checker.
- d) Major temporary road decking systems requiring support beams shall be checked and approved by Accredited Checker.
- e) Contractor to ensure all construction material need to be stored close to the road or public pathways to be stacked safely to prevent any toppled material onto the public area.
- f) All lifting machines, lifting appliances and lifting gear used on Site shall be suitable for the task, used within their safe load capacity, in good condition and in accordance with the manufacturer's specification and the operator who operate the machinery must be competent person.
- g) Crane structures/piling rig should be placed on firm foundation, not liable to settle, and should not be subjected to a weight so as to overload the ground.
- h) 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.
- i) 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.
- j) Where applicable, contractor to provide buffer zone between work area and the nearing road / highway.
- k) Should bridge deck erect equipment (launching gantry, form traveler, segment lifter, etc.) to be used over an existing road, the contractor shall ensure this road is closed for traffic movement.

### **2.4.2 Safety precautions to prevent public / road user encroached construction vicinity**

- a) The contractor shall, from the date of possession of the construction site, be responsible for the management and maintenance of the traffic within the construction site and shall also be responsible for constructing and maintaining all vehicular run-ins and temporary lay-byes or road widening as necessary.
- b) All stockpiles shall be maintained at all times in a stable condition and shall be adequately covered to prevent dispersal of material by wind, rain and the like. Materials that are stored close to roads e.g. Segmental Box Girders (SBG's), Pre



cast beam and the like, shall be positioned with a safe buffer from traffic vehicular flow.

- c) The contractor shall provide and maintain a patrol unit to assist on site traffic management. The main duties of the patrol unit shall include the up keeping of proper lighting, signing and guarding (hoardings, fences, gates, etc.) provisions as well as other related duties.
- d) Hoardings, fences, gates and signs on the construction site shall be maintained in a clean, stable and secure condition. The contractor shall be responsible for the design, installation, maintenance and removal of all fencing, hoardings and other protective measures necessary to provide security of the Site and to protect the public from the construction activities and hazards associated with the Works.

#### **2.4.3 Precautionary measures of collisions with moving plant and vehicles**

- a) When the contractor is undertaking works within an isolated works area with adjacent running traffic lanes, the contractor shall plan and design a safe means of access and shall gain prior approval from the Relevant Authorities before establishing and operating this access / egress.
- b) All vehicles used at worksites shall be roadworthy and comply with the requirements of the Road Transport Department of Malaysia.
- c) 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.
- d) Vehicles arriving at site and leaving site should be suitably scheduled to minimize congestion occurring on public road leading to the worksite.
- e) Vehicles should be parked in designated areas within the hoarded area while being loaded or unloaded.
- f) 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.
- g) 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.
- h) Vehicles should not be driven at speed exceeding the authorized speed limits.
- i) Vehicles should not be loaded beyond authorized load limits and all loose materials should be securely tied down before being transported.
- j) The main gate shall be attended by a flagman if it is located next to the main road to avoid accident.

#### **2.4.4 Safety precautions to prevent public / road user from colliding with construction structures / temporary structures**

- a) 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.

- b) Barriers that is provided shall be strong enough to prevent exposure to hazards by people or vehicles.
- c) Barriers shall be highly visible, rigid and free from protruding objects and strong enough to withstand all weather conditions
- d) Barriers shall be inspected and maintained in good condition at all times and provide continuous protection for the whole of the hazardous area.
- e) Rigid vehicle collision barriers to be installed at locations where existing barrier are considered inadequate or impractical which are designed for impact loads, covered walkways etc. designed to facilitate the protection of the workers and public.
- f) Only concrete New Jersey Barriers shall be used for traffic control on slopes or adjacent to excavation.
- g) 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.
- h) Minimum vertical clearance for any structure or temporary structure crossing any road is 5.4 meter.
- i) Whenever the vertical clearance included the temporary structure (e.g. safety) net is less than 5.4 meter, the contractor need to install height limit gantry pole before the construction area. Contractor shall provide alternative road for any vehicle with exceeded height limit to prevent public vehicle from hitting the construction structure.

## **2.5 Manifestation of Work Adjacent to and Above Live Traffic**

The following are examples of conditions that are potential to cause accidents due to construction works /activities adjacent to and above existing roadways :



**Figure 1: Scaffold and machinery adjacent to live traffic**



**Figure 2: Crane operation adjacent to live traffic**



**Figure 3: Link bridge construction above live traffic**



**Figure 4: Work above live traffic**





**Figure 5: Work above live traffic**



**Figure 6: Elevated highway beam installation across public road**



**Figure 7: Segmental Box Girder under construction in the middle of the roadway with lifting crane**



**Figure 8: Billboard gantry frame structure installation across public highway**



**Figure 9: Elevated highway construction over live traffic load**



**Figure 10: Falsework installation for elevated highway**

## SECTION 3: FALLING OBJECTS

### 3.1 General

Contractor to complete the checklists provided in this Standard before commencing construction works or activities adjacent to and above existing roads. Checklists to be duly completed by SHO or SSS and be submitted to PM/CM/CSE for the issuance of PTW (PTW could be a separate document or approved Part A's checklists by PM/CM/CSE). All requirements in the checklists shall be fully complied with. Non-compliance shall be corrected before commencing construction works. A copy of signed checklists (Part A) and PTW shall be submitted to Project Consultant or their representative for approval. Upon obtaining the approval, the contractor may proceed to carry out the construction works.

Contractor's PM / CM /CSE shall be responsible for the issuance of PTW. PTW shall not be issued before the checklists (Part A) are duly completed for the works adjacent to and above existing roads or public amenities. No works or construction activities to be allowed or commenced without the full compliance of the provided checklists in this standard.

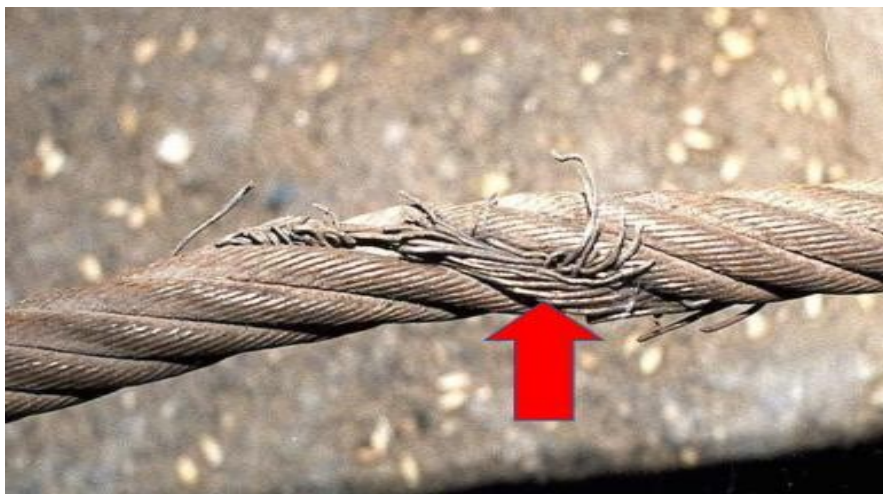
### 3.2 Falling Objects

Falling objects come in diverse range of shapes, sizes and weight, and may fall for variety of reasons and situations. Falling objects may occur when any of the following situation or combination of situations as listed below:

- i) Falls from elevated location by its own weight, gravity or force.
- ii) Falls from elevated location by contact with an energy source.
- iii) Falls from elevated location due to unsecured or awkward positioning.
- iv) Falls from elevated location due to unsafe work condition.
- v) Falls from elevated position due to the failures of mechanical components.
- vi) Falls from elevated position due to unsafe act by human.
- vii) Falls from elevated position due to poor lacing latching and rigging.

### 3.3 Manifestation of Falling Objects

The following are examples of fitting / components / hoisting tackles that are potential to cause falling objects accidents:



**Figure 11: Damaged strands of hoisting wire rope**





**Figure 12: Hoisting without safety latch**



**Figure 13: Defective hoisting webbing sling**



**Figure 14: Unused and unsecured scaffold frames, plywood and timber formworks stored at open edge of building perimeter**



**Figure 15: Expired hoisting tackles**



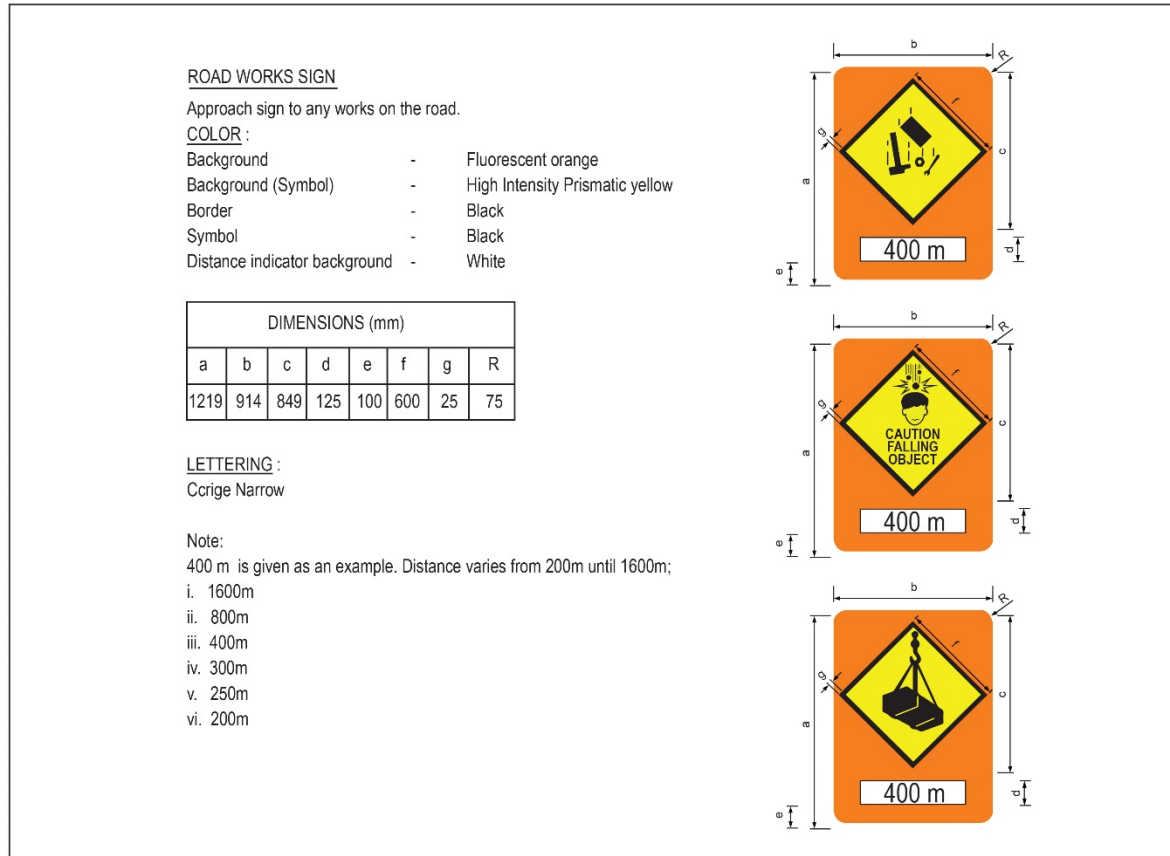
**Figure 16: Corroded hoisting tackles**



**Figure 17: Elevated loading platform**



### 3.4 Some Examples of Falling Object Warning Signage



**Figure 18: Falling object and overload suspended load signs**

## SECTION 4: CHECKLIST

The checklists are to facilitate the contractor to prevent potential accidents involving public and road users due to construction works adjacent to and above existing roadways and public amenities. The checklists cover three phases of works i.e. before work commencement, during work execution and upon completion of work and to be used by contractor.

### 4.1 Checklists

The recommended checklists are intended not to be used independently but to supplement existing safety checklists prepared in SWP or WMS. Contractor's SHO or SSS shall complete the checklists on daily basis before work commencement, during work execution and upon completion of the daily work.

The completed checklists (Part A) shall be approved for work commencement by Contractor's PM/CM/CSE. A copy of the approved checklist and PTW shall be extended to Project Consultant for comments (if any) and record. Upon the approval of the checklists on Part A and PTW granted/issued by PM/CM/CSE, the SHO / SSS / DP may proceed with the construction work.

During the work execution, the SHO / SSS shall supervise the work to ensure the works are being carried out as per the approved checklists and PTW. In the absence of SHO / SSS, a Designated Person shall be appointed for the standing supervision. The checklists shall be duly completed and signed only either by SHO / SSS / DP.

Upon the work completion, SHO or SSS shall organize housekeeping and complete the remaining checklists as provided in this Standard.

The checklists shall be used every time when the contractor planning to carry out construction works adjacent to and above existing roadways and public amenities. New set of checklists shall be used for new locations even though the locations are within the same construction site. Flow chat in respect to the use of checklists, responsibility matrix and explanatory notes are shown in item 4.3.

### 4.2 Contents of Checklists

The checklists are divided into 3 parts, A, B & C as tabulated below: -

<b>Part A</b>	Before Work Commencement ( 22 checks)
<b>Part B</b>	During Work Execution ( 14 checks )
<b>Part C</b>	Upon Work Completion ( 5 checks )

### 4.3 Flow Chat on the Use of Checklists

Flow Chart	Responsibility Matrix	Explanatory Notes
<pre> graph TD     START([START]) --&gt; PartA[Part A- Before Work Commencements (22 checks)]     PartA --&gt; PTW{PTW issued?}     PTW -- No --&gt; PartA     PTW -- Yes --&gt; PartB[Part B- During Work Execution (18 checks)]     PartB --&gt; Comply{Comply?}     Comply -- No --&gt; PartB     Comply -- Yes --&gt; PartC[Part C- Upon Work Completion for the day (5 checks)]     PartC --&gt; Completed{Completed?}     Completed -- No --&gt; PartC     Completed -- Yes --&gt; END([END])         </pre>	<p>SHO / SSS</p> <p>PM / CM / CSE</p> <p>SHO / SSS / DP</p> <p>SHO / SSS</p> <p>SHO / SSS</p> <p>SHO / SSS</p>	<p>To complete and check compliance of the Part A and apply for PTW before commencement of construction works.</p> <p>Part A checklist fully complied with and PTW approved and issued. SHO/SSS to brief the safety requirements to the workforce before commencing construction works.</p> <p>To supervise ongoing construction works and to complete Checklist (Part B)</p> <p>For Non-Compliance (NC) check during the construction works, to immediately stop the work and rectify the situation before recommencing the works.</p> <p>Communicate with workers on housekeeping and complete the Checklist (Part C), with no NC identified.</p> <p>Workforce can be dismissed when checklists are completed and in order.</p> <p>The completed copy of Part A, Part B and Part C checklist shall be submitted to PM/CM/CSE the following day.</p>

**CHECKLIST FOR PUBLIC & ROAD USER SAFETY**  
**– CONSTRUCTION WORKS ADJACENT TO AND ABOVE ROADWAYS (PART A)**

<b>PART A</b>		<b>BEFORE WORK COMMENCEMENT</b>		
<b>Company</b>				
<b>Project</b>				
<b>Location</b>			<b>Date</b>	
<b>Gridline / Chainage</b>			<b>Time</b>	
<b>Item</b>	<b>Checklist</b>	<b>C</b>	<b>NC</b>	<b>Remarks</b>
1	Safe Work Procedure / Work Method Statement is developed and approved by Project Consultant?			Approval from Project Consultant obtained
2	Safe Work Procedure / Work Method Statement communicated to work team members?			Proof of communication to be established
3	HIRARC related to falling object from height and working adjacent to existing road and public amenities are developed and approved			HIRARC document related to falling object and construction work adjacent to existing road approved by PM
4	Traffic Management Plan is approved by Project Consultant			Approval obtained before commencing work
5	Traffic Management Plan is developed and approved by authorities			Approved TMP to be submitted to Project Consultant
6	Traffic Management Officer (TMO) is appointed			Proof of appointment of TMO
7	Designated person appointed to carry out standing supervision for working at height and adjacent to construction zone			Proof of appointment of designated person
8	Working at height training and Emergency Response Procedure (ERP) is briefed to all workforces during tool box meeting			To retain evidence of training records and briefing during tool box meeting
9	Briefing on prevention of falling objects and road user's safety conducted during ToolBox meeting			Briefing conducted and recorded / dated
10	Copy of approved PTW submitted to Project Consultant for comment and record			PTW submitted to Project Consultant
11	PTW is obtained prior to work commencement			PTW obtained and approved
12	All construction personnel registered with CIDB and holding a valid CIDB's Personnel Registration Card			Proof of registration with CIDB checked and recorded
13	Request for inspection to Project Consultant's representative prior to work commencement adjacent to or above existing road submitted and approved			Request for inspection submitted and approved by Project Consultant / Representative
14	Work location is inspected by the SHO or SSS prior to work commencement			Inspection record to be produced when applying for PTW
15	SHO / SSS / DP is authorized to issue stop work order should the workplace's condition unsafe and / or unsafe act by workers at height or adjacent to road / public amenities			Authorized Letter given to SHO / SSS / DP. A copy retained at site office for record.
16	Temporary structures and falsework are fixed and installed according to the drawings and safe clearance (height and horizontal) provided to ensure safe			SHO or SSS to check and verify temporary structures are installed according to approved drawings and safe clearance

	movements of traffic underneath and adjacent to construction area			
17	All hoisting tackles are inspected by trained rigger prior usage?			Inspection record retained
18	Fall arresters safety net / catch net / catch platform is installed beneath the elevated working vicinity or Safe Work System (SWS) adopted?			Fall arresters and SWS are maintained
19	Potential falling object's location identified and cordoned			To show on traffic management plan the said location and how it is cordoned
20	Adequate safety warning signage and notices are installed at strategic location?			Adequate safety warning signage installed
21	Safe rigging procedure is developed and approved by Project Manager			PTW or rigging procedure approved by PM
22	Permit to Work is obtained and approved by the Contractor's Project Manager / CM / CSE?			PM / CM / CSE to issue PTW
Prepared By ( SHO / SSS )		Approved for Work Commencement & Permit to Work Granted/Issued by ( PM / CM / CSE )		
Date:		Date:		

**CHECKLIST FOR PUBLIC & ROAD USER SAFETY**  
**– CONSTRUCTION WORKS ADJACENT TO AND ABOVE ROADWAYS (PART B)**

PART B		DURING WORK EXECUTION		
<b>Company</b>				
<b>Project</b>				
<b>Location</b>			<b>Date</b>	
<b>Gridline / Chainage</b>			<b>Time</b>	
Item	Checklist	C	NC	Remarks
1	SWP on falling object prevention are implemented and continuously being monitored			SWP being implemented and continuously monitored
2	Standing supervision by SHO or SSS or Designated Person			DP appointment and record of standing supervision retained
3	Workers are continuously reminded on safe work procedures when dealing with construction materials, tools, equipment and machineries at elevated structures?			Proof of reminders retained
4	Equipment / Machinery is operated by competent / trained operator?			Machinery and Operator Register available
5	Materials, machinery, equipment, scaffolding supports or debris are placed 2 meter away from the perimeter edges and secured			Photo and records to be retained
6	There are no flammable substances kept within the work vicinity			No flammable substances
7	Weather condition is fine and safe to carry out the construction activities at height			Weather is fine to work
8	Fatigue is observed and managed to avoid work related accident?			Visual observation by SHO or SSS and noted.
9	Adequate illumination provided within the work vicinity			Illumination is adequate
10	Communication system is developed and coordinated with all parties			Communication System established
11	Equipment / machinery / instrument / tools and apparatus are operated by competent person and working within the design capacity?			Operated by competent person and operation within design capacity
12	Unsafe work condition (UC) and unsafe act (UA) spotted and to be corrected immediately			UCUA continuously observed.
13	Hoisting loads are not placed at building's edge perimeter or at the edge of elevated structure			Hoisted loads are not placed at the edge of building perimeter / elevated structure
14	Warning signage and lighting are still at the intended locations and traffic movements are smooth			Warning signage still at the intended locations and traffics movement are smooth
Prepared By:				
Date:				

**CHECKLIST FOR PUBLIC & ROAD USER SAFETY**  
**– CONSTRUCTION WORKS ADJACENT TO AND ABOVE ROADWAYS (PART C)**

PART C		UPON WORK COMPLETION		
Company				
Project				
Location		Date		
Gridline / Chainage		Time		
Item	Checklist	C	NC	Remarks
1	Housekeeping carried out upon work completion			Documented and pictorial evidence retained
2	Equipment, tools, machinery and construction materials are secured from falling			Equipment, tools, machinery and materials are secured
3	Adequate safety and warning signage, and safety cones and blinkers (at dark locations) are installed and placed based on the approved traffic management plan			Warning signage, safety cones etc. are installed and placed
4	Lightings are provided underneath and adjacent to construction zone to ensure smooth and safe traffic flow at night			Lightings provided to ensure smooth and safety traffic flow of traffic
5	Power supply to equipment and machineries that not in use are switched off			Power supply switched off for machineries and equipment
Prepared By:				
Date:				

**Note:**

Upon work completion of the day, SHO or SSS to submit a copy of the checked Part A, Part B and Part C to PM/CM/CSE for comments (if any) and record purposes.

## ACKNOWLEDGEMENT

Construction Industry Development Board, Malaysia would like to extend our sincere appreciation to all those involved in the development of this standard.

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ISBN 978-967-2971-24-5



9789672971245